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THE BENEFITS of INTERACTION WITH ENVIRONMENTS CREATED FOR ATTRACTING BIRDS ON PEOPLE LIVING WITH DEMENTIA

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THE BENEFITS of INTERACTION WITH ENVIRONMENTS CREATED FOR ATTRACTING BIRDS ON PEOPLE LIVING WITH DEMENTIA

By

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Abstract

THE BENEFIT of INTERACTION WITH ENVIRONMENTS CREATED FOR ATTRACTING BIRDS ON PEOPLE LIVING WITH DEMENTIA

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In consideration of the increasing growth of people living with dementia, researchers have started to look at different interventions that help enhance their health and well-being. While the search for medical interventions is important, it is critical for other professions to consider how to contribute to the quality of care that dementia patients receive. Therapeutic landscapes can improve the overall care process for older adults with dementia living in long-term care facilities (i.e., dementia care homes) (Bossen 2010). While the landscape should be designed to help older adults with dementia, it should also create natural environments that attract birds that can further benefit health and well-being of this population. Due to the impact of the decline in cognitive functioning on older adults' health and well-being, the purpose of this study is to summarize design guidelines for interactive landscapes between birds and older adults with dementia and provide design examples that benefit not only older adults with dementia but also a bird friendly habitat.

A comprehensive literature review was conducted to gather information for design guidelines that are specific for spaces that attract birds as well as for older adults with dementia. In addition, intensive telephone interviews with three bird experts from the Audubon Society have been conducted to understand the various aspects of the environment that helps create a healthy bird habitat.

Design guidelines for these specific purposes should focus on creating and maintaining healthy environments for birds that may increase multisensory experience of older adults with dementia. The present study also includes exemplary therapeutic garden designs that encourage the audience to explore spatial and ecological dimensions in the environments for older adults living with dementia as well as birds.

The results of this study have implications for landscape architects and designers who practice in healthcare and long-term care settings. In particular, courtyards in long-term care facilities need to be carefully designed and constructed with a focus on the special needs of older adults with this progressive disease. Also, utilizing birds and natural habitats, it is expected to develop more sustainable and healthy therapeutic spaces.

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INTRODUCTION

1.1 Statement of Problem

Aging is a global phenomenon occurring worldwide, as a result of decreasing mortality and declining fertility rates (United Nations, 2013). As people age, the likelihood of developing dementia increases (Alzheimer's Association, 2014). Alzheimer's disease and related dementias (ADRD) has risen from a little recognized phenomenon in the early 1970s to being recognized as the sixth leading cause of death in the elderly in the United States (Alzheimer's Association 2017). Studies are now emerging to increase the severity of the disease to be the third-leading cause of death in the United States (Alzheimer's Association 2018).

Recent estimates indicate that more than five million Americans have AD and related dementias. According to the Alzheimer's Association, since 2000, death from heart disease has decreased by 14% while death from ADRD has increased by 89%. Every 66 seconds someone in the United States develops the disease, which means without a cure an estimated 16 million Americans will live with Alzheimer's by 2050 (Alzheimer's statistics 2017).

In consideration of the increasing growth of people living with dementia, researchers have started to look at different interventions to enhance the well-being of those living with dementia (Alzheimer's Association, 2014). Dementia has the potential to rob people of their social lives and their social roles, which is a significant problem in our society, when we should be providing appropriate care and meaningful opportunities for social interaction (Innes, 2002). According to Kontos (2005) argument, a person's sense of self is connected to relationships and social interaction, which indicates that social isolation can ultimately lead to a loss of personal identity. People living with dementia who have meaningful activities and cultivate their social interactions, have a higher sense of well-being (Sanders & Morano, 2008).

As people age, the ability to interact with the outdoors may decline (Sabat, 2005). The barriers are greater for those people with dementia. As the disease worsens to the point of institutionalization, opportunities for engagement and access to the outdoors may be completely barred (Bossen, 2010).

Nature can have a positive effect on people's health, wellbeing, and quality of life. Studies have demonstrated the environment is an important contributor to the quality of life and well-being of people with dementia (Kolanowski & Whall, 2000). "Environmental factors include the physical, social, psychological, and emotional environment, as well as the experience of nature" (Bossen 2010). Although nature-based interventions for people living with dementia are innovative, preliminary studies on the benefits of connecting people with dementia to nature are promising and warrant further exploration.

Nearly half of those living with dementia are in nursing homes (American Health Care Association 2013). Many nursing homes, care facilities and other developments for the elderly are under extreme pressure to reduce or stabilize costs while continuing to attract clients with improved care and new medical technologies. "It is imperative for nurses and caregivers that provide services in multiple care environments for people with dementia need to expand their understanding of the importance and meaning of experiences of the natural environment for the people with dementia. By making available a window with a view, a breath of fresh air—natural multisensory stimulation—we can provide a chance to restore and renew patients, by providing opportunities for people with dementia to enhance their sense of self-respect, and their quality of life." (Bossen 2010).

1.2 Purpose statement

The primary goal of this research is to determine the benefits of interaction with nature on people living with dementia. The purpose is to provide enhanced design recommendations for creating bird friendly environment in North Texas for these users. The supporting objectives to meet this goal are:

1. To determine the benefits of interaction with nature on people living with dementia and their social lives
2. To summarize a set of preliminary design recommendations based on existing research in designing therapeutic garden for long-term care facilities for dementia patients
3. To analyze existing facility's outdoor space based on design principles
4. To provide enhanced design recommendations through data analysis, for creating environment that attract birds in long-term care facilities for dementia residents

1.3 Research Questions

Research questions are derived from research collected from the literature review and group of experts in the field of landscape architecture, Alzheimer's Disease and ornithology. Analysis of this data may guide the future design and implementation of therapeutic garden that created natural environment to attract birds. The research addresses the following questions:

1. Does Social interaction improve psychological well-being of older adults with dementia?
2. Does experience of nature improve psychological well- being of older adults with dementia?
3. Does exposure to manmade garden designed for attracting birds improve social interaction of older adults with dementia?

1.4 Definitions of Terms

These definitions are included for terms which may be unfamiliar.

Dementia: is an overall term that describes a group of symptoms and conditions that develop when the nerve cells in the brain die or no longer function normally (Alzheimer's Association, 2012). Alzheimer's disease is the most common cause of a progressive dementia in older adults, but dementia can also be caused by strokes, Parkinson's disease, head injury, or a host of other conditions (Desai and Grossberg, 2010).

Alzheimer's disease and related dementia (ADRD): is a progressive brain disorder that causes problems with memory, thinking and behavior. Symptoms usually develop slowly and get worse over time, becoming severe enough to interfere with simplest tasks (Alzheimer's Association). The disease was named after German psychiatrist and neuropathologist Alois Alzheimer, who formally identified the disease in 1906 (Zeisel and Tyson, 1999).

Alzheimer's disease and related disorders association (ADRDA): is the leading voluntary health and non-governmental organization in Alzheimer's care, provide support, research, education, public awareness, and patient advocacy for Alzheimer's and related disease patients. It is also known as: Alzheimer's Association (Alzheimer's Association, 2009).

Lifetime risk: is the probability that someone of a given age will develop a condition during his or her remaining life span

Therapeutic garden: a consciously designed outdoor garden environment offering individuals the opportunity to connect to natural world that evokes, reinforces, and maximizes the number, quality, and intensity of positive interactions a visitor can have with plants (Kavanaugh, 2005).

Reminiscence therapy (RT): is defined by the American Psychological Association (APA) as, "the use of life histories - written, oral, or both - to improve psychological well-being" (2006), which involves past

activities, events and experiences either alone, or with another person or group of people, usually with the aid of tangible prompts such as photographs, familiar tunes from the radio and other familiar items from the past (Kennard, 2006a).

Multisensory stimulation: provides stimulation of the senses (visual, auditory, tactile, olfactory and taste) (Anke Jakob and Lesley Collier. 2017)

Multisensory environment (MSE): a multisensory space that can be used to provide sensory stimulation in order to increase engagement and reduce behaviors symptoms (Staal et al., 2003; Collier et al., 2010).

(BPSD) stands for Behavioral and Psychological Symptoms of Dementia: ""symptoms of disturbed perception, thought content, mood or behavior that frequently occur in patients with dementia" (International Psychogeriatric Association, 2012)

Social Interaction: Describe as participating in activities that have a social component. (Bath & Deeg, 2005)

Bird Tales: A therapeutic program for engaging people with cognitive impairment through the natural world of birds. (Elkins 2013)

1.5 Research Methods

To evaluate data and the possible benefits of interaction with environment created for attracting birds on people living with dementia qualitative research (Taylor and Bogdan, 1998) is proposed for this study. The process for qualitative data collection includes:

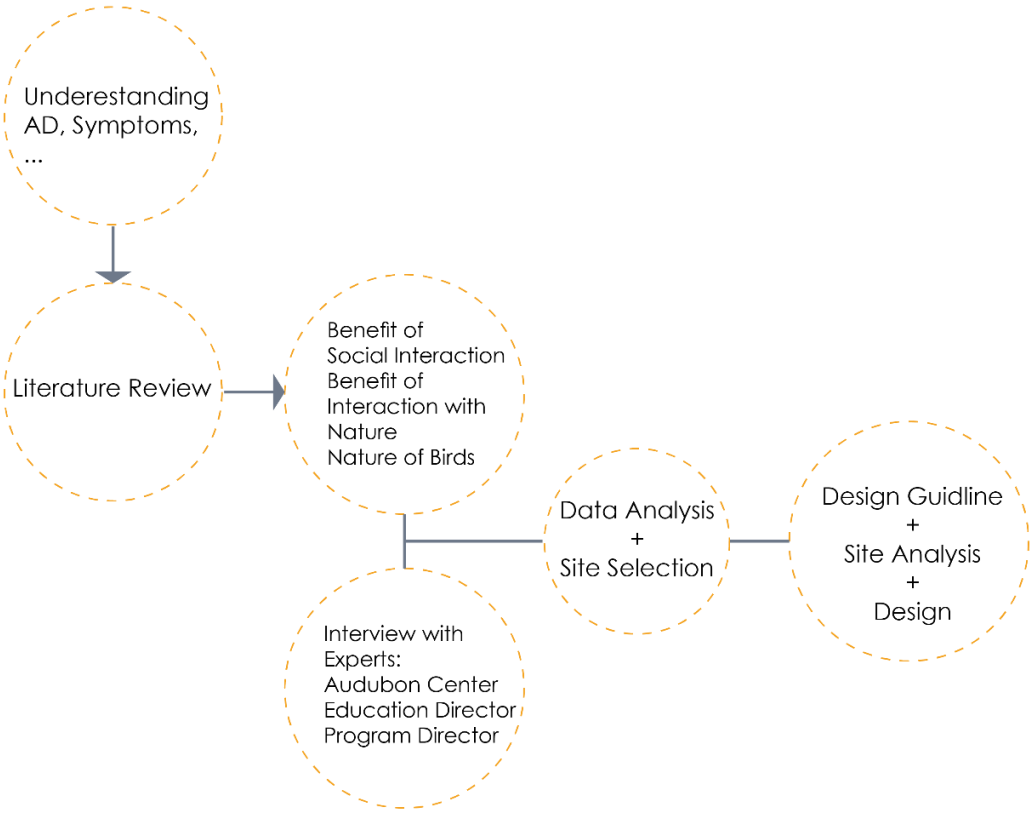

Figure 1-1 Research methods process

1. A literature review with evaluation of selected from disciplines including Gerontology, Psychology, and Landscape Architecture. The materials were summarized to determine the level of impact of active interaction with nature, on well-being of people living with dementia

2. Review and summarize the literature to determine the benefit of social interaction

3. Review and summarize the literature to determine principles and preliminary design recommendations for designing therapeutic gardens that is mainly beneficial for social interaction

4. Selection of a facility in North Texas, based on its location geography, and availability

5. Interviews with Audubon educators, facility program directors, using open ended questions through face-to-face or telephone. According to Taylor and Bogdan, the data can be descriptive based on the perceptions of the interview subjects as stated in their own words (1998)

6. Analyze evaluation scores and develop a list of enhanced design guidelines to create spaces that attract birds to connect residents to nature.

1.6 Significance

An important area of mental health that therapeutic landscapes can improve is the care and treatment of patients suffering from Alzheimer's disease and other forms of dementia receive. Some landscape architects are a head in developing ideas and designs to make aging in an institution a more pleasant experience (Bonnell, 2006). Gardens in Alzheimer's facilities need to be carefully designed and constructed with a focus on the special needs of people with this progressive disease. While the search for medical interventions is important there is also a role for other professions to improve the quality of care the dementia patient receives.

Due to the impact of ADRD on people relations and social lives, the purpose of this study is to determine the benefit of socially constructed and embedded active interaction with nature created for attracting birds on people living with dementia.

1.7 Summary

As the population ages, more Americans will develop dementia. More than 5 million Americans have Alzheimer's disease (AD), the most common cause of dementia.

In a rapidly urbanizing world, many people have little contact with natural environments, which may affect their health and well-being. Collected research of more than 1800 papers by environmental psychologist, Kathleen Wolf, show that green spaces in cities can provide a number of benefits, including revitalizing a person socially, psychologically, and physically. An important area of mental health that therapeutic landscapes can improve is the care and treatment of patients suffering from Alzheimer's disease and other forms of dementia receive.

The present research determines the benefits of therapeutic garden designed to encourage exploration of the spatial dimensions of environment created for attracting birds by people living with dementia. A set of preliminary design guidelines used for therapeutic gardens is proposed from the review of relevant theories and research. The study primarily follows qualitative research methods. Interviews are conducted with experts at the Audubon center, and selected facility executive director.

Since the need for design of outdoor spaces related to healthcare facilities is growing, the list of developed design recommendations can be used for designing outdoor spaces in long-term care facilities that increase residents' connections with nature. The results of the study have implications for landscape architects and designers who practice healthcare and senior living specialties.

CHAPTER 2

LITERATURE REVIEW

2.1 Alzheimer's Disease

Breaking through to memory

Memory is life, and forgetting death

Saul Bellow

According to a 2005 U.S. Census Bureau report, twenty percent of the population of the United States will be over 65 by 2030. The number of those aged 60 years and above "oldest old", is expected to double between 2003 and 2030, and double again by 2050. As people age, the possibility of developing dementia increases (Alzheimer's Association, 2014). Currently, in the United States, as many as 6.8 million people have Alzheimer's disease or another form of dementia (Alzheimer's Association, 2014). The percentage of people with Alzheimer's dementia increases with age: 3 percent of people age 65-74, 17 percent of people age 75-84, and 32 percent of people age 85 and older have Alzheimer's dementia. (Alzheimer's Association, 2018) (Figure 2.1)

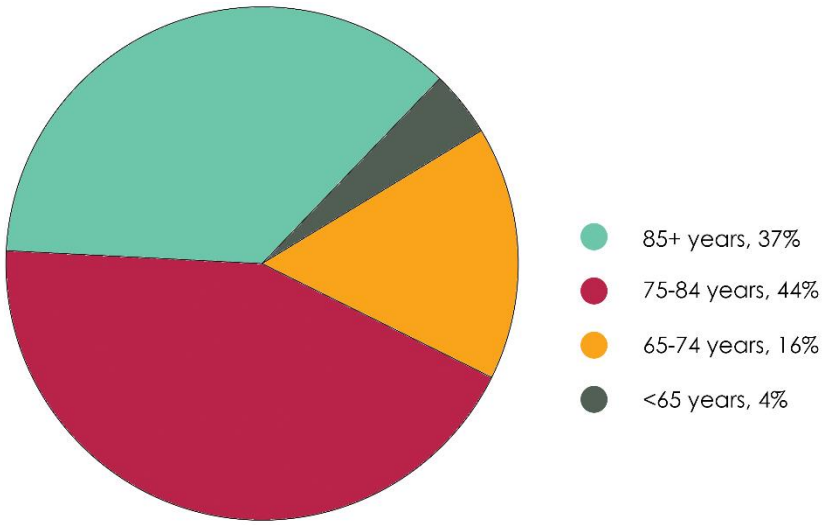

Figure 2-1 Ages of people with Alzheimer's disease in the United States, 2018

Percentages do not total 100 because of rounding (Source: Alzheimer's Association, 2018)

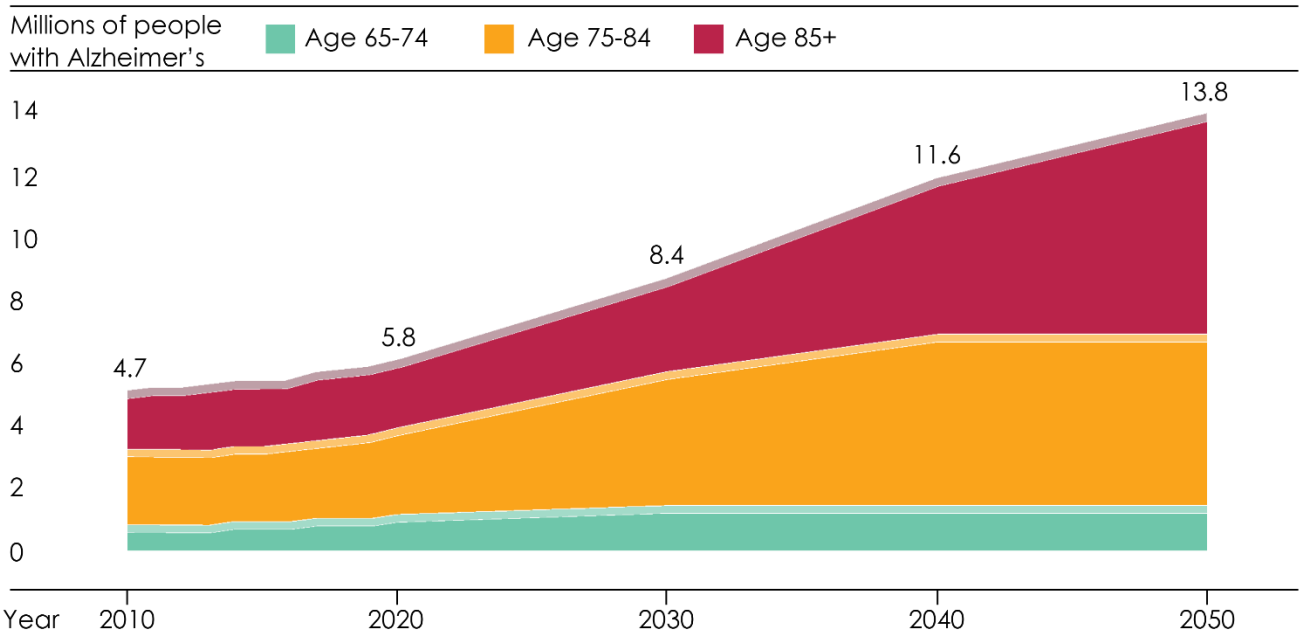

Figure 2-2 projected number of people age 65 and older (Total and by Age) in the U.S. population with Alzheimer's disease, 2010 to 2050 (Source: Alzheimer's Association, 2018)

Old age is not a disease. While occasional forgetfulness and confusion are normal occurrences, dementia is a medical condition (Zeisel and Tyson, 1999). Dementia or the loss of intellectual function, results from disease, and Alzheimer's disease is the most common cause (U.S. Department of Health and Human Services, 1997; Zeisel and Tyson, 1999; Pearce, 2007; Grossberg and Desai, 2003b, cited in Desai and Grossberg, 2010). Alzheimer's disease is a progressive and fatal disease which cause significant loss of intellectual abilities. Almost two-thirds of Americans with ADRD are women (Baum, 2017, cited in Desai and Grossberg, 2010, p.52; Pearce, 2007, p.278; Alzheimer's Association, 2012).

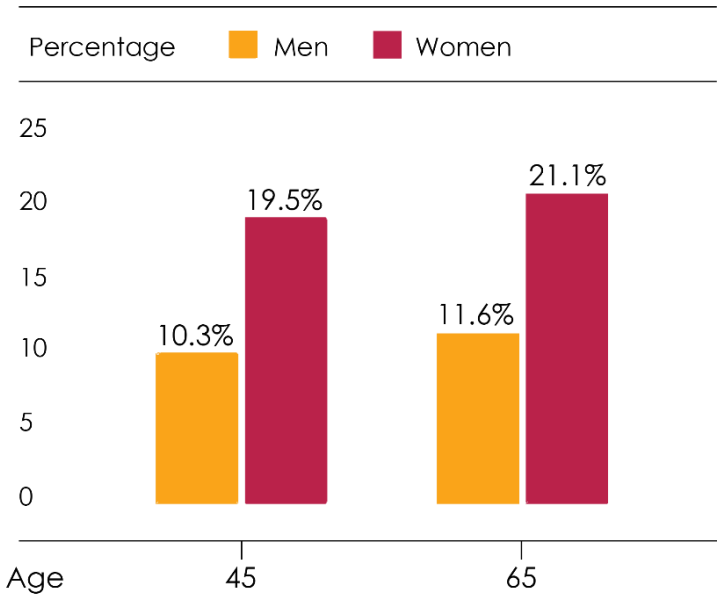

Figure 2-3 estimated lifetime risk for Alzheimer's dementia by sex, at age 45 and age 65

(Source: Alzheimer's Association, 2018)

As shown in Figure 2.3, the study found that the estimated lifetime risk for Alzheimer's dementia at age 45 was approximately one in five (20 percent) for women and one in 10 (10 percent) for men. The risks for both sexes were slightly higher at age 65 (Alzheimer's Association 2018)

Dementia has the potential to rob people of social roles, and is a significant problem in our society. It is important to provide appropriate care and meaningful opportunities for social interaction (Innes, 2002). Many people with dementia experience considerable stress, anxiety, depression, and social isolation. Kontos (2005) argues that a person's sense of self is basically connected to relationships and social interaction, which indicates that social isolation can ultimately lead to a loss of personal identity. By involving people with dementia in meaningful activities and social relationships, a positive impact will help people with dementia to experience a higher level of well-being (Sanders & Morano, 2008).

> Dementia results in a range of cognitive, social, and behavioral difficulties that gradually impair verbal communication and threaten relationships. Depressed mood and loss of social skills frequently accompany cognitive losses that compromise the ability to learn or recall new or recent information, carry out normal activities of daily living, or engage in satisfying social activities (Burns, Deing and Lawlor, 2002; Cherminski et al., 2001; Lyketsos, Steele and Barker, 1997, cited in Gibson et al., 2007, p.126).

Alzheimer's disease has no current cure or, treatments for symptoms. Yet, good planning, well-designed environments, and medical and social management can be used to reduce symptoms and ease the afflictions on family members and caregivers (Zeisel et al., 1999).

The destruction of brain cells caused by Alzheimer's consistently moves through the brain, first damaging the language and memory sections of the hippocampus, which is located in the temporal lobe. As the disease progresses, it continues to destroy neurons in other areas of the brain, with multiple areas being affected simultaneously.

Individuals may experience changes in personality and behavior, and have trouble recognizing friends and family members. Advanced cases develop to affect judgment and movement (the frontal lobe), visual processing (the occipital lobe) and movement, orientation, recognition and perception of stimuli (the parietal lobe).

In advanced cases, most of the cerebral cortex (which contains all of the lobes) is seriously damaged. Individuals lose their ability to communicate, to recognize loved ones and to care for themselves. In the final stages, the section of the brain controlling our most basic functions, like breathing and swallowing begin to deteriorate altogether.

The progression of dementia is slow and consistently changes over time, this process has been simplified into three stages namely early, mid and late (Table 2.1).

Early stage	Lasting from one to three years	Difficulties with recent memory and forgetfulness Anxiety and depression often occur Disguising difficulties may be successful for some of the time
Middle stage	Lasting from two to eight years	Impaired ability for activities of daily living such as dressing, eating or shopping Significant memory lapses such as not recognizing a person they know well Challenging behavior and social disinhibition may be experienced Sleep disorders are common
Late Stage	Lasts for about one to three years	Reduced capacity to reason or make decisions Significant communication difficulties, including fragmented speech Immobility, rigidity and recurrent falls Physical deterioration and difficulties with eating result in progressive physical weakening

Table 2-1 Stages of Alzheimer's disease (Source: Timlin and Rysenbry, 2010, p.17)

Behavioral and psychological symptoms of dementia (BPSD), also known as neuropsychiatric symptoms, represent a group of non-cognitive symptoms and behaviors occurring in people with dementia (Cerejeira, J., Lagarto, L., & Mukaetova-Ladinska, E. B. 2012). Many people find the changes in behavior caused by Alzheimer's to be the most challenging and distressing effect of the disease (Alzheimer's Association, 2012). Behavioral problems are common for people living with dementia and managing the

effects and disrupted quality of life for people with dementia is difficult (Perkins, 2012). Behavioral symptoms usually identified through observation include, physical aggression, agitation, shouting, pacing, wandering, sleep disturbances, hitting and scratching (International Psychogeriatric Association, 2012). Psychological symptoms include depression, psychosis, hallucinations, and delusions, which are usually assessed on the basis of interviews with patients and relatives (International Psychogeriatric Association, 2012).

Managing BPSD is becoming increasingly important as the older population grows and the number of those living with dementia rises, it is estimated that BPSD affect up to 90% of all dementia subjects over the progression of their illness, if these symptoms are not managed they can contribute to institutionalization, an increased cost of health care, distress of nursing staff and caregivers, and ultimately, a decreased quality of life for the resident. (International Psychogeriatric Association, 2012).

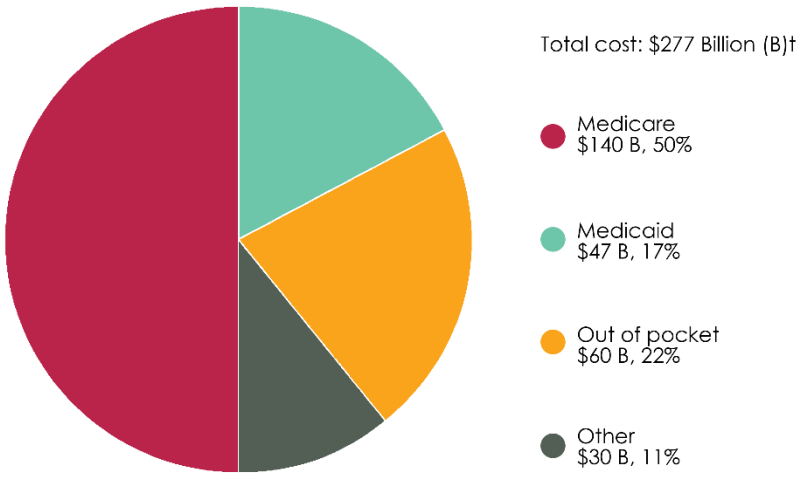

Figure 2- 4 Distribution of aggregate costs of care by payment source

Americans age 65 and older with Alzheimer's or other dementias, 2018* (Source: Alzheimer's Association, 2018)

The costs of health care and long-term care for individuals with Alzheimer's or other dementias are considerable. Dementia is one of the costliest conditions to society. Total payments in 2018 (in 2018 dollars) for all individuals with Alzheimer's or other dementias are estimated at $277 billion (Alzheimer's Association 2018).

According to the International Psychogeriatric Association (2012), there are two main therapeutic interventions to manage BPSD: pharmacological versus nonpharmacological methods. Pharmacological treatments are not particularly effective in controlling behavioral and psychological symptoms (BPS) associated with dementia. As a result, there is an increasing focus on nonpharmacological interventions (American Journal of Alzheimers Disease & Other Dementias 2014). Generally, experts agree that nonpharmacological approaches, such as multisensory stimulation, should be attempted first and if they are not successful after numerous efforts, medication should be considered (International Psychogeriatric Association, 2012).

In the last decades, the use of multisensory stimulation in people with dementia is becoming increasingly popular. Review of the articles shows that multisensory stimulation environments produce immediate positive effects on the behavior and mood of people with dementia (Sánchez, A., Millán-Calenti, J. C., Lorenzo-López, L., & Maseda, A, 2012). The purpose of multisensory stimulation is to stimulate the primary senses, olfaction, touch, vision, taste and hearing, through pleasurable and enjoyable sensory experiences (Burns, I., Cox, H., & Plant, H., 2000).

Though stimulating the senses can be understood by people with dementia, they will respond appropriately to their surroundings and communicate with others (Baillon, van Diepen, & Prettyman, 2002; Bowlby, 1992). Multisensory stimulation has been found to reduce behavior problems, improve functional performance, improve communication and increase residents' attentiveness (Cruz, et al., 2011; van Weert, et al., 2006).

The systematic review and meta-analysis of 14 studies conducted by Kong, Evans and Guevara, concerning nonpharmacological approaches for reducing agitation in individual with dementia, reveal that only sensory approaches had efficacy in reducing agitation; these included aromatherapy, thermal bath, calming music, and hand massage (Kong, Evans, & Guevara, 2009). Although engaging people with dementia in activities can be challenging, research states that one promising strategy is to actively engage them in activities that stimulate their remaining functions (Jakob, A., & Collier, L. 2017)

Common changes associated with a diagnosis of dementia, include differences in mood and/or personality expression, and psychological and/or behavioral disturbances (Sabat, 2005), those living with dementia often face challenges to their sense of self, right to self-determination, and perceived capabilities (Kontos, 2005; Sabat, 2005; Sanders & Morano, 2008). To reduce these effects, meaningful relationships and purposeful exchanges must be made available. Activity programs for people with dementia can help maintain a connection with the environment, and encourage social interaction (Cohen-Mansfield, Thein, Dakheel-Ali, &, 2010; Kolanowski, Buettner, Litaker, & Yu, 2006).

Meaningful activities focus on past roles, interests, and routines, address psychological needs, and strengthen a sense of identity and belonging (Hamer & Orrell, 2008).

In 2007, Phinney, Chaudhury, and O'Connor, conducted an interpretive analysis of multiple interviews to understand what activities are meaningful for those living with dementia. Study participants were involved in a wide-range of activities including leisure pastimes, household chores, work related endeavors, and social involvements (Phinney, Chaudhury, & O'Connor, 2007). Study shows that activities are meaningful for them in three ways: (1) they experienced feelings of pleasure and enjoyment through their involvement; (2) they felt a sense of connection and belonging; and (3) they retained a sense of autonomy and personal identity (Phinney, Chaudhury, & O'Connor, 2007). Researchers have become particularly interested in the study of arts and dementia in the past decade, specifically art interventions that impact well-being, provide opportunity for self-expression, and create meaning (Basting, 2006). According to

Basting, the arts refer to anything that can provoke creative expression which includes poetry, storytelling, gardening/outdoors, cooking, fiber arts, pottery, and dance (2006).

2.2 Healing Power of Nature

The evidence on the benefits of nature for health and wellbeing

> "I go to nature to be soothed and healed, and to have my senses put in order". John Burroughs

The Oxford English Dictionary defines nature as "the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations: "the breathtaking beauty of nature". The realm of nature according to Lewis (1996) is "from its home in the unpeopled wildness to its precarious position as guest in an urban environment, totally depend on human nurturing" (p.3). There is enough evidence from research that people respond positively to nature and natural elements – vegetation (trees, shrubs, flowers, and grass); water; fresh air and sky; birds and other wildlife; earth; stone; wood – and that connection to nature facilitates mental and physical restoration

Nature can restore attention and recover a person from stress (Berto, 2007; Rappe & Topo, 2007). It decreases the physiological effects of stress on the autonomic nervous system. Psychologically, attention deficit can be repaired or minimized, and people report feeling greater satisfaction with a variety of aspects of life. The presence of the natural world promotes social health by encouraging positive social interaction and reducing the frequency of aggressive behavior. Interacting with natural world enhances the spiritual well-being through the experience of greater interconnectedness (Irvine, K. N., & Warber, S. L, 2002).

Mitten summarized the benefits of spending time in nature based on research from numerous disciplines (such as biology, cognitive science, developmental psychology, ecology, education, environmental psychology, landscape architecture, medical, public health, social psychology, social work, and urban planning). The findings are organized into four categories: physical, psychological, spiritual, and societal (Mitten 2009) as presented in Table 2.2. According to Mitten (2009), being outside can be restorative, reduce the impact of stress, improve mood, relieve depression, reduce anger and anxiety, promotes healing, enhance feelings of pleasure, increase feelings of empowerment, and lessen the impact of dementia.

To narrow the scope of study from landscapes in general one successful environmental element in treating Alzheimer's disease is that of regular exposure to garden settings. There has been significant improvement in the design of buildings to meet the particular needs of this elderly group. Sadly, these considerations have rarely gone beyond the design of the building itself, leaving little improvement to the design of outdoor spaces.

Benefits from spending time in nature			
Physical Benefits	**Psychological Benefits**	**Spiritual Benefits**	**Societal Benefits**
Sunlight Vitamin D (lowers blood pressure, decreases risk of colon, prostrate, and pancreatic cancers) Increases calcium uptake Better diet (kids who garden eat more vegetables) Immune system strengthening (kids who play outside have stronger immune systems) Promotes healing Reduces pain Increases life expectancy Provides opportunities for exercise Lowers systolic blood pressure Reduces avoidable disease risk factors Reduces cancer risk Reduces osteoporosis risk	Restorative Stress reduction Attention restoration Improves mood states Reduces depression Reduces anger and anxiety Enhances feelings of pleasure Increases mental acuity (kids who grow plants scored 12% higher on academic tests) Reduces mental fatigue Improve problem solving ability and concentration Improves body image for women Reduces the impact of stress Increases feelings of empowerment Decreases risk of seasonal affective disorder (SAD) Moderate impact of dementia, including Alzheimer's	Give children a sense of peace, oneness with the world Sparks creativity and imagination Inspires connections with the wider world Increases a sense of wonder Encourages reflection Quiets the mind	Cuts crime Strengthens family relations Decreases domestic violence Strengthens neighborhood ties Assists new immigrants cope with transition Cost effective health promotion Environmental economics – increases preference for environmental quality over other goods Increases environmental activism Increases park planning Preserves biodiversity Stimulates social interactions among children

Table 2-2 Benefits from spending time in nature (Source: Dibert, J, 2015)

In well-designed long-term care facilities, residents share elements of the built environment. Appealingly pleasing landscape, scenic beauty, paved sidewalks, clean benches and varieties of plants are all positive features that people encounter in the development of outdoor activity. Well-designed, well-

maintained, and functional elements within the built environment of the therapeutic garden plays a significant role in developing a positive "sense of community" (Ross and Moriwsky, 2001, cited in Hannon et al., 2012, p.387). Residents who have a positive sense of community may feel more comfortable being outdoors to engage in activities, and furthermore, they may also have a positive attitude on life itself (Hannon et al., 2012).

> By making available a window with a view, a breath of fresh air—natural multisensory stimulation—we can provide a chance to restore and renew. Bossen, A., 2010

Getting outdoors improves circadian rhythms and sleeping patterns in the elderly, while 15-20 minutes a day of direct sunshine provides vitamin D needed to prevent loss of bone density (Brawley, 2006). Such gardens also provide families of patients a safe and pleasant place to visit, particularly children who have difficulty sitting indoors with an unresponsive older relative (Carman, 2002).

The use of the outdoor environment is also beneficial for caregivers and staff (Cohen and Weisman, 1991, cited in Zeisel and Tyson, 1999). A pleasant garden as a break area can make staff members comfortable and readjust their mental state when there are stressful situations in the work environment (Tyson, 1998).

> A well designed outdoor environment can contribute to quality of life by increasing opportunities for activities and interests, extending social horizons, and breaking feelings of isolation from the outside world. Sitting out or walking in the open provides contact with plants and an opportunity to collect materials for hobbies such flower arranging or cooking. The garden can also be important in providing an additional private area to the house. It defines personal territory, provides interest and things to look forward to through the year and can be a valued source of escape from the organized indoor world (Stoneham and Thoday, 1996, p.18)

According to Kavanagh (1998), “the purpose of any therapeutic garden is to maximize the number, quality, and intensity of intersections with plant materials in the garden landscape” (pp.287-288, cited in Chalfont, 2008, p.122).

Healing powers of nature have been described in many examples which include interactions among behavior and outcomes and human phenomena. But, it may be difficult to distinguish whether positive outcomes are a result of increased experience of natural light or fresh air, increased socialization, or greater self-rule.

2.3 Importance of Social Interaction

Social interaction is very important in the management of dementia. Numerous studies confirm that seniors with dementia who have a strong social experience delayed cognitive impairment. Seniors who have a considerable amount of support from their families are at a lower risk of developing memory-loss symptoms.

Zunzunegui et al (Zunzunegui, M., Alvarado, B. E., Ser, T. D., & Otero, A. 2003) found that a decline in elderly people's cognitive function could be predicted by poor social interactions, infrequent participation in social and social disengagement. According to Resnick and colleagues (1997), visual impairment, severe hearing impairment, and low levels of communication ability are associated with low social engagement in nursing home residents.

Living in a long-term care facility is associated with higher level of loneliness and maintaining a sense of personal identity is a major challenge for nursing home residents ((Pinquart & Sorensen, 2001; Tobin as cited in Kane, 1995). According to Lawton (2001), social interactions and relationships with others act as indicators of quality of life in residential care setting.

Social interaction is described as participating in activities that have a social component (Bath & Deeg, 2005). Findings revealed that residents within special care units engage in several types of informal social interactions including: 1.active verbal communications, 2.brief verbal communications, 3. physical touch, 4.glancing, 5.attention seeking, and 6.other non-verbal actions (Hubbard, Tester and Downs, 2003; Hubbard, Cook, Tester and Downs, 2002; Kelley, 1997).

Kitwood and Bredin (1992) suggest that social contact is a key indicator of overall well-being. Several studies have indicated that in relation to people with dementia, they spent significant amounts of time lonely, not engaged in any activity, and with little social interaction (Schreiner, Yamamoto & Shiotani, 2005; Diaz Moore & Verhoef, 1999). Based on new evidence, people with dementia are capable of communication, and they are attempting to meaningfully engage with others around them (Ward,Vass, Aggarwal, Garfield & Cybyk, 2008).

Based on literature review, physiological and psychological attributes of a person are important in determining a person's decision to interact with others. Immobility and physical weakness influence how and where residents interact (Hauge & Heggen, 2008).

2.3.1 How nature influences social interaction

People living in care facilities spend a majority of their time in the dining room, living room, and in corridors or hallways doing little or nothing (Ice, 2002). In contrast, the amount of time spent in outdoor spaces or activity rooms is comparatively minimal (Ice, 2002; Moore, K. D., & Verhoef, R., 1999). Researchers have noted that in these public spaces, residents are generally not involved in social interaction, instead contributing in passive activities such as sleeping or watching television (Moore, K. D., & Verhoef, R., 1999; Mckee et al, 1999). It is important that long-term care facilities provide residents the opportunity to do something or participate in an activity that provides joy.

Research has shown that, activity spaces and green spaces provide the most amount of social contact, despite them being used less than other spaces (Moore, K. D., & Verhoef, R., 1999). This relationship may be a result of failed attempts program outdoor activities and, the lack of proper site selection and building design for visual access to nature and programed green spaces.

2.4 Awakening the Senses

Connection and Belonging

Significant attention has been given to exploring the benefits of sensory stimulation with older adults and specifically, people with Alzheimer Disease. Benefits include increased socialization, increased concentration, improved awareness and increased alertness. Many benefits have been found by creating an environment that gently stimulates all of the senses (Alzheimer's Society). It is valuable to draw on emotions and memories by getting in touch with all 5 senses.

Plants give people pleasure and can bring healing through all of the five senses – sight, hearing, smell, touch, and taste – either physically or more "indirectly via memories and moods" (Minter, 2005, p.85). "By incorporating the senses explicitly into the garden, the experience is fuller and more complete" (Eckerling, 1996) (p.29, cited in Ghose, 1999, p.28).

Elderly people who suffer from dementia are also more likely to benefit from a strong connection to pleasant memories with plants because of their heightened sensitivity to mood, emotion and senses (Zeisel and Tyson, 1999; Brawley, 2006).

Sight

It is pleasing to view something you consider beautiful or memorable. The visual pleasure generated from the plants and planting design depends mainly on the choice of plants, their colors and shapes, and the way they are grouped together (Minter, 2005).

Color can be used in a garden to create mood and atmosphere, in particular when the seasons change. Which can be achieved by seasonal flowering plants and the color of trees in the fall. According to Burnett (1997), “marking of the seasons is extremely important to understanding the passing of time and the life force by which we are all connected” (cited in Ghose, 1999, p.28).

> In the words of John Burroughs "How beautifully leaves grow old. How full of light and color are their last days".

Hearing

Listening to sounds is a very important aspect of getting in touch with our senses. Although many older adults have hearing impairments, it is still important to stimulate this sense. (Alzheimer’s Society). From the sighing and rustling of leaves and foliage in the breeze to the tinkling or rushing of water, sounds in the garden can awaken the auditory senses and can generate and influence many different moods and feelings (Minter, 2005; Catlin, 2006). There are many healing sounds in the natural world which please the ear including the wind blowing through trees, shrubs, and grasses, bird sounds, the rushing sound of water from a small zen-style fountain, the deep, low hum of bees as they pollenate flowers.

Touch

Meaningful touch can be an extremely important communication tool with people with dementia. Whether it is a hug, a handshake, or simply holding hands, touching provokes an emotional response that

is incomparable. Minter (2005) recommends using plants that have leaves, petals, or stems with interesting textures or shapes, or that release their scent when touched. The use of carefully designed raised beds with low-growing plants can be handled easily and may help wheelchair-bound patients to get closer to the plants. Most importantly, care should be taken to avoid the use of toxic plant materials (Ghose, 1999; Minter, 2005).

Taste

An "edible garden" in a special care unit can provide interest for the users in seeing "a landscape that gives back both aesthetically and nutritionally" (Burnett, 1997, cited in Ghose 1999, p.29). Mostly in a long-term care facility, an herb or vegetable garden maintained by residents as part of horticultural therapy can provoke warm memories of family and can heal the soul.

Smell

The sense of smell is one of the most meaningful in terms of connecting us to our past and bringing back memories. Smells have a powerful effect. They can be pleasant, relaxing, or comforting, and can elicit many emotions. According to Healy (1997), "fragrance can work to recall fondly remembered or traumatic past experiences and thus be an important tool towards the clearing up of unfinished business" (cited in Ghose, 1999, p.29). Rosemary and lemon can boost mood. Lavender has elements that help calm and soothe. Peppermint can provide energy. And for older adults who have lost interest in eating, scents like ginger and grapefruit can help stimulate appetite. (Essential Science Publishing, 2004).

2.5 The Healing Power of Birds

Enjoyment & Pleasure

Some birds aren't meant to be caged. Their feathers are just too bright."

The Shawshank Redemption

Bird Tales is a dynamic and unique program that takes into consideration the type of activities people with dementia need, i.e. sensory stimulation, and the natural environment. This therapeutic program uses multisensory stimulation and the natural outdoor world of birds to help people living with dementia interact with their environment and share meaningful experiences with others, while helping to protect and maintain the local environment and attract wildlife by creating habitats. Bird Tales represent multisensory stimulation and provides healing through an individual's exposure and experience with nature through sight, sound, and touch. Bird Tales is accessible to all residents (i.e. can be done indoors or outdoors), and can be implemented as a group activity or as a one-on-one activity, and relies on a commonality, bird watching and the outdoors, that everyone can relate to (Rappe & Topo, 2007).

The therapy program includes educational content that builds on participants' past connections to the natural world by involving them in watching and feeding birds, and learning about different species using the Bird Tales Activity Cards and activity lessons provided in the Bird Tales Kit (Innovative Audubon Program, 2016).

"The Bird Tales program brings peace and joy to people living with dementia by connecting them with the healing power of birds. And at the same time, by encouraging facilities managers to create bird-friendly habitats, the program gives birds a boost too." Audubon President and CEO David Yarnold.

We have found through this wonderful program how incredibly comforting, reassuring and secure the sound of bird calls, vocalizations and songs can be to those in distress. … This program is nothing short of

amazing. One day, we may all be afflicted with these horrific diseases. If I am, I only hope Bird Tales and programs like it are available to me." ~ Tyler Edmondson, Community Education Coordinator

The other staff and I bring the sensory observation of birds—the colors, the sounds—and the chance to watch their behavior [at the feeders outside]. These are stimulating for people with dementia, Elkin said (Bryce, E. 2016, April 13).

2.6 Bird Songs

Birdsongs have been proven to relieve stress according to the care provider. Meredith, C., 2013, January 25. Maizie Mears-Owen, head of dementia care at Care UK, said that "Nature, particularly bird songs, have a therapeutic effect on people that is both relaxing and stimulating when counting and watching birds outdoors in the garden or from the comfort and warmth of indoors. According to Maizie, bird songs not only stimulate memories but also encourages conversation between people.

The definition of nature or experiencing nature includes passive interaction, such as watching birds through the window, listening to bird sounds, or sitting on a bench outdoors looking at flowers. However, the interaction or exposure of nature can provide an abundant source of multisensory stimulation in physical, emotional, behavioral, psychological, spiritual, and/or cognitive areas (Griffin and Elkins, 2013).

CHAPTER 3
RESEARCH METHODOLOGY

This chapter focuses on the methodology addressing research questions presented in Chapter 1 and the literature review in Chapter 2. The methodology outline and review of literature provided insight to answer the research questions. To answer if social interaction improves psychological well-being of older adults with ADRD and to understand if environments improve psychological well-being of older adults with ADRD, literature reviews were conducted.

Accordingly, a method of data inquiry, face-to-face and phone interviews, is adopted in this research to examine if environments created for birds improve the social interaction of older adults with ADRD and obtain insight regarding design criteria to create space that attract wildlife. Since four participants were chosen for different fields of expertise, it was difficult to analyze the data across the interviewees. Also, small sample size hindered the researcher from pursuing any advance qualitative analysis. Therefore, interview results were presented in narrative form.

In order to design space that attract birds, care facility was selected. Selection was made from a list of Texas Alzheimer's facilities provided by the official website. Interview was conducted with the executive director of selected facility for basic information of the facilities. Since the purpose of this study is to design environment for attracting birds, regional, neighborhood, and site inventory and analysis has been done. Participants' insights were helpful to develop the criteria of designing bird friendly environment that is beneficial for people living with dementia.

3.1 Research Design

The subjects in this study were selected across all relevant fields of experience: Education Program Environmental specialist, Bird Friendly Communities Educator, Education Director and care facility executive director. They were chosen in the process of conducting the literature review, or by recommendation of other experts. Potential subjects were initially contacted by email. All interviews except one were by telephone. Most interviews were recorded in written format and later transcribed.

3.2 Data Collection Methods

Phone and video call interviews were set up as the first step for data collection. Before each interview, basic research information was explained through email to each of the respondents. Each interviewee was provided an introduction to the study followed by formal open-ended interview questions. Each interview lasted approximately 30 minutes and was recorded in written format.

After an introduction to the thesis, formal open-ended interview questions were asked as follows:

1. Are there any factors, and tips that help the successful development, use or sustainability of bird's friendly garden?
2. Do bird habitats provide opportunities for social interaction of older adults with dementia?
3. Have you noticed any changes of behavior or mood after residents have activities outside?

3.3 Limitations of the Study

The primary limitation of this study, was in lack of access to Alzheimer's Disease patients who currently have access to nature and bird habitats. Therefore, findings were based on export opinions through interviews.

"The awareness of an experience is not the experience" (Panikkar quoted in Schwartz and Jacobs 1979, 108).

The study was conducted between August 2018 through November 2018. Even though this time period was only four months in length, it is prime migration time for birds in north Texas.

Limits to the research also include, language barriers between interviewee and respondents, and lack of flexibility and access to local long-term care facilities in Dallas-Fort Worth.

The small sample size, as well as the unique nature of each patient and their ethnic, cultural and economic background present additional limitations for designing the outdoor spaces. One common challenge is designing a garden for a new facility where there is no user group yet (Meyer, 2007).

CHAPTER 4
ANALYSIS AND FINDINGS

This research seeks to determine the benefits of Alzheimer and dementia patient interaction with nature and bird habitats. Experts such as, birds friendly educators, bird tales program co-developer, and facility program directors, were interviewed to define the criteria for designing birds friendly gardens. Experts recommended various types of plants that are most usefully in creating spaces for birds, butterflies. A selection of facilities were visited, photographed and evaluated for location, environmental condition, courtyard accessibility, facility scheduling and flexibility research participation.

4.1 Analysis of the Selected Study Facility

The Brookdale Care Facility in Mansfield, Texas was selected out of four number of facilities evaluated. The following is an evaluative description of site with photographs and maps.

This long-term care facility offers personalized assisted living and memory care options to patients. The facility is located on a secondary light commercial road in a residential neighborhood in North Texas (Figure 4.1).

Mansfield is a suburban city located mostly in Tarrant County, with small parts in Ellis and Johnson counties in the U.S. State of Texas.

Figure 4-1 Mansfield Texas zoning map

(Source: https://www.mansfieldtexas.gov/planning-and-zoning)

Figure 4-2 City inventory

Mansfield, TX

The facility is located within a half mile of a community park, a nature preserve, and Walnut Creek, approximately two miles southwest of Joe Pool Lake, a significant environmental feature for that attract birds to the region (Figure 4.2 and 4.3). This region contains a strong diversity of landscape and development patterns, which have dynamically evolved over many generations of settlement and use. The Williams Property (community garden) is part of the unique intersection between the Cross Timbers and Texas Blackland Prairie ecoregions, which has helped contribute to the diversity of plant and wildlife species evident in the area. According to respondent, any green spaces within 2-4 miles radius is a strong feature to consider. Any small green patch is considerable for attracting birds. Some bird species will be present only if the site is bordered by more natural habitat (Master Plan Executive Summary, 2011)

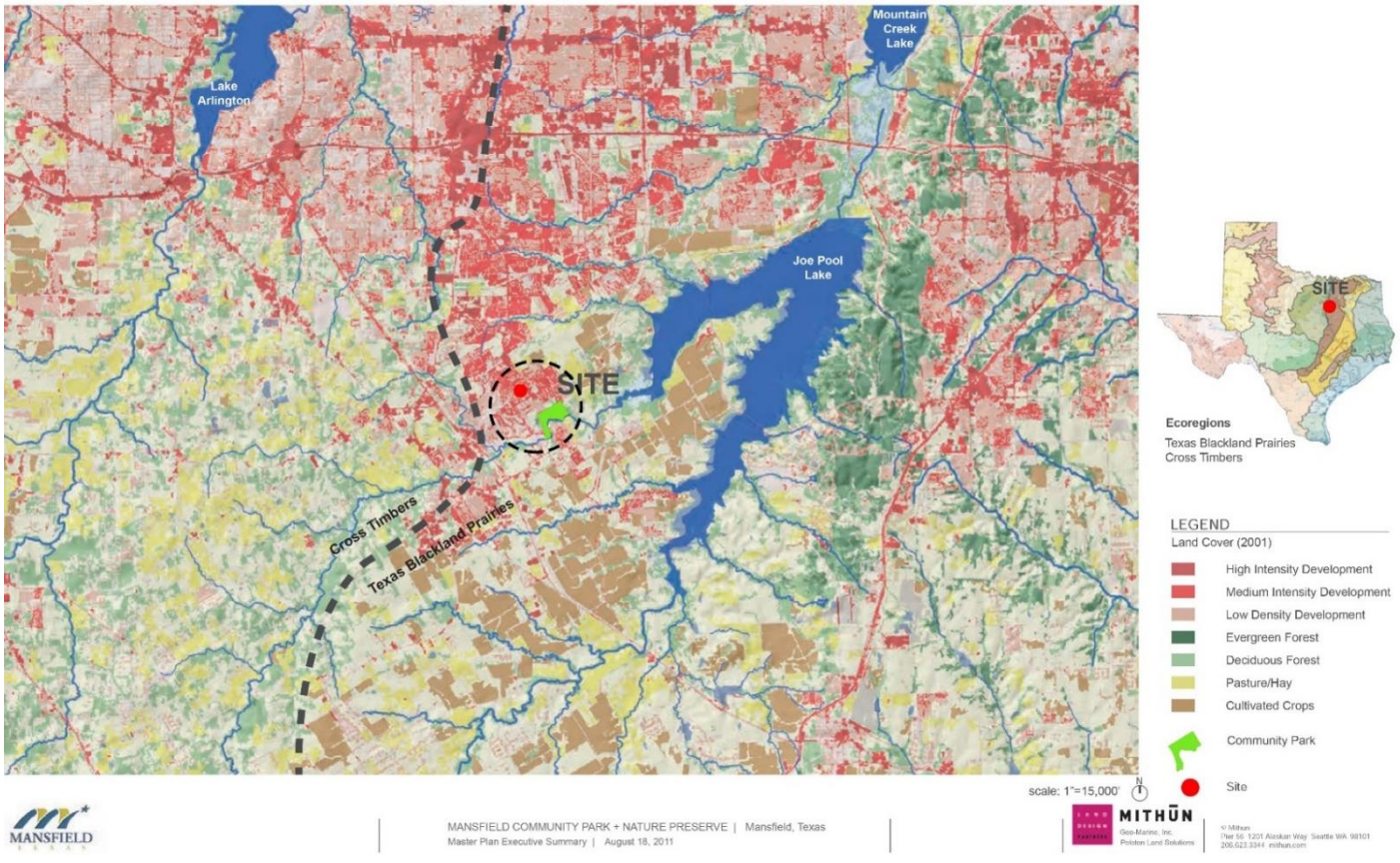

Figure 4-3 Regional ecological patterns (Source: Master Plan Executive Summary, 2011)

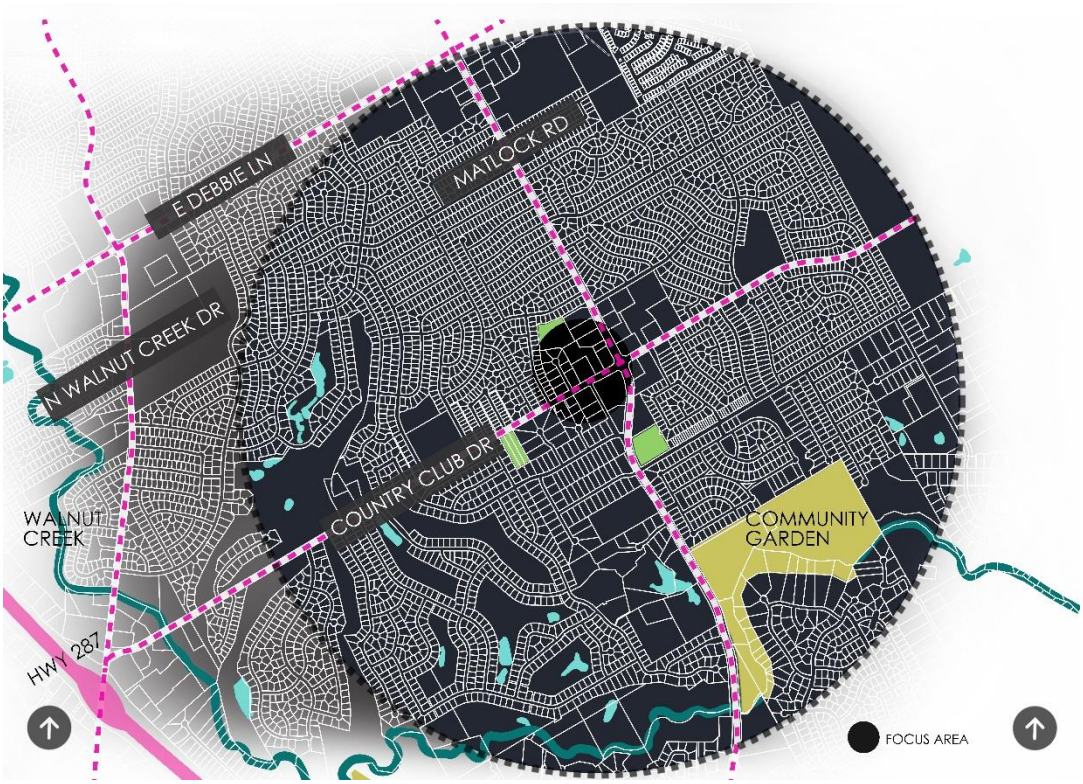

Figure 4-4 Diagram showing neighborhood inventory

Site Selection Location	1771 Country Club Dr, Mansfield, TX 76063
Number of Residents	31 Residents, 55-60% of residents have AD
Gender	4 Men, 27 Women
Age Range	55-96
Number of Staff	26 (6 managers)
Area of Outdoor Space	4905.373 Sq.

Table 4-1 Table Basic information of selected study facility

The building is a single-story, with a stone faced exterior and a centrally located courtyard, visible from a frequently used resident and patient care activity room(Figure 4.5)

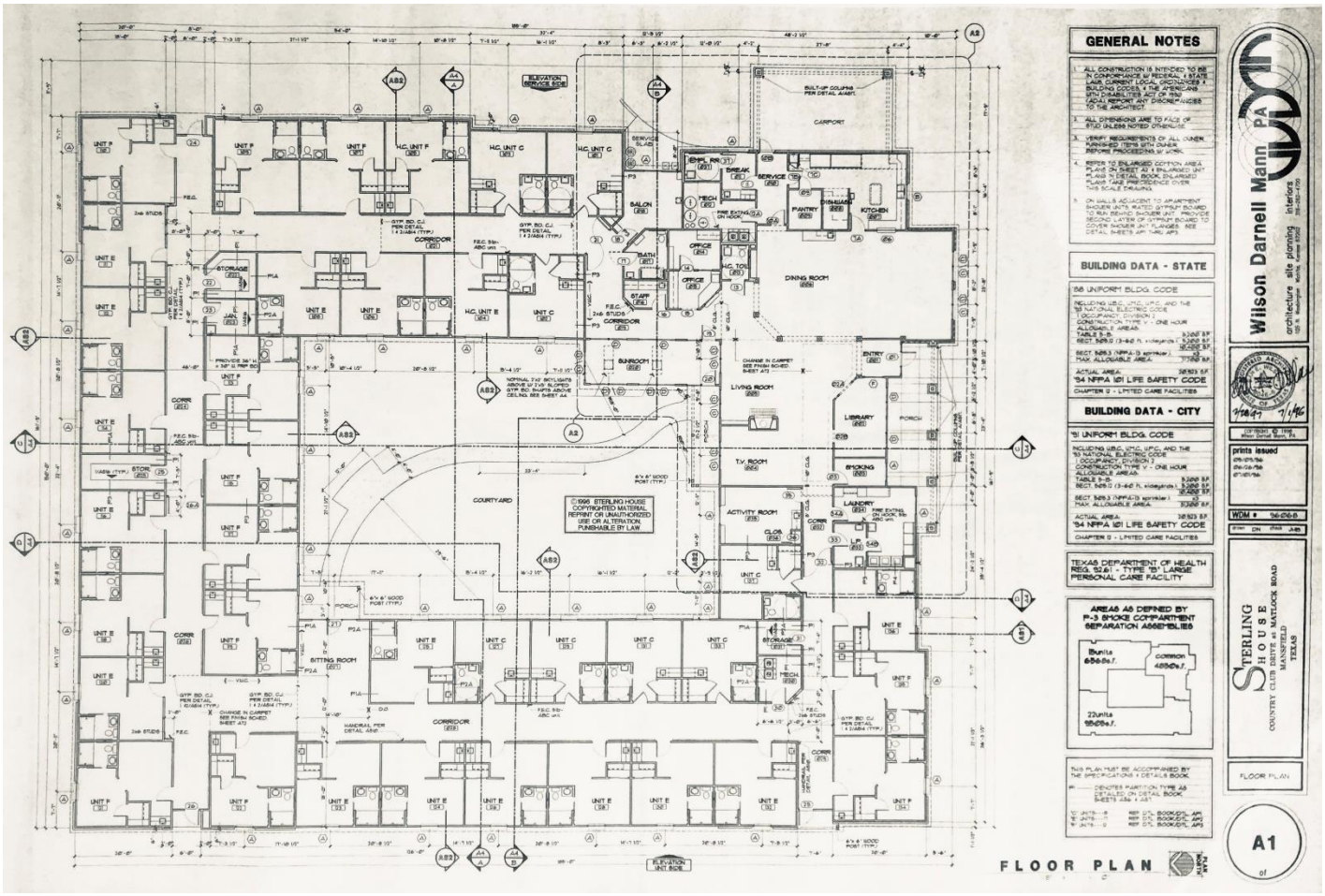

Figure 4-5 Facility Interior Site Plan

The courtyard has two unlocked entrances, one from the activity room on southeast side and the other from living room on the northwest side. Paved pathway leads to a small 7’ by 12’ 8” covered porch directly to the North part of the courtyard. The outdoor space is surrounded by residential rooms (Figure 4.6).

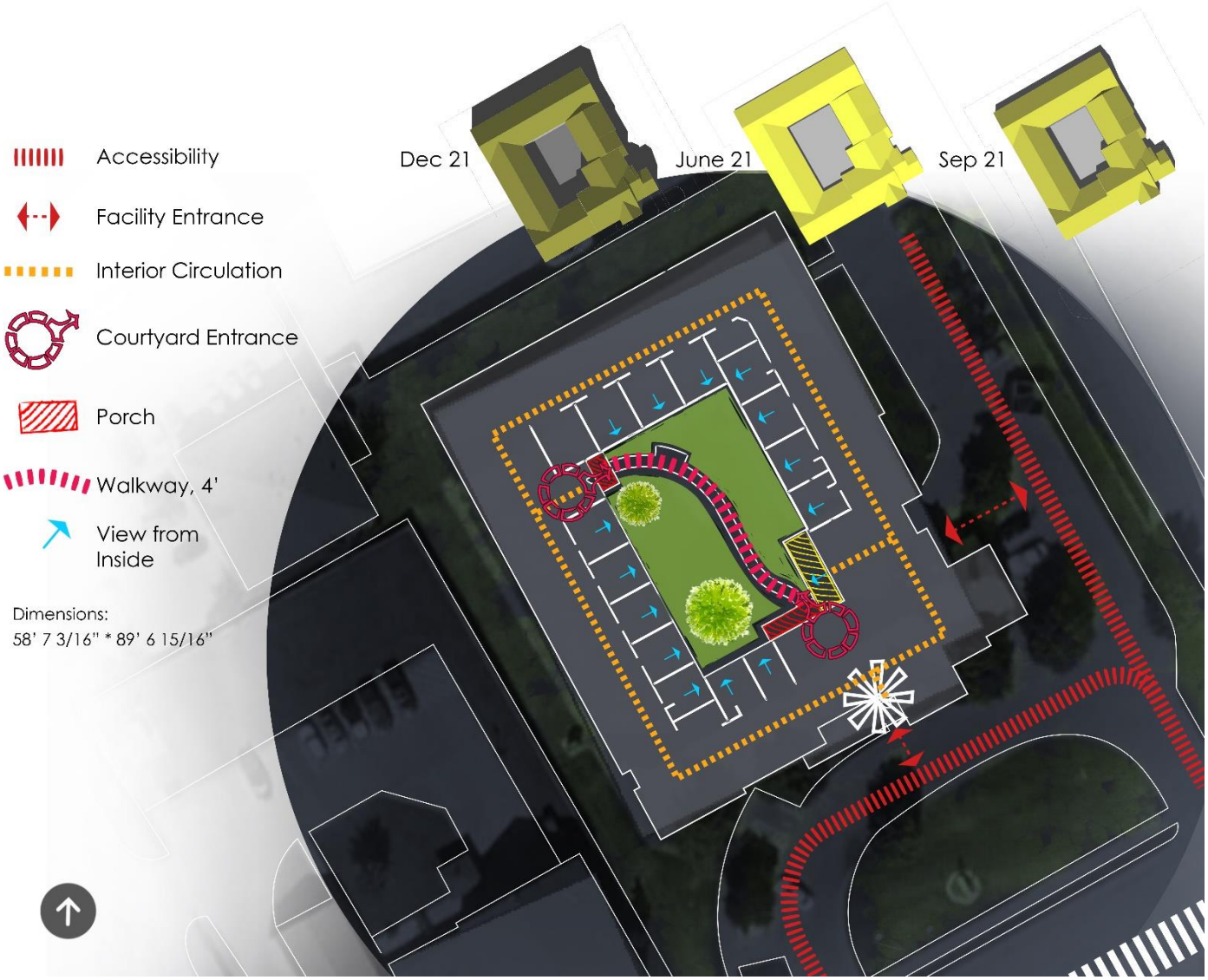

Figure 4-6 Diagram showing site inventory and analysis

Figure 4-7 View from Porch (North West) to the courtyard

Figure 4-8 View from South to the Courtyard

Amenities to the garden include, raised planters, chairs and a wooden park bench adjacent to the walking path. The pavement is level and in good condition. However, the walkway is a little narrow; two people cannot walk side by side, and it is not ADA. There are two post lights next to the walkway is narrow and not ADA compatible, making it difficult for two people to safely walk side by side. Approximately 80 percent of the space is covered with grass. A variety of evergreen plants, are located along the wall and under the windows of residents' bedrooms. Two mature Shumard Oak trees offer shade for the rear half of the green space. One Eastern Redbud, Crepe Myrtle, Rose Bush (Figures 4.7 and 4.8)

Of all the design principles (Table 4.50), the courtyard has sufficient safety and security because of direct access to outdoor area from each side. According to Marcus, a single access point, with simple path arrangements, may increase residents' orientation and reduce confusion when using the garden (Marcus, C. C, 2007). This direct access allows for the staff to be able to observe and directly assist almost all the residents. However, the courtyard is particularly weak in stimulation and does not meet the therapists' needs.

4.2 Interviews Report

Interview notes were taken by the researcher while interviews were being conducted. The purpose of the interviews was to obtain expert opinion on the research hypo.

Data collected from respondents revealed specific benefits of birds are discussed in creating spaces that attract birds to a desired space. The benefits are discussed in creating and maintaining healthy habitats and engaging in multisensory experiences inspired by birds and its impact on people living with dementia. As sense of peacefulness and relaxation among the residents is experienced when patients are interacting with birds and listening to bird songs. Residents reported an increase in mood and behavior while being outdoors, and maintained these feelings even after leaving the outdoor space.

Design Elements	Challenges and Tips
Native Plants are the primary element of bird friendly garden	Layers of habitat are preferable for birds, creating a diverse habitat niches, butterfly-friendly plants, particularly in the sunny area
	If the plant has a high wildlife value (i.e. milkweeds), placement away from walkways will balance the safety of the residents while maintaining the ability to attract birds and butterflies. (Milkweed contains cardiac glycosides that are poisonous to humans)
	Most herbs, especially dill, are host plants for butterflies, so their caterpillars will eat it, and those plants are safe for everyone. They add elements of textures and smells (and taste), and staff can be trained to share those with residents
	Prairie plants in raised wooden bed
	Add a feeder station, store bird seed in a watertight container and fill feeders regularly. Place station in an area where debris can be captured/cleaned. Periodically clean out feeders, and always dispose of rotten seed
	Hummingbird feeders are very success oriented in the fall in our part of Texas. Maintenance includes changing sugar water 2-3 days
	Limit use of pesticides and other chemicals that can kill birds or bird food sources. This may include
	Installed bird baths, should be stable enough if accidentally grabbed by a resident. If the bird bath is not sufficiently stable, landscaping should be placed to prevent patients from failing near the object, preventing injury
	Invasive birds are always an issue in urban areas, so limiting nesting cavities (houses with too large of a hole), would be the one way to limit their activity
Access to running water in the garden areas	Add butterfly and bird garden next to the water feature.

	Clean, shallow (1.5”), moving water (so they can hear it)
	Plants may require more water immediately after installation
	If bird feeders or bird baths is added, make sure someone on site is committed to refilling and cleaning. Make sure there is a clearly marked, pest proof container for seed in a designated spot at the facility

Table 4-2 Table Analysis of Interview. Recommendations of garden design from respondents

Year-round Birds
Species
Mourning Dove
White-winged Dove
Red-bellied Woodpecker
Downy Woodpecker
Blue Jay
American Crow
Tufted Titmouse
Carolina Chickadee
Carolina Wren
Eastern Bluebird
American Robin
Northern Mockingbird
Brown-headed Cowbird
Great-tailed Grackle
Common Grackle
House Finch
Winter Resident
Species
Northern Flicker
Ruby-crowned Kinglet
Hermit Thrush
Yellow-rumped Warbler
Chipping Sparrow

White-crowned Sparrow
White-throated Sparrow
American Goldfinch
Pine Siskin
Summer Residents
Species
Ruby-throated Hummingbird
Black-chinned Hummingbird
White-eyed Vireo (depending on surrounding area)
Barn Swallow
Blue-grey Gnatcatcher (depending on surrounding area)
Indigo Bunting (depending on surrounding area)
Painted Bunting (depending on surrounding area)

Table 4-3 Table List of bird species from respondent

Common Name	Scientific Name	Type
Cedar elm	*Ulmus crassifolia*	Tree
Red yucca	*Hesperaloe parviflora*	Succulent
Flame acanthus	*Anisacanthus quadrifidus*	Shrub
Autumn sage	*Salvia greggii*	Shrub
Little bluestem	*Schizachyrium scoparium*	Grass
Lindheimer's muhly	*Muhlenbergia lindheimeri*	Grass
Goldenrod	*Solidago sp.*	Perennial
Turk's cap	*Malvaviscus arboreus*	Perennial
Gregg's mistflower	*Conoclinium greggii*	Perennial
Blue Mistflower	*Conoclinium coelestinum*	Perennial
Crossvine	*Bignonia capreolata*	Vine
Purple Passion-flower	*Passiflora incarnata*	Vine
Milkweeds	*Asclepias sp.*	Perennial

American Beauty-berry	*Callicarpa americana*	Shrub
Mexican Plum	*Prunus mexicana*	Tree
Fragrant Sumac	*Rhus aromatica*	Shrub
Pecan	*Carya illinoinensis*	Tree
Red Mulberry	*Morus rubra*	Tree
Side-oats Grama	*Bouteloua curtipendula*	Grass
Dogwood	*Cornus sp.*	Tree

Table 4-4 Table List of native plant that will benefit birds, butterflies, and other insects from respondent

4.3 Design

Although some may believe that patients with Alzheimer's disease and related disorders are unresponsive to outdoor exposure, studies show that environments especially designed for cognitively impaired seniors can maintain or increase their level of functioning." These studies have suggested that the cognitively impaired are actually more sensitive to their environments, so that a relatively minor improvement in a health care facility environment may show a dis- proportionate benefit to residents (Mooney, P., & Nicell, P. L., 1992).

> "There is a need for therapeutic gardens to be incorporated as a 'standard' complementary element in special care units for people with dementia. Such an inclusion directly impacts the quality of life for residents, staff and family members." (Hernandez, 2007).

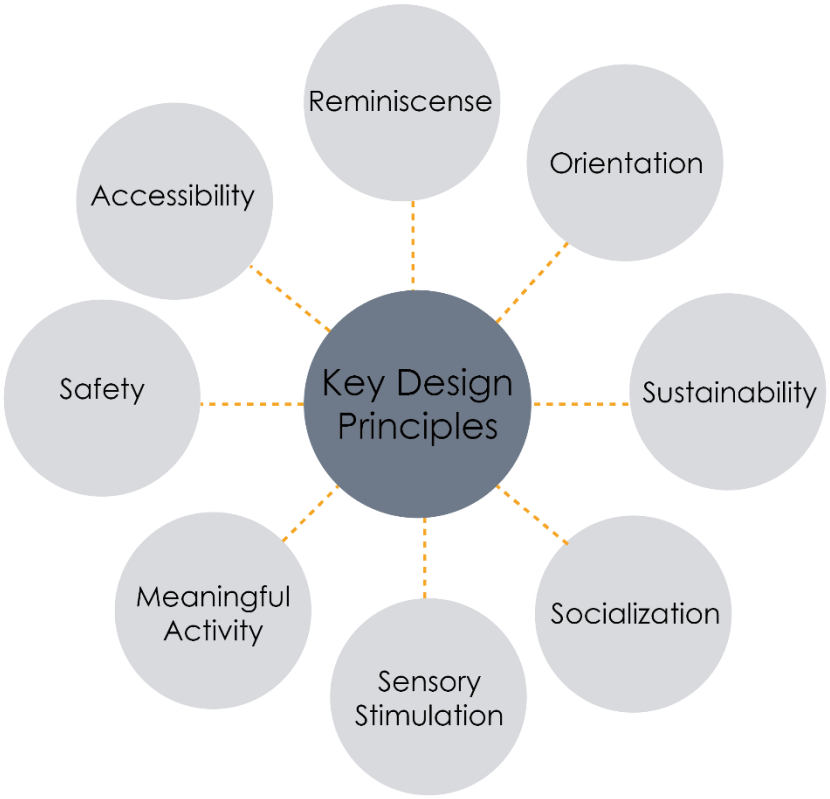

Figure 4-9 Diagram showing key design principal

Principles of design for dementia patients are numerous (Figure 4.9), but the most wide-ranging and applicable to outdoor space were chosen and summarized in Table 4.5: design to assure safety and security, design as a cue to orientation (way finding and reality orientation), design to provide appropriate stimulation, and design to maximize autonomy and socialization (Gilson, 1994).

Category	Recommendation	References
1. Accessibility		
1.1 Location and Entry to the Garden		
	Gardens should be visually accessible from the inside	Marcus, C. C. (2007)
	Door to the garden is easy to see and locate. Door contrasts easily against the wall, and the pathway to the door is clear of obstacles	Marcus, C. C. (2007)
	The door/doors into the garden are easy to operate. (Light weight and easy to pull / push to allow people with walking issues / wheelchairs to go through)	Marcus, C. C. (2007)
	Contrasting colored door handles	Marcus, C. C. (2007)
	The door is unlocked each day, to allow people to go outside to the garden	Marcus, C. C. (2007)
	Shaded seating patio area immediately outside a door, for people who want to go outside but cannot go further	Marcus, C. C. (2007)
	Attractive garden view from this exit/entry patio to the garden as this space may get used more than the garden	Marcus, C. C. (2007)
	Exit/entry patio is large enough to accommodate 4-6 people in wheelchairs	Marcus, C. C. (2007)
	Entry patio is an area where people can have a semi outdoor experience all year round, having bright natural light is beneficial to patient health	Marcus, C. C. (2007)

Category	Recommendation	References
1. Accessibility		
1.2 Layout and Pathways		

	Patio entry is designed as a landmark, so that those using the garden can easily see where they have to return, to get back indoors	Marcus, C. C. (2007)
	Signage in and around the garden clearly indicate user to entries and key locations	Marcus, C. C. (2007)
	The pathway should be a simple looped continuous well defined pathway. No "dead ends" or confusing choices whether to turn right or left to return inside	Marcus, C. C. (2007)
	Pathway should have destination points such as: a gazebo, shaded seating areas, large shade tree (with seating underneath) providing opportunities for social interaction	Marcus, C. C. (2007)
	Pathway should be leveled and well maintained; free of mold, broken pavers, loose gravel and obstacles such as low-hanging tree branches	Marcus, C. C. (2007)
	The path surface should be non-reflective and well defined: with contrasting edging color to support way finding and define the edge from paving to garden.	Marcus, C. C. (2007)
	A minimum of 6' wide for the main pathways to allow for wheelchairs to pass	Marcus, C. C. (2007)
	Appropriate pathway surface for wheelchairs and walkers.	Marcus, C. C. (2007)
	Place hand rails occasionally along the pathway for people to rest as they move through the garden	Marcus, C. C. (2007)

Category	Recommendation	References
2. Safety and Security		
2.1 Plants		
	Avoid the use of toxic plant materials or small loose objects which could be swallowed	Stoneham and Thoday, 1996; Kennard, 2006; Chalfont, 2008

	Avoid the use of hazardous plant materials with sharp, spinney leaves or thorns	Stoneham and Thoday, 1996; Carstens, 1998
	Avoid the use of plants that produce unpleasant sap, that sting or cause allergies	Stoneham and Thoday, 1996
	Use different heights of plants to avoid confusing residents	Mei, 2012
	Have seasonal color and points of interests	Stoneham and Thoday, 1996; Tyson, 1998; Carstens, 1998
	Choose shapes, heights, or placements for planters to ensure they will not be mistaken for a toilet	Chalfont, 2008
	Design green roofs on new buildings as well as when modifying or renovating older ones	Chalfont, 2008
	Design a transitional area or porch with landscape elements such as trees, shrubs, and vines to moderate exposure to sun, wind, and extremes in weather	Carstens, 1993; Carstens, 1998; Kennard, 2006
	Fruit trees, or trees that drop leaves should be well trimmed and maintained, and planted far from pathways to avoid walk areas becoming a slip hazard	Marcus, C. C. (2007)
2.2 Other features		
	Use very shallow, clean water to ensure water features are totally safe. Appropriate low maintenance water features to help create multi-sensory environments	Mei, 2012
	Establish direct access to outdoor areas for staff to observe or assist residents	Tyson, 1998
	Avoid polished materials such as stainless steel street furniture which may generate glare or shiny paving which may be mistaken for water or slippery surfaces	Factsheet No 6 Design Principles for Extra Care, Tom Delhanty, 2013

	Avoid dark, shadowy areas. People with Alzheimer's or other types of dementia can misinterpret these areas for negative events	Kennard, 2006
	Pergola, trellis, arch or tree could be dangerous if a person is intent on suicide.	Chalfont, G. E. (2007)
	Ensure that outdoor space is securely enclosed using screening fences with plants and vine	Carstens, 1998; Tyson, 1998; Zeisel and Tyson, 1999; Chalfont, 2008
	Flat paving stones offering easy access for wheelchair users and avoiding trip hazards for those with poor mobility	Timlin, G. (2010)
	Heavy furniture difficult to move without assistance	Timlin, G. (2010)
3. Sensory Stimulation		
	Provide features that evoke memories for people. Include vegetable gardens and barbeques	Marcus, C. C. (2007)
	Use plants with fragrance and essential oils to evoke memories, decrease pain, lower blood pressure, relieve anxiety, and promote sleep	Marberry and Zagon 1995; Ghose 1999; Zeisel 1999; Minter 2005; Pearce 2007
	Make small scale design changes so that a person walking slowly would have a variety of visual experiences e.g. varied plants, open / sunny / shaded	Marcus, C. C. (2007)
	Avoidance of structures (e.g. trellis / pergola) that cast slatted shadows which may be interpreted as depth changes by people with perception problems	Marcus, C. C. (2007)
	Provide opportunities to sit, listen and observe wildlife	Marcus, C. C. (2007)
	Provide opportunities to sit, listen to watch and touch interesting water features, which also act as orientation points around the garden	Marcus, C. C. (2007)
	Provide opportunities to see and touch different textured plants such as grasses, and trees with soft leafy branches that rustle in the wind	Marcus, C. C. (2007)

	Plan bright colorful contrasting seasonal flowers, arranged and planted at different heights to give the garden color all year round	Marcus, C. C. (2007)
	Aromatic plants such as jasmine, frangipani, lavender, roses; these plants often promote conversation and reminiscence	Marcus, C. C. (2007)
	Plant edible plants: lemon / orange fruit trees, herbs such as mint parsley, basil, a vegetable patch with carrots, lettuce and tomatoes. (at a height that is easy to access e.g. raised garden bed)	Marcus, C. C. (2007)
	Provide colorful hanging baskets/ interesting mosaics on blank large wall areas, bright colored pots and planters	Marcus, C. C. (2007)
	Provide lighting, so the area can be accessible for walking and sitting on warm evenings, or viewed from inside when it is dark	Marcus, C. C. (2007)
	Use plants that have leaves, petals, or stems with interesting textures or shapes	Carstens, 1993; Ghose, 1999; Minter, 2005;
	Design for therapeutic sounds in the garden; such as the sighing and rustling of leaves and stems in the breeze and the tinkling or rushing of water. Use music to enhance the residents' mood and energy levels in the garden	Marberry and Zagon, 1995, Ghose, 1999; Minter, 2005; Catlin, 2006; Wijk, 2007
	Sounds, visual images, smells and kinesthetic experiences, whether used individually or in combination, provide sensory cues for the cognitively impaired residents	Zeisel, Hyde, & Levkoff, 1994
	Use contrasting color codes to provide spatial cues for way-finding	Marberry and Zagon, 1995; Minter, 2005; Innes and McCabe, 2007; Wijk, 2007; Chalfont, 2008
4. Socialization		
	Provide seating options for a person to sit alone, as a couple, or with others	Marcus, C. C. (2007)

	Appropriate seating design includes seating options with – back and arms for ease of pushing up from a sitting position	Marcus, C. C. (2007)
	Comfort of seating: timber, hard plastic fabric preferable, seat cushions for added comfort	Marcus, C. C. (2007)
	Choice of seating in sunshine / shade	Marcus, C. C. (2007)
	Provide meaningful activities such as Bird Tales to improve interaction with nature created for birds and social interaction	Respondents

Table 4-5 Table Dementia garden design guideline derived from literature review

4.3.1 Concept Diagram

Therapy by Design

Therapeutic gardens should provide safe, secure and comfortable settings for people. The aim of the design component of this research was to create an environment that includes multiple nature based experiences. Experiencing nature includes both passive and active interactions. Passive interactions include activities such as watching birds through the window, listening to bird sounds, or sitting on a bench outdoors looking at flowers. Active interactions include activities such as bird feeding, bird touching, and planting. Therapeutic gardens designed for people living with dementia are based on several assumptions (Figure 4.7). These assumptions are: design to assure safety and security, design as a cue to orientation (way-finding and reality orientation), design to provide appropriate stimulation, and design to maximize autonomy (Gilson, 1994). The following diagram (Figure 4.8) indicates the framework for the design. The following principles were considered in the conceptual framework: socialization, sensory stimulation, meaningful activity, reminiscence, and sustainability (Table 4.5).

Strategy	Purpose
Sensory Garden	Sensory Stimulation (Sight, Smell, Touch), Sustainability
Flexible Space	Socialization (Interaction with others)
Herb Garden, Raised Garden	Meaningful Activity (Horticulture Therapy) , Multisensory Stimulation (Smell, Touch)
Bird Feeder	Meaningful Activity, Socialization
Bird Garden, Butterfly Garden, Water Feature	Sensory Stimulation, Reminiscence, Sustainability

Table 4-6 Table Conceptual framework

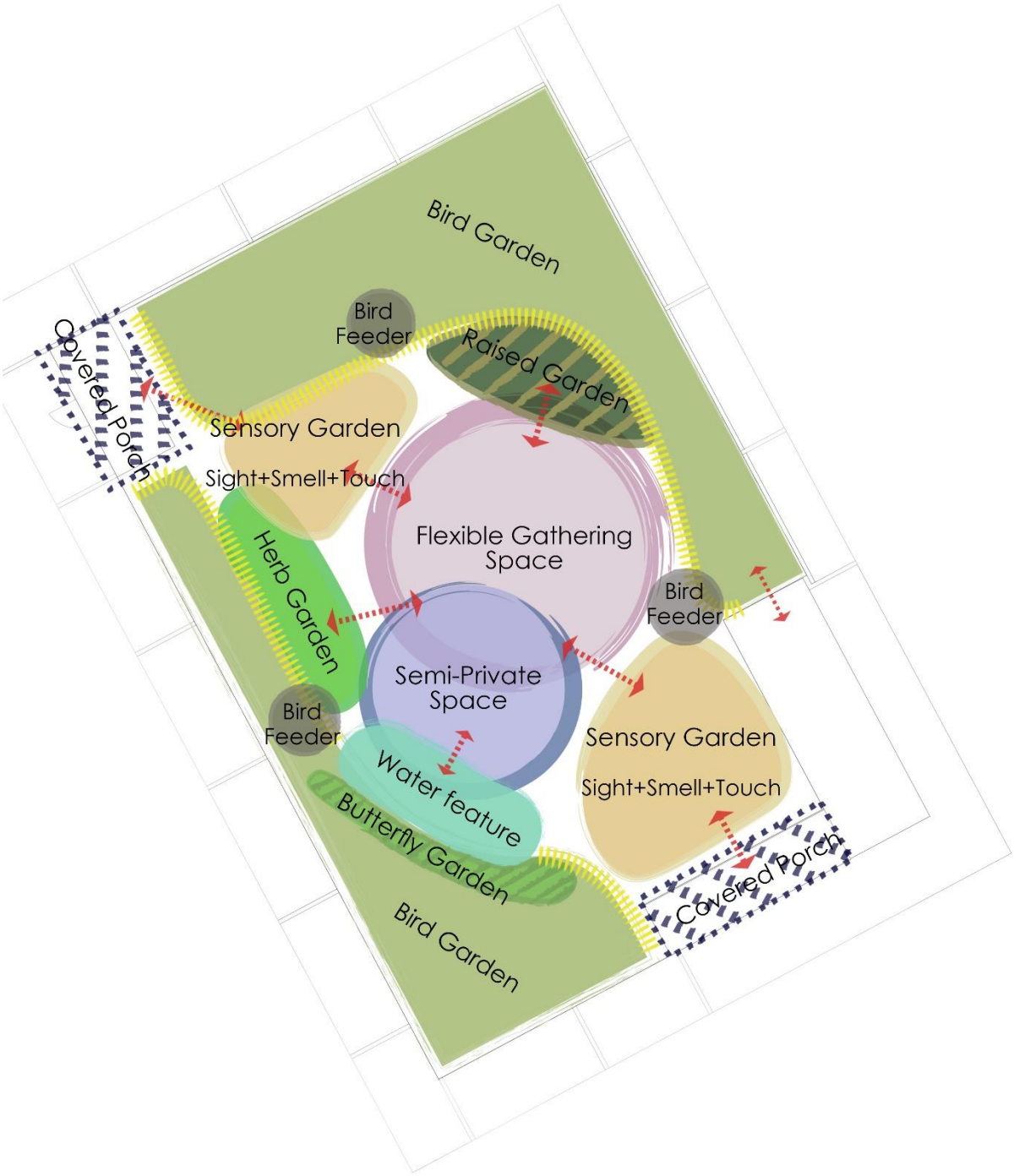

Figure 4-10 Diagram showing the conceptual framework

The strategy of creating a bird friendly environment is to represent multisensory stimulation by bringing sounds and sights of birds to the garden and connecting residents with the healing power of wildlife. This strategy required certain features, including: bird feeders to provide food for a wide variety of species, aimed at engaging residents in meaningful activities, such as bird feeding, bird watching, and listening to

bird sounds (multisensory stimulation). Other features that are important to include are: Water sources, native plant species that benefit birds, and butterflies.

Figure 4-11 Sketch showing design concept

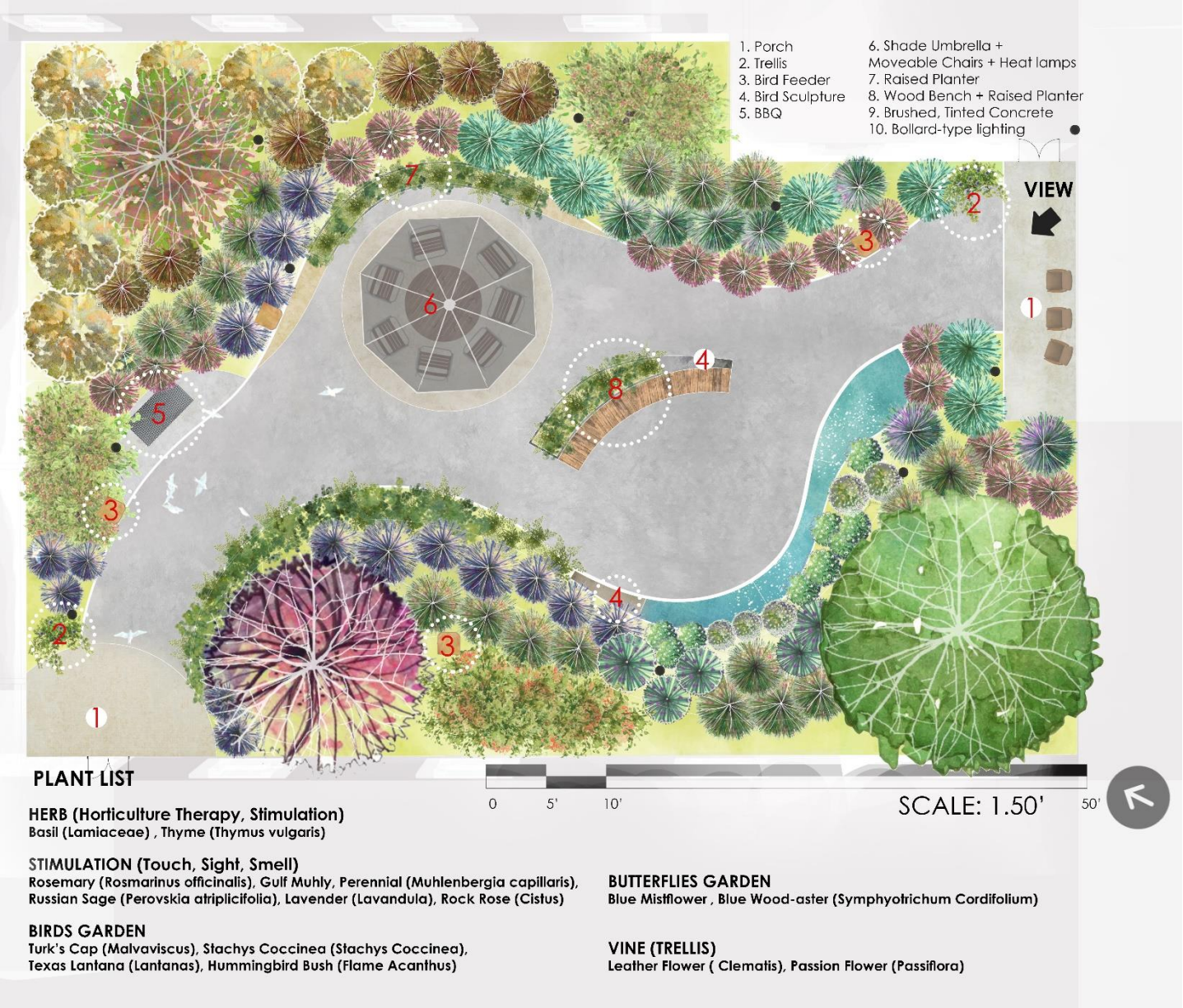

Figure 4-12 Site plan and context

The design strategy was developed to create opportunities for social interaction (Figure 4.12). Evidence and guidance suggest that social interaction is important for maintaining physical and cognitive function, as well as personal well-being (Alzheimer's Society, 2007; Steeman et al, 2006). Design guidance suggests landscape architectural features capable of responding to cognitive impairments, with the purpose of reducing both behavior symptoms and use of drugs.

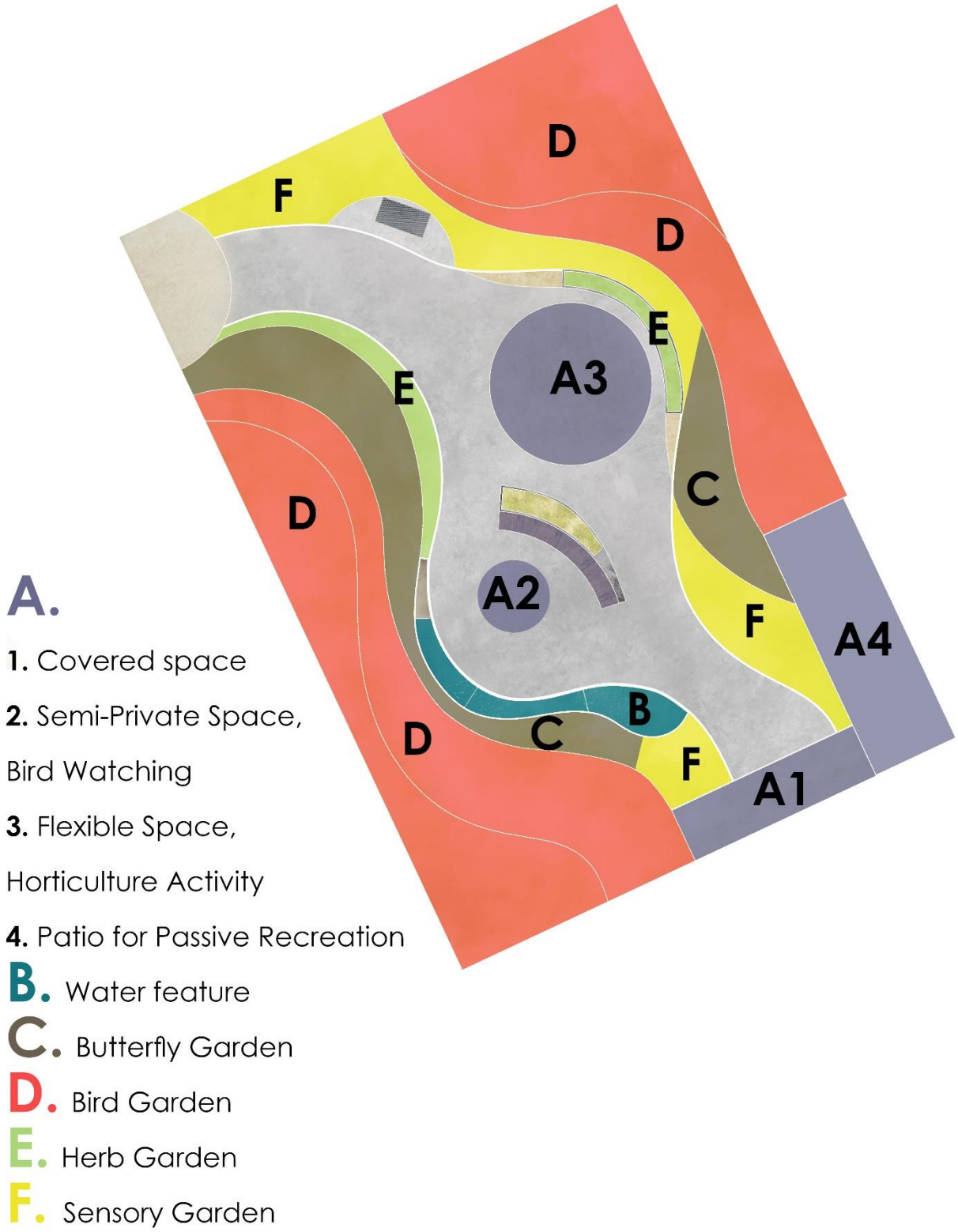

Figure 4-13 Diagram showing space program- functional diagram

The circulation is arranged to accommodate the wandering behavior of the residents, who find a sense of relief in continuous movement. The pathway is leveled with the minimum width of 6’ to allow for wheelchairs to pass through. Ensuring that residents can access the garden without risk to themselves is necessary for their independence and wellbeing (Timlin, G., 2010). A range of shared and more private spaces provides opportunities for varying degrees of social interaction and common attentiveness. Adding a barbeque can be a good way of gathering. The seating options are ‘adaptable’ with both summer and winter, shade and sun modes, and maximizes use of outdoors in different weather. Shaded seating patio, for people who want to be outside but cannot go further. Opportunity to sit, listen and watch water movement has been provided with the purpose of sensory stimulation.

Seasonal colors and year-round interest has been incorporated, through choosing plants to help familiarize residents with the time of year. Placement of the sensory garden adjacent to the pathway provides sensory stimulation through the plants. For example, gulf muhly was chosen for its visual stimulation, and rosemary and lavender were chosen for their fragrance. The inclusion of raised beds allows residents with wheelchairs to engage with planting shrubs or with the weeding, and allows other residents to participate without needing to kneel on the ground.

Choosing appropriate plants regardless of their therapy benefits and effects was a challenging task (Table 4.6). Toxic plant materials, plants that produce unpleasant sap, or plants that sting or cause allergies should be avoided. For this reason, the bird garden is located far from the walkway, for the matter of safety and to provide the opportunity of passive interaction with birds for residents.

Bollard type lighting was proposed, so the area can be safe and accessible for walking and sitting on warm evenings. The lighting can also be viewed from inside when it is dark.

Urban noise, loud and unpleasant sounds are all considered negative distractions in a therapeutic garden. These distractions were masked with the sound of water, and screened with vegetation.

HERB (Smell)	COMMON NAME
Basil	Lamiaceae
Thyme	Thymus vulgaris
STIMULATION (Touch, Sight, Smell)	COMMON NAME
Rosemary	Rosmarinus officinalis
Gulf Muhly, Perennial	Muhlenbergia capillaris
Russian Sage	Perovskia atriplicifolia
Lavender	Lavandula
Rock Rose	Cistus
BIRDS GARDEN	COMMON NAME
Turk's Cap	Malvaviscus
Stachys Coccinea	Stachys Coccinea
Texas Lantana	Lantanas
BUTTERFLIES GARDEN	COMMON NAME
Blue Mistflower	Conoclinium coelestinum
Blue Wood-aster	Symphyotrichum Cordifolium
VINE, TRELLIS	COMMON NAME
Leather Flower	Clematis
Passion Flower	Passiflora

Table 4-7 Table Plant list. Plants were chosen with the purpose of creating different type of nature-based experiences

CHAPTER 5
CONCLUSIONS

Alzheimer's disease become the six leading cause of death in the elderly in the United States (The Alzheimer's Disease and Related Disorders Association, Inc. 2017). The costs of health care and long-term care for individuals with Alzheimer's or other dementias are extensive, and dementia is one of the costliest conditions to society (Alzheimer's Association. 2018). In consideration of the increasing growth of people living with dementia, researchers have started to look at different interventions to enhance the well-being of those living with dementia (Alzheimer's Association, 2014) to reduce the cost of care.

According to the literature reviews performed in this study, outdoor space is claimed as beneficial to the Alzheimer's disease patient through sensory stimulation and opportunities for social interaction. Orientation in space, exposure to fresh air, relief from the over or under stimulation of indoor settings, space for exercise, and meaningful activities which connect them with nature are primary benefits to the AD patient.

Interview notes were informative, especially as they combine and relate to the review of literature to develop the design guidelines. Findings from this study show that the use of natural elements within the environment, such as bird songs and engagement of resident in multisensory stimulation activities such as birds feeding, and birds watching were associated with decreased patient agitation and aggression and a more positive affective response. The respondents' insights highlighted the possibility of improvement in social interactions and well-being, through patient's connection with environment created for birds.

In order to be therapeutic, outdoor areas for people with dementia must be safe, have engaging elements, have a clear direct walking path, and contain flexibility and tolerance for individual circumstance. The strategy of creating a bird friendly environment is to represent multisensory stimulation by bringing sounds and sights of birds to the garden and connecting residents with the healing power of wildlife.

Nurses and caregivers in multiple care environments that provide services for people with dementia need to expand their understanding of the importance and value patience experiences of the natural environment for people with dementia.

5.1 Relevance to Landscape Architecture

The main goal of this study is to investigate the benefits of creating environment that attract birds on people with dementia. Because the need for design of outdoor spaces related to healthcare facilities is growing, the list of developed design recommendations can be used for designing outdoor spaces in long-term care facilities that increase residents' connections with nature. In the educational field, many universities and colleges have certificate programs in therapeutic healing garden design, such as The University of Washington, or landscape architecture programs or specialties in therapeutic site design, such as Texas A & M University Center for Health Systems and Design and the University of Virginia Center for Design and Health. Landscape architecture curriculum could benefit from including the specialty of healthcare design. While the search for medical interventions is important, there is also a role for other professions to improve the quality of care the dementia patient receives.

5.2 Future Research

This study utilized qualitative data for its findings. Taking this into consideration, experts Cooper Marcus and Barnes (1999) recommend that the most accurate method of research is monitoring physiological changes by physical measures as an indicator of emotional shifts. Therefore, more observed research is needed to measure the therapeutic benefits when residents have interaction with birds in outdoor spaces. Tests need to be conducted to determine the benefits of creating natural environment for birds, and effects on residents engaging in multisensory activities such as bird watching and bird feeding to determine

social interactions among people living with dementia. It is imperative to convince developers and managers of long-term care facilities that the costs associated with bringing therapeutic gardens and bird habitats into facilities is worth the time, money, and effort. In addition, more research needs to be performed to link patient behavioral outcomes with specific outdoor environmental features.

Observations could provide useful data to document the benefit in bird friendly gardens for dementia residents. However, due to the limited time span, and access to the facilities with the focus on creating spaces to attract birds, interviews were the only method to collect the data. In order to better understand the human-environment behavior, gerontologists, ornithologists, and landscape architects need to work together to measure how patient exposure to landscapes impact people with dementia well-being.

UNIVERSITY OF TEXAS ARLINGTON | OFFICE OF RESEARCH ADMINISTRATION
REGULATORY SERVICES

December 4, 2018

Mahsa Yari, Masters Student
Dr. Diane Allen
School of Architecture
University of Texas at Arlington

IRB Submission Inquiry & Project Determination of Non-HSR

Good afternoon Yari Mahsa,

Thank you for contacting the UT Arlington Office of Research Administration; Regulatory Services regarding a study to be conducted for your Masters Thesis project titled, "The benefits of interaction with environment created for attracting birds on people living with dementia." The study procedures as described to our office include a literature review of existing published studies about the benefits of social interaction and experience with nature on older adults with dementia; brief interviews with up to 2 professional educators at the Trinity River Audobon Center about local bird species and plant species which attract birds; and an additional case-study interview with an individual employed at Brookdale Senior Living in Mansfield about how the current facility courtyard and design criteria have impacted the facility and the overall mood of the Brookdale community.

Upon reviewing the procedures involved with the study, it appears they would not meet the definition of, "research with human subjects" as defined by the Office for Human Research Protections (OHRP) and would therefore not be subject to review or approval by the Institutional Review Board (IRB) at UT Arlington. OHRP defines research as:

- "A *systematic investigation*, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge." A human subject in research is defined as, "A living individual about whom an investigator conducting research obtains data through intervention or interaction with the individual, or identifiable private information."

From the description of procedures provided, it appears that the interview questions to be asked of the professional educators at the Trinity River Audobon Center will be factual questions about birds and local fauna, and therefore do not fit the definition of "research with human subjects." In addition, the literature review component of your project does not involve any aspect of human subject research since you will consult published scholarly works, and the interview questions posed to the individual employed at Brookdale Senior Living in Mansfield are general questions about the courtyard and facility without reference to any specific individual residents or formal assessments. Your interviewing method is not systematic in nature, and your study findings will not be generalizable to the field as a whole on the basis of the Brookdale case study. Therefore, this project is not subject to review or approval from the UTA IRB, and you do not need to submit a protocol to our office at this time.

Please note that although IRB review is not required for this study, there may be other institutional requirements or agreements such as Data Use Agreements that pertain to this project. Please contact Dan Vincenzo, UT Arlington's Agreements Manager, at vincenzo@uta.edu for assistance in processing study-related legal agreements. You must also obtain the appropriate approvals from any collaborating organizations (such as Brookdale Senior Living in Mansfield) to conduct the study about their facility or to visit their site for the interview. In addition, it is your responsibility to abide by the UT Arlington

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Standards of Conduct and the ethical standards within your field for all projects and activities, even when IRB review is not required.

I have included the link for decision charts provided from OHRP from which this determination is made for your reference below. If the procedures that have been outlined and provided to our office change such that IRB approval might be necessary or you have any questions regarding this determination, please do not hesitate to contact us at RegulatoryServices@uta.edu .

Thank You,

Alyson Stearns
Regulatory Services Manager
Office of Research Administration;
Regulatory Services

OHRP reference: http://www.hhs.gov/ohrp/policy/checklists/decisioncharts.html

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