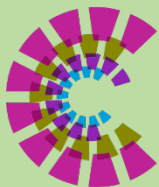# Improving Quality of Life and Enhancing COVID-19 Infection Control in Existing Residential Care Settings for Older People
Universal Design Guidelines

Centre for Excellence in Universal Design

Údarás Náisiúnta Míchumais
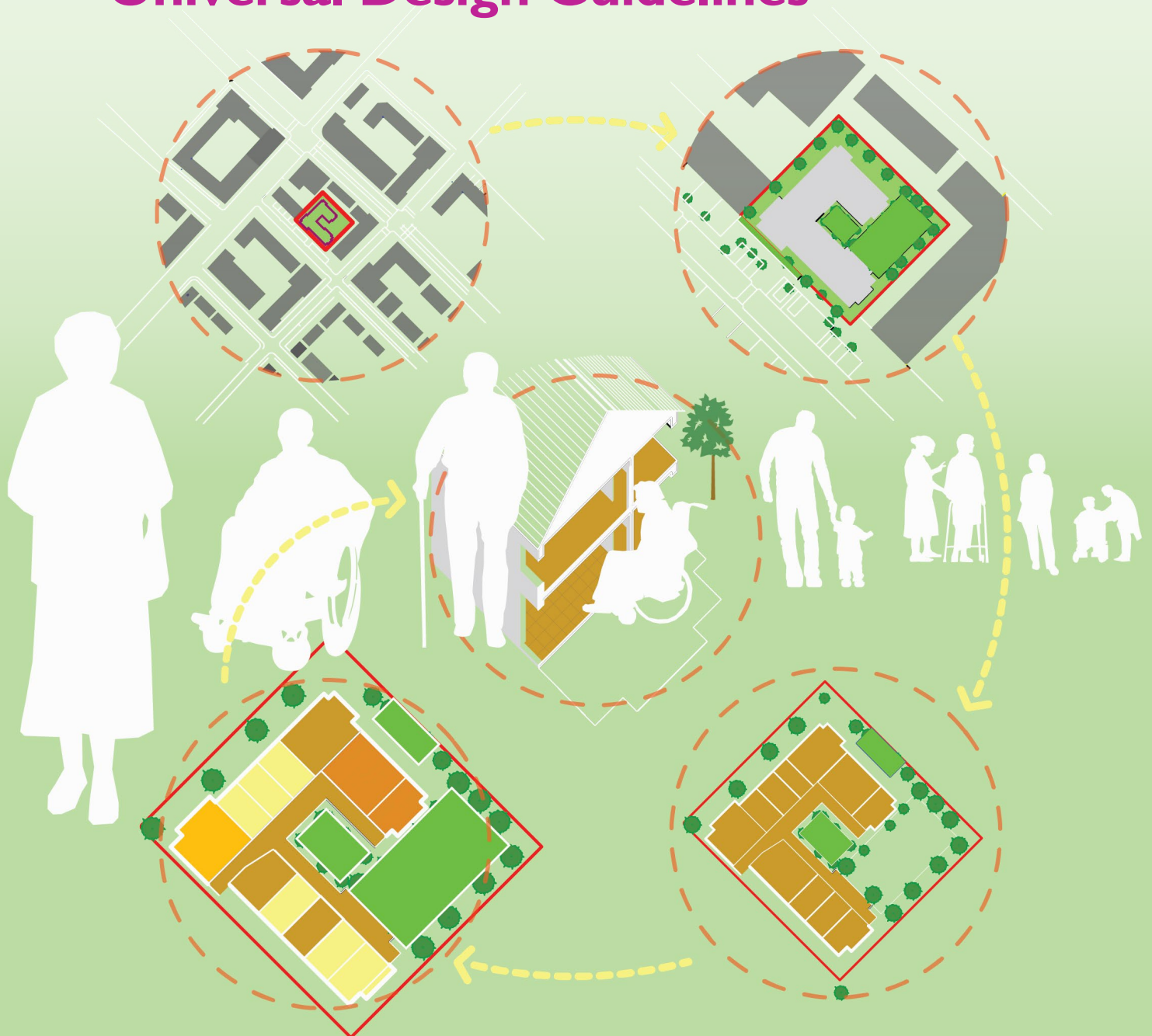**National Disability Authority**

2022

Improving quality of life and enhancing COVID-19 infection control in existing residential care settings for older people

Universal Design Guidelines

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2022

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Centre for Excellence in Universal Design

Creating an environment that can be used by all people, regardless of their age, size, disability, or ability.

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Foreword

I am pleased to present these Universal Design Guidelines for improving quality of life and enhancing COVID-19 infection control in existing residential care settings for older people, produced by our Centre for Excellence in Universal Design, at the National Disability Authority.

The COVID-19 pandemic has had a significant impact on older people living in residential long-term care settings in Ireland. While the primary impacts of COVID-19 were illness and death, the secondary impacts of isolation, loneliness, lack of physical activities and social interaction that resulted from infection control measures also had a negative impact on quality of life for people living in these settings. The guidelines advise on how the design of the built environment can be adapted and retrofitted to have a positive impact on both quality of life and infection control.

These guidelines build on previous work the Centre for Excellence in Universal Design has undertaken in this area, including the 'Universal Design Guidelines for Dementia Friendly Dwellings for People with Dementia, their Families and Carers' (2015) and 'Dementia Friendly Hospitals from A Universal Design Approach' (2018).

Our aim is that these guidelines will inform national policy and will be used in practice by all stakeholders – those who commission, design, and provide residential long-term care settings, when they are being retrofitted or adapted.

I would like to thank all of the stakeholders for their engagement in this process and our contractors, TrinityHaus, Trinity College Dublin, and Tallaght University Hospital who conducted the research that underpins these guidelines and developed this publication.

Helen Guinan

Helen Guinan

Chair

National Disability Authority

Introduction

Background

The COVID-19 pandemic has disproportionately affected older persons, particularly, those living in residential long-term care settings (RLTC). While the primary impacts of COVID-19 were illness and death, the secondary impacts of isolation, loneliness, lack of physical activities and social interaction that resulted from infection control measures were also devastating to people living in RLTC settings.

These guidelines, informed by the research **'Universal Design for Improving Quality of Life and Enhancing COVID-19 Infection Control in Existing Residential Care Settings for Older People'**, focus on how the built environment in settings can be adapted or retrofitted to:

a) enhance the quality of life for residents,

b) improve the visitor experience for friends and family members (without compromising the quality of life for residents); and,

c) improve pandemic preparedness and resilience while still protecting the psychosocial health and well-being of residents.

RLTC settings for older people are also referred to as 'nursing homes', 'long-term care facilities', or 'care homes', and in some cases 'community nursing units'. In the context of this project residential long-term care refers to settings registered with HIQA as designated centres for older people and will be referred to as '**settings**' throughout this document.

This project was funded by the **Centre for Excellence in Universal Design at the National Disability Authority**. Research and guidelines were completed by **TrinityHaus, Trinity College Dublin** in collaboration with **Tallaght University Hospital**.

The guidelines recognise that settings must accommodate a wide diversity of physical, sensory, cognitive, and immunological needs. In this context, the guidelines adopt a Universal Design Approach to address the diverse needs of residents, staff, family members and other visitors, regardless of their age, size, ability, or disability.

Residential Long-Term Care in Ireland: Retrofit and adaptation

Currently there are more than 570 private, public, and voluntary sector existing settings in Ireland, ranging from nine person units to settings with over 180 residents. These guidelines are aimed at highlighting the role of the built environment in all of these settings to balance quality of life and infection control measures, and can be applied to:

- Minor adaptations (e.g., specific spaces, or elements in the setting)

- Refurbishment (e.g., refurbishment of individual spaces such as bedrooms or whole-scale/large-scale refurbishment of the entire setting)

- Major retrofit or adaptation of setting (e.g., reconfiguration of the entire setting, major structural changes, or whole-scale reconstruction).

(For more detail see **Levels of design and retrofit** on page 11)

Acknowledging the diversity of care needs within RLTC settings

The guidance presented in this document acknowledges that there is a diversity of care needs across individuals in RLTC. While a proportion of residents will be able to get out of bed, move around the setting, and leave the premises on their own or with little or no assistance, there will also be many residents who will have higher care needs, requiring a significant degree of assistance from staff, family members, and assistive technologies.

Impact of COVID-19 on residents, families, and staff

COVID-19 has highlighted the vulnerability of care settings to infectious diseases, having been disproportionately affected by COVID-19 when compared to other settings. One Irish study showed how 75% of the settings included in the study had COVID-19 outbreaks; in these settings 43.9% of residents and 23.8% of staff were infected, and the case-fatality rate in residents was 26.7% (Kennelly et al., 2021). This study also highlighted that these findings were largely consistent with international findings, thus revealing the primary impacts and the toll taken by COVID-19 on RLTC.

Furthermore, COVID-19 can inflict secondary impacts on residents when infection control measures negatively impact their psychosocial health and well-being. These include quarantine, constrained social interaction, restricted visits from family and friends, the cancellation of shared activities, and the wearing of personal protective equipment by staff. These interventions are particularly difficult for people with a cognitive impairment or a person that walks with purpose, formerly termed 'wandering'.

These secondary impacts are also felt by families and friends whose visits are restricted and who are left to worry about their loved ones. Meanwhile, staff are not only impacted by the stress and emotions of dealing with resident illness and death, but they must also wear PPE and deal with difficult working conditions for long periods of time.

01: Older person interacting with family members through an upper floor window due to COVID-19 related visitor restrictions

Residential care settings for older people: Key policy context

The Health Information and Quality Authority (HIQA) is responsible for inspecting residential centres for older people to ensure conformance with the Health Act 2007, regulations and the 'National Quality Standards for Residential Care Settings for Older People in Ireland' (HIQA 2016). These HIQA standards comprise eight themes and 35 standards that cover issues ranging from health and quality of life, to staffing, governance and management. Across a number of these themes, there are standards related to the built environment and how design can support quality of life.

See https://www.hiqa.ie/reports-and-publications/standard/national-standards-residential-care-settings-older-people-ireland

The Health Act 2007 (Care and Welfare of Residents in Designated Centres for Older People) (Amendment) Regulations 2016 specify certain design requirements for residential settings for older people. For instance, from January 2022, the regulations require bedrooms to have a minimum floor area of 7.4m2 per resident (including bed, chair, and personal storage space). The regulations state that if rooms are shared, they should not have more than 4 residents, other than in high-dependency rooms which will not have more than 6 residents, in that room. The regulations also provide requirements for sitting and recreational space.

See https://www.irishstatutebook.ie/eli/2016/si/293/made/en/print

The 2017 HIQA 'Guidance on Dementia Care for Designated Centres for Older People' highlights the importance of the physical environment for people with dementia. In terms of dementia specific units, this guidance promotes "small size, in terms of the numbers of people accommodated", a "familiar building style, that is, domestic and home like" and "single rooms - big enough for a reasonable amount of personal belongings".

See https://www.hiqa.ie/sites/default/files/2017-01/Dementia Care-Guidance.pdf

The 2016 Health Services Executive (HSE) 'Design Brief: 10 Bed Dementia Specific Household - Residential Care Centre' provides design criteria for dementia specific units as part of an RLTC setting. The brief states that the "10 bed dementia specific household core areas with single bedroom en-suites will have their own sitting/sunroom area, dining room and kitchenette at the centre or 'heart' of the home."

The brief is based on the 'Teaghlach', or 'household' model as described in Appendix 3 (p. 109 – 121) of the brief, which contains a document called 'Person Centred Care in Residential Services for Older People'. Appendix 3 sets out a vision for a small-scale and resident-centred living model where overall settings are divided into individual households that can cater to all residents, not only people living with dementia.

(Please note that the link below provides access to documents from 2016 and that the HSE should be consulted for current information).

See https://www.lenus.ie/hse/bitstream/10147/621465/1/Dementia+Specific+Household+Brief+Final+April+2016comp.pdf

In relation to COVID-19, following a recommendation from the National Public Health Emergency Team (NPHET) in 2020, an Expert Panel on Nursing Homes was established to examine the complex issues surrounding the management of COVID-19 in nursing homes. This resulting 'COVID-19 Nursing Homes Expert Panel Examination of Measures to 2021' included a number of built environment related recommendations related to internal circulation and spatial zoning; isolation facilities; social distancing facilities; infrastructural adaptations for visitors; ICT for patient/family communication; and a reconsideration of overall models including a move towards smaller settings.

See https://www.gov.ie/en/publication/3af5a-covid-19-nursing-homes-expert-panel-final-report/

The Housing Options for our Ageing Population provides a policy framework to support Ireland's ageing population in a way that will increase the accommodation options available and give meaningful choice in how and where people choose to live as they age. It identifies a programme of 40 strategic actions to further progress housing options for older people including Action 4.12, which focuses on the issuing of planning guidelines for the development of residential care homes and primary care centres to ensure that they are appropriately designed and located in areas with access to transport and amenities.

See https://www.gov.ie/en/publication/ea33c1-housing-options-for-our-ageing-population-policy-statement/

The guidance in this current document is based on research showing that smaller settings may be preferable from the point of view of quality of life outcomes and infection control. However, beyond the 2017 HIQA guidance on dementia care, or the HSE dementia specific household brief described earlier, there is currently no national policy in relation to the maximum or minimum number of residents that a RLTC setting should cater for. This contrasts with national policy in relation to residential services for persons with disabilities, where the government's ambition is to de-congregate settings with more than 10 persons, to a model of community living where there would be a maximum of four residents living with support staff.

The guidance provided in this document is developed within the current Irish policy context for residential care for older people. While this wider discussion is beyond the scope of this guidance, further consideration of how best to support older people who require short or long-term residential care is warranted. Any discussion about the subdivision of larger settings into households, or the creation of smaller settings will have to include the implications for staffing levels and management, and the costs associated with such approaches (see 'Levels of Design and retrofit' below for further consideration of the impact of design changes on a setting).

Quality of Life and the Built Environment

The best settings support the quality of life of residents, regardless of age, health, or illness. These guidelines were developed using a set of quality of life domains as indicators of an environment where residents have the support and freedom to live full and meaningful lives. These quality of life domains are broken into four sectors with 15 key domains as outlined below in Figure 1.

A. Physical, Sensory, Cognitive
- Health & functional status
- Safety & security
- Physical and sensory comfort

B. Psychological
- Autonomy/ control & individuality
- Privacy & dignity
- Experiencing a high quality of care
- Self-realisation & personal growth
- Spiritual well-being
- Pleasure & enjoyment
- Generativity/contribution to society

C. Social
- Social engagement, relationships & active engagement with life
- Integration & engagement within the community
- Meaningful activities

D. Place-based or Ecological
- Sense of home & sense of place
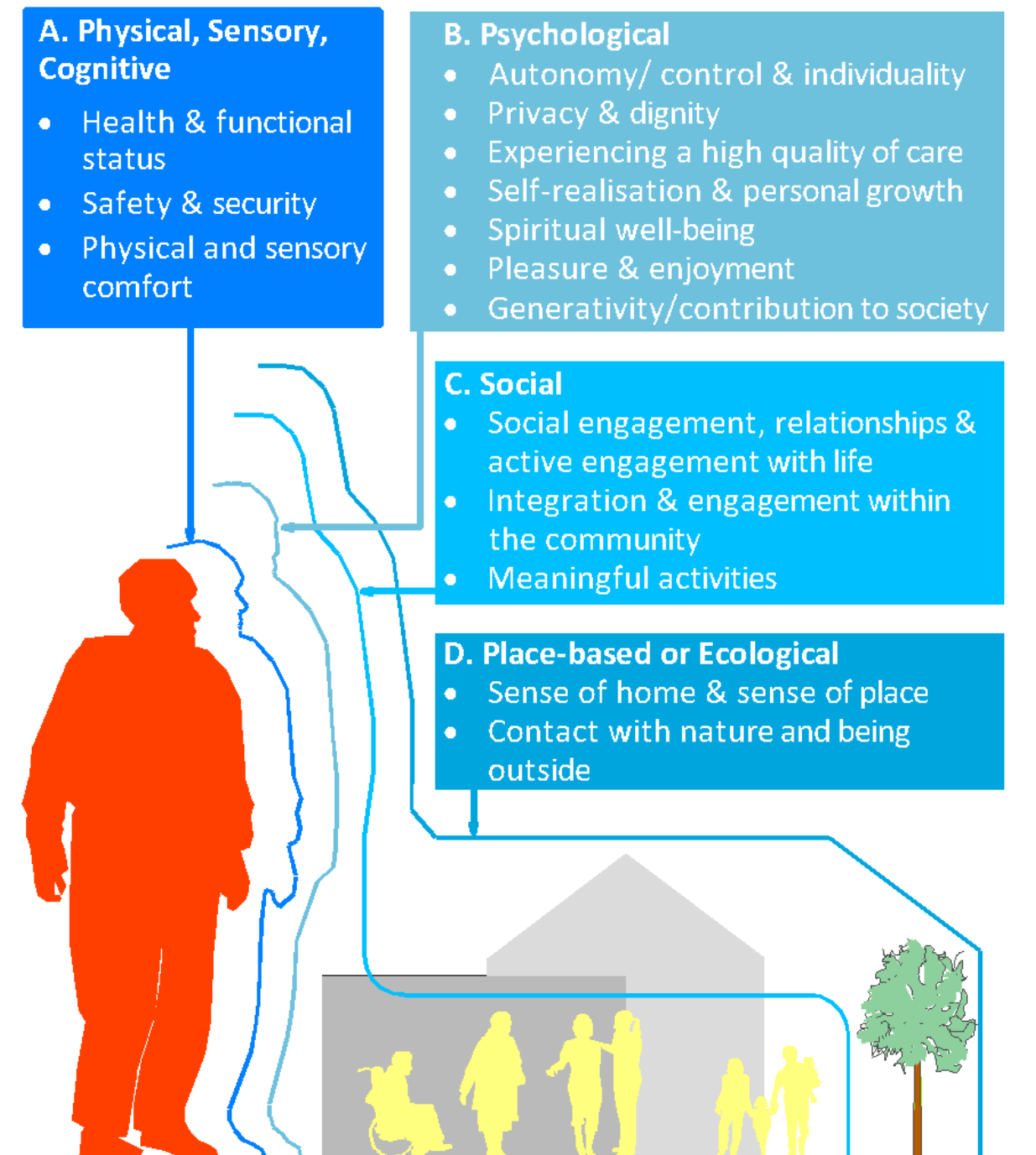- Contact with nature and being outside

Figure 1: Quality of life sectors and domains

These domains overlap to form an overall picture of the key issues around quality of life, wellbeing, and thriving for residents and provide a framework to understand the role of the built environment in supporting quality of life for all residents.

Infection Control and the Built Environment

According to the US Centre for Disease Control (CDC), respiratory viruses are mainly transmitted through contact, droplets, and airborne routes. Infection control strategies therefore must take into account all transmission routes. However, there is good evidence that for COVID-19, contact transmission is generally lower risk and that the **principal modes of transmission involve respiratory droplets and airborne transmission**.

> "The principal mode by which people are infected with SARS-CoV-2 (the virus that causes COVID-19) is through exposure to respiratory droplets carrying infectious virus. It is possible for people to be infected through contact with contaminated surfaces or objects (fomites), but the risk is generally considered to be low" (CDC, 2021).

Research shows that the risk of transmission is reduced outdoors due to air movement removing and diluting COVID-19 virus particles and environmental conditions such as sunlight that may damage the virus particles and decrease transmission.

Based on these principal modes of transmission, design, retrofit, adaptation, or management measures within settings should primarily concentrate on:

- Zoning or the creation of smaller 'households' with zone or household specific staff to reduce the risk of infection spread. The 'household' approach groups residents into smaller clusters (typically less than 12 people) of single bedrooms gathered around dedicated common areas. These households often have an independent 'front door,' direct access to a garden and are designed to create a homelike setting (see section 2.1 for more detail on the household model).
- Circulation strategies and spaces used to reduce occupant density, create more comfortable walking areas, and maximise social distances.
- The provision for single rooms and ensuite bathrooms for protection or isolation
- Optimising ventilation, providing air filtration, and improving and monitoring air quality.
- Taking advantage of reduced outdoor transmission and the increased use of outdoor spaces.

While these measures support infection control, they also greatly improve quality of life by supporting: a more homelike setting; mobility and physical exercise; privacy and dignity; improved air quality; and greater access to the outdoors and nature.

As mentioned earlier, some infection control measures can have secondary impacts and can negatively affect residents, families, and staff. To mitigate these negative impacts, any design, retrofit, or adaptation measures should seek to balance infection control with quality of life through:

- Recognising that these settings are people's homes and that infection control measures cannot dominate the environment in terms of building layout and access, materials and finishes, and overall management of the setting.

- Creating and maintaining safe, attractive, homely, and comfortable interior and exterior spaces for mobility and social interaction with other residents, staff, and visitors.

- Providing and maintaining access to outdoor spaces and to nature for all residents on all floors of the setting.

- Using technology to enhance residents' communication with their family, to avail of telemedicine such as video consultations, or engage with therapeutic activities from listening to music to using augmented reality or virtual reality devices.

These guidelines highlight the role of the built environment in creating a balance between infection control measures and quality of life. In fact, **one of the key messages promoted in these guidelines is the convergence between many good infection control measures and improved quality of life.**

Benefits of Universal Design for Residential Long-term Care Settings in Ireland

The Centre for Excellence in Universal Design (CEUD) at the National Disability Authority (NDA) refers to Universal Design as "the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of age, size, ability or disability".

A Universal Design approach recognises that settings cater to a wide spectrum of people including residents, staff, visiting health and social care professionals, family members, friends, and various visitors. In this regard, an inclusive setting must support a diversity of users with varying physical, sensory and cognitive capabilities, needs and preferences.

Compared to previous decades, many people are entering settings at a more advanced age and therefore may be experiencing greater levels of comorbidities, frailty, and cognitive impairment, thus reducing the average length of stay/life expectancy to less than two years. This has an impact on the design of the setting, the kinds of activity possible, and the level of engagement with the wider community. Adopting a Universal Design approach acknowledges the diversity of people who occupy long term care settings.

COVID-19 has taken a greater toll on certain groups, including people living with dementia. Adopting dementia-inclusive practices, underpinned by a Universal Design approach, are important for these settings. In the context of the design and physical environment, and in the interest of providing designers with a broad understanding of dementia, the following symptoms are highlighted:

- Impaired rational thinking, judgement, and problem-solving.
- Difficulty with memory (initially short-term but progressing over time to long-term memory difficulties).
- Problems learning new things.
- Increasing dependence on the senses (i.e., with impaired cognitive abilities a person may rely more on their sense of smell, touch, hearing, or sight).
- Fear, anxiety and increased sensitivity to the built and psycho-social environment.

Furthermore, considering the age profile of many people with dementia, other age-related health problems such as cardiovascular disease, Parkinson's disease and diabetes may be an issue. They are also more likely to experience other age-related difficulties such as:

- Mobility difficulties.
- Visual difficulties.
- Hearing difficulties.

Finally, as stated in the introduction, this guidance acknowledges that there is a diversity of care needs across individuals in RLTC. While a proportion of residents will be able to operate with little or no assistance, there will also be many residents who will have higher care needs, requiring a significant degree of assistance from staff, family members, and assistive technologies. This spectrum of care needs and the significant proportion of residents who have high care needs must be considered at all times.

Engaging with key stakeholders

When making changes to the built environment in RLTC settings, remember that Universal Design is an inclusive, stakeholder-driven, people-centred approach. As such, it is important to engage with key stakeholders, whether they be residents, staff, family members, and/or visitors to ensure that the adaptation or retrofit of existing RLTC settings, is in line with and reflects the needs of the individuals. All key stakeholders should be invited and supported to contribute in a meaningful way to ensure that their needs and preferences are incorporated into the design – whether it be a minor adaptation, a full-scale refurbishment, or a major retrofit of a RLTC setting.

The guidelines have been developed in recognition of the diversity of people in RLTC settings – whether they be a resident, staff member, family member or visitor – and they have been framed by a Universal Design approach to provide a more inclusive setting for a wide range of users.

Universal Design and Key Spatial Scales

A Universal Design approach considers the built environment across all key spatial scales. In these guidelines, we adopt the following key principles for residential long-term care settings in Ireland:

- **Integrated into the neighbourhood** - highlights the relationship with the community and ensures the setting is close to local services and public transport and is well integrated into the community.

- **Easy to approach, enter, and move about in** – provides accessible and comfortable routes when approaching the setting from the community, when entering and moving around on the site, and when entering and exiting the building, including internal circulation within the setting (i.e., doors, corridors, stairs, lifts, and other circulation routes and issues).

- **Easy to understand, use and manage** - covers a wide spectrum of considerations across various scales; from the wider issues around circulation and wayfinding, to more specific issues such as the use of spaces within the setting (bedrooms, living room, etc.), to signage and technology.

- **Flexible, cost effective, safe, and adaptable over time** – ensures a setting is flexible and adaptable in use on a daily basis. This flexibility and adaptability will cater for changing health, social, and environmental circumstances, and help make the setting more economically sustainable over the long-term.

These principles were initially developed for private dwellings but are also appropriate for use in the context of long-term residential care settings, highlighting that these settings should be, first and foremost, a home.

Levels of Design and retrofit

These guidelines recognise that retrofit and adaptation projects may be carried out in diverse settings, may be applied to various spatial scales of these settings, and may range from minor low-cost and low disruption projects to large-scale, high-cost, and high disruption projects.
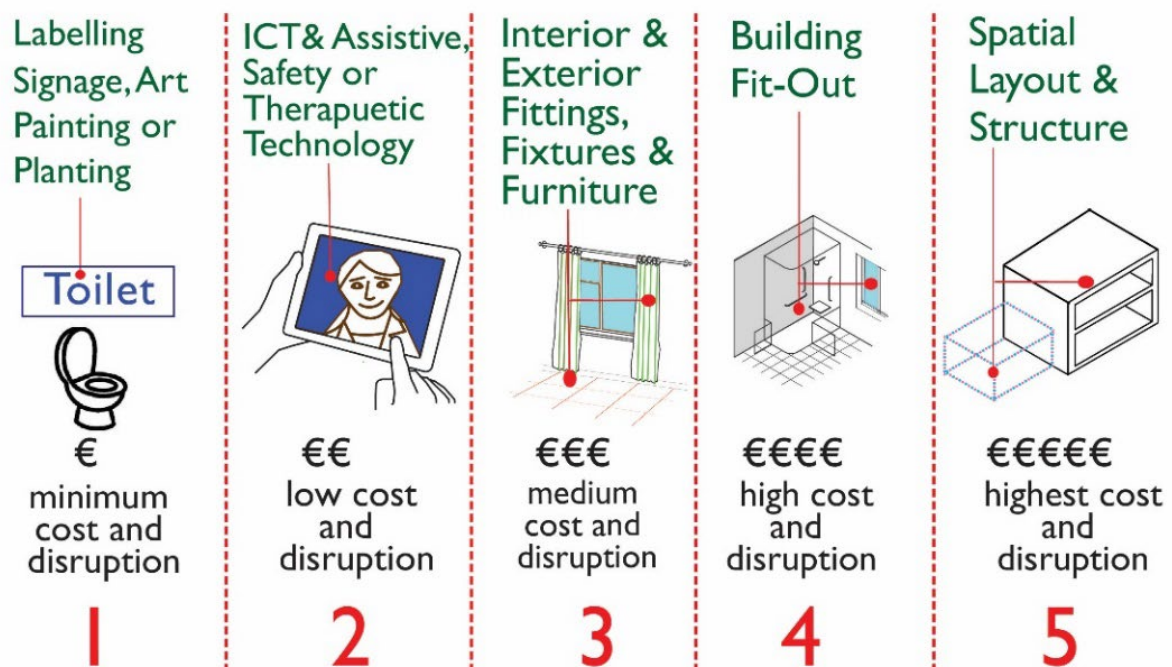
Figure 2: Five scales of design

These five scales of design have been identified to outline how the guidelines are:

- **Applicable across all spatial scales of a setting, from site design, to building components.**

- **Usable across a wide spectrum of issues; from minor low-cost adaptations to major works involving structural adaptations or new build.**

- **Usable by various stakeholders, whether this is a staff member who wants to implement minor changes, or the design team involved in new-build or refurbishment.**

The reader should consider these design scales as part of the design process to help inform the decision-making process in line with resident needs and construction budget. It should also be noted that if a setting is sub-divided or the layout is reconfigured, there may be implications for staffing and overall management.

Guidelines at a glance: Key Design Issues

These guidelines examine settings at four key spatial scales, ranging from the broad scale issue of location down to small scale issues such as building fit-out or materials. There are key issues that should be considered across all spatial scales:

- RLTC settings are people's homes, and while good infection control measures are vital, designing **a built environment that supports quality of life** is the priority.

- Creating and maintaining **safe, accessible, attractive, homely, and comfortable interior and exterior spaces** for mobility and social interaction with other residents, staff, and visitors is critical for settings, particularly during a pandemic.

- Some of the key modes of COVID-19 transmission include droplet or airborne transmission, therefore **improved ventilation** not only improves quality of life but is also an important part of infection control.

- Providing and maintaining **access to nature and outdoor spaces** for all residents on all floors of the setting can take advantage of the reduced transmission risks while also improving quality of life.

These spatial scales are outlined below along with some key design issues that should be considered at each spatial scale.

1. Site location and site design
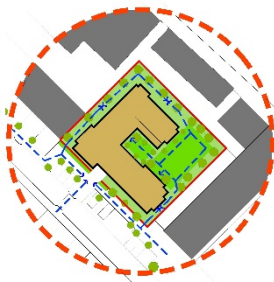
- **Site design that creates connections and engagement with community:** Provide onsite spaces and boundaries that create visual connections and engagement between the setting and the local context to minimise the sense of isolation during normal times and when sheltering in place.

- **Site layout and circulation:** Provide high quality landscaping and accessible and attractive walking routes and outdoor seating areas around the site to be enjoyed in normal times and to enable safe socialisation and exercise during a pandemic.

2. Overall building layout and circulation

- **Zones or households:** Break up larger settings into zones with staff dedicated to each area to reduce the risk of virus introduction and spread. These zones should be ideally designed as part of a 'household' approach. Where possible, provide each zone with its own entrance to minimise traffic in terms of residents, staff, and visitors. This approach will not only enhance infection control but will also improve the quality of life for residents and working conditions for staff.

- **Circulation:** During a pandemic, provide one-way or controlled circulation within the setting to allow social distancing as people move around and to allow ease of movement for people using mobility aids. Remove any clutter or equipment from circulation routes to maximise passing or social distancing space.
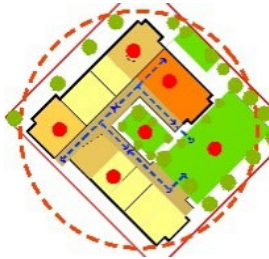
3. Key internal and external spaces

- **Maximise space for common areas**: Utilise all available space to reduce occupancy density within communal rooms and to provide space for social distancing in shared living, dining, or recreation rooms.

- **Safe visitor access and spaces**: Provide a variety of safe and comfortable internal and external visiting spaces that enable different levels of privacy.

- **Single rooms and ensuite bathrooms:** Provide single rooms and private bathrooms to minimise the spread of infection, and to allow the isolation of residents who are unwell or cocooning for vulnerable residents. Single rooms allow family visits without having to use common areas. Ideally bedrooms should have direct access to an outdoor space.

- **Staff facilities:** Provide comfortable and accessible staff rooms, changing areas, and storage space.

- **Maximise use of outdoor space:** Take advantage of the reduced risk of outdoor transmission and maximise the provision and use of outdoor spaces throughout the setting including gardens, courtyards, roof terraces and balconies.
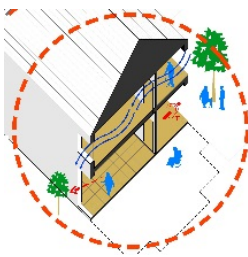
4. Elements and systems

- **Air quality and ventilation**: Throughout all internal spaces, maximise natural and mechanical ventilation to dilute and flush out airborne virus and to maintain general air quality. Use HEPA filters to clean the air and monitor air quality on a regular basis.

- **Technology:** Optimise technology to enhance resident communication with families, avail of telemedicine such as video consultations, or use devices for therapeutic activities or social interests/hobbies.

1. Site Location and Site Design

02: Pleasant and accessible urban environment to allow residents to be in and a part of the community.

1.1 Site Location, inclusion, and interaction with the community

Design considerations and awareness

While redesign or retrofit projects, which are the focus of these guidelines, cannot change the location of existing settings, careful consideration should be given to location to ensure that the setting is maximising its relationship with the community in terms of social interaction and inclusion in community life. Knowledge about the location and adjacent local community will also inform design and operational decisions around infection control and community interaction during a pandemic.

In terms of location and local community, the public realm adjacent to the setting should be pleasant, safe, and accessible, with good walking and cycling routes, and easy access to public transport for residents, staff, and visitors.

Local air pollution from transport, home heating, or commercial activities is also a local environment issue that impacts quality of life. Older people are more vulnerable to both short-term and long-term air pollution, while research shows a link between poor air quality and higher rates of COVID-19, making pollution both a quality of life and an infection control issue for existing settings.

Examining the wider location and the adjacent local environment will help inform decision making for a redesign or retrofit project through:

- Understanding and incorporating the local context and the needs and preferences of local people living in the setting in terms of design and the built environment.

- Identifying additional services that may be required within the community and including these in the redesign project if appropriate.

- Using knowledge of the adjacent built, natural, and cultural environment to inform the redesign or adaptation of the site and site boundaries (see Section 1.2 below).

While many of the issues mentioned above are outside the scope of most retrofit projects, setting owners or managers should be aware of these issues and should liaise with the local authority to highlight these issues if required, and to request local improvements. In some circumstances, where a setting is located within a larger development, the setting may have greater influence over the design, management, and maintenance of the local public realm, and should use this influence to improve the safety, accessibility, and attractiveness of the public spaces adjacent to the setting.

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- Design projects for existing settings should take account of the setting location, local context, and adjacent local environment, as part of the design process. Knowledge about the locality may help establish missing services in the community that could be potentially provided by the setting, or identify key local access routes, views, or landmarks to inform design decisions related to the boundaries or site layout.

- If local environmental conditions are substandard, settings should liaise with the local authority to request local public realm upgrades and air quality improvement measures to provide a more supportive community for the setting.

1.2 Site design

Overall Design Issues

A residential long-term care setting can take many forms, ranging from a small standalone single-storey building sitting on its own site, to a large multi-storey setting directly adjoining the public street. It might be co-located with another healthcare facility or supported housing. Therefore, the site layout of the setting will vary greatly depending on its location and site circumstances.

In the context of these guidelines where the focus is on balancing quality of life with infection control, issues around site boundaries and overall site layout are discussed.

1.2.1 Site boundaries and views: Seeing out and feeling like part of the community

Design considerations and awareness

The relationship between site boundaries, site design, and building layout, define the views from the setting to the community and can influence the resident's interaction and engagement with the locality. Ensuring that residents can 'watch the world go by' from their bedroom, sitting rooms, balconies, verandas, or from a garden will provide interest and stimulation for residents and help them connect with the community. Views to familiar or visually significant landmarks from inside or outside a building can help with spatial orientation and can also help people to orientate themselves within a setting.

Views of the community, seeing everyday activities taking place outside, and views to nature are particularly important and attractive to those who are confined indoors due to ill health. Furthermore, while residents may need to quarantine or shelter in place during a pandemic, visual access from the setting or from resident bedrooms to the community, the outside word, and nature can help to alleviate loneliness and isolation.

> **"Even in old age, there is joy, companionship, and spontaneity which, I would add, is facilitated by the material context - the places and porches - that allow the elderly to touch the world beyond."** (Granger, 2020)

Universal Design Guidance

- While privacy for certain areas or activities within the setting is important, consider how the existing site and building boundaries can be adapted to create visual connections and engagement between the setting and the local context in a safe and secure manner. This may involve lowering hedges or walls, creating boundary wall openings or 'windows' or providing railings that enable views.

- Consider how certain parts of the setting such as the entrance, internal social areas or certain outdoor spaces can be visually connected to the community through visually permeable boundaries. This may involve creating new windows or doors within external walls, and/or adapting boundaries as described above.

1.3 Site layout

Design considerations and awareness

The overall site layout determines the location and quality of outdoor spaces and also onsite circulation, access, and parking. These site issues influence both quality of life within the setting and also infection control measures during a pandemic.

A pleasant, homelike, and accessible site design encourages residents to go out and about on the grounds (walking, sitting, reading etc.), and provides an accessible and welcoming environment for staff and visitors. These site amenities are of particular importance for residents who have to shelter in place during a pandemic.

Some residents may require safe and secure external spaces with an enclosed boundary in a location that is easily supervised by staff within the setting. Trees or tall shrubs should be used to screen and soften any walls or fences that enclose this space.

Redesigning certain aspects of the site including onsite circulation, parking, and loading may support infection control measures. For instance, during a pandemic it would be beneficial to have the flexibility for separate parking and circulation areas for staff and visitors, or outdoor loading and material delivery/collection spaces.

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- Provide high quality landscaping and accessible and attractive walking routes and seating areas around the site to be enjoyed in normal times and to enable safe socialisation and exercise during a pandemic.

- Employ a Universal Design approach, including dementia-friendly design measures to ensure the site can be accessed, understood, and used by all residents, visitors, and staff.

- To facilitate enhanced infection control when required, consider how permanent and temporary site measures can be used to create site zoning to separate activities with high infection risk (e.g., removal of materials associated with infection cases) and other activities (e.g., resident movement, visitor access, etc.). It may be more appropriate that site flexibility can temporarily facilitate these measures only when required.

- Provide exterior social areas for occupants and visitors. These areas should have adequate outdoor accessible seating of an appropriate height and be fitted with backrests and armrests.

- Provide seating areas around the entrance where visits can take place without entering the building.

- Provide safe and secure external spaces with enclosed boundaries in locations that are easily supervised by staff within the setting. Trees or tall shrubs should be used to screen and soften any walls or fences that enclose this space.

Technical sketch 1: Indicative site layout

A. Consider how the existing site and building boundaries can be adapted to create visual connections and engagement between the setting and the local context in a safe, and secure manner.

B. Provide seating areas around the entrance where visits can take place without entering the building.

C. Consider how parts of the setting such as the entrance, internal social areas or certain outdoor spaces can be visually connected to the community through visually permeable boundaries.

D. Provide high quality landscaping and accessible walking routes and seating areas around the site that can be enjoyed in normal times and to enable safe socialisation and exercise during a pandemic.

E. Provide safe and secure external spaces with enclosed boundaries in locations that are easily supervised by staff within the setting. Trees or tall shrubs should be used to screen and soften any walls or fences that enclose this space.

F. To facilitate enhanced infection control when required, consider how permanent and temporary site measures can be used to create site zoning to separate activities with high infection risk (e.g., removal of materials associated with infection cases) and other activities (e.g., resident movement, visitor access, etc.).

2. Overall building layout and circulation

2.1   Overall scale and setting configuration

Design considerations and awareness

Smaller scale settings are typically less institutional, more home-like in size, are easier to relate to, and are more comfortable in terms of scale. Smaller settings often perform better in terms of infection control due to a lower resident population, less traffic, smaller common areas with lower number of occupants, and fewer challenges around accessing multiple floors.

As mentioned earlier, the 'household' model of care is based on this small-scale and homelike approach with up to 12 residents living in private ensuite bedrooms gathered around a central living, kitchen, and dining area.

03: Willow and Meadow View, St. Joseph's Centre, Clonsilla, Dublin 15: Household model providing homely dining and kitchen areas for residents

In the US, one of the most successful examples of this small-scale setting approach is the 'Green House' model. This is a trademarked model developed by the 'Green House Project' which seeks to create "…radically non-institutional elder care environments that empower the lives of people who live and work in them" (https://thegreenhouseproject.org). These settings contain 10-12 resident bedrooms gathered around a shared living, dining, and kitchen space. Nursing assistants or 'care partners' are assigned to the one small setting and have extra duties such as personal care, meal preparation and service, housekeeping,

laundry, and other activities. This allows the staff and residents to get to know each other well and reduces the movement of staff in and out of the setting.

These smaller scale, home-like models have been linked to better resident satisfaction and improved quality of life. There are also benefits for infection control due to fewer people living, working, visiting, and being admitted to these settings. Private bedrooms and ensuites have also been identified as beneficial in terms of infection control. These models may also support social distancing and isolation for infection control reasons due to design features including private bedrooms.

Technical sketch 2: Generic and hypothetical ground floor plan of a household model showing a unit with 10 ensuite single rooms organised around a central communal area and courtyard
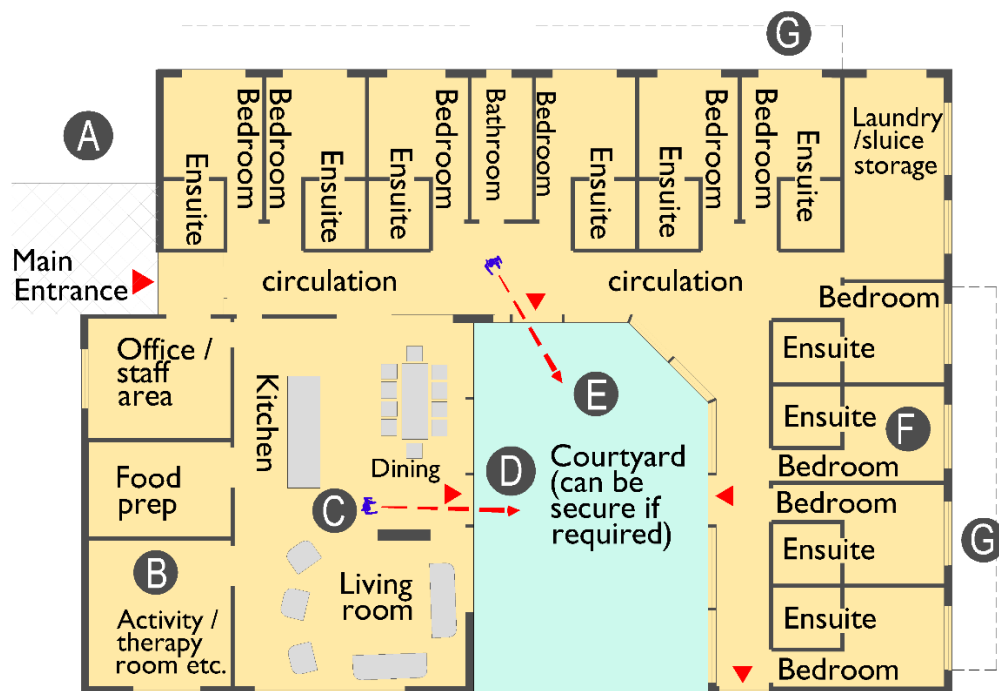
A. The household has a small number of residents (10). This reduces traffic from residents or visitors. The household also has a small number of fixed staff who do not move between units, which reduces traffic and potential cross contamination.

B. Activity room can be used as small visitor area

C. Visual and physical access to the outside from the central social area.

D. Potential for multiple exterior doors facilitate separate entrance/exit areas (i.e., one-way systems) or dedicated staff or visitor access points.

E. Easy access to outdoor areas and fresh air provides safer space for social interaction and exercise.

F. Single room with a private ensuite provides privacy and dignity, reduces risk of infection spread and makes isolation and socially distanced visits easier.

G. Depending on the context or floor level, a terrace or balconies can be considered.

For larger settings that are not divided into households or similar smaller units, the creation of separate zones should be possible during a pandemic. These should be capable of becoming independent operating areas with controlled movement between areas to reduce infection spread. In some cases, adjustable and flexible compartmentalisation within settings to enable isolation of individuals and small groups may be more appropriate.

(For information on design for dementia see Appendix A and the link to Universal Design Guidelines: Dementia Friendly Dwellings for People with Dementia, their Families and Carers).

Universal Design Guidance

- Where possible, reconfigure the layout of larger settings to create smaller, distinct, and more independent units. These may align with a 'household' or a 'Green House' approach where settings are sub-divided into 'household' units with maximum 8 to 12 private bedrooms with ensuite bathrooms in each household.

- For larger settings that are not divided into households or similar smaller units, the creation of separate and independent zones should be possible during a pandemic. However, given the benefits associated with a household approach, the permanent subdivision of larger settings into smaller units should be considered.

Technical sketch 3: Large conventional setting subdivided into households
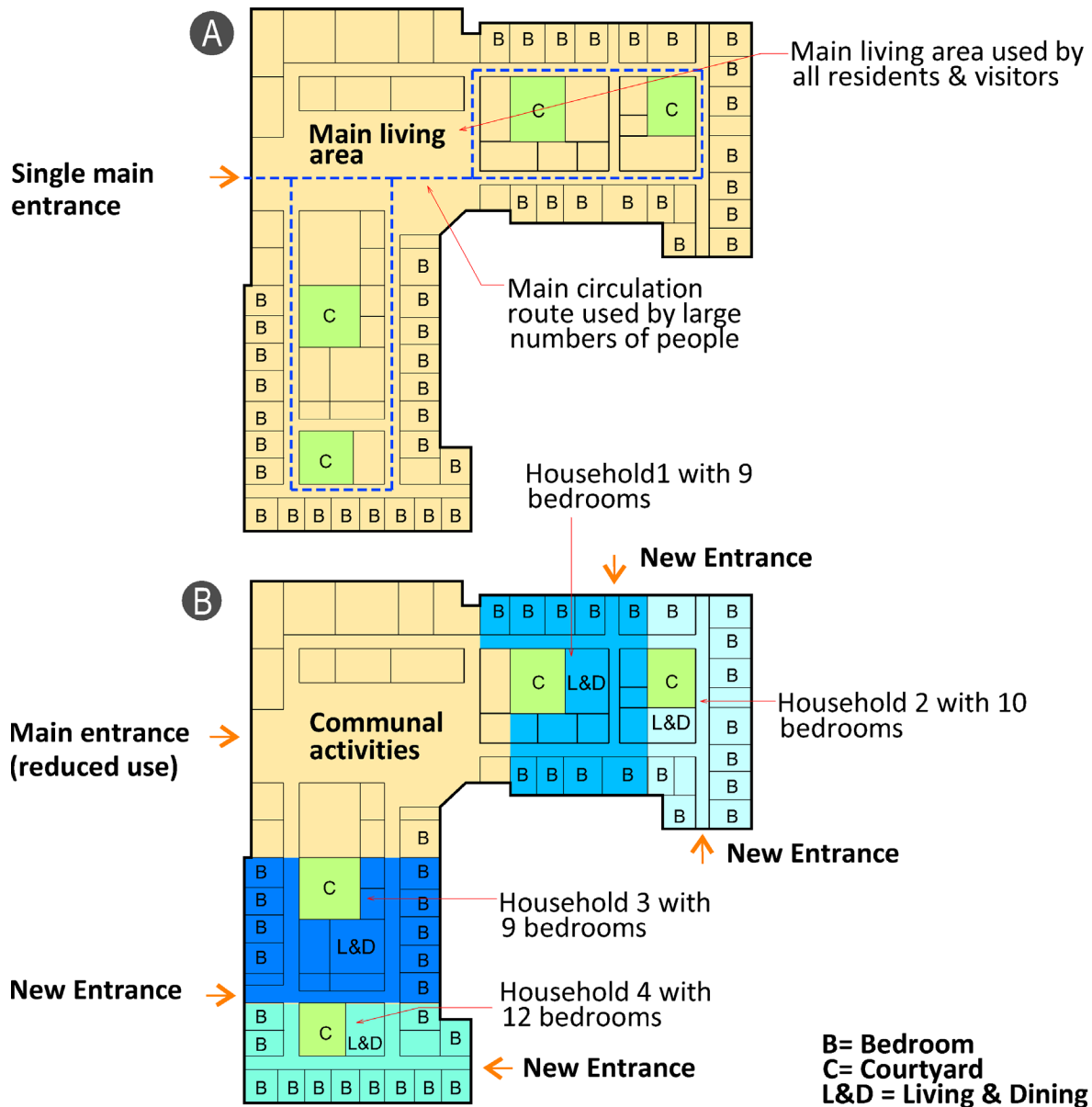
A. Large conventional setting with single entrance, one main living area, and circulation area shared by the full setting

B. Setting reconfigured to create smaller, distinct, and more independent units. These align with a 'household' approach where settings are sub-divided into 'household' units with maximum 8 to 12 private bedrooms with ensuite bathrooms in each household. Depending on the layout and internal space available, a bedroom may need to be used or a building extension may need to be added to create an adequate living and dining space for each household.

2.2 Dealing with multiple floors

04: Phoenix Care Centre, Grangegorman, Dublin 7: Residential setting using roof terraces and roof gardens to create access to outdoor space above ground level in a building with three floors (top image shows an aerial view of the building while the bottom image shows one of the ground floor courtyards).

Design considerations and awareness

Larger settings such as multi-storey buildings present a greater risk for increased isolation for residents during COVID-19. For instance, for residents on upper floors, window visits or socialising in gardens or other outdoor areas is more difficult to achieve. Similarly, room visits by family members to residents on upper floors can be more difficult in multi-storey buildings as visitors typically have to enter the main building and use stairs or lifts.

For existing multi-storey settings, examine how rooms on upper floors which do not access meaningful outdoor space can be retrofitted with balconies or provided with access to a roof terrace. Where this is not possible consider how existing windows can be altered to provide at least 'Juliet balconies' that would give the resident greater exposure to outside when desired.

Universal Design Guidance

- In existing multi-storey settings, consider how balconies or roof terraces can be retrofitted to provide residents with access to outdoor space on upper floors.

- Where this is not possible consider how existing windows can be altered to provide a 'Juliet balcony' or a 'balconet' This is when a railing or balustrade is fitted to the outside of a full-length window or door on an upper floor, to take the form of a balcony.

- Access to upper floors for visitors should be facilitated through spacious and well-ventilated circulation routes, ideally without having to travel through parts of the main building frequently used by residents. This may involve an internal fire stair, external stairs, or some form of balcony access.

2.3   Access and circulation

2.3.1 Horizontal circulation

Design considerations and awareness

The household approach as described above typically has its own entrance and independent circulation area that only serves a small number of residents. This configuration has benefits for both quality of life and infection control.

For settings that are not divided into households, any separate and independent zones put into place during a pandemic should have dedicated circulation systems (e.g., entries and exits), separate routes for services and waste collection, and independent air-conditioning or ventilation systems. Physical partitions between these zones may be necessary during a pandemic, and space to store the materials for these partitions should be considered in any retrofit projects.

Where achievable, one-way, or controlled circulation within settings to allow social distancing, or to allow the separation of visitors from residents as an emergency action during a pandemic, may be beneficial in some settings. It is also important to remove any clutter or equipment from circulation routes to maximise passing or social distancing space. For projects that involve the construction of new circulation areas or the adaptation of existing corridors, additional width for social distancing, increased natural ventilation through openable windows or increased mechanical ventilation should be considered.

Finally, the length of circulation routes such as corridors should be kept to a minimum and double-loaded corridors (rooms on both sides) should be avoided as much as possible as

these can create a monotonous and institutional environment. Where long corridors or lengthy circulation distances exist, accessible and comfortable seating should be provided at appropriate intervals. If there is sufficient space, these seating areas can become small social areas marked with a distinct colour, artwork, or planting.

05: Ofalia House, Edenderry, Co. Offaly: Corridor with direct views to garden and small social area with comfortable seating.

Universal Design Guidance

- Where settings are permanently divided into households or temporarily divided into zones, ensure these households or zones have independent entrances and exits, dedicated circulation routes, separate routes for services and waste collection, and independent air-conditioning or ventilation systems.

- Where required and achievable, implement one-way or controlled circulation to allow social distancing or to allow the separation of visitors from residents as a short-term, emergency action during a pandemic.

- Remove clutter or equipment from existing corridors to maximise passing and social distancing space.

- For projects that involve the construction of new circulation areas or the adaptation of existing corridors, the provision of spacious corridors with additional width for social distancing, increased natural ventilation through openable windows, or increased mechanical ventilation should be considered. This additional width is also beneficial for residents using mobility aids.

- Avoid long or double-loaded corridors and provide seating at appropriate distances within long corridors or lengthy circulation routes.

2.3.2 Passenger lifts

Passenger lifts can present a challenge in multi-storey settings due to the confined space of a typical lift and the limited opportunities for ventilation. For existing lifts, measures to improve natural and mechanical ventilation should be considered.

Universal Design Guidance

- Reset the timing on existing lift doors so they remain open for a longer period to help flush air out of the lift car.

- Increase of the lift's mechanical ventilation capacity by increasing the Air Changes per Hour (ACH) to above 20 ACH by adjusting or reprogramming the lift ventilation.

- Ensure the ventilation in lifts in an idle position remains on for an appropriate length of time rather than shutting down automatically when the lift is in an idle position.

- Reverse the flow direction of the ventilator, creating a unidirectional downflow of fresh or filtered air (e.g., HEPA filtered) from the ceiling towards the floor of the lift car.

Technical sketch 4: Indicative building layout showing access and circulation within a reconfigured setting
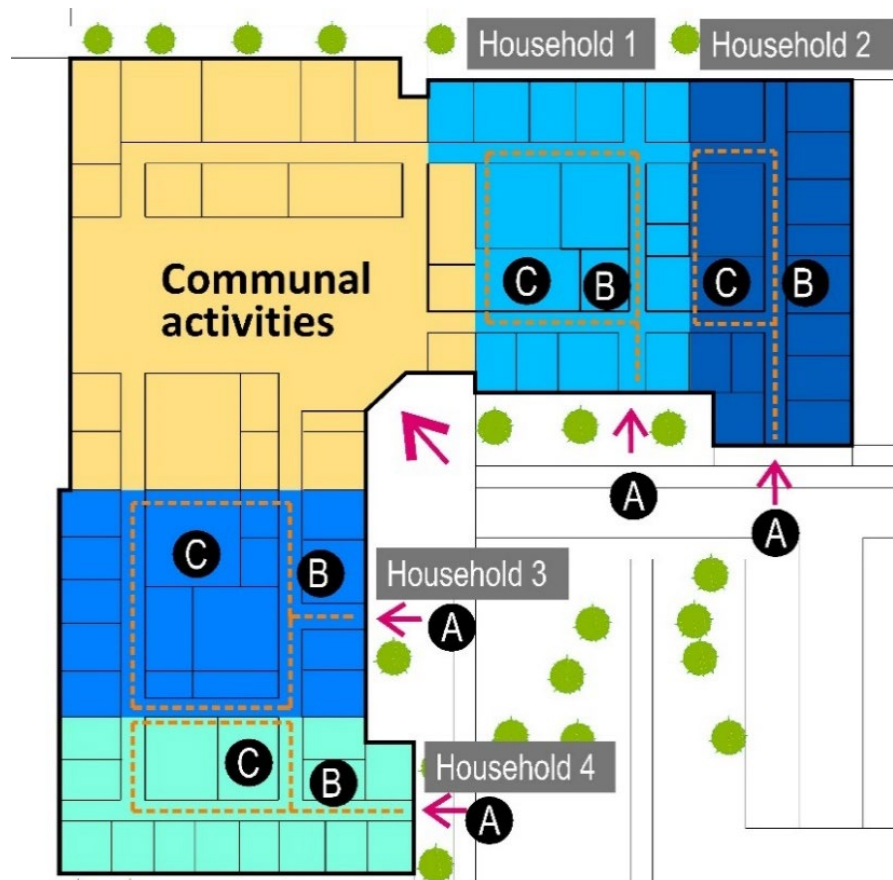
A. Households with independent entrances for visitors and staff. This indicative layout demonstrates how someone can enter a household without having to travel through a main entrance or circulation area. Residents may need to pass through sections of an adjacent household to get to the main common area, but during a pandemic they can stay within their own household or access the communal area by going outside and entering through the main front entrance. In these circumstances, consider covered external routes or sheltered walkways.

B. Dedicated circulation routes for each household mean that visitors and staff can restrict their movement to one household. (See note A above for outline of resident movement and access to the central communal area).

C. Household living and dining areas. Depending on the layout and internal space available, a bedroom may need to be taken over or a building extension may need to be added to create an adequate living and dining space for each household.

3. Key Internal and external spaces

06: Residential setting where a bedroom has direct, level access to a small outdoor space and also to the overall garden

Overall considerations

A typical RLTC setting will include a range of key spaces such as bedrooms, ensuite bathrooms, sitting rooms or central living spaces, dining areas, kitchens, shared toilets along circulation routes or adjacent to common areas, and specialised spaces such as therapy and treatment rooms. The design and quality of these spaces is important for overall quality of life.

As outlined previously, household models that create smaller, compact settings can be more supportive for residents, moreover, the provision of homelike environments and greater levels of privacy are linked to improved quality of life. These settings emphasise positive relationships with other residents, such as visiting each other's rooms, and participation in meaningful activities. In this regard, creating more homelike spaces that balance social interaction with privacy are crucial for successful setting design.

Note: See Technical Sketch 2 (p. 21) for a Generic and hypothetical ground floor plan of a household model

(For information on design for dementia see **Appendix A** and the link to Universal Design Guidelines: Dementia Friendly Dwellings for People with Dementia, their Families and Carers).

3.1. Bedrooms

07: Bedroom in St. Brendan's Community Nursing Unit, Loughrea.

Design considerations and awareness

Private rooms with ensuite toilet and bathroom/shower room are linked to quality of life, improved infection control, and can be used to isolate confirmed or suspected cases of COVID-19, and to facilitate visitors. The quality of these rooms is important and therefore size, good natural light and ideally access to a private outdoor space or balcony would improve the experience for the resident, visitor, and staff.

Given the diversity of care needs, the progressively high levels of care required in many settings, and the aspiration to support individual residents as their care needs evolve, bedrooms should be provided with ceiling mounted hoists to assist in the movement of residents from their bed and assist in transfer to the bathroom.

To provide flexibility in terms of medical care, consideration should be given to the installation of an integrated gas supply system in the headwall of each bedroom to provide connections for various gases such as oxygen, if required.

Universal Design Guidance

- Provide spacious single bedrooms with a private ensuite bathroom/shower room for all residents where possible.

- Rooms should be large enough to provide spaces for care services and spaces for staff disinfection and hand sanitation inside and outside these rooms and related equipment.

- Ideally bedrooms should have a small sitting area and kitchenette that would allow more autonomy, independence, and flexibility to support family members to spend time with residents and to facilitate the hosting of visitors.

- Bedrooms should be provided with large windows with good views to the outside. These windows should have a low-level sill to provide views outside when seated or in bed.

- Ideally bedrooms should have direct access to a private outdoor space in the form of a terrace or balcony.

- Good ventilation is critical to reducing the transmission of COVID-19 in indoor spaces, therefore all bedrooms and bathrooms should be well ventilated to help with infection control and improve air quality.

- Provide ceiling mounted hoists to assist in the movement of residents from their bed and transfer to the bathroom.

- Consider the installation of an integrated gas supply system in the headwall of each bedroom to provide connections for various gases such as oxygen.

- Provide technology to enhance resident communication with families, to avail of telemedicine such as video consultations, and engage with various therapeutic activities from listening to music to using Virtual Reality or Augmented Reality devices.

3.2. Common rooms: Living and dining rooms

08: St. Brendan's Community Nursing Unit, Loughrea, Co. Galway: Day room and dining room

Design considerations and awareness

The success of the 'Green House' model demonstrates the value of a central, shared, domestic-scale communal area composed of a living area, and an open kitchen and dining area, collectively called a 'hearth'. Meals are prepared in the open kitchen by caregivers and shared at the common kitchen table. This shared area is typically connected to an enclosed space, where in the more successful settings the doors are left unlocked, and the outdoor space is used for activities and socialising.

As a result of COVID-19, many settings restricted access to common areas or shared living areas and this was very isolating for residents, therefore a balance must be struck between social engagement, communal activities, and infection control. To achieve this, it may be necessary to change layouts or reduce seating in shared spaces to facilitate social distancing or provide outdoor seating and exterior social areas for occupants and visitors. As emphasised previously in this document, good ventilation is critical to reducing the transmission of COVID-19 in indoor spaces and therefore all living, kitchen, and dining areas should be well ventilated using natural and mechanical means.

While some settings may need to zone or group patients, it is still important to ensure there is safe walking space and access to a common area, especially for residents with a cognitive impairment who may 'walk with purpose'.

Universal Design Guidance

- Consider changing layouts or reducing seating in shared spaces to facilitate social distancing.

- All living, kitchen, and dining areas should be well ventilated using natural and mechanical means.

- Provide exterior social areas for residents and visitors. These areas should have adequate outdoor seating that are an appropriate height and fitted with backrests and armrests.

3.3. Dedicated visitor spaces

Design considerations and awareness

One of the most challenging aspects of COVID-19 related restrictions in settings is the curtailing of visitors. This is compounded by settings that only have a single, centralised living area to host visitors. During a pandemic the use and sharing of these spaces among multiple visitors and residents is often not feasible. Furthermore, residents and family members often lament the lack of privacy in these areas and the noisy nature of such shared spaces. In response to COVID-19 some settings converted offices, storage areas, or other spaces to dedicated visiting rooms for small groups or single visits.

Where residents have their own bedroom, visits can take place there, but in some situations and in relation to certain visitors, this may feel like an invasion of a person's privacy. For instance, you wouldn't visit a friend or a neighbour in their bedroom.

Using outdoor spaces, particularly covered outdoor spaces such as verandas or garden shelters can also provide valuable visiting space, but the weather or the frailty of a resident may not always permit this.

Overall, the COVID-19 pandemic has highlighted the need for more numerous and varied visitor spaces within settings to handle different kinds and numbers of visitors at different levels of privacy. Again, as with all spaces, these visiting areas should be spacious enough for social distancing and well ventilated.

Universal Design Guidance

- Provide more numerous and varied visitor spaces within settings to handle different kinds and numbers of visitors at different levels of privacy. This may involve converting existing rooms, subdividing common areas, or building on new visitor spaces.

- All visitor areas should be spacious enough for social distancing and well ventilated.

- Provide a range of open and sheltered outdoor visiting areas in gardens or courtyards, or on balconies or roof terraces. Within these spaces provide a variety of open areas and seating and covered areas such as verandas or garden shelters (see outdoor space below).

3.4. Staff areas

Design considerations and awareness

COVID-19 also takes a considerable toll on staff, and they should be provided with spacious, well ventilated, and comfortable staff rooms with adequate changing and hygiene facilities. These should have the flexibility to be segregated further as part of a pandemic preparedness approach.

Ideally staff should have access to respite areas which include access to natural light and nature, given the challenges posed by COVID in the context of mental health.

Universal Design Guidance

- Provide spacious, well ventilated, and comfortable staff rooms with adequate changing and hygiene facilities.

- Provide staff respite areas that include access to natural light and nature, given the challenges posed by COVID in the context of mental health.

3.5. Outdoor space

09: Residential setting with well-designed outdoor space that provides a combination of large and small social areas, and covered seating area with direct access to the main day room. (This photograph was taken prior to COVID-19)

Design considerations and awareness

Outdoor spaces provide direct access to nature which is crucial to quality of life for residents living in RLTC settings. They also provide space to exercise, fresh air, and exposure to the sun which can provide a natural boost for vitamin D. Specific to people with dementia, this access to outdoor space and gardens is crucial to their health and

wellbeing in terms of socialising, as therapy, and as a break from the internal setting.

If the outdoor space is readily accessible and safe, it makes it easier for residents to go outdoors independently, to enjoy nature, socialise, or carry out gardening. All of these activities have been shown to be therapeutic for people with dementia in particular and are therefore an important part of design for dementia.

As discussed previously, there is good evidence to show that outdoor spaces are considerably safer in terms of infection risk. As a result, the creation of safe and accessible outdoor space for activity, exercise, and social interaction is critical for infection control in RLTC settings.

COVID-19 has highlighted the value of outdoor visits, but these visits require a safe, comfortable physical location where a resident can be brought to meet with family, while maintaining physical distance from others outdoors.

Universal Design Guidance

- Provide centrally located, high quality outdoor spaces or gardens to support quality of life and infection control.

- Despite being outside, it is still important to consider good ventilation in all outdoor areas, especially in relation to any covered outdoor seating areas.

- Provide safe, comfortable, and accessible locations where a resident can be brought to meet with family, while maintaining physical distance from others who might also be using the space.

- Provide sheltered external spaces with heaters for the colder months.

- Well-designed balconies and roof terraces on upper floors can provide many of the same benefits as a ground level garden including access to fresh air, daylight, and views, and contact with nature. These spaces become even more important if a patient who is located on an upper floor or is unable to travel to or access a ground level garden due to illness, frailty, delirium, or infection control.

4. Internal Environment, Elements and Systems

4.1. Internal environment

4.1.1 Ventilation

10: Windows that can be partially opened for trickle ventilation or fully opened to perform purge ventilation.

Design considerations and awareness

Ventilation and air quality are critical to the wellbeing of older people in long term care settings. Openable windows should be used to provide natural ventilation, and fresh air can improve well-being. The overall building and the design of the windows should be carefully considered where high noise level, pollution or dust levels may be a potential problem.

As discussed throughout this document, airborne transmission is one of the main infection routes for COVID-19, therefore air quality and ventilation are crucial. In addition to high quality natural and mechanical ventilation, the use of portable high-efficiency particulate air (HEPA) filters will help to remove infected aerosols from the air.

Monitoring poor ventilation using CO_2 (carbon dioxide) monitors to ensure that CO_2 levels in a room are maintained below an agreed level (typically 600ppm) is an important part of a ventilation and air quality strategy.

11: HEPA filter.

Universal Design Guidance

- Increase natural ventilation to dilute the virus in the air and help extract it outside. For existing settings this may simply involve opening windows or making sure passive wall vents are open. It may also involve retrofitting openable window sections or installing new passive wall vents.

- Perform purge ventilation at regular intervals to air out the rooms. Purge ventilation is the introduction of intermittent, rapid ventilation to a room, usually by opening all windows and doors, and therefore should be easily achieved in all existing settings. It may be better to do this when the room is unoccupied.

- Where existing settings have mechanical ventilation systems, make sure they are fully serviced and operating at optimum capacity. Ensure fresh air is being drawn in from outside; a system that recirculates air from one place to the next may not be safe and may need to be adapted to use fresh air.

- Existing mechanical ventilation systems should be adjusted to extend the operating times to before and after people use the spaces, they should also be reprogrammed to maximise fresh air intake.

- Where possible, fit high-efficiency particulate air (HEPA) filters in the mechanical ventilation system.

- Monitor poor ventilation and low humidity with CO_2 (carbon dioxide) monitors to keep CO_2 below 600ppm. These are reasonably priced and readily available and can be placed in each room or carried from room to room as part of intermittent monitoring.

- Use portable air filters in the bedrooms of residents with COVID-19, (portable high-efficiency particulate air (HEPA) filters) to help remove aerosols from the air. Many domestic type filters are equipped with H13 HEPA filters capable of filtering 99.97% of particles at a clean air delivery rate of 467 m3 per hour on the highest fan speed setting. These portable filters are small-scale freestanding units that can be easily removed when not required.

4.1.2 Room temperature and humidity
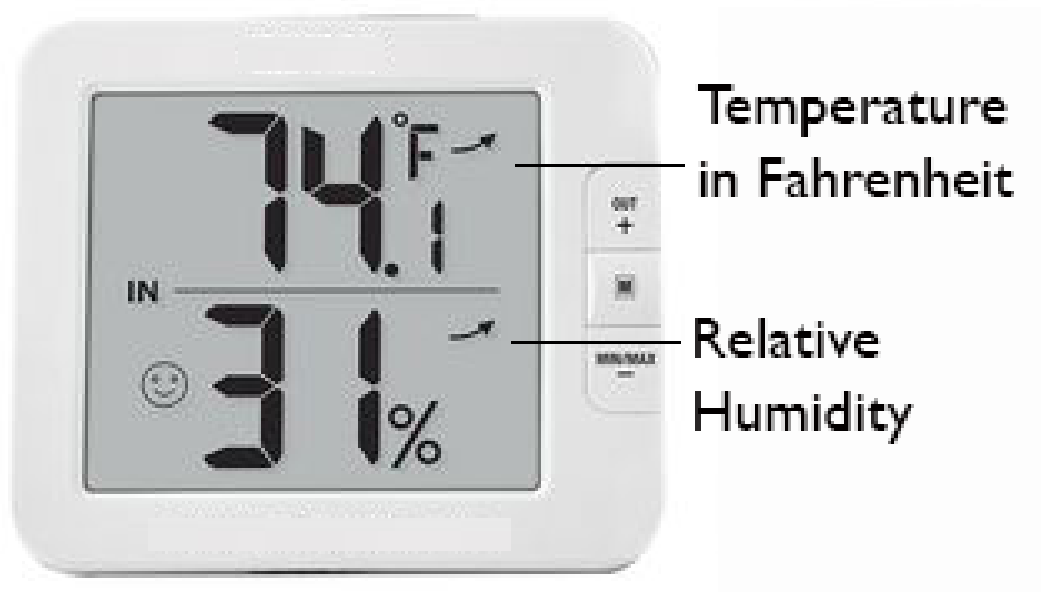
12: Portable Hygro-Thermometer to measure temperature and humidity

Design considerations and awareness

Comfortable temperatures are associated with quality of life among residents; however, the research shows that there are health issues associated with dry, over-heated environments, and that settings often tend to be too warm. These conditions can exacerbate health issues with dehydrated people in dry over-heated environments where the virus can linger.

Furthermore, studies have found that the spread of pathogens and viruses can be facilitated in cold and dry conditions. An indoor relative humidity between 50 and 60% is suggested to reduce the risk of spreading airborne-infectious diseases.

Universal Design Guidance

- Cold and excessively dry conditions may be problematic in terms of COVID-19; therefore, it is advisable to have warm indoor temperatures (while maintaining comfortable conditions) and an indoor relative humidity at approximately 50%. Relative humidity can be monitored using readily available and economical air quality meters.

- Where humidity is too low it can be increased with portable vaporisers or humidifiers, or by simply bringing bowls of water into the room for evaporation.

- Introducing leafy plants (e.g., Spider or Jade Plants) to a room can also increase humidity through evaporation and evapotranspiration from the plant leaves.

- Increased natural or mechanical ventilation, or portable dehumidifiers, can be used where humidity levels are too high.

4.2. Finishes, materials, and fittings

13: Timber automatic opening doors providing an attractive domestic appearance.

Design considerations and awareness

As discussed in the introduction, the transmission of COVID-19 through surface contact is now considered to be lower risk. Therefore, self-disinfecting surfaces, fittings or furnishings containing materials with antimicrobial properties are not a priority in these guidelines.

Nevertheless, frequent cleaning and disinfection of surfaces may help reduce secondary airborne transmission as well as prevent the spread of other infections. Technological infection controls such as UV germicidal irradiation, and the cleaning of surfaces using vacuums with HEPA filtration should also be considered.

Furthermore, while the benefit of automatic sensor taps, automatic opening doors, and other 'no touch' features may be marginal in terms of COVID-19 infection control, these features have benefits in terms of accessibility for a wide range of setting users.

Finally, finishes, materials, and fittings should strike a balance between being homely, accessible, easily cleaned and easily disinfected. The use of finishes and colour is a critical part of RLTC design in terms of creating a domestic environment and also supporting orientation and wayfinding. (For more information on orientation and wayfinding in the context of dementia see **Appendix A** and the link to Universal Design Guidelines: Dementia Friendly Dwellings for People with Dementia, their Families and Carers).

Universal Design Guidance

- Finishes, materials, and fittings should strike a balance between being homely, accessible, easily cleaned and easily disinfected.

- Consider how the use of automatic sensor taps, automatic opening doors, and other 'no touch' features can help with infection control and accessibility.

4.3. Technology

4.3.1 Technology for communication
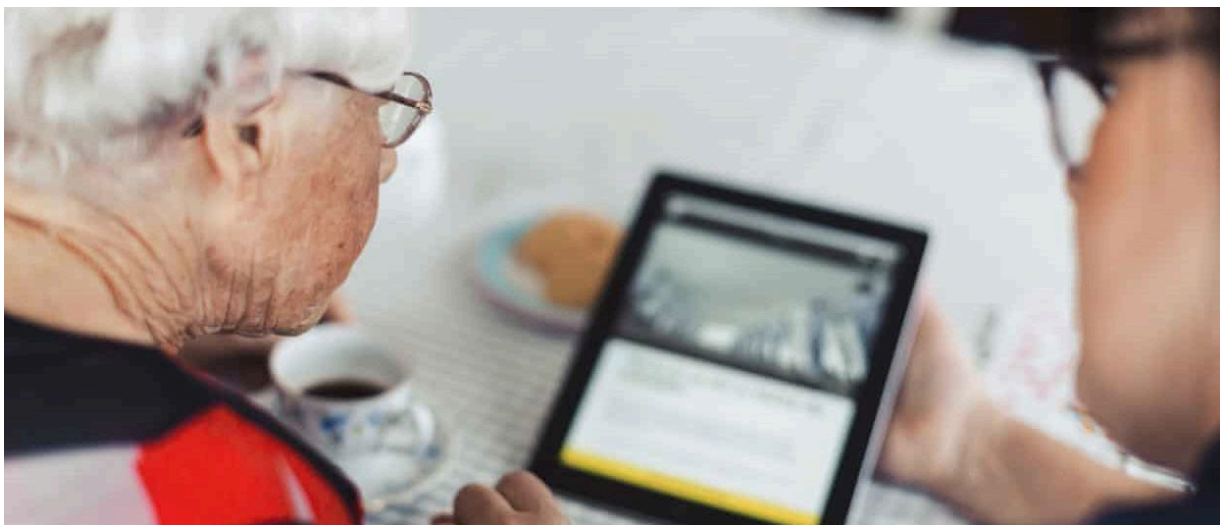
14: Older couple using a tablet

Technology can assist in social networking that enables residents to communicate with friends and family who are not able to visit on a regular basis. Furthermore, considering that the secondary impacts of COVID-19 include isolation, loneliness, stress, and lack of engagement with family and friends, information, and communications technology (ICT) has been promoted as a way to mitigate at least some of these impacts.

Universal Design Guidance

- Ensure building structure and materials facilitate Wi-Fi technologies.

- Ensure use of technology such as silent staff call systems to reduce noise within settings.

- Ensure technology is accessible and usable by all residents including those with physical, sensory, or cognitive disabilities.

- Where possible, encourage residents to use their own technologies (such as smart phones and tablets) that they are familiar with.

4.3.2 Technology for healthcare

Design considerations and awareness

Technology can help residents access healthcare that may not be otherwise available during isolation or quarantine. Furthermore, the use of technology, in particular platforms that support remote audio and video assessment of patients can reduce infection risk by reducing foot fall into the setting.

Healthcare technology is always evolving, and new innovations include robotic telepresence where remote controlled mobile robotic devices allow doctors to interact with staff or patients from a distance. While this may be beneficial and effective in terms of delivering medical care, careful consideration should be given to how such technology will be perceived by a person with dementia.

Universal Design Guidance

- Ensure desktop computers, laptops, tablets, or smartphones are available to support remote audio and video assessment of patients by healthcare professionals. Consider which device is the most appropriate to use depending on the resident's needs and preferences.

- While Wi-Fi may be suitable for many technologies, the provision of CAT 6 ethernet cables will ensure a stronger and more reliable connection, which may be vital during important health assessments, as well as during periods of high demand (e.g., during pandemic lockdowns when residents can only engage with the outside world through technology).

4.3.3 Therapeutic technology

15: Older woman wearing a VR headset.

Design considerations and awareness

The 'Snoezelen' room concept provides an example of how technology can provide therapeutic spaces in RLTC. This is a room where multi-sensory stimulation is achieved through visual effects using water columns, fibre-optic cables, mirror balls, screen projectors, video, interactive projection systems; sound effects through musical selections; tactile stimulation using vibrating water beds, and olfactory stimulation using aromatherapy equipment. Research shows multi-sensory stimulation to be an appropriate and effective therapy for people with dementia. Such therapeutic spaces may also prove beneficial during stressful and isolating events such as a pandemic.

Augmented reality (AR) is an enhanced version of the real-world that is achieved through the overlay of digital elements (e.g., visual images or sound), typically delivered via an AR headset. Users can see images that blend both real-world elements and virtual elements that have been introduced by the headset. Using an AR headset could provide relaxing experiences within their own environment.

Virtual reality (VR) is a computer interface that allows a user to become immersed in a computer-generated environment in a naturalistic fashion, typically using a VR headset. A VR headset could provide the resident with immersive experiences, ranging from connecting with loved ones in a common simulated space to visiting environments not otherwise accessible (e.g., a music concert or a nature expedition that could include interaction with virtual animals).

The provision of these technology-based amenities and social contacts for older patients isolated in settings, may potentially decrease their sense of loneliness, and increase their self-perceived health. However, careful consideration should be given to the use of such technologies by people with cognitive or sensory impairments as an immersive experience could potentially be disorientating or distressing.

Universal Design Guidance

- Ensure building structure and materials facilitate adequate Wi-Fi technologies

- Provide facilities to allow residents the choice to listen to music or the radio.

- Consider augmented reality (AR) and virtual reality (VR) technologies where appropriate and desired by the resident, bearing in mind that such technologies may be disorientating for some residents with cognitive or sensory impairments.

Universal Design Guidance

5. Appendices

Appendix A – Links to research and further information

Universal Design for Improving Quality of Life and Enhancing COVID-19 Infection Control in Existing Residential Care Settings for Older People: Research Report https://universaldesign.ie/built-environment/residential-long-term-care-settings-for-older-people-/

Universal Design Guidelines: Dementia Friendly Dwellings for People with Dementia, their Families and Carers: https://universaldesign.ie/built-environment/housing/dementia-friendly-dwellings/

Research on Dementia and Home Design in Ireland: https://universaldesign.ie/built-environment/housing/housing-research/

Age-Friendly Homes: https://agefriendlyhomes.ie/

Appendix B – Links to useful organisations (in alphabetical order)

Age Action: https://www.ageaction.ie

Age Friendly Ireland: https://agefriendlyireland.ie

All Ireland Gerontological Nurses Association (AIGNA): https://www.aigna.ie

Centre for Excellence in Universal Design at the National Disability Authority: https://universaldesign.ie

Health Services Executive (HSE): https://www.hse.ie

Irish Association of Directors of Nursing and Midwifery (IADNAM): https://iadnam.ie

Nursing Homes Ireland: https://nhi.ie

Sage Advocacy: https://www.sageadvocacy.ie

Tallaght University Hospital: https://www.tuh.ie

Appendix C- Key References

For the source material that underpins these guidelines see project related 'Research Report' listed above.

CDC 2021. Science Brief: SARS-CoV-2 and Surface (Fomite) Transmission for Indoor Community Environments.

GRANGER, W. 2020. *Viewing, Watching, Observing: Aging and the Architecture of Intermediate Space* [Online]. PLATFORM. Available: https://www.platformspace.net/home/viewing-watching-observing-aging-and-the-architecture-of-intermediate-space [Accessed 22-08 2020].

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