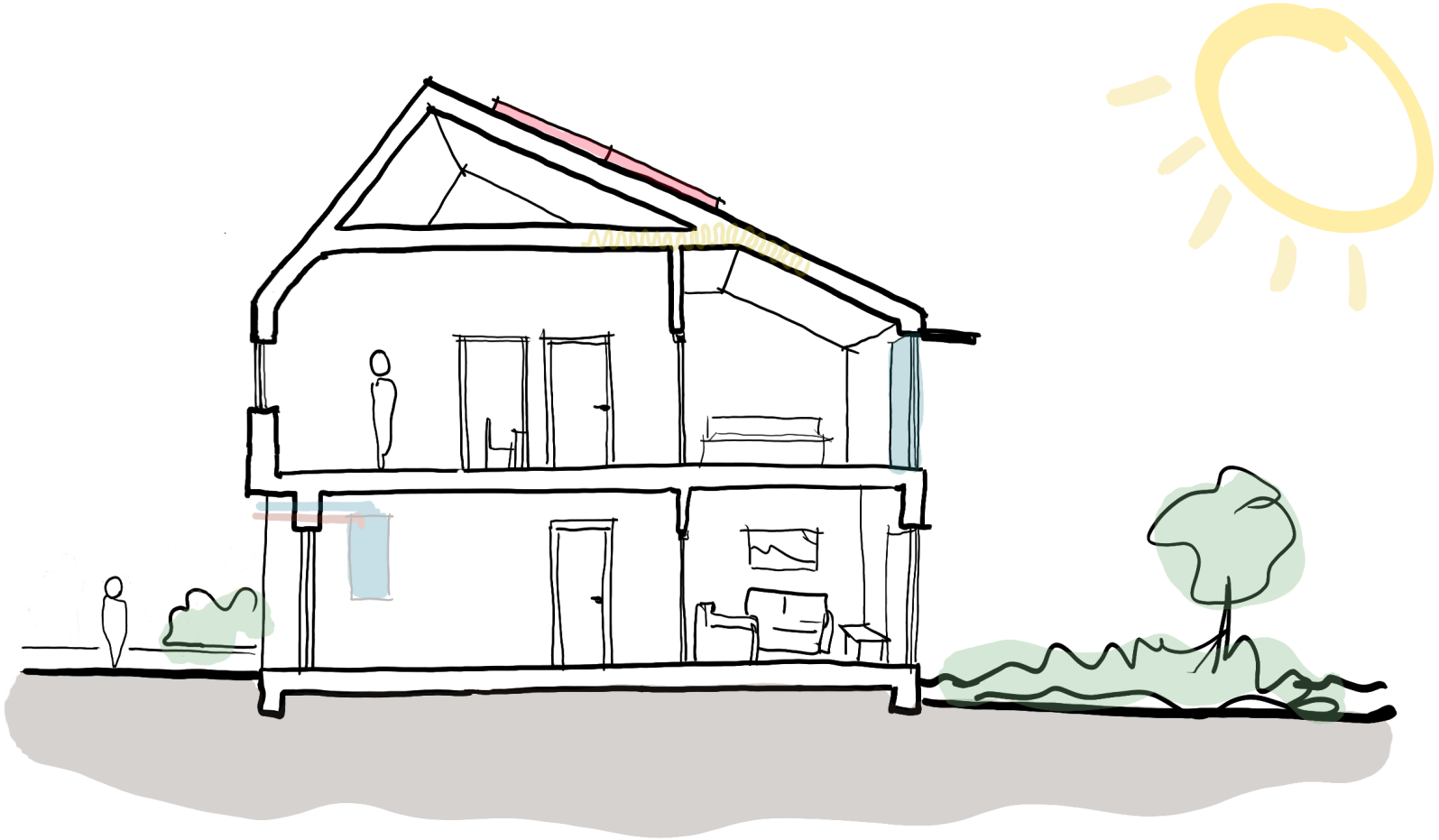
Sustainable, Inclusive Homes

A Net Zero Carbon Design Guide

Perth & Kinross Council

November 2023



This document has been prepared by Perth & Kinross Council in association with ECD Architects.

I welcome the new PKC 'Sustainable, Inclusive Homes' Design Guide which will help deliver aspects of our new Local Housing Strategy 2022-2027. The LHS sets out what homes and communities should look like over the next five years across Perth and Kinross for all residents and communities.

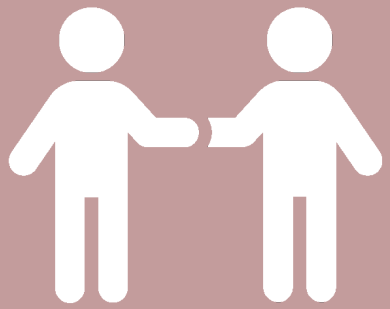
This new Design Guide supports the LHS vision of creating liveable and sustainable places which are well designed, safe, and connected. It outlines best practice in developing suitable, affordable and energy efficient housing design. The Guide incorporates a range of recommended features which will ensure new build homes can meet the individual needs of each household, and are well connected to local services, jobs, and communities.

I encourage the use of this Design Guide for all those involved in the planning and design of our communities and I look forward to seeing these new homes delivered across Perth and Kinross to ensure people can have the right housing in the right place and at the right cost.

- Councillor Tom McEwan, Convener Housing and Social Wellbeing Committee

Contents

Figure 1



01

Introduction

1.1 Our Vision

“Everyone in Perth and Kinross has access to the right home, in the right place and at the right cost.”

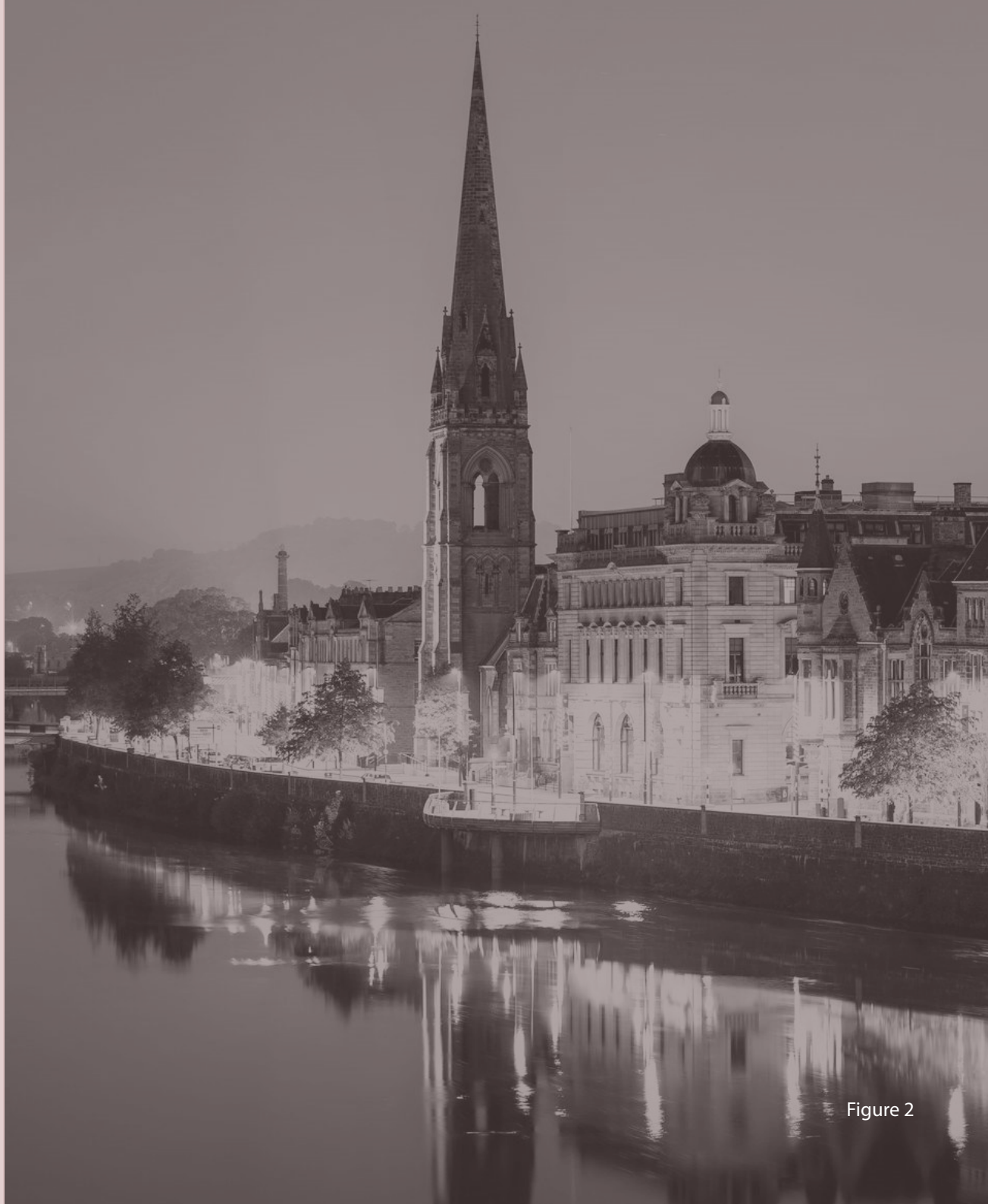


Figure 2

Aspirations

Our Priorities

- Providing more affordable homes to support liveable and sustainable communities.
- Providing a range of housing options that people can easily access, afford and keep.
- Delivering housing for people with varying needs.
- Delivering quality homes with affordable warmth, zero emission and SMART technology.

Aspirations

There is a significant role to play in ensuring new housing and retrofits adopt and achieve the highest possible standards of energy efficiency, low carbon and Net Zero building design.

PKC are committed to a sustainable future. We embrace the pathway to net zero by 2045. The reduction of emissions through mitigation measures, climate resilience and projects is the most important means of reducing our environmental impact and associated costs.

The Climate Change (Emissions Reduction Targets) (Scot land) Act 2019 set legally binding targets for us to achieve net zero greenhouse gas emissions by 2045, with interim targets requiring a 75% reduct ion by 2030, and 90% by 2040.

The Scottish Government has set out ambitious targets for emission reductions, and energy strategy, along with proposed programmes and legislation to enable the delivery of these ambitions.

The Scottish Government's recently published twenty-year vision for housing, Housing to 2040, sets out the commitment to adapt and retrofit existing homes to improve their energy efficiency and decarbonise their heating, highlighting housing's contribution to ending climate change emissions.

The Heat in Buildings Strategy also set out a consistent vision for zero emissions homes and near-term actions that can be taken to help drive forward progress, requiring all new builds to incorporate zero emission heating systems from 2024. and homes delivered by Registered Social Landlords and local authorities to be zero emissions homes by 2026.

There is no single technology that will deliver zero emissions heating in Scotland. The most cost effective pathway will require several different approaches.

1.2 Design Guide Purpose

Purpose

The purpose of the design guide is to ensure that the homes we are designing and building are of the highest quality, incorporating best practice design with low economical and operational costs enabling those who live in them to enjoy a high quality home environment regardless of age, ability, health or tenure at an affordable price.

Who is it for?

This document is intended for use by consultants, developers, contractors,housing professionals, RSL's and other affordable delivery partners involved in the design and construction process of affordable housing developments for Perth & Kinross Council.

By bringing together good practice, this guide outlines an exemplar minimum design standard with a highly sustainable approach for all new build affordable housing and neighbourhoods across Perth and Kinross.

What should it achieve?

- High quality, affordable homes for life
- Safe and Secure environments
- Sustainable and resilient communities
- Improved levels of energy efficiency
- A reduction in CO2 emissions
- Value for money
- Increased tenant satisfaction
- Whole building life ease of maintenance
- Innovative and modern building technology

1.3 How To Use

How to use the guide

This Design Guide is presented in a format which allows the basis of decision making in the development design process. Any specific requirements for individual projects will be highlighted within a separate Project Brief which will be passed to the Design Team.

The design and specification of each project will be appraised and approved separately by the Council. If any requirements set out in the Guide cannot realistically be met due to specific site constraints the designer must highlight these to the Council and seek agreement on how to proceed.

The guide specifies requirements for a range of user groups (general needs and wheelchair users) and tenures (social rent, mid-market rent and housing for sale).

Supplementary guidance may be issued in addition to the requirements within this guide, for example when design for occupants with specific needs such as housing for the elderly where designing for dementia may need to be considered or specialist accommodation is required.

The Design Guide is to be used as the reference base for all types of procurement, including traditional, design and build (D&B) and partnering ventures, and for all tenures including social rent, mid-market rent and housing for sale.

For D&B projects and partnering ventures the guide is to be included as part of the Employer's Requirements but edited to exclude criteria which do not apply to that particular project.

Similarly, where there is a contractor's design portion within a project which is part of the traditional procurement process, the guide must form a framework for establishing requirements to which specialist contractors should design. This may involve edited parts of this document being presented as part of the Employer's Requirements for the relative portion.

The council has prepared a model 'Employers Requirements' which will be used alongside this Guide

The Design Guide forms part of the Council's development performance criteria to which consultants, developers and contractors must comply. Other key documents include the Council's Health and Safety Policy and Equal Opportunities Policy.

The inclusion of any statement in the guide does not relieve consultants, developers or design contractors of any liability under appointment or contract.

2.0 Policies & Parameters

2.1 Funding

2.2 Policies

Figure 3

02

Policies + Parameters

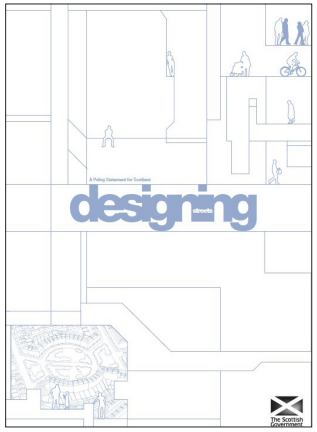
2.1 Funding

The acquisition of land and buildings, professional fees, building costs and other capital costs are partly funded by the Scottish Government, who lay down design standards and cost benchmarks as well as funding mechanisms through More Homes Division Scotland Guidance notes. The remaining costs are financed through Council funding and prudential borrowing.

When applying for grant assistance to deliver affordable housing, councils and RSLs are required to self-certify that the amount of funding that they are requesting is the minimum required for a project to be financially viable for their organisation. As a minimum, all new housing developments in receipt of Scottish Government funding must comply with the following quality measure benchmarks :

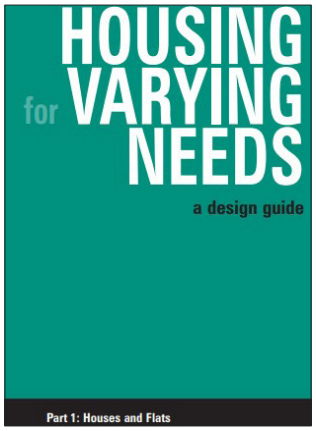
Building Life
For funding, all new build developments must achieve a minimum life span of 60 years.

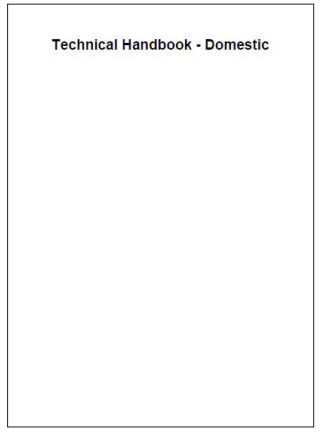
Housing for Varying Needs
All housing funded by Housing Grant must comply with Part 1 of Housing for Varying Needs (basic standards as a minimum)or Part 2: Houses with Integral Support (basic standards as a minimum). The design criteria indicated as "desirable" should also be included where possible.



Place Making
It is a Scottish Government funding requirement that the design of new housing should reflect the principles in the Scottish Government place-making documents 'Designing Places' and 'Designing Streets.

Projects should also be designed with reference to the Place Standard tool, designed to take consideration of quality of place and the relationship to quality of life. Grant applicants should also consider "Delivering Better Places in Scotland: A guide to learning from broader experience" when developing project proposals, as well as Scottish Natural Heritage's "Maximising the benefits of green infrastructure in social housing".





Additional Green Subsidy
To qualify for the higher 'greener' subsidy, homes must meet Section 7, Silver Level, of the 2019 Building Regulations in respect of Energy for Space Heating (full Bronze Level plus Aspect 2 of Silver Level). Note that PKC's minimum green benchmarks as page 22 requires new homes to meet Section 7 Gold Level Aspects 1 and Section 7 Silver Level Aspects 2 - 8 in the current Technical Handbook Building Regulations.

Additional Quality Measures Benchmarks
Additional funding is available by incorporating optional further measures detailed in the Scottish Governments "More Homes Division Guidance Notes".

2.2 Policies

New PKC housing developments are governed by a series of design parameters and a policy framework to ensure the efficient and accountable delivery.

The Council will produce a Project Brief for each new development at the initial feasibility stage. The Project Brief will outline the Council's specific requirements with regards tenure mix, housing type and user groups, and will highlight any variations or additions to the standard Design Guide which will be required for that specific development.

The Council will advise consultants and contractors of any requirements and procedures which are under development and review.

In addition to the statutory regulations and funding requirements, PKC Housing Council requires that all its new developments are designed in accordance with the following general design parameters:

- **Guidance and specification identified within this guide**
- **Housing to 2040 (Scottish Government)**
- **National Planning Framework 4 (NPF4)**
- **Planning requirements and relevant supplementary guidance**
- **Current Building Standards (Scotland) Regulations incorporating all Amendments**
- **Relevant technical standards such as Scottish Water and SEPA**
- **Housing for Varying Needs ***
  * *please note that Guide will be updated to incorporate revised HfVN later in 2023*
- **British Standard 8300 : 2018 Design of an accessible and inclusive built environment**
- **CDM Regulations 2020**

Figure 4

03

A Net Zero Carbon Approach

3.1 Requirements

Perth & Kinross Requirements

This section sets out Perth and Kinross Council sustainable benchmarks, statutory sustainable requirements and net zero carbon best practice targets in order to aim for net zero design. All designers and contractors undertaking development should fully consider incorporating the measures detailed in this section where possible.

Figure 5

3.2 What is Net Zero Carbon?

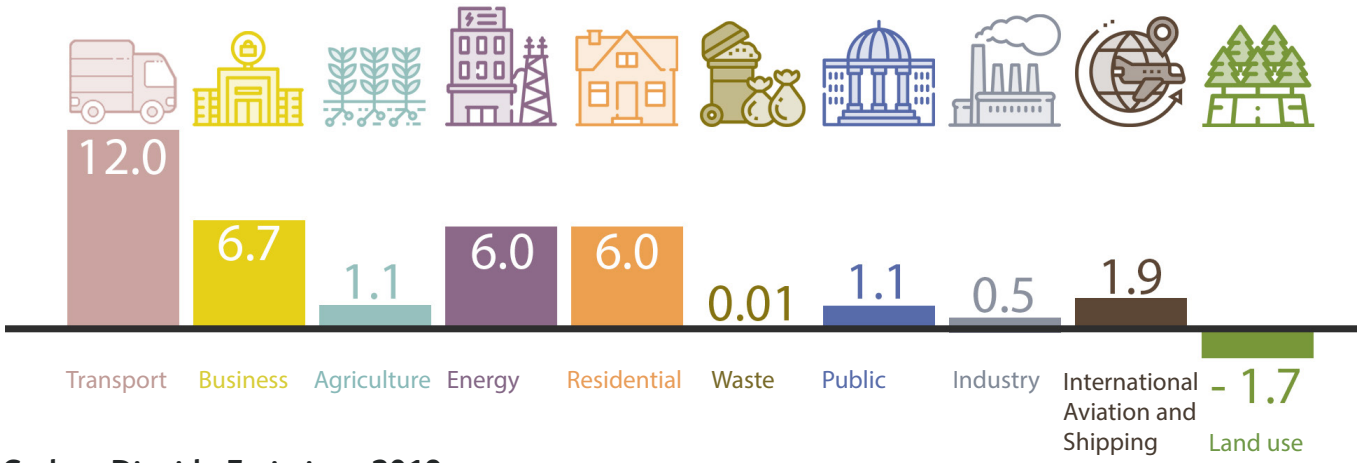
Buildings emit a lot of carbon
Building a home emits carbon both in the materials used and its construction, along with subsequent heating and electricity use.

Homes currently account for 13% of Scotland's total greenhouse gas emissions (1). It is therefore vital that new homes are now designed and built to use significantly less energy. Carbon Dioxide is by far the largest contributor to Scottish Greenhouse gas emissions. Housing provides a significant opportunity for reducing carbon emissions with benefits for those living in them such as reducing fuel poverty, improve energy bills as well as local air quality.

What is Net Zero?
"A Net Zero carbon home is one that is responsible for emitting net zero greenhouse gas emissions."

Highly energy efficient with low levels of space heating demand, a net zero carbon home does not use fossil fuels and generates energy from on-site and/or off-site renewable sources. This means the amount of carbon emissions associated with a building's usage (operational carbon) and construction stages (embodied carbon up to practical completion) must equal zero or negative.

> **A Net Zero carbon home is one that is responsible for emitting net zero greenhouse gas emissions.**



Carbon Dioxide Emissions 2019

1 Heat in buildings strategy, Achieving Net Zero Emissions In Scotland's Buildings, Scottish Government, Page 18

3.3 What is Whole Life Carbon?

Whole Life Carbon
Aiming for Net Zero is achievable but it requires a shift from the standard fabric and heating strategies often used in construction if we are to end Scotland's contribution to climate change.

Net zero carbon emissions for housing should be considered in the context of **whole life carbon.** Whole life carbon covers all carbon emissions that arise as a result of the energy used in the construction, operation, maintenance and demolition phases of a building.

Whole life carbon comprises two key components :

Operational Carbon - These are carbon emissions from **regulated use** - heating, hot water, lighting, cooling, ventilation and **unregulated use** - plug in equipment such as cookers, fridges and televisions. A new building with net zero operational carbon does not burn fossil fuels, is powered by 100% renewable energy whilst achieving a level of energy performance in-use in line with our national climate change targets.

Embodied Carbon – These are upfront emissions associated with the extraction and processing of building materials, the energy used for manufacturing, their transport and installation on site as well as their disposal at end of life. It also includes the 'in-use'stage (maintenance, replacement, and emissions associated with refrigerant leakage). To achieve WLC, best practice targets for embodied carbon should be met, and the building is made from re-used materials and can be disassembled at its end of life in accordance with the circular economy principle. Embodied carbon should not be an afterthought and considered early in the design process.

The purpose of using WLC is to move towards a building that produces the lowest carbon emissions over its whole life. A building that is whole life net zero carbon meets the operational zero carbon balance and meets best practice targets for embodied carbon.

Ideally carbon assessments should be undertaken at key RIBA Stages through to practical completion. This assists in optimising carbon reductions and monitoring reduction measures over the life of the project. It also offers future proofing of asset value by pre-empting changes in standards and legislation.

Any post-occupancy evaluation (POE) process should take account of all WLC impacts. This should include the actual performance of the building's environmental systems, together with the fabric's physical performance with respect to durability and fitness for purpose.

WLC should be considered not only for the homes but for the whole development.

3.4 Whole Life Carbon Pathway

This diagram illustrates PKC's Net Zero Carbon Pathway.

The following pages detail the pathway's key performance indicators which are consistent with the LETI Climate Emergency Design Guide to consider when designing housing for whole life carbon.

3.5 Whole Life Carbon KPI's

1 Reduce Operational Energy

- Early consideration of a fabric first approach, with improved fabric performance.
- Building orientation - design to maximise natural light, minimise heat loss and optimise solar gains.
- Consider building form factor to reduce energy consumption.
- Achieve energy use intensity target of 35kWh/m2 per year (excluding renewable energy contribution) & space heating demand target of 15kWh/m2 per year.
- Air tightness < 1 (m3/h.m2@50Pa)
- MVHRs to have 90 % efficiency with <2m duct length from unit to external wall

Form Factor

Small scale	1.7 - 2.5
Medium / large scale	0.8 - 1.5

Window Area (% of wall area)

North	10 - 15%
East	10 - 15%
South	20 - 25%
West	10 - 15%

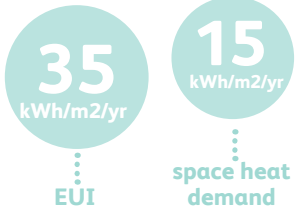
Include openable windows,cross ventilation & external shading

Fabric U-values (W/M2K)

Walls	0.13 - 0.15
Floor	0.08 - 0.10
Roof	0.10 - 0.12
Windows	0.8
Doors	1.00

Efficiencies

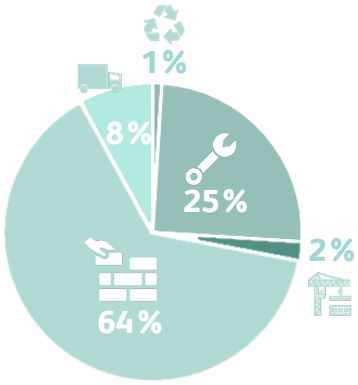
Thermal bridging	0.04 (y-value)
Glass G-value	0.6 - 0.5



2 Limit Embodied Carbon

- Consider material specification in terms of longevity and low embodied carbon. Check product EPD's for details on carbon footprint.
- Design around site topography, reducing amount of cut and fill removed from site and reusing excavated soil.
- Ensure future use and end of life are considered with recycling.
- Design for future flexibility and robustness with efficient fabrication and methods such as modular construction to reduce waste.

Reduce embodied carbon by 40% or to :

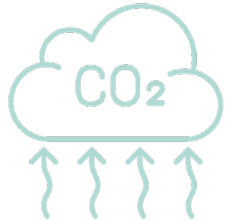


Focus on reducing embodied carbon for largest uses (typical % for medium scale residential)

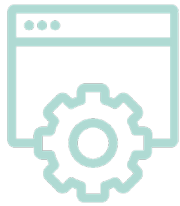
3 Whole Life Carbon, Whole Life Costing

- Define building life expectancy.
- Measure all upfront and operational carbon emissions, including maintenance, fitouts, minor and major refurbishments, deconstruction and the reuse of building materials. All this must be considered over an extended design life .
- Ensure carbon assessments are carried out at key design and project stages from inception to completion.
- Use carbon measurement software tools and BIM to ensure accurate reporting of Whole Life Carbon and costs.

Measure all embodied and operational carbon emissions



Use carbon measurement software tools



4

Eliminate Fossil Fuels, Maximise Renewables

- Ensure heating and hot water is fossil free.
- Limit peak heat loss for heating to 10W/m3.
- Average carbon content of heat supplied should be reported in use.
- Limit the dead leg of hot water pipework to 1 litre.
- Use European Water labels for hot water outlets ie certified 6L/min shower head not using flow restrictors.
- Maximise renewable energy measures - 100% of annual energy requirement to be generated on site for small scale housing & 70% of roof is covered for medium to large scale housing.

Maximise renewable energy measures

Maximum dead leg of 1 litre for hot water pipework

No fossil fuels

Use water saving products

5

Energy Flexibility

- Design to reduce heating and peak electrical demand.
- Incorporate active demand response measures ie thermal storage and point control.
- Introduce easy display and reporting of power consumption and use for occupants.
- Consider times of day that electricity is used, not just over the period of a year.
- Consider electric vehicle charging.
- Consider electricity generation and how it can be stored ie battery storage.

Reduce peak energy demand

Consider times of day electricity is used

Electric vehicle charging points

Electricity generation & storage

6

Data Disclosure, Measuring & Verification

- Ensure energy consumption is monitored and recorded.
- Adopt post occupancy evaluation to verify and disclose building performance.

monitor & record

Post Occupancy Evaluation

3.6 PKC Sustainability Benchmarks

Building Regulations
In Scotland, sustainability is embedded into the Building Regulations for all new buildings. The intention of the Sustainability Standard is to recognise the level of sustainability already achieved by the building regulations whilst also encouraging more demanding sustainability standards through enhanced upper levels including energy and carbon emissions targets, but also broader issues such as water efficiency and flexibility in design.

Levels of sustainability are defined as Bronze, Silver, Gold and Platinum which have been created through identifying cost-effective benchmarks verifiable by the building warrant system. Section 7 also includes 'Active' levels that identify where buildings incorporate low or zero carbon generating technologies (LZCGT). At present, only the aspect of net zero carbon dioxide emissions has been defined for the platinum level.

Scottish Ministers consider that it is not practicable at this time to require every building to incorporate higher performance standards or further sustainability measures due to financial or technical viabilities. Reaching upper levels should however be a valid target for any new PKC development, regardless of size or location.

PKC Sustainability Benchmarks
Taking this into consideration, PKC have developed four sustainability benchmark options (illustrated in the diagram opposite) which fulfil the statutory requirements whilst also delivering low carbon developments.

We encourage new developments to meet with the energy efficiency benchmarks based on the Scottish Building Regulation Sustainability levels and target the net zero carbon KPI's to provide exemplary sustainable housing that will last a lifetime.

Consultants will be required to report on the design and financial implications of meeting the relevant targeted benchmark.

Local Development Plan Policy
Policy 32 sets a requirement that "all new buildings will be required to demonstrate that at least 10% of the current carbon emissions reduction set by Scottish Building Standards will be met through the installation and operation of low and zero-carbon generating technologies".

A statement will be required to be submitted demonstrating compliance with this requirement. The percentage will increase at the next review of the local development plan.

1 SILVER & GOLD HYBRID

Section 7 Gold Level Aspects 1
Section 7 Silver Aspects 2 - 8
Independent approved certifiers of design

2 GOLD

Section 7 Gold Level Aspects 1 - 8
Independent approved certifiers of design

3 LOW CARBON EMISSIONS

Homes designed to Passivhaus Standard
Section 7 Silver Level Aspects 4 - 8
Passivhaus certified

4 NET ZERO CARBON

Section 7 Platinum Aspects Level 1
Section 7 Silver Level Aspects 2 - 8
Independent approved certifiers of design

3.7 Energy Tools

Energy Standards
There are several new-build energy modelling tools that can help in achieving the construction quality and energy targets required to deliver Net Zero Carbon Buildings. These are

Passivhaus Classic, Plus and Premium
These schemes are a fabric first , energy performance standard used by designers with a third party certifier to ensure the design achieves best practice in energy efficiency.

PHI Low Energy Building Standard
Similar to Passivhaus, but with slightly reduced energy targets.

Energiespong
Energiesprong is whole house refurbishment and new build standard with a funding approach to deliver a home that has net-zero or very low energy use. The upfront costs of this are financed through a payback based on savings to tenants bills and an additional comfort charge.

Building Energy Performance Improvement Toolkit (BEPIT)
A toolkit for each design stage in order that the energy efficient measures are delivered on site, so that "as built" matches "as designed".

The above standards can help achieve the space heating and energy consumption levels required to achieve net zero carbon buildings.
Some standards also address low carbon heat and renewable energy generation but they focus primarily on energy efficiency. Embodied carbon is not addressed by the above schemes and needs considered separately.

3.8 Other Sustainability Considerations

Set the right brief and targets from the outset
A strong brief, sustainability, energy use and space heat demand targets require to be agreed from the start.It is important that everyone within the team has a shared vision and clearly understands their responsibilities and targets.

The Team
The early appointment of an energy consultant who can advise on Passivhaus or low energy design is recommended along with energy modelling to accurately predict energy useage.

Build The Team's Knowledge
A lot of what is involved in building a net zero home is not necessarily part of normal traditional building practice. Ensure that all parties from the design team through to the contractors and site teams understand the KPI's and sustainability strategy that need to be achieved, through regular meetings and toolbox talks.

Sustainability Policy
Any developer, contractor or designer applying to provide new build design and construction services for the Council will be required to have a published Sustainability Policy.

A "Fabric First" Approach
The Council's preference is for a 'fabric first' approach, with energy efficient design resulting in reduced emphasis on space heating. Where micro-renewables such as solar thermal panels or photovoltaics are proposed, this must be agreed by the Council. Micro-renewable products and installers must be accredited under the Microgeneration Certification Scheme (MCS).

Whole Life Costing
Whole life costing techniques will be used to demonstrate that value for money is being achieved over the whole (minimum 60 year life) of buildings. These techniques will be introduced and phased into the design, construction and monitoring process. The design team/contractor will be requested to provide life cycle costs of all main components using an agreed template to be provided by the Council in a format that can be input into PKC's asset management system.

What To Do, When
Refer to **"Section 9 net zero design and construction checklist"** which details key actions and design requirements in relation to the RIBA stages in order to achieve a low carbon development.

Vegetation to improve biodiversity and high quality amenity spaces

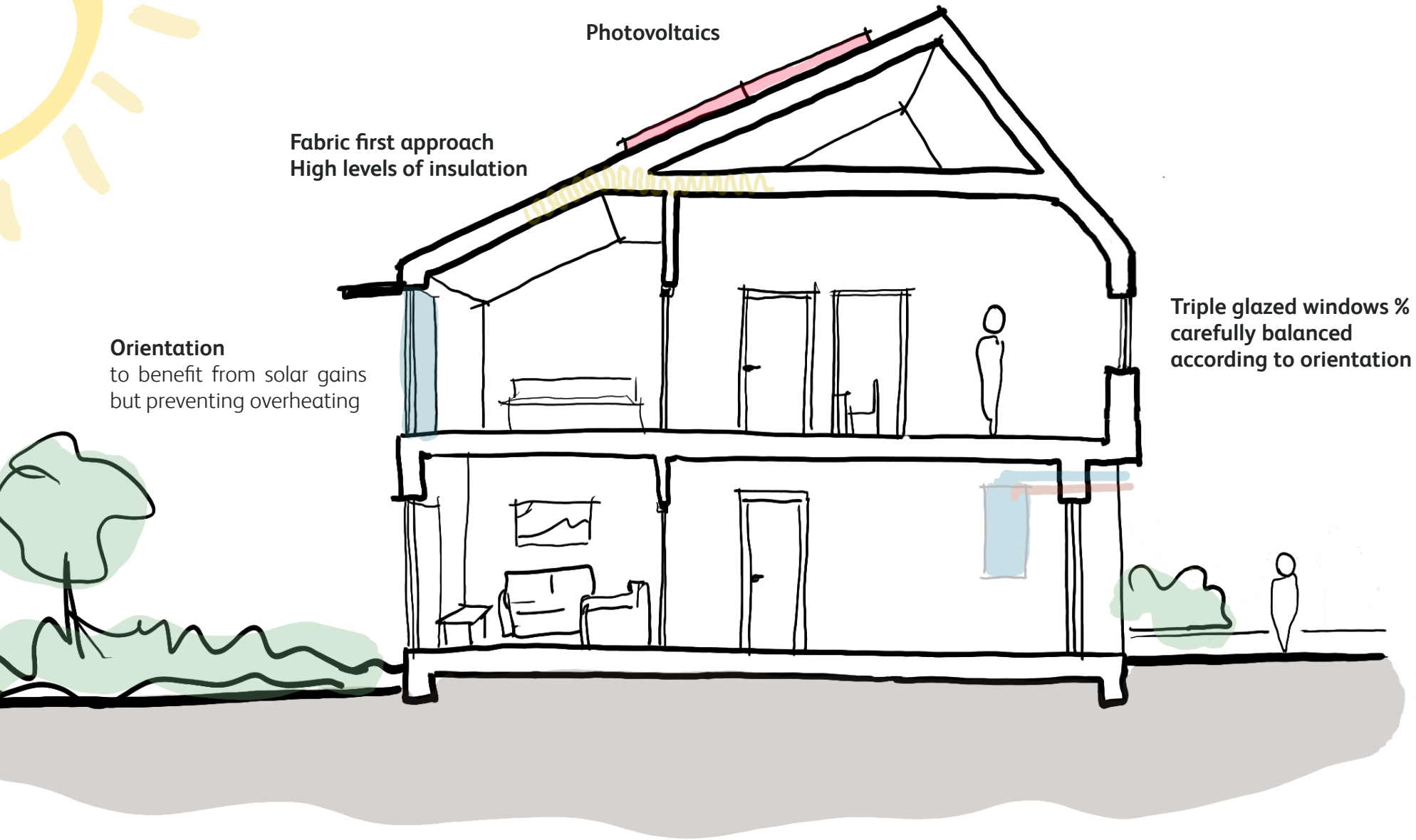

Photovoltaics
Fabric first approach
High levels of insulation
Orientation
to benefit from solar gains
but preventing overheating
Triple glazed windows %
carefully balanced
according to orientation

Figure 6

04

External Spaces

4.1 Streets, Routes & Surfaces

Street Design
The design of streetscapes should be incorporated in the early design stages, referencing the guidance in the Scottish Governments report "Designing Streets".

Roads
Road design should be to an adoptable standard of the relevant Highways Authority to permit future adoption. Developments should be designed to encourage vehicles to reduce speed to appropriate levels for the local context. For residential streets, a maximum speed of 20 mph is normally an objective.

Footpaths
All common and in-curtilage footpaths to dwellings, gardens, bin stores and drying areas to be minimum 1200mm wide. For wheelchair accessible homes, path to be widened to a turning circle of 1500 x1500mm at each end of path. Paths accessing barrier free entrances to be step free.

Common public footpaths to be asphalt or block paving. Footpaths within shared common areas must be slabs, paviours or asphalt. Private in-curtilage footpaths to be 50mm pre-cast textured face (non slip) concrete slabs bedded on compacted sand on compacted hardcore. Gravel paths should be avoided.

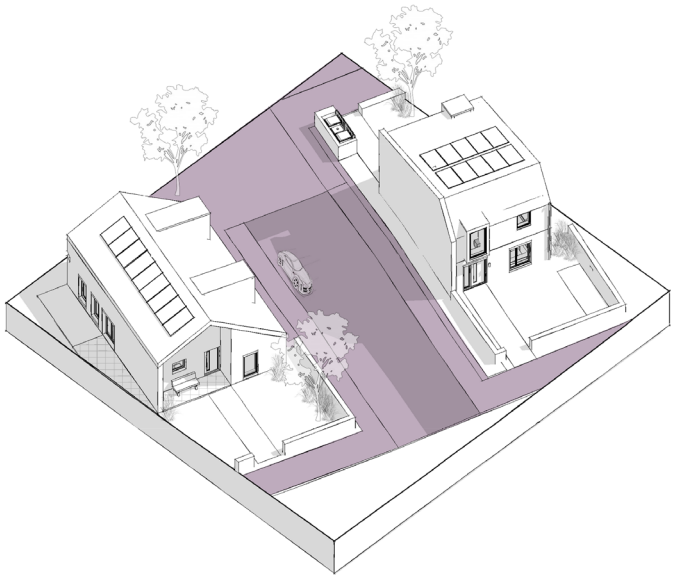
Surface Materials
Surface materials are to be durable, easily maintained and suitable for disabled and visually impaired. Avoid patterns that create visual confusion. Kerbs should be provided because pavements that are level with the carriageway are not detectable by walking sticks and guide dogs, posing difficulties for visually impaired.

Street and External Lighting
Street lighting must be designed by Tayside Contracts and approved for adoption by the local authority.

Street lighting must illuminate all public pedestrian and car parking areas. Street lighting glare should not intrude into habitable rooms of dwellings, nor over spill light into adjoining or neighbouring properties.

All street lighting and amenity lighting must be designed sensitively in accordance with current Institution of Lighting Engineers' guidance to avoid light pollution. Light Emitting Diode (LED) lighting is preferred throughout all areas.

Surface materials should be durable and appropriate for function. Kerbs to be provided to assist visually impaired and disabled.



4.2 Sustainable Drainage

Drainage Design should reference the following guidance:

Scottish Water guidelines
PKC Flood Risk Supplementary Guidance
PKC Open Space Provision for New developments

With the climate changing, sea levels and the increase of flooding is rising. Water management is therefore important in the design of new developments. They should include above ground features capable of managing drainage in and around homes by slowing and holdng back rainfall. They should not contribute to increased water run off and flooding.

Most developments will require a Drainage Impact Assessment (DIA) submitted as part of the planning process. The extent of a DIA will be dependant on the size and complexity.

Sustainable drainage is to be integrated within site layouts, streets and gardens. Preference is to capture all volume above ground but if this is not achievable then a combination of below ground storage tanks and oversized pipes with above ground strategies will offer an acceptable solution. Drainage should ensure that flows directed away from homes with road surfaces kept lower than verges, footpaths and homes where possible.

Permeable surfaces should be discouraged in new housing developments and are not supported by the National Roads Development Guide due to maintenance costs.

Developments should incorporate landscape features to support sustainable drainage such as rain gardens and swales. These can provide opportunities to support communities by supporting growing spaces, providing pleasant green zones and spaces for children to play and learn.

4.3 Parking Principles

Although car ownership in affordable housing is below average, parking can still pose a significant issue for new residential developments.

Parking requires be carefully designed and considered early in the design process. There needs to be a balance between achieving sufficient parking without it being over-dominant and detrimental to other aspects of the surrounding public and private realm.

The Scottish Government's general planning policy for car parking is set out in the Scottish Planning Policy (SPP). This makes it clear that a design-led and contextual strategy for car parking can often lessen the impact on the built environment. Design teams should provide a parking strategy detailing how it contributes to the site layout at pre-planning stages.

The design and layout for parking is to comply with the following:

Technical handbook – Domestic
National Roads Development Guide
Housing for Varying Needs
Scottish Planning Policy

The following design factors should be applied to parking design for new residential developments:

• schemes dominated by parking are not appropriate. Consider design solutions such as underground or undercroft parking for higher density developments to preserve street frontages

Consider locating parking on periphery of sites or to rear of houses to allow for pedestrianised developments or no car developments where suitable public transport links exist.

• Consider car club provision which provide neighbourhood based short term car hire to members as a means of reaching a zero carbon target whilst reducing onsite parking provision

• pedestrians should have priority over parking and moving vehicles

• Parking within the front curtilage should generally be avoided as it breaks up the frontage, can be unsightly and restricts informal surveillance. Front curtilage parking may only be suitable in restricted situations when integrated with other parking solutions and when considered in terms of the overall street profile.

• Where parking is to the front of properties it should preferably be integrated with an element of landscaped front garden, designed in a way that it cannot be easily converted into another parking space.

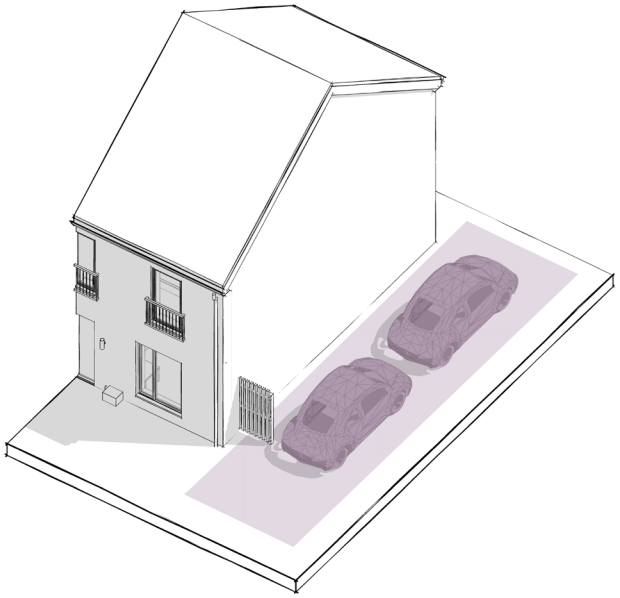
• In curtilage parking is better bumper-to-bumper with the first space behind the building line to the side of the home, as opposed to side-by-side in front of the building line

• Consider a mix of parking types to reduce parking dominance within the development

• consider positioning parking within the street scene to reduce vehicle domination where rows of terraced homes are proposed

• Parking spaces should be integrated with generous planting to balance the visual impact of parked cars. Incorporate a tree, or other SUDS feature, every few bays.

• Provide in-curtilage car parking for wheelchair-user housing. Allow for car port, if requested in the Project Brief, for wheelchair user housing.



In curtilage parking is better bumper-to-bumper with the first space behind the building line to the side of the home, as opposed to side-by-side in front of the building line.

Locating parking to rear of housing allows pedestrianised streets and green space frontages.

Electric vehicle Charging Points

The Scottish Government's Climate Change Delivery Plan indicates that Scotland requires "almost complete decarbonisation of road transport by 2050 with significant progress by 2030 through wholesale adoption of electric cars and vans". Scottish Planning Policy states that "development plans should support the provision of infrastructure necessary to support positive changes in transport technologies, such as charging points for electric vehicles" and that "electric vehicle charge points should always be considered as part of any new development and provided where appropriate".

PKC expects that a minimum percentage of general car parking provided in new developments should be in the form of "passive" EV spaces, designed to provide for easy conversion to electric vehicle charging use ("active" spaces) should demand manifest itself. Reference should be made to the project brief for project specific requirements.

Ducting and wiring is to be provided to allow for future provison to each home with an allocated parking space. For Communal parking, ducting and wiring is to be provided to allow for future provison at positions to be agreed with Project Officer.

Public- As required by Planning Authority.

4.4 Cycle Storage

Cycles are vulnerable to theft and adverse weather and not suited to long term outdoor storage. Parking and storage for cycles therefore requires to be sheltered, safe and secure, located within or to the rear of homes.

Where a home does not have a dedicated external rear shed more bespoke solutions may be required for internal cycle storage. In **smaller dwellings,** consider a dedicated internal space for vertical cycle storage adjacent to front doors or a store that forms part of a recessed porch. Hallways, balconies and terraces are not acceptable for cycle storage.

Communal cycle parking facilities is a common solution for **groups of properties** or **flatted developments**. These can be internal or external.

Internal communal cycle storage should be secure, located on the ground floor and easily accessible with ramped access. If in a basement access should be via a lift. Consider stacked storage solutions for tight spaces.

External communal cycle storage should weather proof, be well located, visible , well lit and lockable. They should be well designed, relating to the architectural language of the homes and be thoughtfully integrated as part of the site landscape strategy. Charging points for E-bikes should be considered and quantity will be provided within the project specific brief.

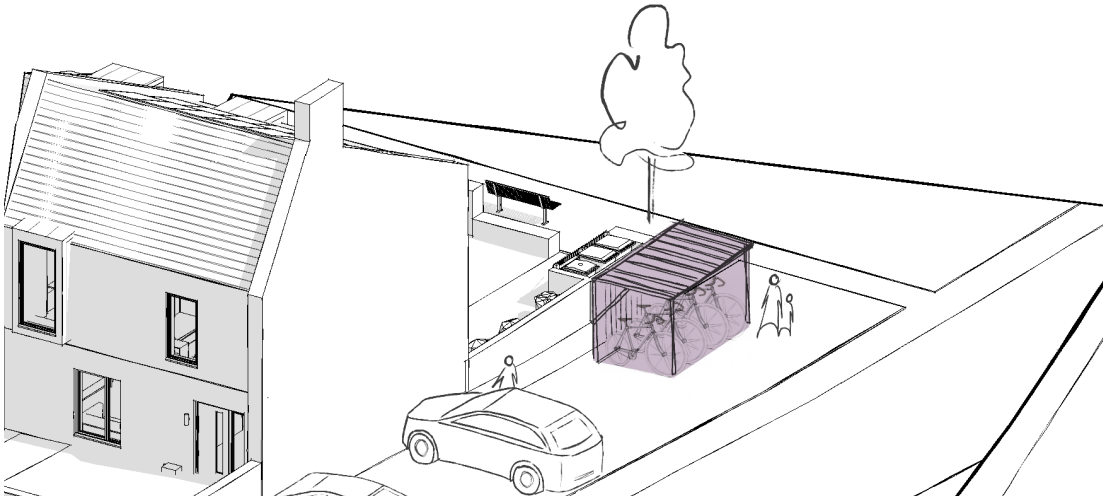
Initiatives such as Cycling Scotland's Cycling Friendly Initiative Fund aims to make it easier and more accessible to cycle in places where people live. Organisations can apply for a range of initiatives, such as installing cycle parking or buying bikes.

Depending on the amount of provision required, cycle facilities can be purpose built out-buildings or integrated with car parking and amenity space. PKC recommend the following provision (to be assessed on a site by site basis):

Minimum Cycle Provision

1 space per unit unless a dedicated shed of sufficient size for bikes is provided.

0.25 space per unit visitor cycle storage where there is communal residents cycle storage.



External communal cycle storage should be well lit, visible, waterproof and secure.

4.5 Recycling & Bin Storage

The location of refuse and recycling stores should be considered from the outset and developed in conjunction with the Council during the design stage.

Quantity, capacity of containers and collection distances are to be in accordance with Perth and Kinross Council's current published guidance for waste management and recycling.

The council have plans to introduce a twin-stream recycling service, resulting in the standard bin provision being 1 x 140litre general waste bin and 3 x 240l recycling bins. Properties with larger families may be eligible for additional capacity, increasing the number of bins required.

Bins should be located in an area that is unobtrusive and well designed, inconspicuous, safe and convenient to access, empty and maintain, but have minimum impact on the quality of space surrounding them. The location should consider distance from the property to deposit items into the bins and also to the kerbside where bins will require to be presented for collection.

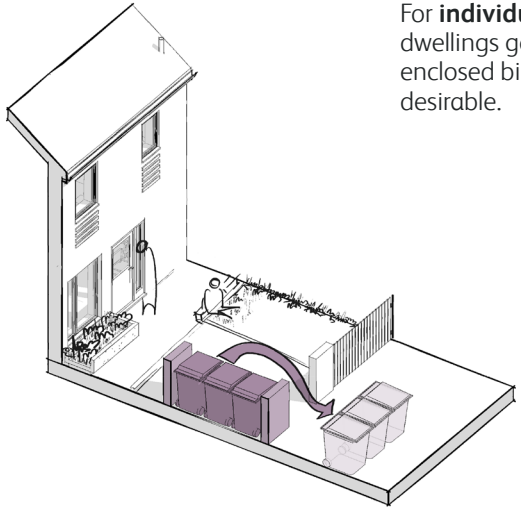
All bin stores and refuse collection areas must be adequately screened, lit and ventilated, and be robustly detailed as to allow for ease of cleaning. They should also share an architectural language with the overall residential development. Refuse storage must be located away from habitable room windows, considering noise and odour.

For **flatted developments** enclosed, external bin stores are preferable to internal. While individual bins are preferable in most locations, communal containers can be provided however the storage location to the uplift point should be less than 10metres, paved surface with a level gradient and dropped kerbs Communal refuse storage should be large enough to store wheeled bins.

For **individual** dwellings generally, enclosed bin stores are desirable or alternatively ensure bins are stored within the property boundary.

A small recycling sorting/storage station shall be incorporated into all kitchen/utility for flats and houses to allow segregation of Dry Mixed Recycling, Glass and Food Waste from General Waste.

For **flatted developments** enclosed, external bin stores are preferable to internal.



For **individual** dwellings generally, enclosed bin stores are desirable.

4.6 Gardens & Boundaries

Private Gardens
All new homes should benefit from rear private garden space, providing a secure area for children and pets, accessible from a back or side door of the home.

All dwellings should have a minimum garden depth of 9 metres. It is good practice to provide the following area for private garden space :

1-2 bed home 60 sqm private garden space
3+ bed home 80 sqm private garden space

Allow adequate garden ground for future positioning of a garden shed with a slabbed patio area minimum size of 3m x 2m. Rear gardens are to be accessed from a footpath, either in-curtilage (for detached or semi-detached houses) or public (for terraced dwellings).

Front garden space is to be minimised and rear garden space maximised. Avoid gardens and footpaths sloping down towards the entrances of homes as well as steeply sloping gardens. Gardens should be a maximum gradient of 1:10 where possible.
Ensure adequate drainage within gardens and landscaping to avoid water logging, ponding and rainwater run-off towards dwellings.

Boundary Treatment
The quality and character of boundaries between public and private space should reflect both immediate context and public realm. Traditional boundary treatments such as native hedgerows and rubble walls can anchor a development in its local setting. Maintenance for boundaries should be considered from the outset.

"Secure by Design" principles should be incorporated into boundary treatments, designed to allow for surveillance of the street without obscuring daylight into homes.

Garden Retaining Walls
To be used only where necessary due to site constraints or planning requirements. Where required. walls to be facing brick or fair faced block work, with precast concrete coping.

Fencing
Dependant on both site and Secured by Design requirements, rear gardens are to be enclosed by:

- 1200mm high screen fence between gardens
- 1800mm high perimeter screen fencing
- 1000mm wide gate, same height as fence

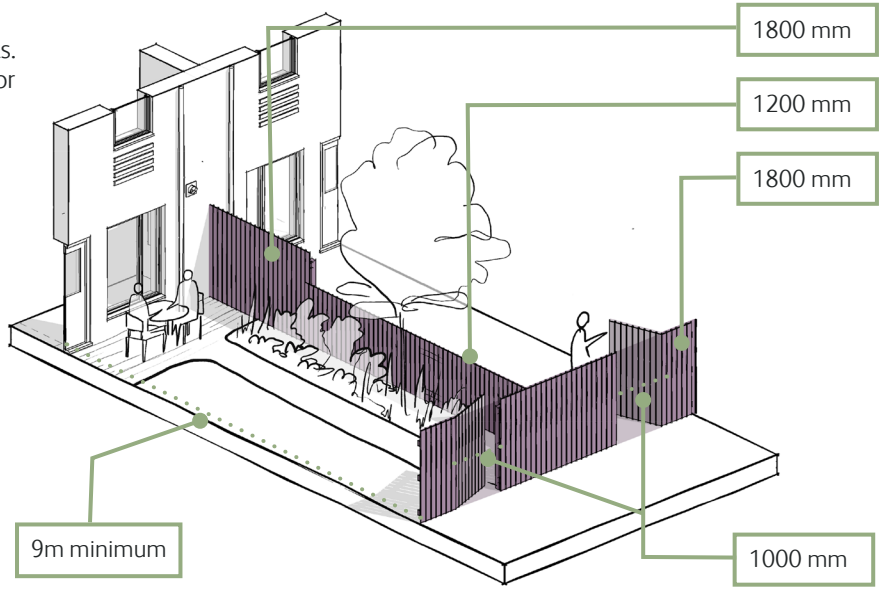
The locations, heights and types of fences and gates are to be agreed with the Council prior to specifying. Again, dependant on location, gaps between each of the posts should be considered to allow for hedgehogs to commute through. Avoid gaps that lead directly to roads.

Fence Materials
Timber fences are generally to be timber slatted, sawn Redpine or Larch pressure treated vertical boarding with 25mm spacing, galvanised nail-fixed to posts and rails of appropriate size. Posts to be set in concrete foundations. Gates to be close boarded as fences, with galvanised "Suffolk" latch with cranked folded eye hinges. Fence posts should have a chamfered top – chamfered at 20 degree pitch and should be retreated following chamfered onsite. Steel fencing must be galvanised.

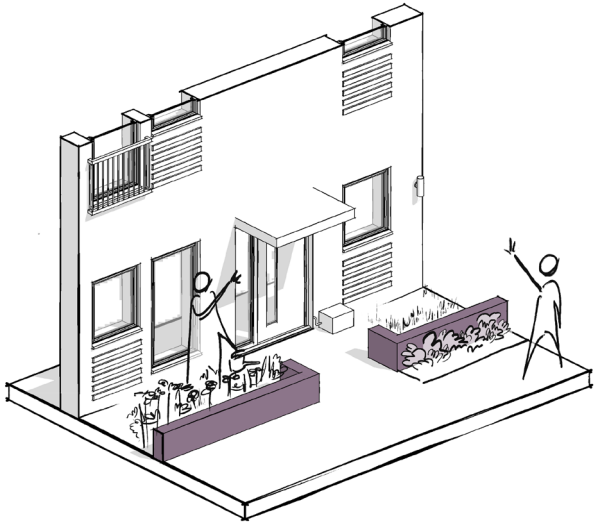
Fencing to common drying areas (where provided) are to be 1800mm high.

No division fencing to front gardens unless agreed or required by Planning.

Typical rear garden enclosure fencing heights. Consider gaps at posts for hedgehog highways.



Boundary treatment should reflect immediate context and allow for clear surveillance of streetscape.



Clothes Drying

Adequate clothes drying areas are to be provided, either in external defined drying areas, individual gardens, ventilated common areas, a ventilated area within the home or as last resort mechanical provision within the home.

All drying areas should suitably located, exposed to breezes and sunshine to facilitate drying. Locate drying areas close to dwellings but not directly outside living room windows and away from bin stores and fences. Ensure dryers can be reached directly from 1200mm wide footpaths in common drying areas and within individual private gardens.

Tenants should be able to observe drying areas but care should be taken to prevent where possible observation of and access to them by non-residents.

Within flatted developments, a number of small communal drying areas to suit the number of households are preferred to one large drying area. .

Heavy duty adjustable height rotary dryers to be provided, both in communal drying greens and private gardens. For wheelchair user homes, allow space for an adjustable height rotary dryer, which can be easily accessed by the wheelchair user.

4.7 Soft Landscaping & Biodiversity

Carefully designed green infrastructure plays an important role in a development's sustainability strategy. Biodiversity (the variety of all living things) should be considered from the outset, as a central element of any development's siting and design process. This helps to avoid unacceptable impacts, whilst ensuring valued habitats are both retained and enhanced, increasing existing biodiversity value.

PKC encourage biodiversity action plans to be developed for sites, identifying how biodiversity and ecological benefits will be integrated into the wider site.

Public open spaces and private garden grounds provide many opportunities to incorporate elements which facilitate habitat creation and biodiversity.

Refer to the following guidance :

PKC Open Space Provision for New Developments Supplementary Guidance

PKC Food Growing Strategy 2021

Soft Landscaping

Landscape design should be informed by site soil conditions, drainage, groundwater, and underground constraints such as utilities, power cables etc. as well as existing natural features.

Existing natural features are an important part of the character of an area and should be used to a new development's benefit. Native species within landscaping should be used where appropriate as a first principle.

All landscape proposals are to be approved by the Council (Greenspace) prior to seeking approval from the Planning Department.

Hedgerows

An effective boundary function, hedgerows also have many ecological benefits for wildlife creating connective corridors, food and shelter. Hedgerows should be of the native variety to maximise biodiversity. Informal hedges should be at least 1.5m away from footpaths and pavements to prevent future maintenance issues.

Trees

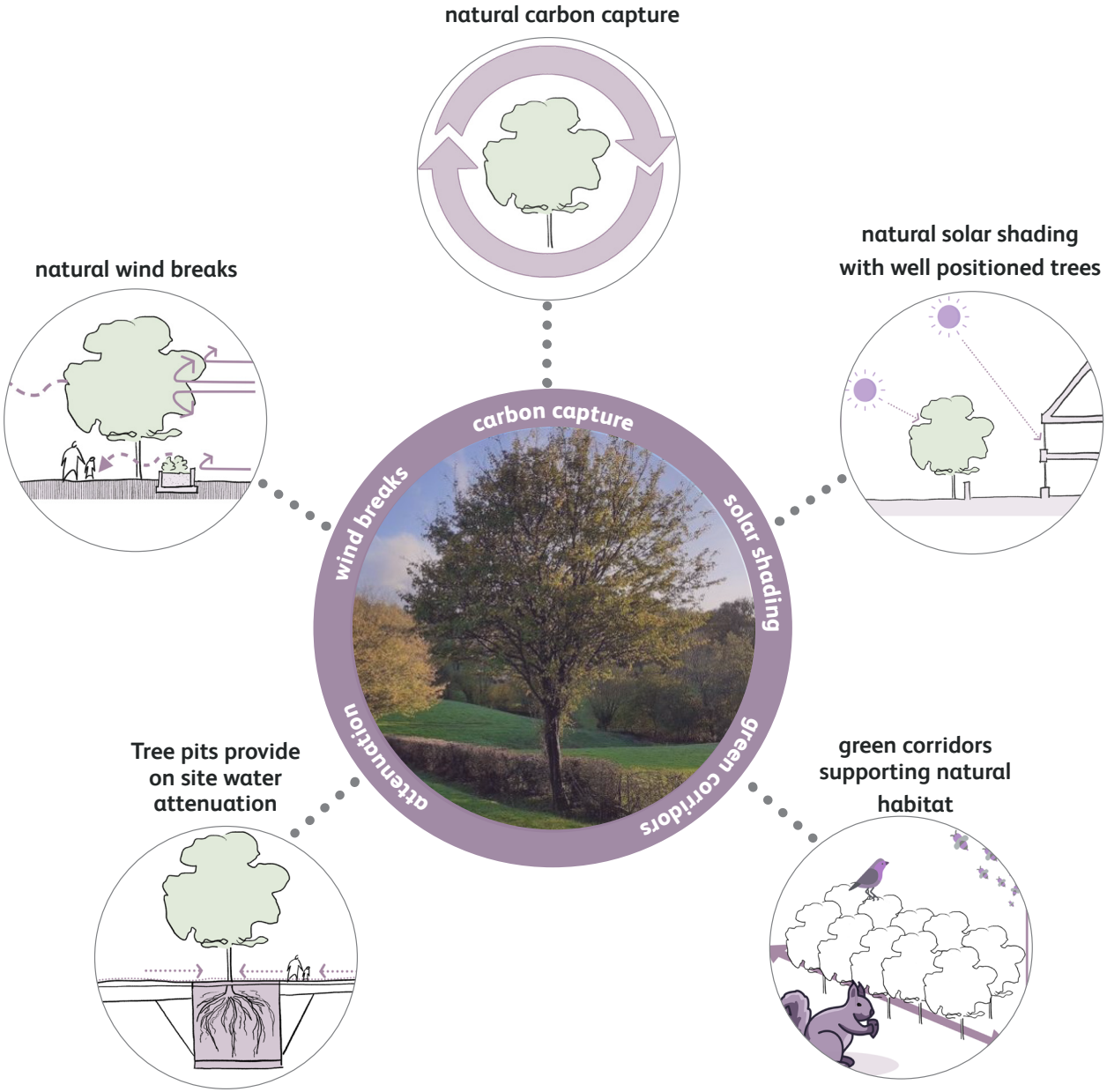
Trees create attractive developments providing aesthetic value as well as promoting biodiversity, providing natural habitats with food and shelter for plants and animals. They also absorb carbon, provide shade and promote wellbeing.

If sufficient space, trees in private front gardens can make a positive contribution to the environment and street scene.

Trees are to be of a standard size and should be suitable for gardens e.g. rowan and birch. Consider using native species which are more durable and have lower long term maintenance costs. Use native species for structure planting (especially blossom and berry bearing trees)

Ensure an appropriate distance is retained between trees, buildings, service routes and walls both within gardens and on the street. Sufficient space must be provided between trees and residential boundaries, sports pitches, play areas and paths.

Provide a grass-free 800mm diameter circle around the base of each tree (to avoid damage from grass-cutting equipment). Specialist input will be required for street trees to advise on tree pit requirements, root systems and supports for newly planted trees.


natural carbon capture
natural wind breaks
natural solar shading
with well positioned trees
carbon capture
wind breaks
solar shading
green corridors
attenuation
Tree pits provide
on site water
attenuation
green corridors
supporting natural
habitat

4.7 Soft Landscaping & Biodiversity

Shrubs & Planting
Keep planting design simple, in well-defined blocks of one species. Plant densely. All shrubs specified are to be frost hardy (and resistant to salty air in tidal areas) and fast growing, especially in larger areas of planting, or 5 litre size, depending on type of plant. Shrubs to include a mixture of perennial plants, both evergreen and deciduous, flowering and non-flowering. Avoid those which have poisonous berries or irritant leaves. Plant at least 1.5m away from footpaths and pavements to prevent future maintenance issues.

Design to create shelter on the site, seasonal colour and to attract wildlife. Avoid small strips of landscaped or grassed areas as these can be difficult to maintain and define. Introduce Wildlife kerbs around road gullies and drainage openings.

Refer to Secured by Design for guidance on large planted areas. Avoid large planted areas adjacent to buildings or planted areas over service routes. Any planting out with the spring and autumn is to be from containerised plants.

Grassed Areas
Turf to be provided to all front and back gardens to houses and flats and all common, grassed areas within developments.

Provide a mowing strip where grassed areas are adjacent to buildings and walls. This is to be timber edging board to the grassed area with 100mm wide gravel infill. Gravel infill to be 50mm below the base level of the grass.

Topsoil
The minimum topsoil depth for areas of soft landscaping is 150mm below grass planting and turfed areas and 450mm in shrub beds, hedge rows and similar areas. Topsoil set aside to be re-used to be separated from subsoil and checked for quality prior to re-using on site.

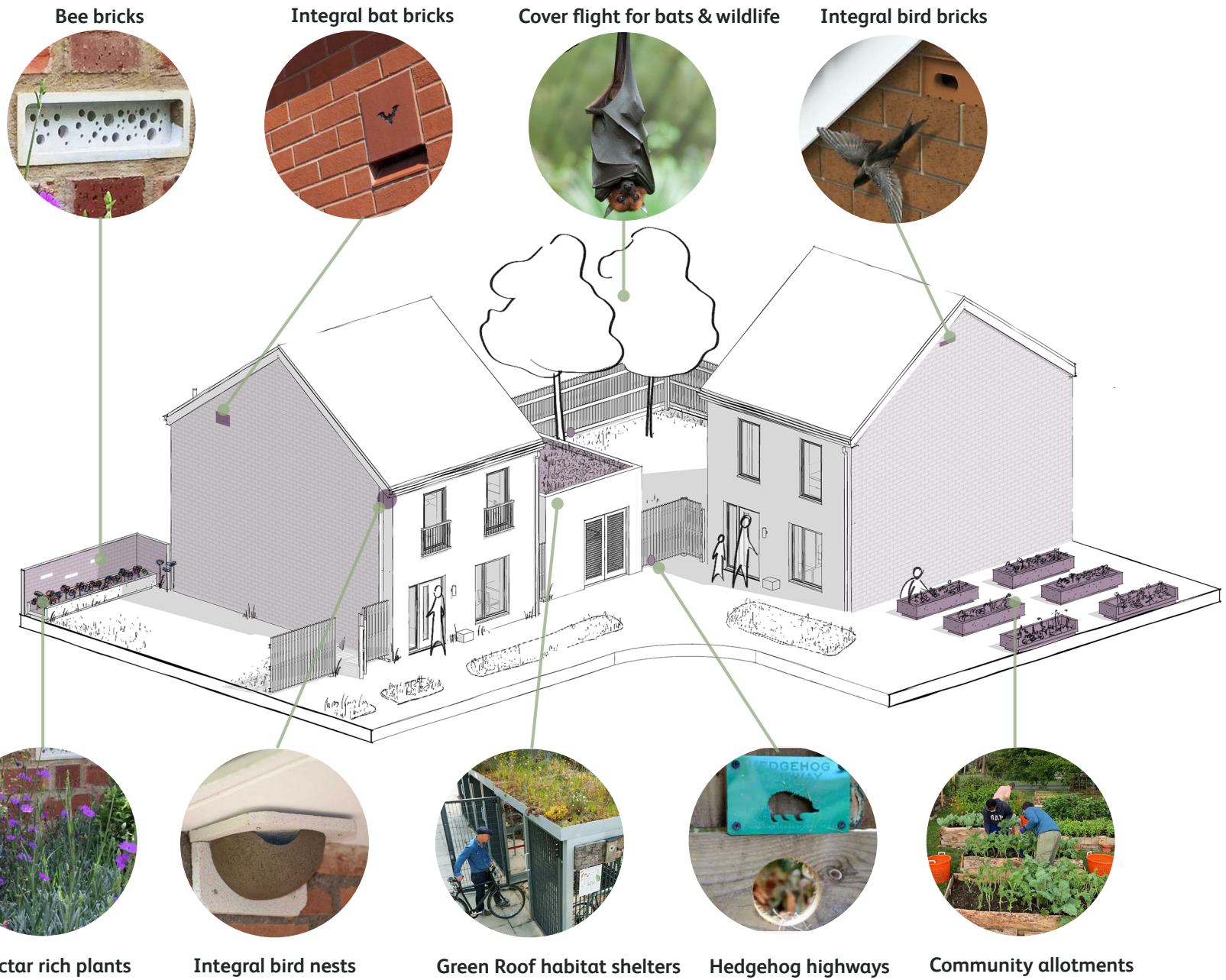
Landscape Maintenance
The Council (Greenspace) will take over the maintenance immediately after handover. Requirements and specification prior to Handover will be highlighted within the Employers Requirements

Food Growing Provision
Where possible, food growing provision should be considered in a development's design. Investigating strategies such as communal and private allotments, community gardens and community orchards all improve biodiversity and by providing access to locally grown food, they reduce carbon emissions associated with food miles and packaging.

PKC has developed a Food Growing Strategy which responds to the Government's vision to become "a Good Food Nation". Aiming to improve the provision of community growing spaces across Perth and Kinross this helps communities lead more sustainable lifestyles.

Multi-Purpose Biodiversity Features
Multipurpose features that enhance biodiversity are encouraged. Examples include

- **Green Roof habitat shelters** over bike storage and bin stores.
- **Integral bird bricks** at a ratio of one per house referring to BS BS42021 which details nest box installations.
- **Integral bat bricks** located where they are warmed by the sun or alternatively species roost boxes on trees.
- **Bee bricks**. Boundary walls are ideal places to incorporate bee bricks. Locate in sunny, sheltered locations between 1-1.5m above ground close to nectar rich plants.


Bee bricks
Integral bat bricks
Cover flight for bats & wildlife
Integral bird bricks
Nectar rich plants
Integral bird nests
Green Roof habitat shelters
Hedgehog highways
Community allotments

4.8 Public Space For All Ages

Refer to the following guidance :

National Roads Development Guide
PKC Play Framework
Scotland's Play Strategy

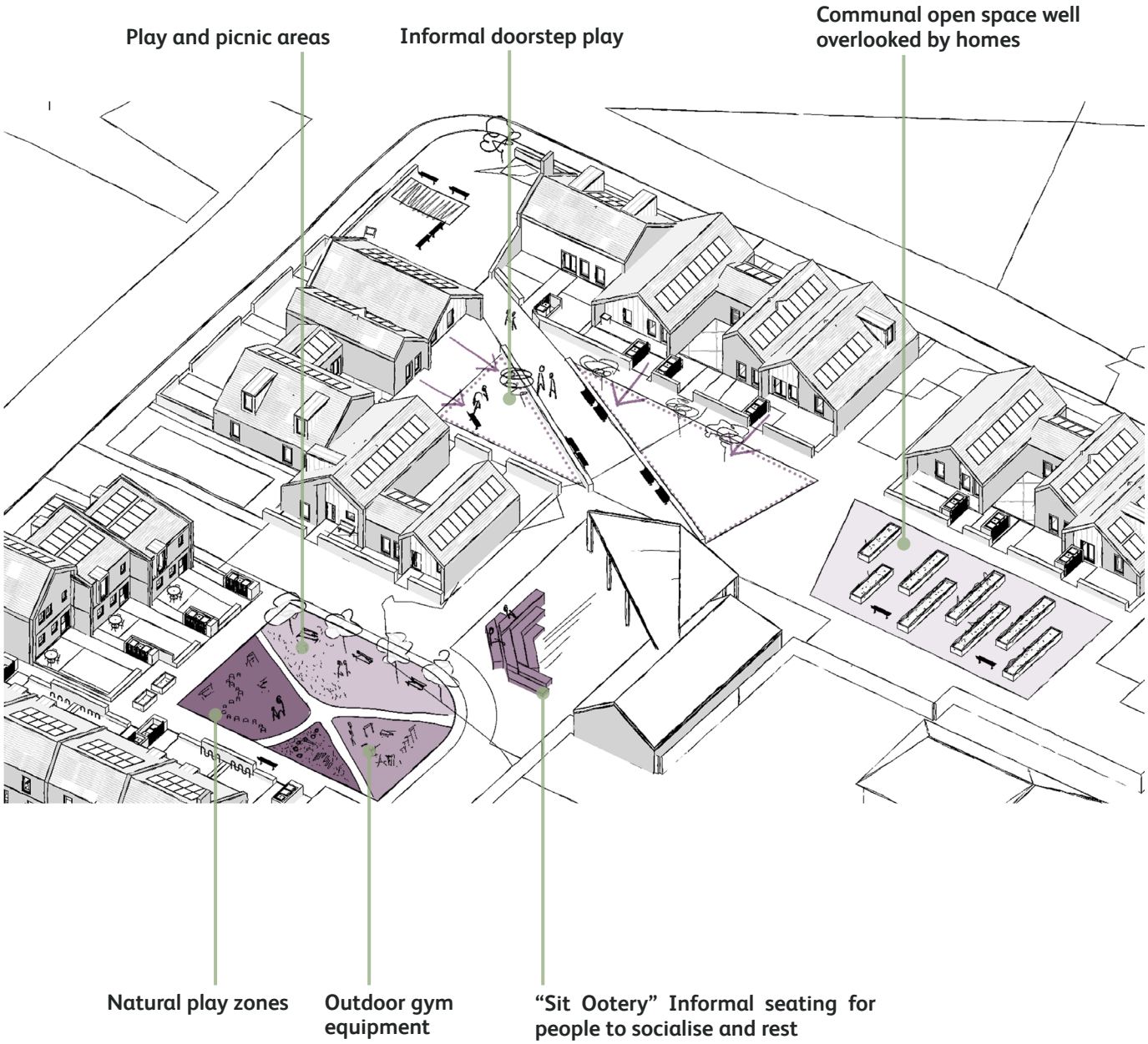
The quality of the spaces between homes in a residential setting is as important as the homes themselves. Public spaces are communal streets, squares, parks, play spaces and other spaces with different uses by cars, cyclists and pedestrians supporting community life and play.

Cater for all ages with an inclusive approach to design, allowing them to used for a variety of activities such as socialising, play, resting and movement. Ideally, they should encourage people to walk and cycle rather than rely on cars for short, local journeys.

Spaces should be designed to allow for safe and continuous movement with pedestrian priority. Lower car parking ratios can allow for family friendly streets. Shared surfaces should be restricted to areas only where vehicle speeds and traffic volumes are low. Otherwise, there should be a distinction between the pavement and carriageways, taking into consideration the needs of people with disabilities such as limited mobility and visual impairment. The design should include safe inclusive crossing points and discourage cars from parking on pedestrian routes.

Public and shared spaces should feel safe. Careful planning can create the right conditions for residents to feel safe and secure, without the need for additional security measures. Typical measures include :

- Locate homes around the edges of a public space, providing active frontages along its edges
- Ensure entrances and windows overlook public space providing natural surveillance from inside homes.
- Providing reasons for people to enter into the space with an activity or destination or because it is on a natural line of direction of travel.
- Undertake a risk assessment at early design stages, allowing security measures to be integrated into positive design features.
- Ensure public spaces support social interaction with meeting places and opportunities for relaxation and stimulation for all ages, regardless of type or tenure of the homes around them.



Play Spaces

Play areas will only be considered where these will be adopted by Perth & Kinross Council. They should be designed by a qualified landscape architect. The design should be robust with a long low maintenance life and offer a rich play environment with a variety of play experiences.

Good play spaces should be multi-functional and offer opportunities for both formal and informal play, exercise and rest accessible to all. Avoid segregating children on the basis of age or ability, and plan so that equipment and features can be used by a wide range of children, even allowing different patterns of usage throughout the day or week ie equipment that also doubles up as a seating area for adults and children.

There is generally a lack of good quality provision for older children and teenagers and taking a more inclusive approach will provide them with a variety of social spaces to meet with friends and access more challenging play opportunities.

Figure 7

05

Housing Design

5.1 A Residential Mix

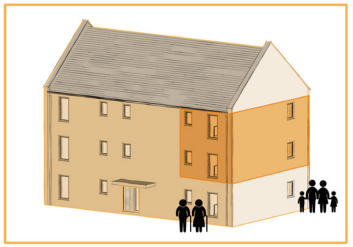
As a general principle, and allowing for any site characteristics and specific Project Brief requirements, developments should provide for as wide a range of needs as possible, and should incorporate a mix of tenures and a full range of house and flat types.

Tenure and Varying Needs Blind

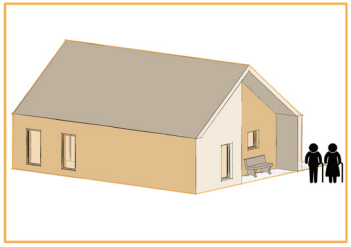
The design of buildings and spaces should be 'tenure blind' whereby homes for affordable rent, intermediate forms of tenure and private sale are indistinguishable from each other in terms of design quality, appearance or location within a site

Housing Typologies

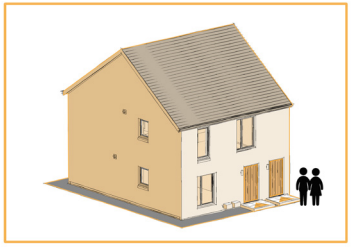
Different housing forms are capable of delivering differing needs and requirements for their residents; while two storey housing units may be preferred for families, bungalows are often preferred by elderly residents. The selection of the optimum housing typology is therefore key to delivering a successful housing development.



Maisonette-
Can house a family as well as an elderly couple



Bungalows-preferred for elderly



Front door entrance for all flat typologies

Figure 8

Case Study I Goldsmith Street
While complimenting the existing context, the building typology for Goldsmith street was decided and influenced by the form factor in order to help deliver the passivhaus development.

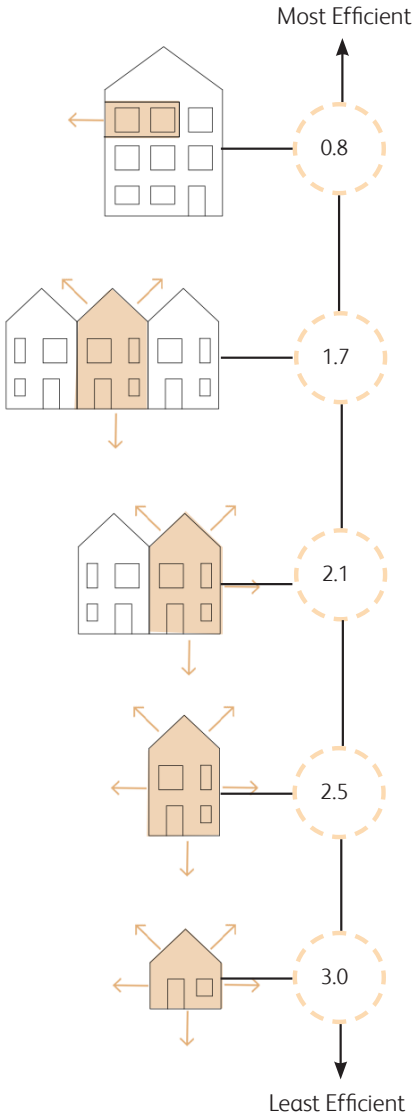
Form Factor

While different housing typologies should be considered when designing development for specific needs or briefs, the form of these homes is the key consideration to achieve maximum energy efficiency in the home design. The building form should be designed to be as compact and simple as possible; this will reduce the surface area exposed to the elements and, in turn, reducing the area responsible for heat loss. A simple building form can be achieved by avoiding design features such as stepped roofs, roof terraces, and inset balconies.

The efficiency of the form can be determined by measuring its 'Form Factor':

$$\frac{\text{Total Heat Loss of walls, floors, roofs and openings (m2)}}{\text{Habitable Floor Area of All Storeys (m2)}}$$

If a building is designed with a poor form factor then the fabric efficiency will need to be increased significantly to achieve the optimum levels of performance. This will increase costs as more insulation and more efficient systems will be required.



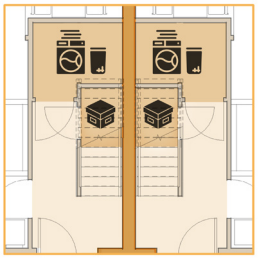
5.2 Internal Layout Efficiencies

Flexibility
Homes must be designed with spaces that fulfil different needs and uses for individual residents. Spaces should be capable of being used in many ways, and by different members of a household at the same time, The larger the household, the more critical this becomes. Every person needs space to call their own.

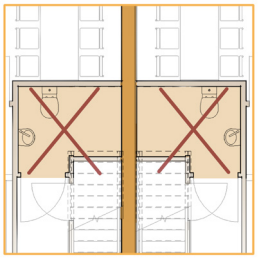
Layout
The layout of any development and the building form adopted should aim to achieve efficiencies in design, construction and energy use in accordance with good building practice, and should maximise the full development potential of each site in accordance with the housing mix specified.

Functionality
Designing a home that is functional and easy to live in relies on an understanding of where to position rooms in relation to each other, to daylight and sunlight, and to public and private frontages.

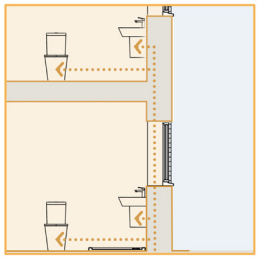
Design Principles



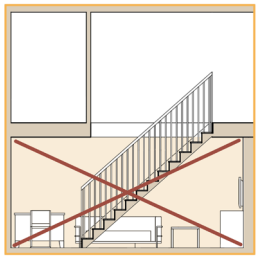
Locate utility and circulation spaces on each side of the party wall



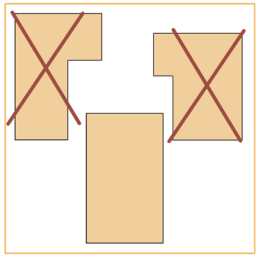
Avoid internal bathrooms, shower rooms and kitchen where possible



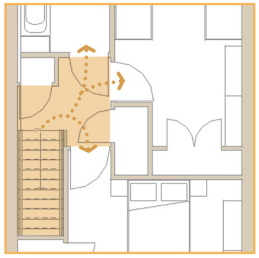
Locate all wet rooms close together and adjacent to external walls to minimise pipe and ducting runs.



Avoid locating stairs to the first floor within a living room



As few layouts should be adopted for each dwelling type



Layouts to be economically arranged to minimise wasteful circulation space

Locate doors into rooms, stores and wardrobes to maximise useable wall and floor areas

Regular shaped rooms where possible to allow maximum use of usable space

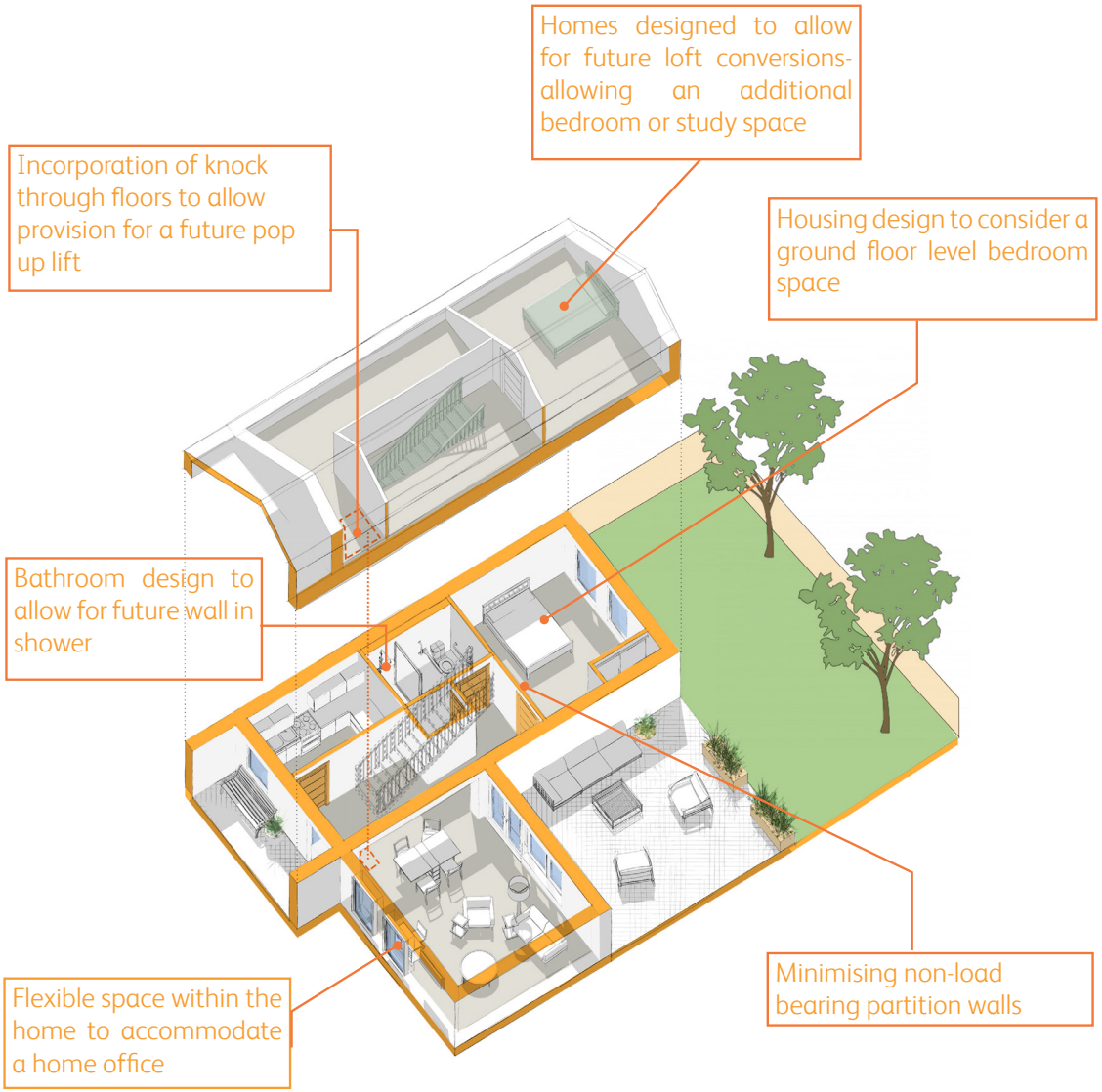
Figure 9

Built in Resilience

Homes should be able to accommodate the various activities of daily life that change when we start a family, growing older, become ill or less mobile. Layouts should be designed to accommodate some flexibility to enable residents to customise their homes if and when required, allowing them to remain in their homes in the long term

Case Study | Woodview Mews

Each unit has been designed to facilitate for a 6 bedroom home, however the flexibility in the column free floorplate allows the unit to be divided into different typologies to accommodate for different stages within a family's lifecycle. Rather than a couple having to relocate to a smaller dwelling once their children have left the family home, they can change their single 6 bedroom unit into a maisonette typology and rent out the area they will no longer be inhabiting.



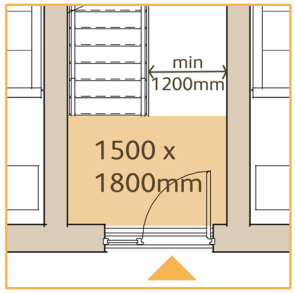
5.3 The Communal Entrance

Access

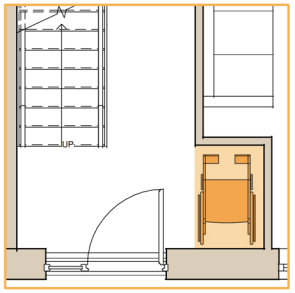
It is preferable that flats share an enclosed communal staircase with the number of lifts kept to a minimum. Lift access will only be provided above four floors, unless agreed on an individual basis by the Council.

In two storey flatted developments, cottage style flats are preferred, with private stairs to the first floor flats.

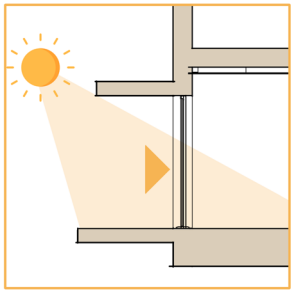
The use of open deck access will be considered where designers are able to demonstrate that the design has taken account of, and resolved, the following issues: a maximum of six flats to be accessed from each deck, privacy for rooms facing onto the open deck, sound and thermal insulation between rooms and the open deck access (i.e. measures for ensuring prevention of cold bridging), security and defensible spaces including appropriate lighting of the deck, surface finishes to the deck (non slip, frost protection, surface water drainage) and minimal noise.



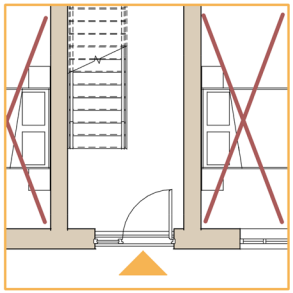
Entrance halls to have a clear floor area at the entrance door of 1500mm wide x 1800mm long reducing to a clear width of 1200mm minimum for the remainder of the hallway and stairs.



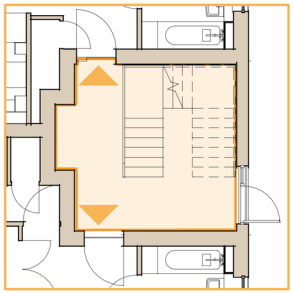
Entrance platt to be 1500 x 1500mm laid to a fall of 1:100 away from the entrance door. Entrance lobbies must be level with the external entrance platt.



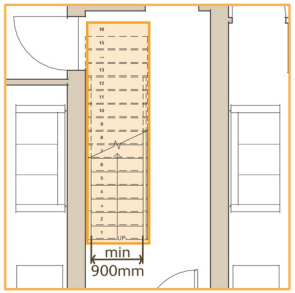
Design halls and stairs to maximise natural daylight without the use of large glazed screens. Design layout to be easily understood by people with visual impairment.



Entrance halls should not to be located adjacent to bedrooms. Design layout to minimise use of door closers within flats.



Entrance halls must allow level access to all ground floor flats (where these are not main door).



Straight flight preferred with a minimum clear width of 900mm for stairs

Design Requirements

All communal entrances and stairwells should feature the following:

1

Cleaners Store

One lockable cleaner store with cold water tap, floor drain and power supply to be provided. Coved vinyl flooring.

2

Landlord Electricity Cupboard & Sockets

Common stairwell to include a cupboard adequately sized to house the required electrical mains equipment and services distribution boards including renewables control panels and equipment, landlord's consumer unit and meters.

All common stair lighting to be connected to the landlord's meter. Cupboard to contain a key switch for testing of emergency lighting and a switch to manually override the photocell controlling the communal stair lighting.

A 13A switched socket outlet to be provided on each level, within the service riser cupboard.

3

Door Entry System

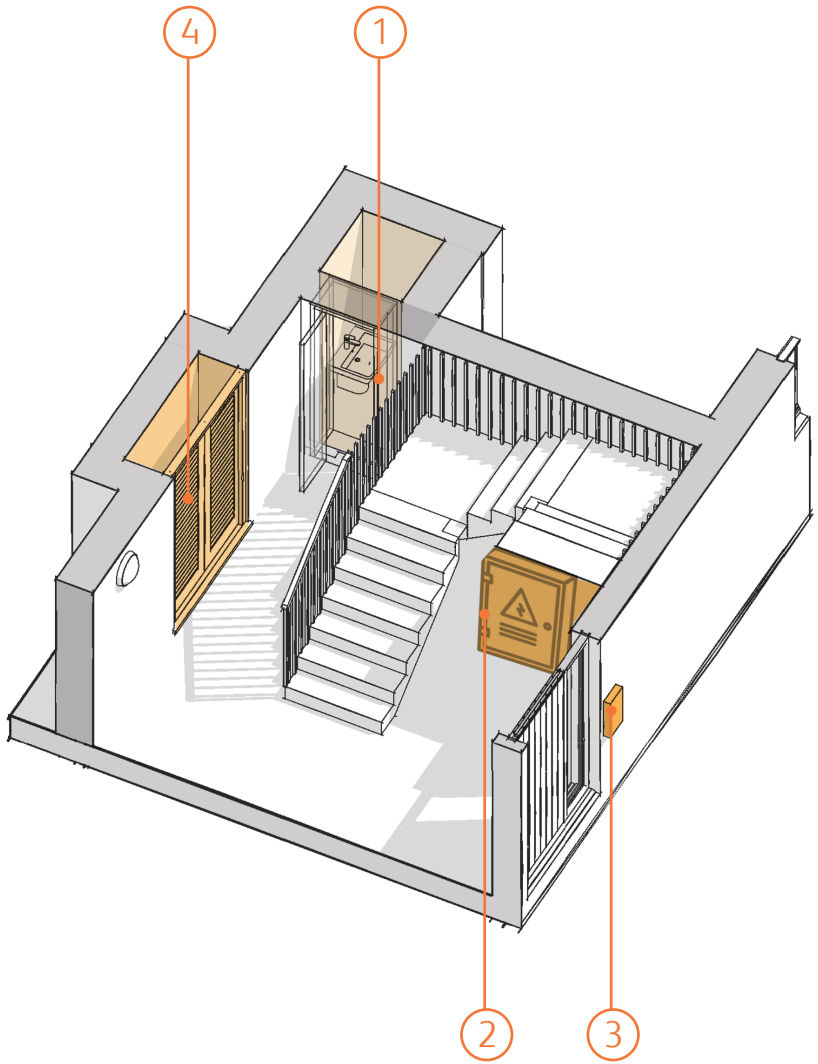
Install control panel at 1000mm from ground level externally to bottom edge of panel.

4

Common Stair Service Ducts

Recess all common service risers into internal wall fabric. Use removable non-combustible duct covers, cup and screw fixed to give a flush finish. Provide full height doors to service doors where access is required, with suited keys.

All duct covers and service doors in common halls and stairwells to give 60 minute fire resistance from both sides.

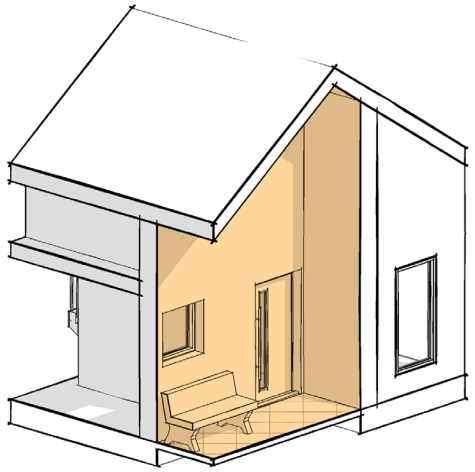


5.4 The Main Entrance

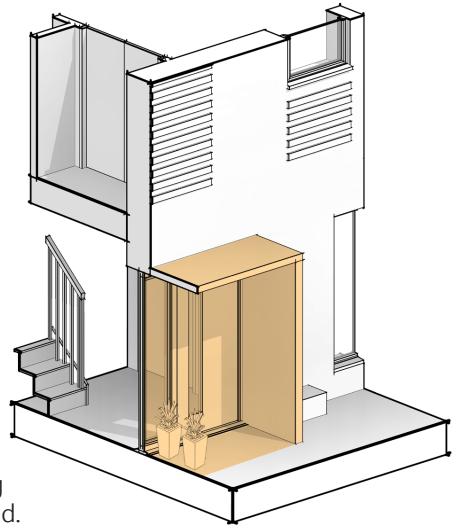
The Main Entrance
The main entrance of the property should be highly visible and welcoming. It should provide shelter from the elements in the form of a maintenance free canopy or recess wherever possible. This space should be adequate enough to protect a wheelchair or buggy.

Thresholds
Thresholds are an often overlooked design detail yet they are the physical link between a resident's private domain and the street outside. A semi-private space between the front of the dwelling and the public street, thresholds should aim to protect the privacy of the home, but connect to the world outside.

Access
Entrances should be designed with easy level access where possible., even where they meet the 15mm maximum. Ensure that any threshold drainage does not create an obstacle. Any footpaths from the street or car parking provisions which approach the front entrance of the home must have a suitable width and gradient to allow universal access within the site.



Integration of threshold into built form with recess and overhanging eaves creating shelter.



Entrance canopy overhang creating sheltered threshold.

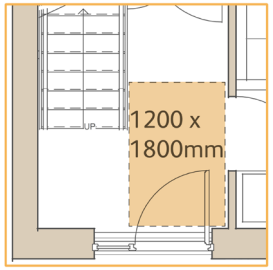
Figure 10

Case Study Wilderness Mews

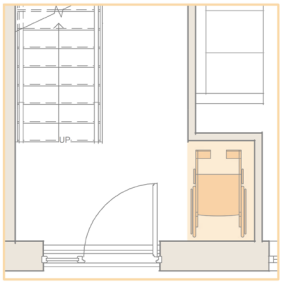
These retirement homes in Kent use the form of the home to create a threshold between the front door and the wider housing estate. In this example, the threshold space also combines a sheltered outdoor bench and a storage area within the built form of the dwelling.

The Entrance Hall

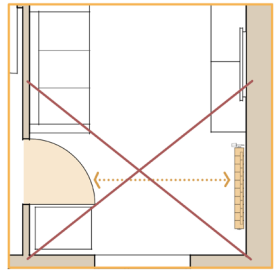
The main entrance to the property should be highly visible and welcoming. It should provide shelter from the elements in the form of a maintenance free canopy or recess wherever possible and this should be adequate to protect a wheelchair or buggy.



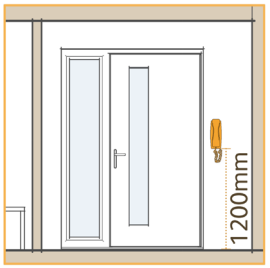
Entrance lobby should be 1200mm x 1800mm long between doors



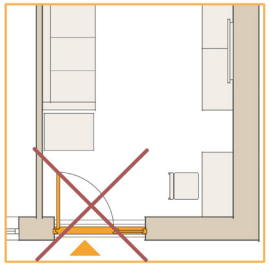
Hall should incorporate a recess for outdoor clothes, large enough for pram/ wheelchair storage



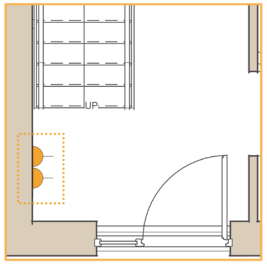
Avoid locating radiators/heaters opposite doorways



Provide door entry system handset with privacy button in hall to be mounted 1200mm from floor



Dwellings should not be entered directly into a living room



1 or 2 no. sockets required, depending on the size of the hallway Upper floor landings - 1 no. double socket.

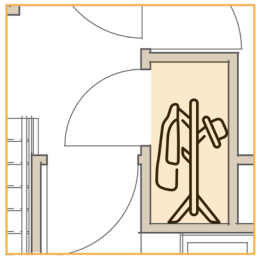
5.5 Storage

Sufficient storage should be provided to meet immediate needs and anticipate changing lifestyles. Each home will require a range of storage spaces to reflect the needs of residents who will have all kinds of items to display or store, whether these are small and personal mementos or bulky storage.

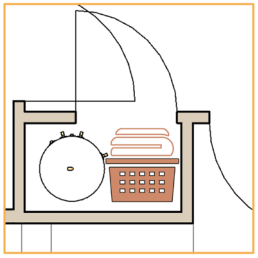
Store for Conversion to Future Shower Room
Where shower room is not provided on the principal living level, provide a store adjacent to the WC compartment to allow future conversion to a shower room. Minimum size as per Building Standards, with future water service pipework, electrical supply and waste installation provision made.

Storage Shelving
Allow for at least one cupboard to be fully shelved (to be agreed on site).Shelving to be minimum 18mm thick lipped blockboard, all adequately supported on softwood bearers and haffits as required.

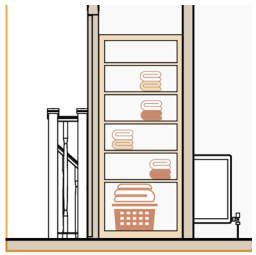
Storage Principles



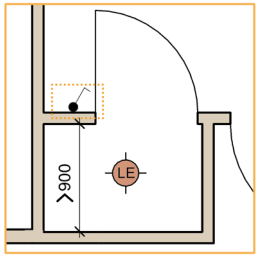
Allow at least one large store for bulky clothing



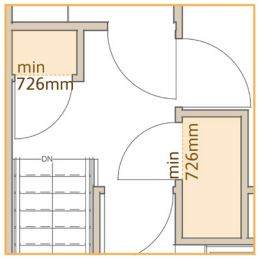
Provide one separate linen cupboard. Can be combined with hot water cylinder store



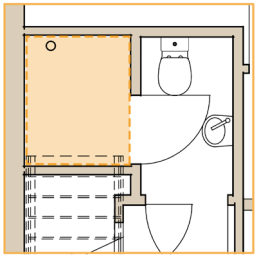
Linen cupboard to be fitted with slatted shelving. Should not be located in bathroom, WC or kitchen



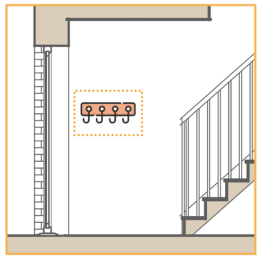
All stores deeper than 900mm to include lighting with light switch located outside door. For large walk-in stores make door 826mm wide.



All store doors to open outwards with a minimum of 726mm wide.



Store for future conversion to a shower room



Provide a minimum of 4 coat hooks on a dressed timber plate in the hallway or walk-in cupboard

Storage Requirements

KEY:

Minimum built in general internal storage area free of hot water cylinders**, washing machines, tumble dryers and other obstructions, with a minimum floor to ceiling height of 2m.

Linen cupboard* minimum 2m high. May contain the hot water cylinder as long as 2No. 600mm x 600mm slatted shelves can be fitted with 450mm minimum clear height above each.

Kitchen storage with removable shelves for storage of bulk purchase items – excluding under sink storage.

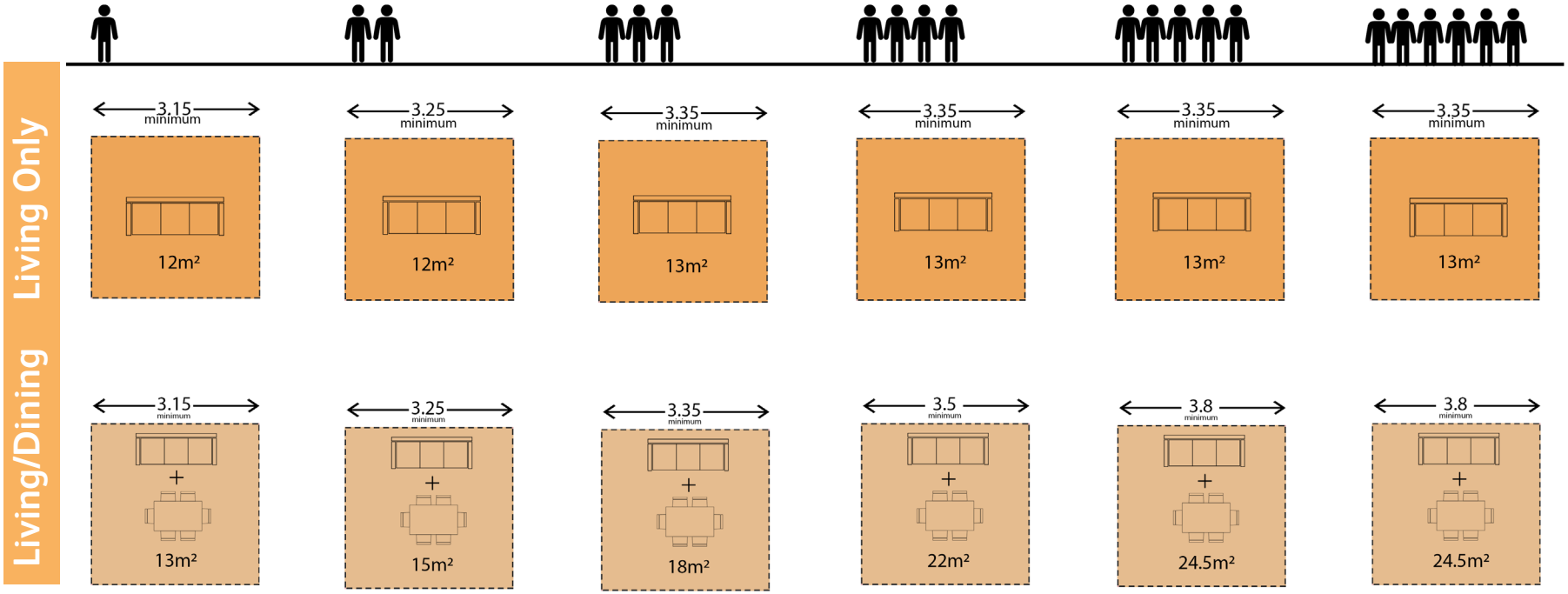
	Single Storey			Two Storey Housing			Flats		
1	1	0.6	1.3	-			1.0	0.6	1.3
2	1.5	0.6	1.5	1.5	0.6	1.5	1.5	0.6	1.5
3	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
4	2.5	0.6	2.1	2.5	0.6	2.1	2.5	0.6	2.1
5	3.0	0.6	2.2	3.0	0.6	2.2	3.0	0.6	2.2
6	3.5	0.6	2.4	3.5	0.6	2.4	3.5	0.6	2.4
7	4.0	0.6	2.6	4.0	0.6	2.6	-	-	-

5.6 The Living Room

Space Standards
Where open plan kitchens and living rooms are provided the floor area will be the sum of the relevant living room and kitchen floor areas for the size of the dwelling.

Seperate Dining Area
Where a separate dining room is not provided, create a distinct dining space (either in the living room or in the kitchen). Where dining is provided in the living room this should be near to the kitchen.

Design to allow future conversion of room into a ground floor bedroom.



Design Requirements

1 **South Facing**

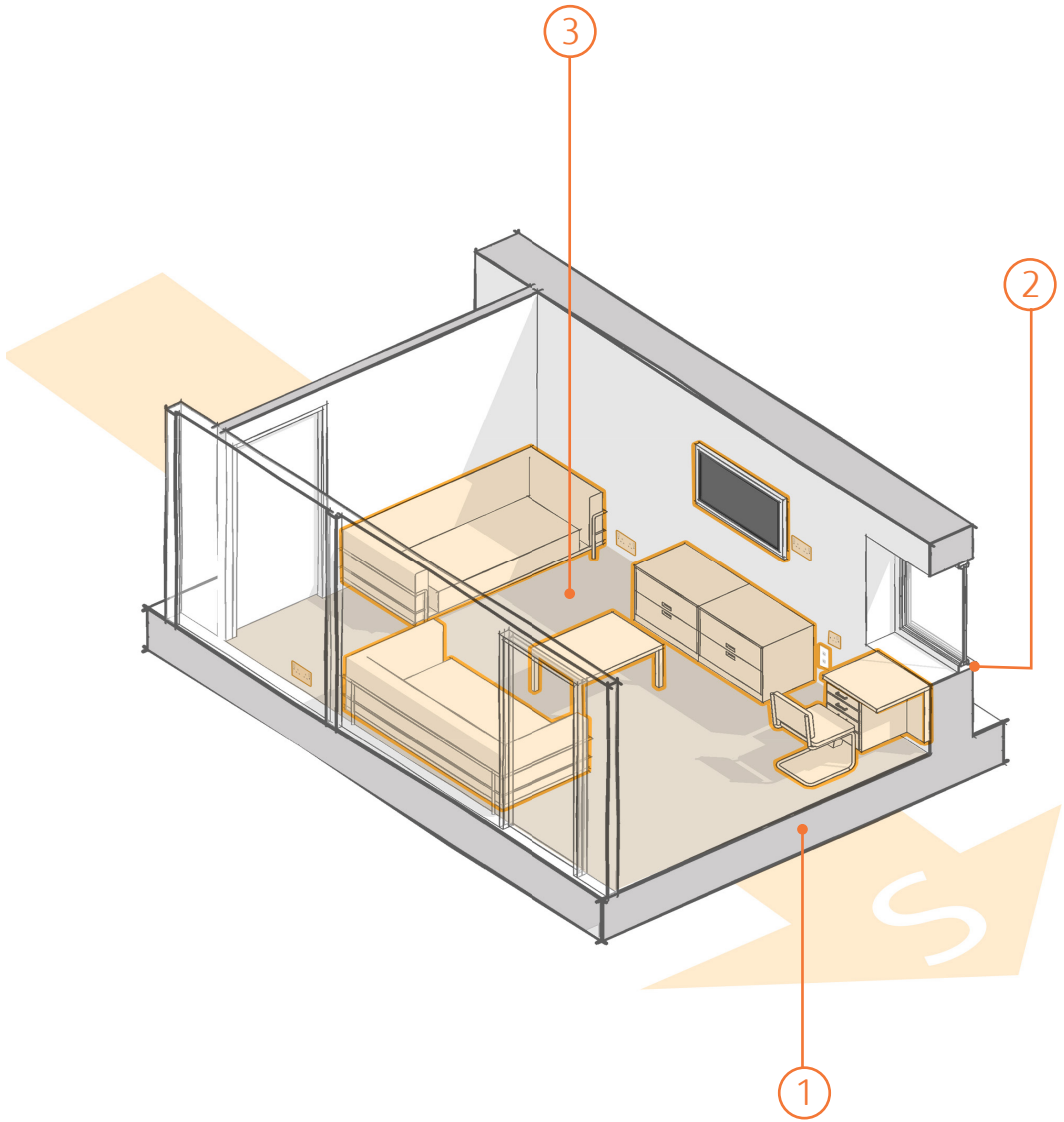
Where possible, living rooms should be orientated south to maximise sunlight and allow useful solar gains

2 **Window Cills**

All window cills should sit at a maximum of 600mm above finished floor level

3 **Flexible Arrangement**

Living rooms should cater for a variety of activities. It should be designed with at least two possible arrangements of furniture



Sockets and Switches Provisions :

Minimum of **6** Double Sockets

- 2no. adjacent to TV and satellite outlets

-1no. adjacent to telecom outlet

5.7 The Kitchen

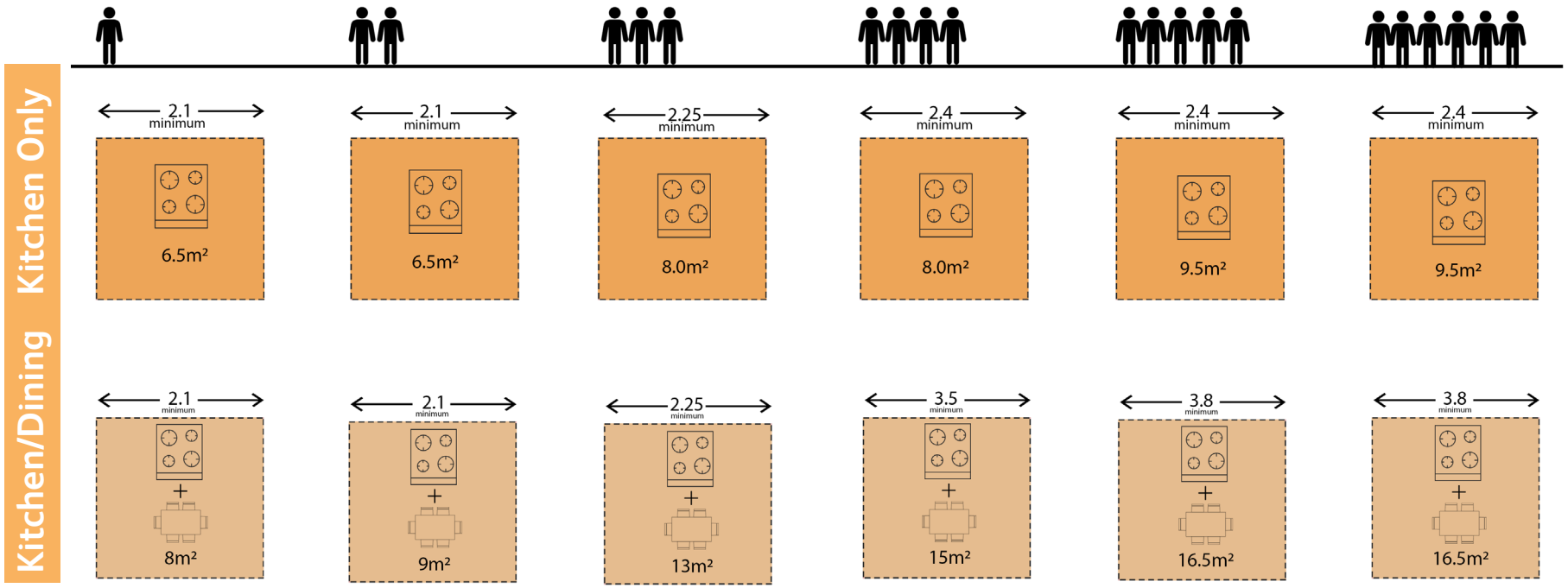
General Layout
Where possible the kitchen should be a separate room, located away from bedroom areas and preferably situated close to the living-room area, have a window and have adequate ventilation provided through either passive or mechanical ventilation.

Space Standards
Often perceived as the heart of the home, the kitchen requires a welcoming design, accompanied by a layout which allows for the essential functional standards.

All areas and dimensions indicated below are the minimum accepted.

Kitchens within larger properties (5 persons and above) shall be separate from the living area or have a separate utility room included.

In smaller flats it is accepted that separate kitchens may not be possible. In these circumstances some form of visual separation of the living room and the kitchen area is required.



Design Requirements

1 **Work Triangle**
The location of the appliances should consider the work triangle; the optimum placement of the appliances to create a functional kitchen.

2 **Window**
All window cills should sit at a maximum of 1050mm above finished floor level. Where possible, no units or appliances should be placed in front of window

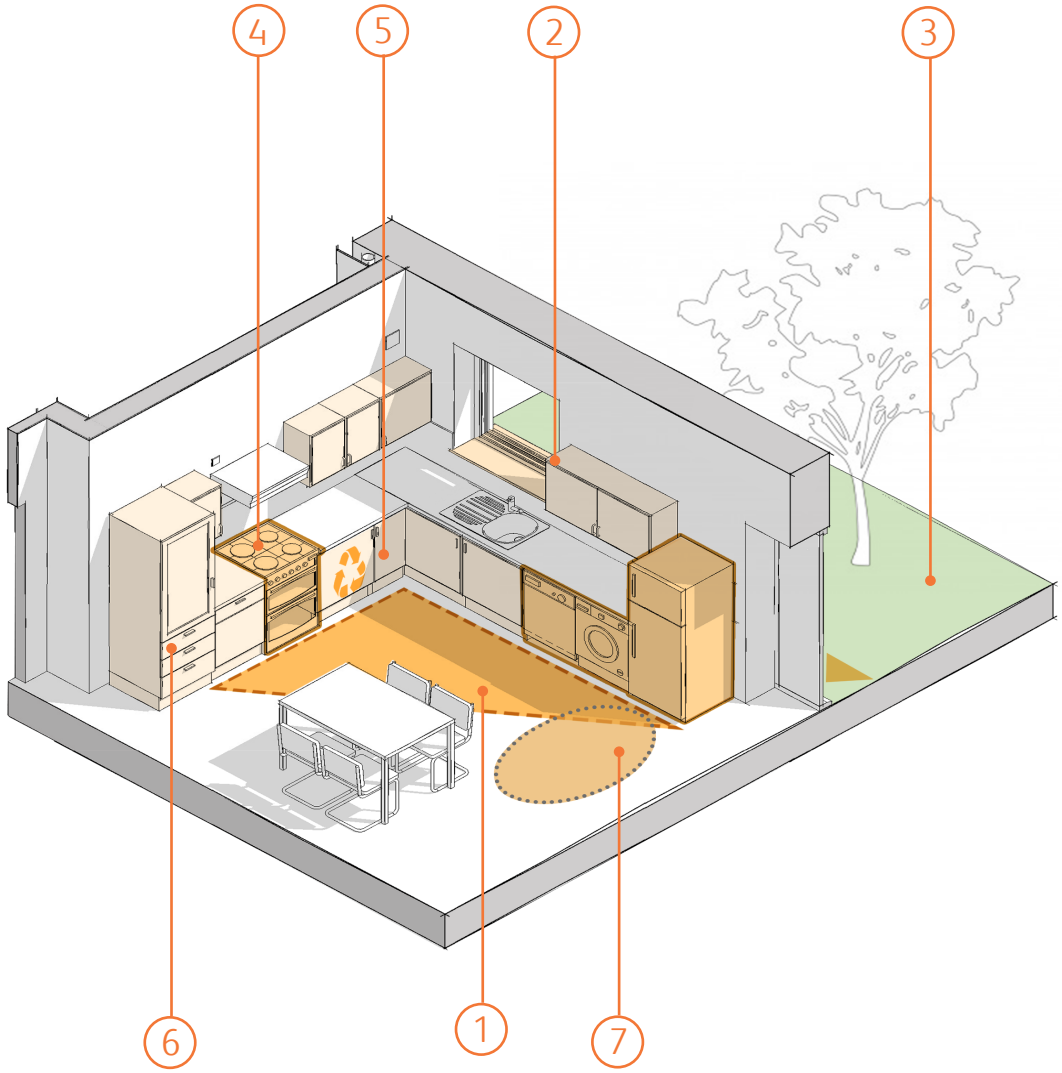
3 **Direct Garden Access**
Provide a view and direct access from ground floor kitchens to supervise childrens play

4 **4 Appliances**
Design the layout to incorporate four appliances. Further details on page 85.

5 **Recycling Storage**
Allow for a small recycling storage solutions to be incorporated within kitchen layouts

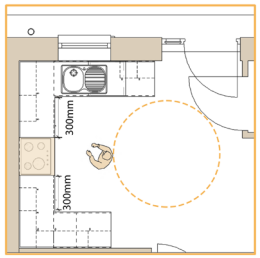
6 **General Storage**
Allow for minimum kitchen storage as noted in previous table. These requirements are to include a 600mm wide tall cupboard or built-in store

7 **Clear Activity Space**
Allow a 1400mm x 1800mm ellipse or 1500mm square clear floor space in front of fitments and appliances.

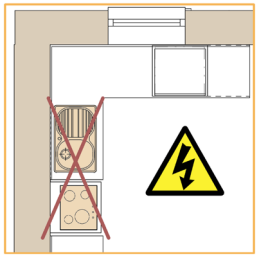


5.7 The Kitchen

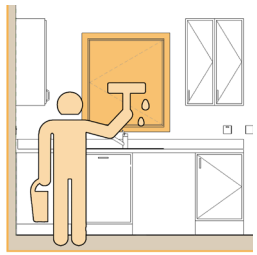
Storage and Accessibility Requirements



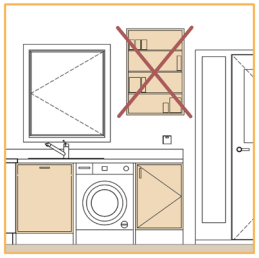
Sufficient space around the cooker for it to be used safely e.g. the kitchen door should not swing open such that it could strike someone using the cooker and potentially cause an accident



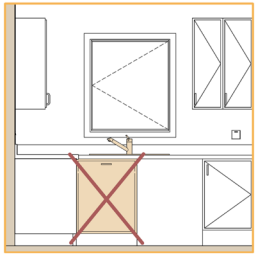
To be considered safe there must be at least 300mm of worktop space between the cooker and sink wet area including drainers



Layouts of kitchen units and fittings should aim to allow easy access to window handles & locks and so that windows can be cleaned



Open shelving will not be considered as part of the storage requirements



The sink unit should not count in the minimum 1m3 food storage requirement.

5.8 The Utility Room

Where possible a utility room to be provided in accommodation with more than 4 persons where there is no separate kitchen. Where this is applicable, the following should be considered:

1 **Appliances Required**

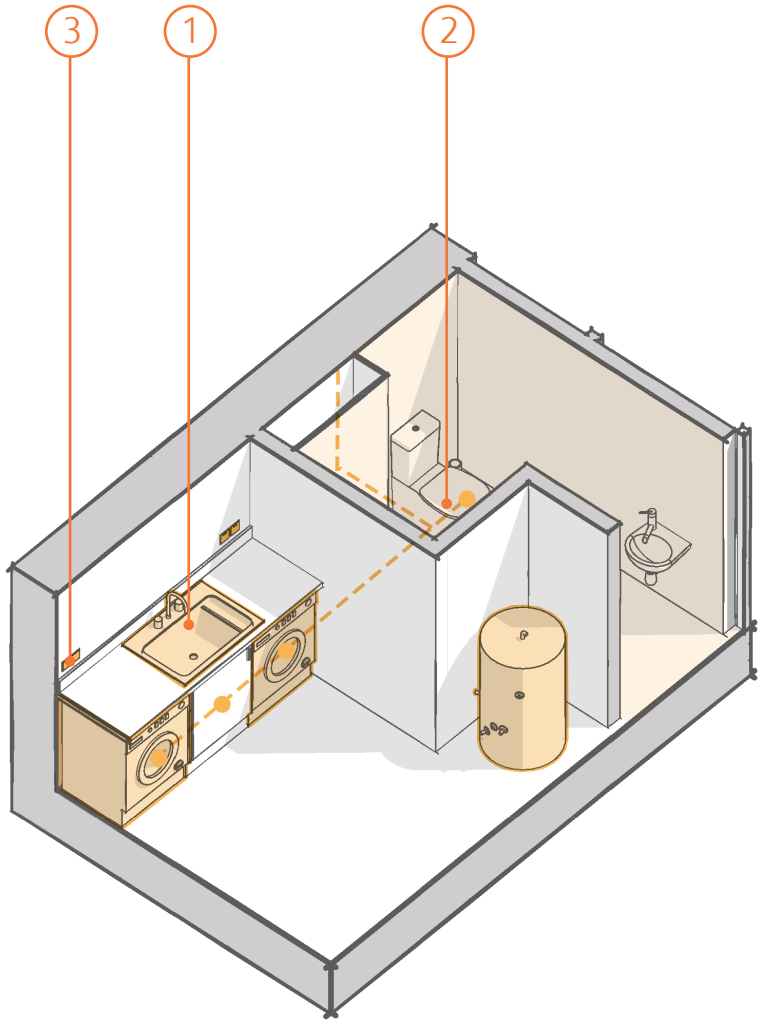
Allow for sink, washing machine, tumble dryer. Ensure adequate ventilation for tumble drier.

2 **Location of Services**

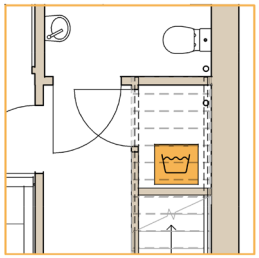
Careful consideration given to the location of the utility room in connection to the drainage and supply services. Ideally services to run back to back with bathroom/kitchen.

3 **Socket Provision**

1 no. double socket to be provided. Appliances to be remotely switched.



In smaller dwellings, the washing machine can be located in storage cupboards such as a cupboard under the stair.



5.9 The Bathroom

Bathrooms are small, functional spaces and should be designed so household members can add their own character and personalise them. The layout should be space-efficient, allowing for later adaptation of additional supports and aids if required.

Design Requirements

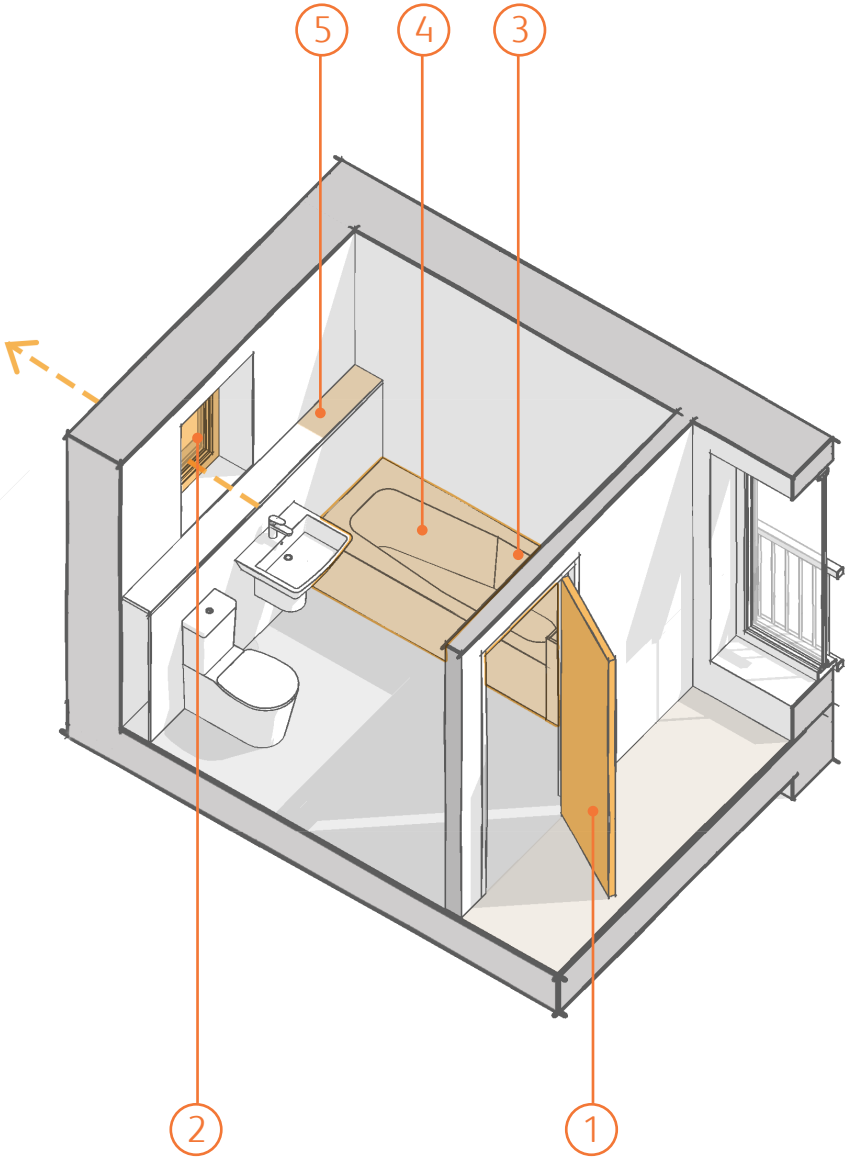
1 **Door Opening**
Allow for an outward door opening to the bathroom.

2 **Window Placement**
Avoid internal bathrooms in the layout of homes to allow natural ventilation and air flow. All sanitary ware must be easily accessed and must be located to provide easy access to the windows and ducting.

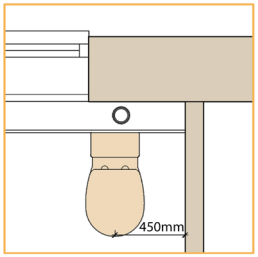
3 **Bath Location**
Baths should not be sited below windows.

4 **Resilient Design**
Where a shower is not provided initially, allowance should be made in all ground floor accommodation for the future provision of a level access shower tray instead of a bath (e.g. pop-up drainage).

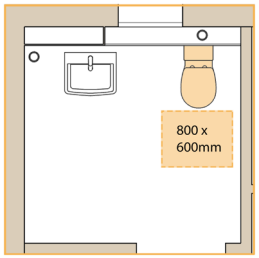
5 **Allow for a Bath Shelf/Ledge**
A shelf of at least 400mm at the head of a bath can be used a shelf or seat.



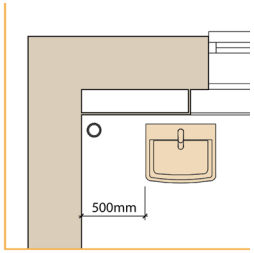
Spatial Requirements



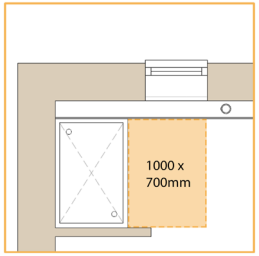
WCs should be positioned with their centre line 450mm from a wall capable of taking support rails.



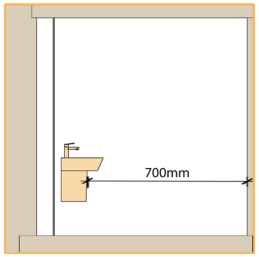
Provide an activity space at least 800mm wide by 600mm long in front of the WC (the length should be increased to 800mm, if measured directly to a wall).



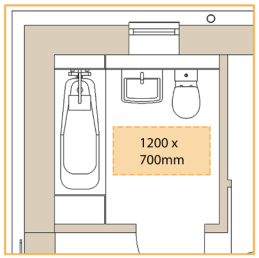
Wash hand basins should be positioned so that their centre line is at least 500mm from any adjacent wall.



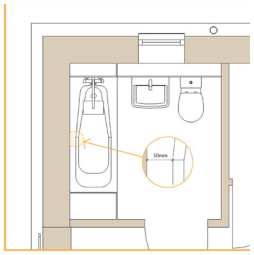
Shower trays (where fitted) should have an activity space 1000mm wide and 700 mm long in front of them (the length should be increased to 900mm if measured to a wall).



Provide a clear activity space at least 700 mm long in front of the WHB (the length should be increased to 900mm if measured to a wall).



Provide a clear activity space of at least 1200mm wide by 700mm long (the length should be increased to 900mm if measured to a wall).



Baths should be fitted so that the rim against a wall is exposed for at least 50mm of it's width to provide support for bath seats etc.

5.10 The Bedroom

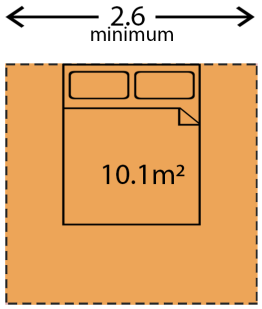
Bedrooms should be designed to allow flexibility of use. People often use bedrooms for work or study, or to relax away from the social spaces of the home.

Double/Twin Bedroom

Floor area includes built in wardrobe of 1200mm x 600mm minimum

Provide 4 no. double switched socket outlets to principal bedroom and 3 no. to all other bedrooms.

At least one socket to have a USB connection

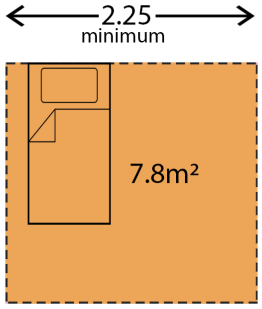


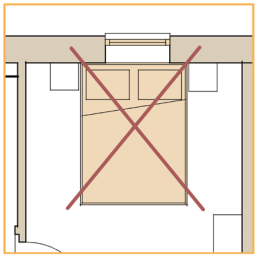
Single Bedroom

Floor area includes built in wardrobe of 600mm x 600mm minimum

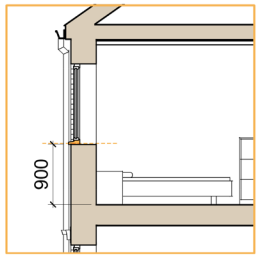
Provide 3no. double switched socket outlets

At least one socket to have a USB connection

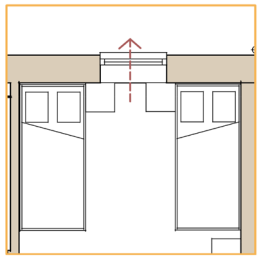




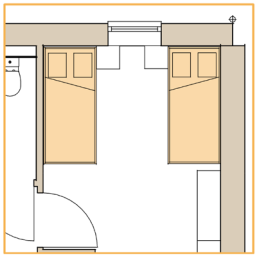
Bed(s) should not be located directly under windows.



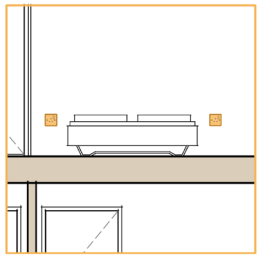
Window cill to be 900mm from finished floor level



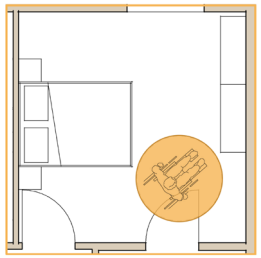
Placement of furniture to allow access to windows



Double bedroom must accommodate two single beds in place of a standard 1900 x 1500mm bed with circulation space around beds.



Locate 1no. socket to either side of the bed



Ensure that ground floor bedrooms can be accessed by a wheelchair user. Space for future pop up lift to be provided for access to first floor bedrooms

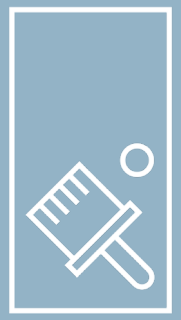
5.11 General Space Standards

The space standards indicated opposite are recommended as a minimum to be provided to accommodate the number of persons designated.

- Floor Area Excluding Storage (m2)
- General Storage Area (m2)
- Minimum Separate Utility Cupboard or Room (m2)

	Single Storey			Two Storey Housing			Flats		
1	30	3	-	-		-	30	2.5	-
2	44.5	4		59.5	4		46	3	
3	59	4		71	4		57	3	
4	69.5	4.5		81.5	4.5		72	3.5	
5	79	4.5		94.5	4.5		-	-	-
6	85.5	4.5		102.5	4.5		-	-	-
7	-	-	-	117	6.5		-	-	-

Figure 11



06

Specification

6.1 The Building Envelope

Building envelope is the term used to describe all the exterior building components of the home. This includes the windows, doors, roof, walls, ground floor and foundations. As the barrier which divides the internal and the external, the design of the building envelope influences how much heat is leaked from the inside out and defines how efficient the building is performing.

Designing for Airtightness

To ensure an energy efficient home, the airtightness strategy for the development should be implemented right from the start of the design process. The location of the airtightness layer within the building envelope is critical in deliver an airtight home with minimal thermal bridging; this location must be made clear in all tender documentation before site works commence.

Once construction starts ensure the airtightness strategy is fully implemented. Trades people should be briefed and the work regularly checked to ensure the airtight layer is installed correctly.

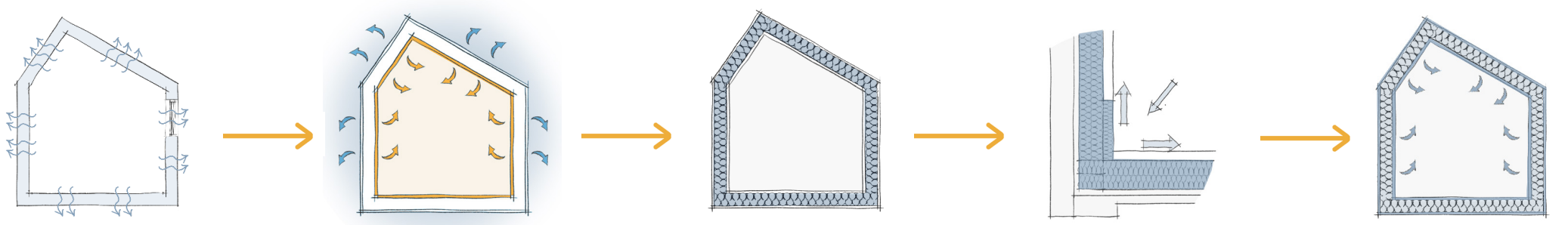
Continuous Insulation

As the thermal performances of a building improves, it responds more slowly to drops in outdoor temperature. To ensure the interior is a comfortable and controllable temperature during all seasons of the year, the building envelope must be wrapped by a layer of continuous insulation. Wrapping the building envelope with super insulation provides the thermal barrier between the inside and the outside, promoting heat retention yet reducing heat loss.

Considerate Detailing

Continuous insulation and the installation of an airtight membrane is what creates the thermal barrier and protection between the interior and exterior of the home; however the detailing at the junctions of each of the building elements is what is critical in reducing thermal bridging and creating a true airtight home. All areas where two components of the thermal envelope meet must be identified and considered as potential areas of heat loss and should be carefully detailed to ensure the continuous insulation and membrane required to create an airtight home.

Steps to Achieve an Efficient Building Envelope



Air Leaking Through an Inefficient Building Envelope

Add a Continuous Airtight Barrier

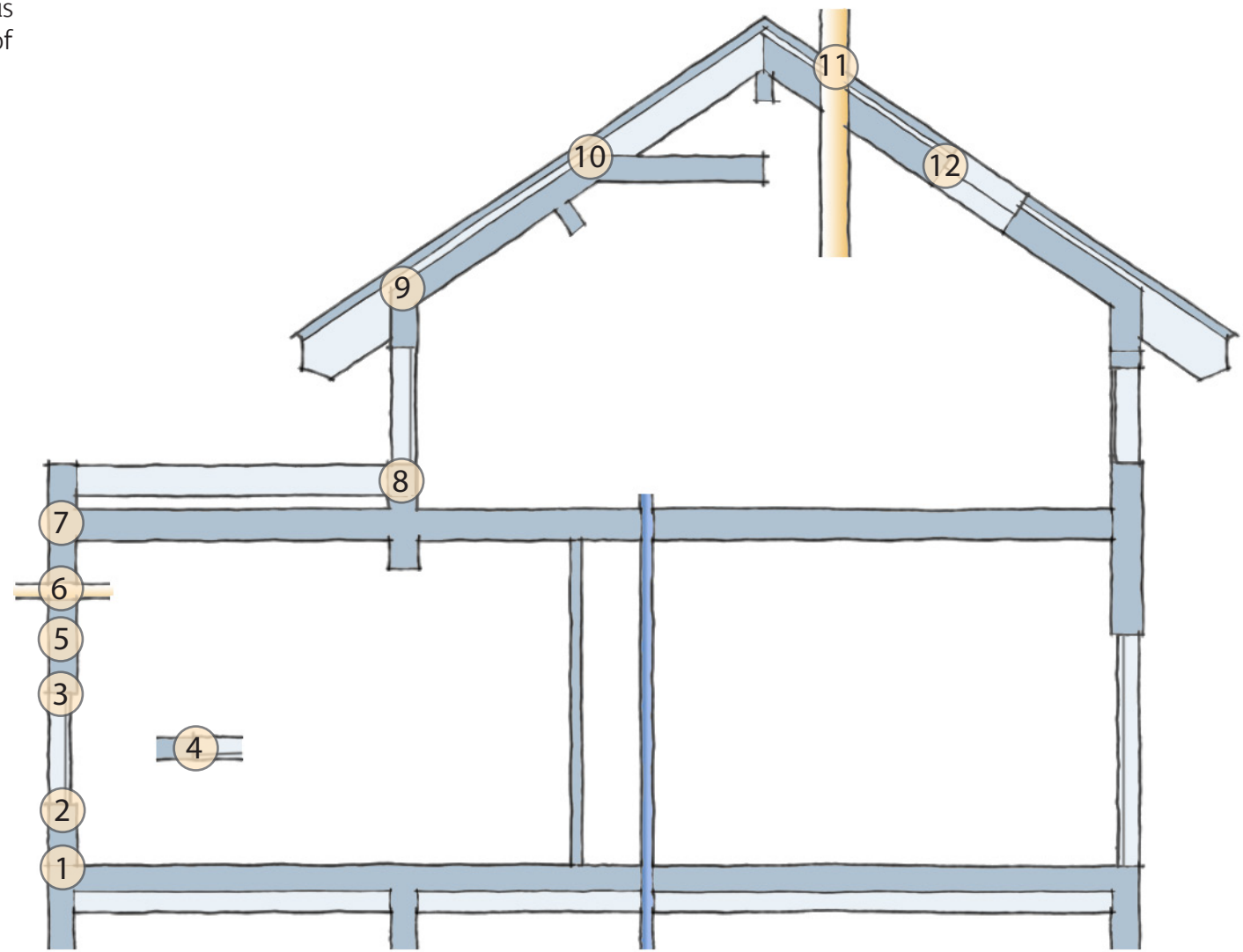
Allow for Continuous Insulation

Detail Carefully at Envelope Junctions

An Airtight and Energy Efficient Buildiing Envelope

The diagram opposite highlights the key areas which should be considered as common areas of heat loss that require robust detailing:

1. Junction between ground floor and external wall
2. Junction between window sill and external wall
3. Junction between window lintel and external wall
4. Junction between window reveal and external wall
5. External wall build up
6. Penetrations through external wall
7. Junction between top floor and external wall
8. Junction between french windows and external wall
9. Junction between roof and external wall
10. Junction between roof and roof ridge
11. Penetration through roof
12. Junction between roof and skylight



6.1 The Building Envelope

External Walls
Wall components should be designed to resist water, condensation and provide thermal energy control. Responsible for approximately 9 % of heat lost in a building, the specification and detailing of the fabric of the external walls are critical in achieving a net zero home.

Joints
Joints in the facing brick should be agreed with the designer and structural engineer. While the joint type should take into account the materials and the orientation of the face, they should be located unobtrusively wherever possible.

Joints in facing brick or block should be bucket-handle type.

Construction
Timber frame is the preferred method of construction in order to reduce the amount of embodied carbon within the project.

To ensure an airtight home, the airtightness layer should be installed to the warm side of the insulation. A service zone should also be incorporated into the wall build up to prevent penetrating the crucial airtightness barrier.

As a lighter form of structure, specifying with timber frames also means the foundations will have to support a minimal load. In turn, less material will be required to form the foundations.

Lintels
Steel lintels to be stainless steel or fully galvanised finish. Lintel should incorporate a thermal break to allow a more thermally efficient design than a standard lintel.

Cills and Slopes
All window cills and copes must project from the face of walls and capillary drips on the underside. These must be avoided at or above roof level.

Finishes
Recessed pointing is not acceptable due to water ingress.

Avoid large areas of timber cladding or finishes without a whole life cost unless they are a formally defined planning condition.

Avoid finishes that require maintenance and are difficult to access.

Avoid wet dash render. If it is required, pre-coloured wet dash render is to be used.

Mortar
Avoid using cement mortar between any bricks and block work where possible. Instead, specify a lime based mortar as a low embodied carbon alternative. This mortar type will also allow materials it has bonded to be deconstructed easily and recycled at the end of the buildings life.

Ground Floor

Service Zone
75mm clear service zone required within the floor construction (all floors) which doesn't compromise sound attenuation or thermal performance.

General
Generally, all ground floors within dwellings to be 22mm thick moisture resistant chipboard throughout on 75mm thick timber battens on a concrete floor slab.

Concrete Slab
Consider installing a concrete slab which has integrated insulation to help towards the airtightness strategy. Specifying products by 'Econekt' (a low energy construction specialist) as an example.

Screeded Ground Floors
For wet-floor areas, such as for shower rooms within dwellings, floor should be formed as a waterproof, in-situ screed on a concrete base, suitable for a non-slip vinyl final floor finish.

In common stairs, areas must be built as solid concrete floors with either a smooth concrete or in-situ screed finish, both suitable for a non-slip vinyl final floor finish.

Timber Ground Floors
22mm thick moisture resistant tongued and grooved chipboard floor sheeting with glued joints on timber battens.

Loose laid chipboard flooring on insulation board is not acceptable to the Council.

Boards must have all edges fully supported on battens.

Additional battens will be required below storage heaters and similar heavy equipment.

Provide screwed access hatches in floors to provide access to junctions in pipe runs.

Pipe runs/services to be marked on flooring.

Timber floors on timber joists to be as above, but all fixings to be to joists and supporting dwangs instead of to battens. Services routed under the floor to be located under the floor, but above the insulation.

Floor Insulation
Must extend, unbroken, over the entire ground floor area and detailed to avoid cold-bridging at junctions with walls.

In-situ concrete floor insulation must be placed below the concrete slab, but above the damp proof membrane.

6.1 The Building Envelope

The Roof

Roof Pitch and Form

Roof forms should be kept simple with no over elaborate detailing unless discussed and approved by council officials.

Pitched roofs are preferred and rafter pitch should be within 27.5 to 45 degrees. Any complicated roof forms and details should be avoided.

The roof shape and structure should be designed to facilitate for an efficient amount of solar panels to contribute to the homes energy strategy. By designing the roofscape to have a larger area facing south will allow more PV's to be installed facing the optimum orientation. Asymmetric south facing for maximum PV energy generation.

Roofs should be designed to leave no opportunity for birds to roost.

Flat Roofs

The use of flat roofs should be avoided wherever possible. Where they are unavoidable, a proprietary roofing system with a warranty should be specified, and the work carried out by a specialist installer. Upstands, flashings and general design must be carefully considered.

Flat roofs, where provided, should be designed and specified utilising proprietary roofing systems.

Parapets

Parapets and barge boards should be kept to minimum and be designed to last the life time of the building.

Soffits and Fascias

All soffits and fascias should be formed from UPVC. Fascia should be fixed to an external grade plywood backing board. Fascias should be low maintenance and minimum 20mm thick. Soffits should be a minimum of 9mm thick subject to the councils approval.

Roof Finishings

Roofs should be finished with concrete tiles, slates, metal sheet covering or other material as approved by the Council and have projecting eaves and verges.

Roof Drainage

Secret and parapet gutters should be avoided.
Gutters and downpipes should generally be UPVC except at street level and any exposed position where uPVC could be damaged; in these instances, metal rainwater goods should be specified. All rainwater, waste and soil pipes must have rodding access at ground level. Rainwater pipes should be pipes should be fitted externally. Recessed pipes are not permitted.

Colour of downpipes and gutters as per planning requirements.

Roof Construction

Structural and non-structural timber, preservative impregnated.

Treated timber sarking, minimum 15mm thick, to be provided to all slated roofs. OSB or exterior plywood sarking to be provided to concrete tiled roofs.
Dry ridge and verge systems when roof tiles are used.

If a timber frame is used, advise the council of the timber kit manufacturers recommendations prior to ordering.

Avoid pre-cast concrete skew stone or wallhead cope stone construction at roof level unless this is specific planning requirement. Details must be approved by the council.

Roof Access

Avoid snow boards, duckboards and similar provision unless to Council approval. Avoid inaccessible areas of either glass or materials that

require maintenance.

U-Values
The construction build-up of the roofs should aim to achieve a combined u-value of the requirement of the current Scottish Building Regulations.

Roof Overhang
Consider incorporating a roof overhang by projecting the roof eaves to provide a strategy for adequate solar shading at window openings.

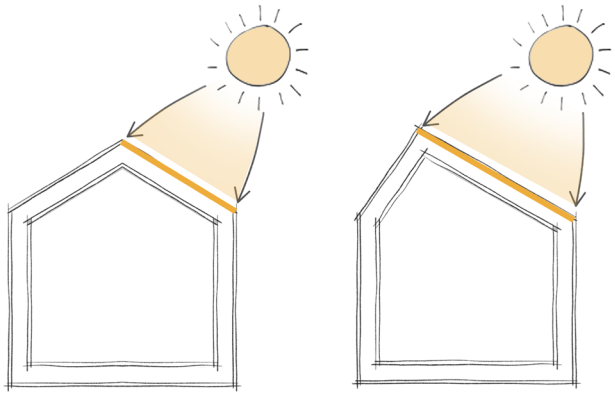
Airtightness Provision
As well as insulation to the general building fabric, any penetrations such as pipe work and ducting should be well insulated to avoid cold bridging.

Green Roofs
Green roofs are an excellent way of offsetting the carbon footprint of a building. Where appropriate, green roofs can be incorporated into the design of homes to provide an additional barrier against heat gain and heat loss.

Future Hoist Provision
Roof trusses in wheelchair housing should be designed to allow for future ceiling mounted track hoist provision.

Balconies
PKC generally approves of the use of balconies for upper floor flats, but they should normally be freestanding galvanised ms free-draining structures. The use of balconies that rely on a waterproof membrane over living accommodation below should be avoided.

The overall design and layout must avoid the creation of any 'dangerous attractions' such as roofs which can be accessed from windows or any barrier protections to balconies, parapets, retaining walls etc. which can be climbed on, sat upon or used as a ledge for plants, drinks etc.



Consider asymmetric south facing pitches for maximum PV energy generation.

Figure 12

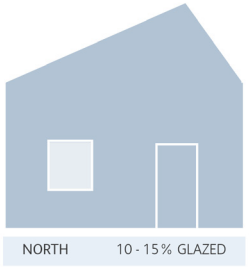
6.1 The Building Envelope

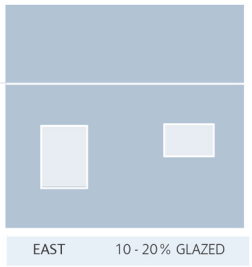
Windows

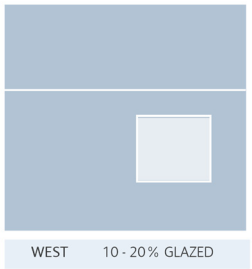
Designed effectively, windows can reduce requirements for lighting, heating and mechanical cooling. However, as unavoidable gaps in the building fabric, they can account for over a quarter of a buildings heat loss if not detailed to be airtight and efficient.

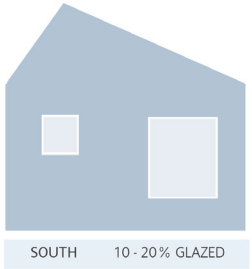
Glazing Proportions

Consider the extent and ratio of glazing incorporated within each façade based on its orientation. An abundance of glazing is what is primarily responsible for the overheating of homes in the summer and the loss of heat from homes in the winter.









Frame Design

All new windows should be UPVC. Colour of windows should be agreed to ensure they suit the overall design of the home and meet planning requirements.

All new windows shall be provided with clip on extension cills if required.

DPC shall be installed around the perimeter of all new windows. Consider specifying a DPC which utilises recycled content.

Glazing

All new windows should be fitted with 48mm triple glazed 4/16/4/16/4 argon + argon filled windows.

Due to triple glazing being heavier than standard double glazing, the size of the openings should be considered. The suggested maximum opening width is typically 700mm with a maximum opening height of approximately 1600mm.

Consider using standard sizes of glazing to ease the re-use of the product at the end of its expected life stage.

Any glazing below 800mm from finished floor level shall be toughened to comply with BS 6262:Part 4.

Operable Windows

All bathroom windows shall be supplied with frosted glass.

All operable windows should be fitted with a keyed locking system that uses a removable key and with glazing that incorporates laminated glass or similar robust glazing material.

All operable windows should be fitted with restrictors to prevent windows being opened fully in one single movement. Windows to be secure when both closed and open. Child-proof restrictors are required on all windows.

While key in delivering a natural ventilation strategy for the home, window openings should be selective and minimal to reduce the number of transoms and mullions required to maximise the windows thermal performance.

All windows, including those in common areas, should be reversable to allow being washable from the inside, All windows within wheelchair dwellings should be accessible by a wheelchair user.

Transoms and Mullions

Avoid window design which incorporates many mullions and transoms to minimise the chances of thermal bridging and heat loss. In terms of energy

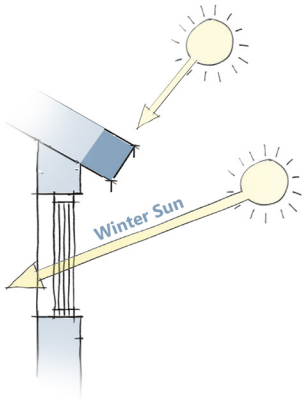
efficiency, the frame of a window will generally perform worse than the glazing itself, therefore minimising the amount of frame will help in delivering a more energy efficient glazing system.

Avoid locating transoms at seated eye level in the living room.

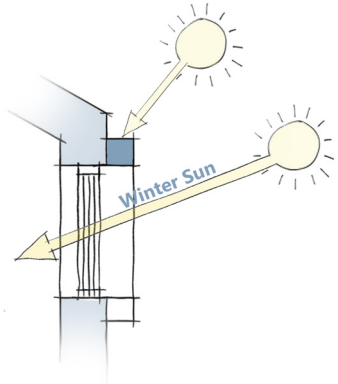
Closing Mechanism
Specify a multi-point mechanism with two separate seals to assist with airtightness. This closing mechanism will avoid creating draughts as well as assisting with security measures.

Ironmongery
All internal ironmongery shall be finished in chrome. All first floor windows should be fully reversible to allow windows to be cleaned from inside. First floor windows should also have an unobstructed opening area of 0.33msq and at least 450mm x 450mm wide. The openable area should be no more than 1100mm above floor level.

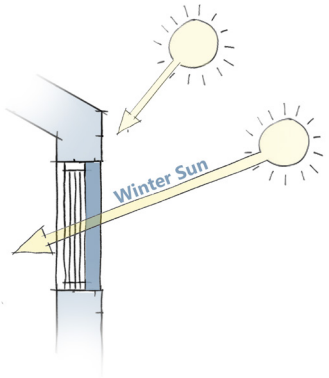
Acoustic Performance
It may be necessary in certain locations to achieve increased acoustic window performance in order to satisfy local authority planning conditions. In such cases this will require Council prior approval before the specification is agreed.



Extend the roof eaves to create an overhang and effective solar shading



Create a design feature around the window to provide effective solar shading



Extend the window reveals to contribute to the solar shading strategy

Detailing for Airtightness
All window positions in relation to the walls structural leaf should be designed to help achieve an airtight envelope. Position windows to be tied back to the inner structural leaf; the window frame will sit mainly in the insulation zone, preventing thermal bridging.

Secured by Design
New windows and glazing should meet the recommendations for physical security as noted in Section 2 of Secured by Design, or by use of a window which has been tested and certified by a notified body as meeting a recognised standard of security such as BS 7950:1997.

Solar Shading
Allow for solar shading design on the south façade to prevent overheating in the summer. This can be achieved by:
- Extending the window reveals to contribute to the solar shading strategy
- A design feature on the building ie bris soleil
- A roof overhang, refer to page 71

U-Values
All new windows should as a minimum meet the requirement of the current Scottish Building Regulations. The u-value should be determined by the combined value of the pane and frame of the window.

6.1 The Building Envelope

External Doors

All external doors should be a UPVC Composite door set and fitted viewer, low threshold, and draught stripping all as per Housing for Varying Needs.

All external entrance doors to have a minimum clear opening width of 840mm i.e. 1000mm structural opening with 926mm door leaf width and be fully guaranteed against warping, twisting and similar distortion.

Where fitted in a roughcast finish, the door frame is to have a stop bead with a 5mm gap to allow the frame of the door to be mastic sealed fully. Provide adequate carpet clearance, as necessary (18mm). Thresholds to be fully mastic bedded/sealed.

All external doors should be inward opening and should have Secure by Design certification

Flats & Houses
Intumescent letter plate with internal flap connecting sleeve and draught seals to be provided to all flats and houses, in addition to any mailboxes in common stairwell. Ensure that this is located as far from the door lock as possible. Set at 1000mm from finished floor level.

Intumescent strips/smoke brushes to meet fire requirements, fitted to door frame, not to door.
Door number, screw fixed.
Door stops, screw fixed to the skirting or floor.

Door viewer, wide angled, set at 1500mm from finished floor level.

Approved threshold plate to provide min 25mm upstand to rear of door for carpet clearance.

Security door chains to be fitted as standard.

Draught Exclusion Provision
All external doors to have high performance sealing and draught exclusion provision to prevent wind and water penetration. Weathering details must take account of local exposure and climatic conditions.

Door Glazing Details
All new doors should have a glazed section included within a design approved by Perth and Kinross Council. The glazing should be a 26mm toughened sealed triple glazed unit. Site cutting is not acceptable.

Patio Doors
All patio doors must be factory-made, pre-assembled prior to arrival on site.

High performance standard glazed door and full height glazed side screen to be fitted and glazed

U-Values
All doors should provide a U-value that should meet as a minimum the requirement of the current Scottish Building Regulations. All external doors should be tested and certified by a notified body meeting a recognised standard for security such as BS PAS 24:2007 for doorsets.

Door Bells (House & Main Door Only)
All external doors should be provided with a push button door bell with chimes and 1000mm above finished floor level, to all houses and main door flats, with an interconnecting twin bell wire drawn in PVC conduit.

Ironmongery
All ironmongery specified should be heavy duty and robust for low future maintenance. Ironmongery selected should resist corrosion to avoid salt attack. All ironmongery is to be approved by the Council prior to billing or ordering.

Specify double sprung lever handles, (25mm diameter, and min.100mm long with 45mm minimum clearance from the face of door) to be bolt-through and fitted with long plates to allow

proper screw fixing into stile. Set lever handles at 950mm from finished floor level. Three hinges on all doors, non-ferrous, surface finished (stainless steel or equal), rebated into door frame.

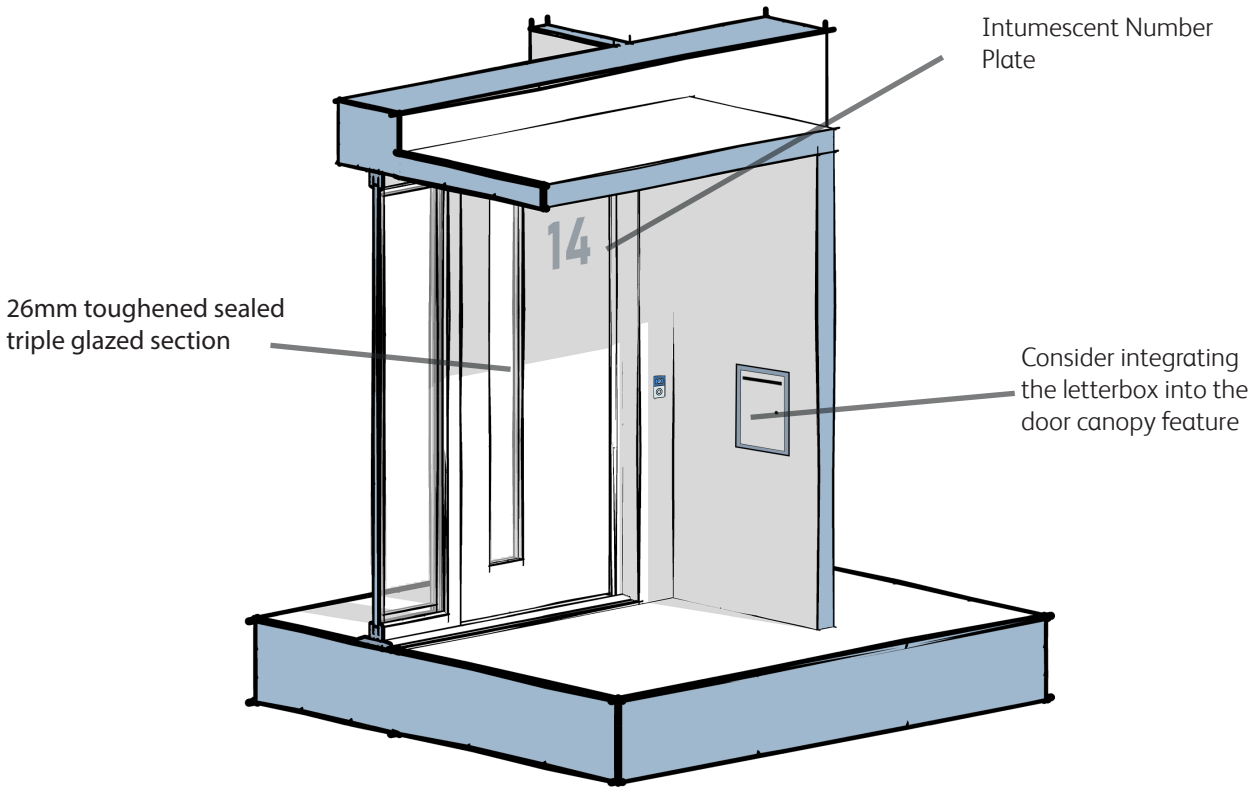
Locking System
All doors to be fitted with Bi-Locks and a three point locking system with high security Euro cylinders, to PAS 23/24.

For communal entrance stairs which must be certified 1 hour fire rated, Winkhaus locks should be installed

Letter Boxes
Locate letter boxes externally within the development. While stand-alone mailboxes will be accepted, consider integrating the mailboxes into the garden boundary walls of the development.

Doors to Common Bin Stores
Doors to be design in accordance with current council requirements and subject to approval and consultation with the Council.

Fire Rating
External doors to communal flats and blocks should be 1 hour fire rated.



6.2 Material Specification

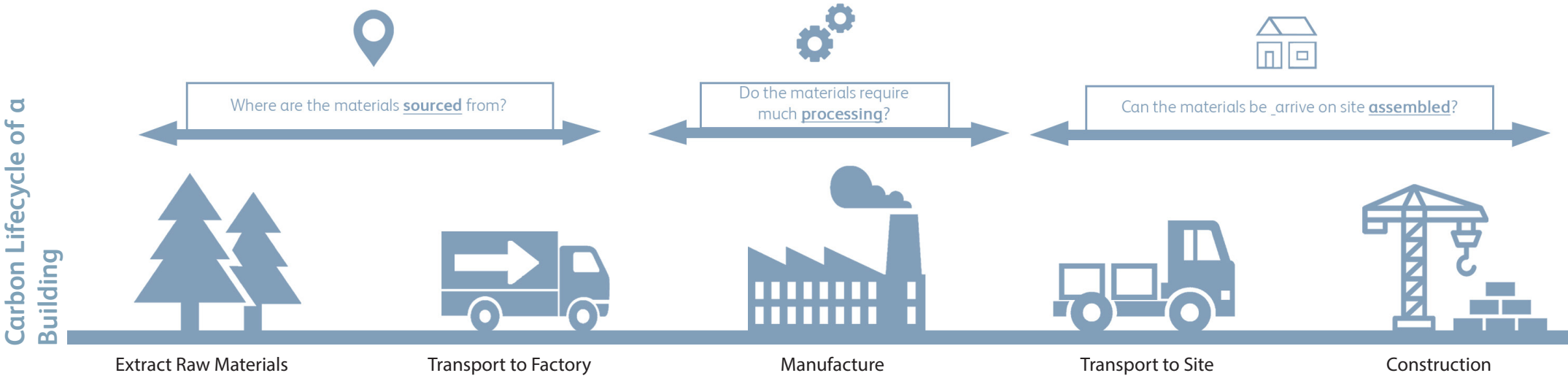
From their sourcing through to their disposal, the material specification in all aspects of the project determines the extent of embodied carbon which will be present during the developments lifespan. The following options should be considered in all new housing developments to ensure an efficient material strategy for all new home designs.

Locally Sourced Materials
Consider locally sourced materials to minimise the environmental impact and carbon emissions from transportation while also supporting local economies and and services. Additionally, local materials can help achieve a sense of place for the housing scheme.

Natural and Renewable Materials
Choose materials which are grown or extracted in the natural environment and require minimal processing during the manufacturing stages.

Specifying these types of material often have the dual purpose of assisting in creating healthier living environments such as breathability and improved air quality.

Carbon Sequestering Materials
Utilise regenerative resources from our biosphere such as wood and hemp. These materials capture and store natural carbon from the atmosphere as they grow, resulting in a carbon offset during the lifespan of the home.



Durable Materials
Specify materials which are appropriate to the lifespan of the project and do not require any extent of maintenance.

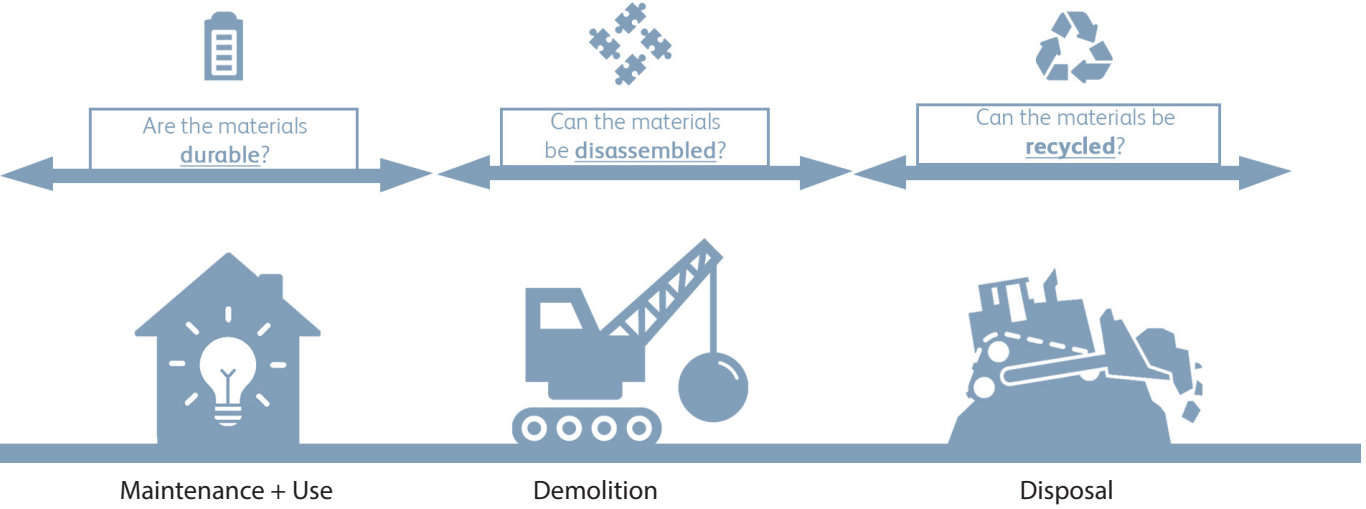
Aim to utilise materials which need minimal or no finishes or coatings. While coatings are generally used to assist in increasing the lifespan of the project, they are generally composed of complex chemical products and can prevent the re-use of materials at the end of the buildings lifecycle.

Reclaimed and Recycled Materials
Specifying recycled materials, or those constructed with high recycled content, and materials which can be recycled at the end of the buildings lifecycle can significantly reduce the carbon emissions.

Sustainability Rating
Assess the desired materials Environmental Product Declaration (EPD) before specifying. This is a good indicator of the selected materials environmental performance is and provides the materials life cycle story.

Insulating Materials
Consider natural insulation options to improve the overall efficiency of the building. Insulation composed of natural materials can significantly reduce the carbon emissions typical of manmade insulating materials; while natural materials embody carbon, manmade insulating materials emit carbon.

Waste Products
Consider utilising waste products as an effective insulating material. Many by-products resulting from the farming industry, such as sheep wool and straw, have natural thermal properties which should be utilised better in construction.



6.3 Methods Of Construction

While net zero targets are not determined by the construction method used, some methods of construction lend themselves better to the aims of low energy buildings than others.

From off-site construction methods to eliminate waste, to manufacturing systems in controlled environments to assist in an airtightness strategy, the method of construction should be considered within the context of the carbon lifecycle of the home.

Modular Construction

Consider using modern methods of construction, such as modular construction, to help deliver energy efficient homes. By manufacturing and assembling building components off site in controlled environments, the risk of waste products are significantly reduced due to greater efficiencies in raw material use.

Assembled and Manufactured in Factory

Modules Transported to Site

On-Site Installation

Closed Panel Systems

Closed panel systems are prefabricated insulated panels, manufactured and assembled in controlled factory conditions. Due to these conditions, closed panels systems offer a construction type which is naturally airtight and highly insulated providing a highly efficient alternative to achieving a high performing building fabric.

There are a range of closed panel systems available, all offering different levels and methods of achieving net zero. Examples include:

- SIPs (Structural Insulated Panels) is a resource-efficient construction type, fabricated from timber but using less material than a frame construction.

- Panel systems utilising natural resources. For example, ModCell are a manufacturing company specialised in constructing panel systems using timber to create a resource efficient frame infilled with compressed straw bales to utilise this raw materials thermal performance.

Modcell Panel System
Timber framed panel infilled with compressed straw bales

Ensuring Quality in Construction

The quality of workmanship is critical in delivering a building with the environmental efficiency it was designed and intended to have.

Once in the construction stage, regular checks should be made on site to allow any problems or errors to be addressed during the building process to avoid any potential problems once inhabited.

Design for Disassembly and Reuse
Consider methods of construction which allow reversible connections and design for disassembly.

Designing a building for the end of its useful life is another intentional design technique than can reduce carbon impacts. Developments which implement design for disassembly will allow for a variety of strategies including:

- Opt for mechanically fixed systems over adhesive fixed for ease of demounting and re-usability
- Maximise clarity and simplicity of the design of the home to allow ease when disassembling
- Use standardised/modular design components to respond to standard manufacturing sizes to avoid off-cut waste
- Avoid painting or staining timber and galvanised steel
- Separate cladding and finishes from main structural elements
- Specify lightweight materials and components as they are easier to dismantle

Figure 13

6.4 Ventilation Systems

While airtight, well insulated homes will prevent heat loss, they should not compromise indoor air quality. The key to managing ventilation in new dwellings is being in control of where, when and how air flows through a building. This starts with very good airtightness, to limit any uncontrolled infiltration.

Ventilation systems may be either mechanical or passive but must be approved by the Council prior to specifying or ordering.

Any serviceable items will be located in a common stairwell, not accessed from resident's flats.

Extraction Fans
Extractor fans should be wall mounted and flush fitting type. These should be of the continuous trickle vent type with humidistat and anti-back flow running 20% with cowl. Either decentralised continuous acting extracts in kitchen and bathroom or whole house ventilation and heat recovery systems are preferred.

Ductwork
Long runs of ductwork should be avoided wherever. However, if unavoidable, all ductwork should be:

- Rigid plastic pipe with flexi pipe only for shorter runs, for example, straight out wall from rear fan
- Factory insulated in any unheated spaces (including loft spaces)
- Fitted with proprietary condensate traps in accordance with fan manufacturer's instructions with drain outlet routed away from the fan to an external wall or soffit

If passing through external walls, fix duct with slight gradient to fall away from the fan position to avoid damage to the fan by condensate.

CO^2 Detector
A Carbon Dioxide detector should be installed within the main bedroom. Detector should have a monitor display to allow tenant to be able to see the level in the room.

Ensure detector is installed near the head of the bed and away from doors to ensure accurate readings.

Passive Ventilation
Always allow for multiple window openings of different sizes to allow the occupant to have control over their environment and suit their comfort levels.

From an operational energy and carbon perspective, a mixed mode system utilising both an MVHR unit and passive ventilation is the preferred solution

Trickle Vents
While trickle vents should be incorporated into the window design of the home to contribute to the overall ventilation strategy of the home, they should not be relied on to provide adequate ventilation.

Trickle vents are not required when an MVHR system is installed.

MVHR Unit

The installation of an MVHR unit within the home will provide an adequate and controlled ventilation strategy while maintain the integrity of airtightness of the home. Ventilation losses account for a significant component of the total heat losses in a low energy building. The only way to further reduce these losses whilst maintaining indoor air quality is to recover some of the heat lost from the outgoing air.

MVHR Ductwork

All ductwork should be fitted with adequate insulation to prevent heat loss and designed to avoid sharp bends which could affect air pressure loss and flow. Air intake and exhaust ducts must be insulated. Furthermore, all ventilation ducts behind the unit that go through unheated rooms should be covered with insulation to prevent condensation of moisture. Insulation should be diffusion resistant. Supply air filters are to be F7 or better . Exhaust air filter to be minimum G4.

All associated ductwork should be circulated in the ceiling therefore allow a minimum of 150 – 250mm service void above the kitchens, bathrooms and any other extract rooms. This service void should be located below the OSB air barrier.

How does the MVHR System work?

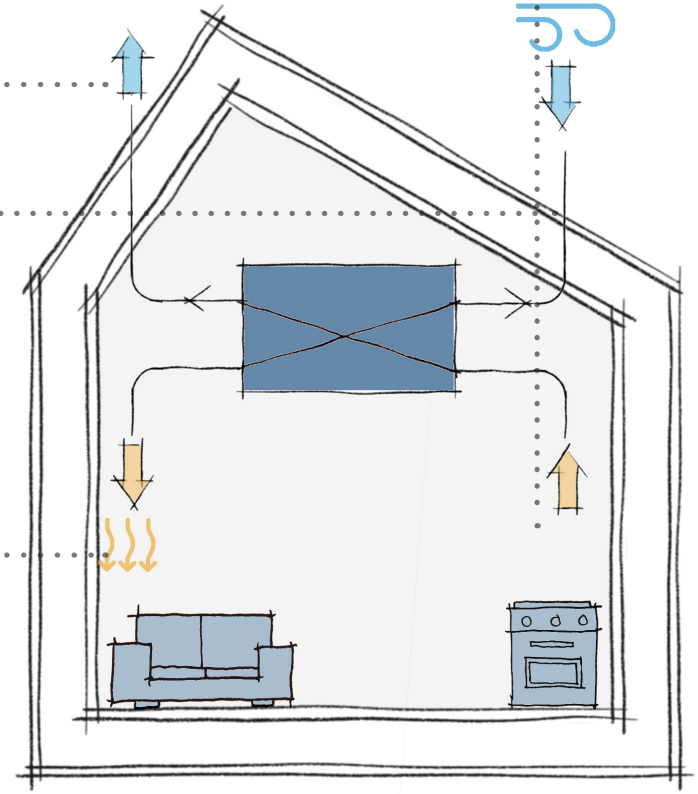
1. From bathrooms and the kitchen, the MVHR ystem extracts air containing moisture, odours and pollutants

2. As used air is extracted, it passes through a heat exchanger, and can recover up to 95% of heat inside the recovery unit

3. Replacement, fresh air from outside is continuously supplied into the property.

4. This fresh air is passed through a filter and heat exchanger and it then supplied to living and bedrooms

5.When the temperature of outside air increases, the heat recovery mode is switched off to avoid overheating and increasing internal temperature



6.4 Ventilation Systems

Careful detailing of the ductwork path is essential to ensure there is minimal temperature and humidity differences to avoid condensation. Condensation drainage to be provided where necessary.

MHVR Unit Location
The location of the ventilation unit if key for both the efficiency of the system, but also its durability.

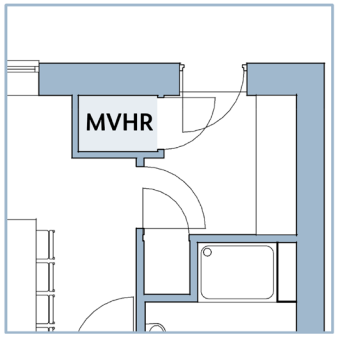
Unit should ideally be located within a 2m distance from an external wall to prevent heat loss from the ductwork that connects to the outside. Non absorbent insulation.

Units should be located within a service cupboard accessible from the utility room or a circulation hall at ground level of the home to allow ease of maintenance. This cupboard can be accessed from the interior or the exterior.

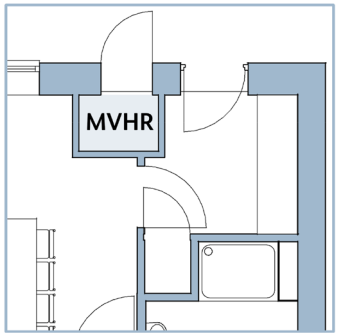
Access will be required for changing the filters every few months therefore the unit should be positioned at a height to allow for easy access.

MVHR units should not be located within, or mounted on an adjoining wall, to a bedroom or living room.

Electrical power supply switch for unit to be labelled to advise occupiers to not turn off.



MVHR located in service cupboard accessed from the utility room



MVHR located in service cupboard accessed from the exterior

MVHR Install and Specification Requirements
The following criteria should be implemented when considering and specifying an MVHR system:

How much Ventilation is Required?
While the Scottish Building Standards use floor area/volume to determine the ventilation required in a home, PKC requests for the ventilation requirement to be calculated based on people and use, with a target of approximately 1200ppm of CO2.

Grommets
Ensure any penetration through air barriers are provided with grommets to stop air leakage from intake and exhaust ducts.

Grilles
Intake and exhaust grilles need to be 1.5m apart, away from any other flues. Omni-directional grille would also be acceptable.

Silencers
Ensure silencers are provided appropriately to lessen the breakout noise from the system. Depending on the ducting system (branch or manifold) additional silencing between rooms may be required to prevent noise travelling between them.

Condensate Drainage and Mounting
Condensate drainage must be provided for the unit and should be connected to the internal soil pipe system via a trap and not straight to the outside to avoid the pipe freezing and the unit flooding.

Allow for condensate drainage to the underside of the MVHR to avoid condensation build up in the heat exchanger. A dry tap may also be required to stop smells backing up in the ventilation system from the pipework you are draining to.

Insulation
Install non-asborbent insulation (rigid insulation, for example) pre-shaped to the ductwork to stop condensation on ducts and preventing heat loss.

Switched Fused Spur
Socket should be installed at high level in a less accessible location to prevent tenents from turning unit off.

Install
Ensure MVHR is installed by a specialist contractor

MVHR System Maintenance
MVHR should be serviced as per manufacturers recommendations to carry out the following checks and replacements:

- Clean the heat exchanger
- Change the filters
- Clean the room Valve

After 5 years, the ducts should be cleaned in addition to the above maintenance requirements.

After 10 years, the system should be re-commissioned.

MVHR Commissioning and Handover
All MVHR units will require professional commissioning service at the end of installation. Once commissioned, all systems should be handed over to the end user with user manuals and guidance on how to use and maintain the systems.

MVHR units include filters that require to be changed on a regular basis in accordance with manufacturer's instructions therefore ease of access must be allowed for within the design.

6.5 Space and Water Heating Systems

Generally

Full detailed specifications and layouts must be provided to the Council for approval prior to ordering.

Systems are to be fully designed and warranted, and benchmarked by, or in conjunction with, the manufacturer or consultant.

All systems to be designed to allow space heating and water heating programmes to be run independently.

Installers must be fully qualified in the installation and commissioning of unvented systems.

All systems to be fully flushed out and sterilised and pressure tested on completion of installation, commissioning certification to be issued at handover.

Programmers and Controls

All central heating and water heating control panels should be located in kitchens and be easily accessible. The controls must be simple and easy to operate for all.

Design Temperature

All heating systems implemented in the home should be designed to provide the following internal temperatures when the outside ambient temperature falls below the external design temperature from the MCS design guides:

Living Areas: 23 degrees
Circulation Areas: 19 degrees
Bathrooms: 22 degrees
Bedrooms: 19 degrees
Kitchen: 19 degrees

Radiators

All radiators should be located on internal walls, and where possible, locate behind doors to maximise useable floor space in rooms.

Radiators should be sized for a design flow temperature of 45˚C or lower, with at least a 10˚Δt; for greater efficiency, 20˚Δt if possible.

Low surface temperature (LST) radiators in wheelchair housing to be discussed with the Council at design stage.

Heating and Hot Water Pipelines

All pipelines to be located within an accessible floor, low level horizontal ducts or in storage cupboards. They should be well secured to background using two-piece pipe rings or saddle spacer bar pipe clips.

Provide drain down valves in easily accessible locations.

All pipework should be sized for optimal flow rate and pump efficiency, including a minimum pipe size of 15mm to radaitors.

All pipework should be copper. Plastic or Microbore will not be accepted.

Thermostat

All properties should be installed with a thermostat fitted in the living room.

Ensure thermostat is located as per maufacturers instructions and must not be close to a direct heat source eg radiators or sunlight

6.5 Space and Water Heating Systems

Towards achieving a net zero strategy for any development, Perth and Kinross Council encourage integrating systems which transfer heat from natural renewable sources including air and the ground.

Air Source Heat Pumps (ASHP)

All ASHPs to be installed and designed in accordance to MCS standards and by a MCS accredited installer. Refer to page 84 for design parameters

Suitable soakaway should be provided to defrost water discharge from the unit.

Provide isolation valves by the outdoor unit and an electrical isolator adjacent to the unit.

Any ASHP specified should be monobloc with an un-vented hot water cylinder.

Cylinder should be located in a central location to all hot taps in order to minimise the total length of pipework required and avoid the need for secondary circulation.

Air Source Heat Pumps Location

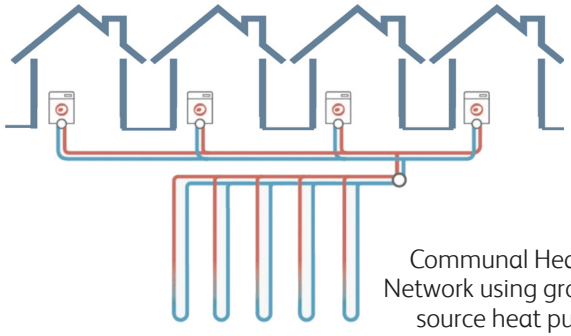
To ensure ASHP's perform as efficiently as possible, the below should implemented within the design in terms of location:

- Should be located to the rear of the property and positioned on the floor immediately outside the external wall to reduce the length of pipework required to connect internally and therefore reducing opportunity for heat loss.

- ASHP should not be positioned adjacent to bedroom or living room windows.

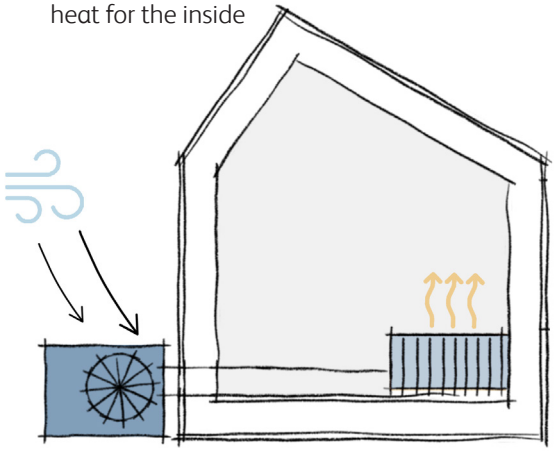
- Ensure there is plenty of space surrounding the unit to ensure air flow is not obstructed around the unit.

- ASHP should also be positioned in close proximity to cylinder to minimise heat loss through the primary pipework.



Communal Heating Network using ground source heat pumps

Air source heat pump extracting cool air from the outside to generate heat for the inside



6.5 Space and Water Heating Systems

Ground Source Heat Pumps

Consider installing ground source heat pumps. Although these may be more expensive, they are a more efficient alternative to air source heat pumps.

The heat generated from this system can be used to serve radiators, underfloor heating, warm air systems and hot water. While the pumps run on electricity, the heat they extract from the ground is renewed naturally.

Commissioning and Handover

Ensure the installed system for both ground source and air source provide the right quantity of water and temperatures for the household. The user should be provided with an instruction manual upon handover.

Communal and District Heating Network

Consider integrating a communal heating network to increase the fuel efficiency within a housing development.

A community heating scheme provides heat from a central source to more than one building or dwelling via small heat networks. Heat can be supplied to the scheme from conventional boilers, renewable-fired boilers, utilise the waste heat from power generation (known as CHP) or geothermal or solar energy.

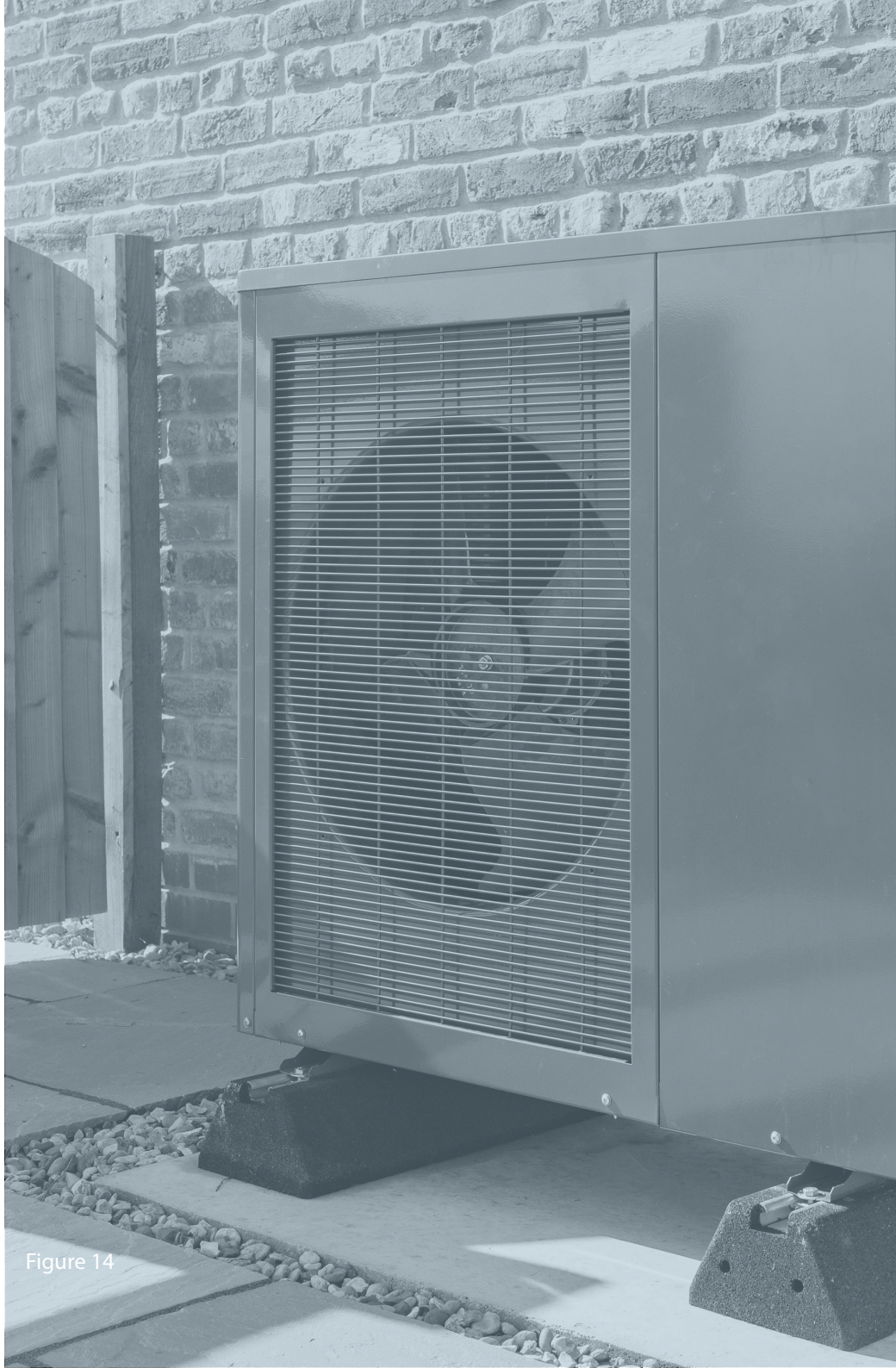


Figure 14

6.6 Solar PV Panels

Heating demand currently accounts for more than 40% of UK energy consumption with the vast majority coming from fossil fuelled natural gas therefore alternative technologies should be implemented and prioritised into all new housing developments. However, any technologies specified should be free from heavy capital subsidy and economically efficient in terms of the capital build cost and whole life costing.

Solar PV Panels

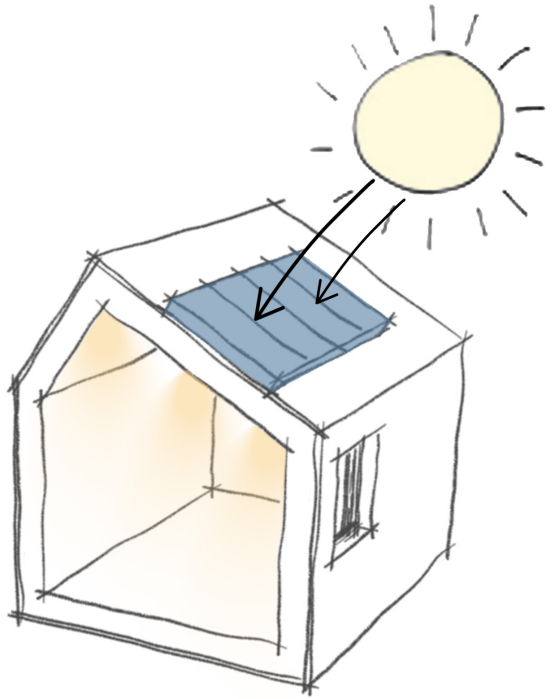
As one of the simplest but most reliable methods of renewable technology, install solar PV's onto the roofscapes of a new development. They should be installed in unshaded areas and orientated south to achieve maximum efficiency.

Any Solar PV panels installed should be designed and installed according to the MCS standards and by an MCS accredited installer.

If proposing to use an in-roof mounted PV panel system, the system should use MCS approved PV panels and use an in-roof moutning kit which is also MCS approved, verified and tested as compatible for use within the solar PV panels

Solar PV System should be connected to an RCBO on the consumer unit and not to an MCB on a common RCD.

All solar PV system components should be labelled and solar PV system schematic displayed at the consumer unit as per the MCS standards



Asymmetric roof design with south facing solar panels to optimsie solar gains.

6.7 Waste and Water Installations

Soil and Waste Pipe Installations
Main stacks to be plastic as standard, located within the dwelling, within cupboards or bathroom and located to minimise disturbance to occupants.

Provide access handholes at the exit location of flats and at the base of all stacks.

Provide access handholes in kitchens, above the worktop level.

Fill vertical ducts and bulkheads with sound deadening quilt.

Do not run pipe branches behind appliance spaces in kitchens.

Fit access plugs on long lengths of pipework and at pipe branches.

Provide a waste outlet for the washing machine, generally adjacent to the sink unit, but dependent on the kitchen layout.

Provide easy access to all traps, including shower traps.

Wet floor shower gullies must be easily accessible for cleaning/rodding.

Water Installations
Water supply installations must fully comply with current Water Authority requirements and Byelaws.

Plumbing layouts must be approved by the Council prior to billing or installation.

Pipework
All hot and cold pipework within unheated spaces must be insulated with the exception of any short lengths of exposed pipes from floor to radiator, WC or sink.

All hot and cold pipework must be secured to backgrounds with clips that allow the necessary insulation to be fitted.

Service runs and equipment/appliance locations should be designed to minimise the lengths of the runs whenever possible

Pipework must be fully flushed and sterilised and pressure tested on completion of installation. Commissioning certification to be issued at handover.

All pipework should be copper and must be fully flushed and sterilised and pressure tested on completion of installation. Commissioning certification to be issued at handover.

Valves
Mains cold water stop valve must be fitted adjacent to the point of entry to the property, clearly labelled at the stop valve, and easily accessible for the resident.

All valve positions must be accessible for repair and renewals, without damage to finishes or furnishings.

Drain down valves must be provided for both pipework and tanks to allow the system to be drained. Provide drain down valves at the lowest point in the system. These are to be easily accessible. For both domestic hot water and central heating, locate drain down valves on outside face of external wall in houses and at lowest point possible within flats.

Handover
Prior to handover, a Legionella risk assessment must be carried out

Hot Water Storage
Hot water storage tanks to be un-vented and suitable for use with the ASHP/GSHP. Cylinders should be appropriately sized to provide hot water and reheat times as per the standards

Storage cylinders should not be located in bedrooms.

Rainwater Disposal
To be plastic, circular section, laid to deep flow profile rainwater gutters and downpipes as standard.

All rainwater pipes must be installed externally.
Cast iron or cast aluminium rainwater goods must only be provided where:

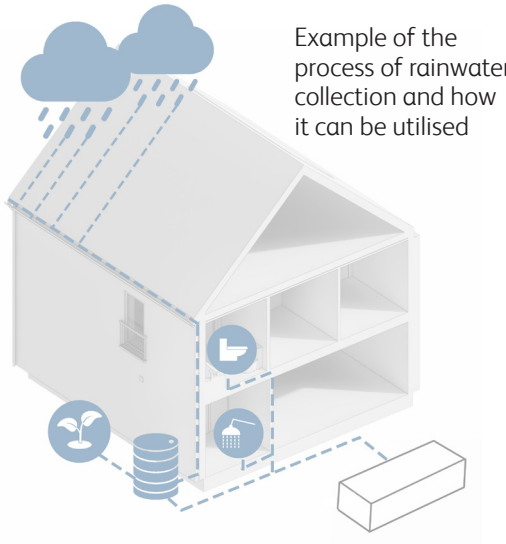
- Required to comply with a planning condition.
- Between ground level to 1st floor level where buildings are in locations vulnerable to vandalism.

Consideration must be given to access for maintenance of gutters.

Rainwater Harvesting
Consider allowing provision for a rainwater collection system as a method of water management for the home. Harvested rainwater can be used for a number of applications within the home, such as flushing WC's, water for washing machine and watering plants.

Greywater Harvesting
Consider installing the appropriate services to recycle greywater from the home.

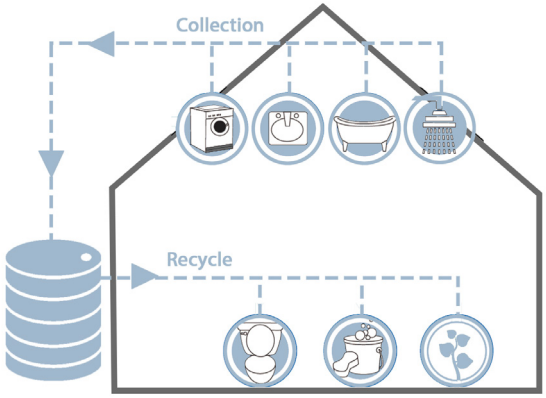
Differing from a rainwater harvesting system, which relies completely on rainfall, greywater is in abundant supply on a daily basis; the more clean water you use to wash yourself, food, dishes or clothes, the more greywater will be available to recycle for flushing toilets or watering plants.



Example of the process of rainwater collection and how it can be utilised

Waste Water Heat Recovery
Consider installing the appropriate services and fittings to recycle heat from drained shower and bath water.

This system recovers the heat from shower and bath water Installing a specific pipework onto the drain of the shower, the outgoing warm water can be used to pre-heat the fresh cold mains water coming into the home. This means that the water heater requires less energy to heat the cold water up.



The Process and Applications of Greywater Harvesting

6.8 Internal Details

Internal Walls and Partitions

Timber Dividing Walls
Must be formed in cavity or multiple skin construction as required to current fire protection and sound transmission reduction standards. Cavity face of construction to have Orientated Strand Board (OSB) or similar to provide additional physical barrier.

Curtain Plates
Allow for timber curtain plates ensuring that they are at least 100mm wider than the window opening.

Internal Wall Finishes
Plasterboard to be screw fixed

All walls and ceilings to be taper edged plasterboard (insulated, or insulated as required for U values) with proprietary joint reinforcement and Ames tape finish.

In common stairs and other common areas, use hard wall plaster with skim coat finish on blockwork ready for decoration

Other proposed wall finishes such as sheet or timber board lining or proprietary suspended ceiling systems may be required on an individual project basis and should be agreed with the council first.

Sound Attenuation
Sound attenuation and fire protection should not be compromised by electrical fittings. Sound transmission reduction and testing to be in accordance with Building Standards Regulations

Internal Wall Construction
To be normally formed as 75 x 50mm timber stud partition with 15mm plasterboard finish. Metal stud partition may be used where appropriate

In wheelchair adapted properties allow for a 1200mm wide removable panel in partition between shower room/bathroom and bedroom for future hoist provision.

For all stud walls fill voids fully within the partition with mineral wool insulation batts to minimise sound transmission

All bulkheads or vertical ducts containing pipework are to be filled with mineral wool for sound deadening and bulkheads or vertical ducts for soil and waste pipes located in habitable rooms, to have a double layer of boarding (plasterboard/plywood)

Internal Floors

Timber Separating Floors
Floors to be as per ground floor, but with additional impact and airborne sound insulation detailing as required

Separating and Upper Floors
Timber joists with moisture resistant chipboard flooring as per requirements for timber floors on timber joists. Notching of joists for services routes must be NHBC and building standards

To be sound insulated with mineral wool quilt between joists to reduce airborne noise within the dwelling between ground and first floor

Concrete Separating Floors
Floor finish to be as per timber flooring on battens, but with the additional impact and airborne sound insulation detailing as required

Provide an acceptable means of fixing for ceiling brandering on the underside of the concrete slab

Floor Finishes
Provide slip resistant vinyl sheet floor coverings to the following:

- Bathrooms, shower rooms, WC compartments and kitchens of elderly amenity and wheelchair user housing.

- Any wet floor shower rooms in general needs housing.

- Any bathrooms where a shower tray is installed instead of a bath in general needs housing.

- Staircases, corridors and landings of communal staircases

Vinyl to be slip resistant, from an approved supplier, and laid as a continuous sheet, including under WC pedestal. All joints to be welded.

In wet floor shower rooms, vinyl to be also taken up the walls to form a skirting which is a continuous sheet with the flooring.

Skirtings
Vinyl in all communal areas and shower rooms.
Timber or MDF in all other areas.

Stairs

Common Stairs
Straight flights with landings preferred. Winders will not be permitted.

Pre-cast concrete staircases to be smoothly finished on top surfaces of treads and risers for the application of vinyl sheet non-slip floor finishes. Floor finish to be Polysafe Verona, or equal, durable non-slip vinyl flooring. Colour to be agreed.

Stair nosings to be non-slip and from an approved manufacturer. To be screw fixed to the junction between tread and riser or landing edge, in a contrasting colour to the vinyl flooring, and approved by the Council.

Staircases to be smoothly finished on all exposed concrete soffits and edges which are to receive direct decoration. To be free from blowholes, rough areas and similar irregularities. Stair stringers to follow the stair pitch line.

Balustrades and handrails to be constructed from mild steel, smoothly finished, ready for painting. Balustrading bars to be vertical or diagonal, not horizontal. Perforated steel sheets or similar alternatives to bars may be used.

Provide a clear space of 50mm from the wall face to the inner edge of the handrail. Handrails to be capped. The details of this to be approved by the Council.

Service Cupboards
Pipework must be accessible. In common stairs, provide ducts, with lockable doors or lockable removable panels for maintenance access. Signage should be provided on doors or panels to indicate what service is contained within

Private Stairs
Straight flights preferred. Winders will not be permitted.

To be constructed from softwood or appropriate sustainable hardwood. Suitable composite boards may be used but prior approval from the Council must be obtained prior to billing or ordering.

Suitably fixed handrails (with plate behind plasterboard) to have cranked supports allowing a minimum of 50mm from the face of the wall or timber plate to the inner edge of the handrail. Amenity housing to have handrails provided on both sides of all staircases.

Stair stringers to follow the pitch line.

6.8 Internal Details

Decoration

Generally
Specification to be to BS 6150 Code of Practice for painting buildings. All paints and stains to be applied in accordance with manufacturer's written instructions.

Timber and Metals
Should be a high performance system that will provide the life cycle expectancy of 5 years without maintenance.

All windows to be fully factory finished.

Applied coatings and colour to comply with any planning conditions.

Masonry
Avoid paint finishes to external render, roughcast, concrete cills and masonry

Ceilings

To be 15mm gypsum plasterboard, taper edged.
Plasterboard to be screw fix.

In bathrooms and shower rooms, plasterboard must be moisture resistant.

Internal Pass Doors
All pass doors to have a minimum 826mm opening leaf.

Cupboard door widths to suit.

Doors to be factory manufactured, pre-finished and hung with 3 Nr. hinges.

Pass doors to be solid core with a 30 minute fire rating. Allow 18mm carpet clearance.
No threshold plates.

Bathroom door mortice latch with indicating turn reference. Fire doors to have overhead closers. Door stops to be screw fixed to skirting or floor.

Loft Hatches
Provide proprietary insulated loft hatches fitted with a bi-lock where possible.

6.9 The Bedroom

Socket Provision
Provide 4 no. double switched socket outlets to principal bedroom and 3no. to all other bedrooms, to include 1 no. socket to either side of bed space.

Provide telephone and TV socket outlet to all bedrooms, adjacent to a socket outlet, on opposite wall to bed head.

Wardrobes
Wardrobes doors generally to be either pre-finished or paint-finished hinged doors with the exception of wheelchair accommodation where sliding doors tracks may be required.

Wardrobes should not be located on external walls. Handles to be 25 mm diameter minimum D-type.

Wardrobe shelving to be minimum 18mm thick lipped block board, adequately supported on softwood bearers and haffits as required.

Shelving to be set at 1650mm to underside of shelf and be fitted with chrome plated hanging rail, centrally supported, for the full length of the wardrobe.

Figure 15

6.10 The Kitchen and Dining Area

Kitchen

Appliances and White Good

The following appliance spaces should be provided in all dwellings:

- Freestanding cooker space of 650mm wide
- Full height fridge/freezer space of 650mm wide
- Washing machine space of 650mm wide
- Fourth appliance space of 650mm wide

For fridge freezer space allow a clear width of removable worktop with full length timber support with clear wall space above the worktop.

Washing machine space should not be located in or near corners. The fourth appliance should be provided with remote switch and water connection for dishwasher or tumble drier. Depending on location of fourth appliance, ventilation and drainage requirements should also be considered in the design.

All isolators of white goods should be accessible adn identified. Isolators should be engraved.

Refuse

Provide space for a free-standing pedestal bin, preferably not in front of the radiator.

Lighting

Allow for two-way light switches within open plan kitchens/living areas, i.e. a switch located within the kitchen area and one located at the entrance to the living room.

Safety Devices

Heat detector to be fitted.

Pipework

Exposed pipework should be avoided wherever possible and any essential pipes should be concealed in pipeboxes.

Sockets and Switches

All switches (remote or direct) for appliances must be engraved. This includes boiler, water heater, cooker, fridge/freezer, washing machine, tumble dryer (if appliance space provided). Sockets above kitchen fitments should be mounted with bottom edge at 150mm above worktop height.

Fused connection unit must be provided where appropriate at a suitable location adjacent to the cooker position to provide a dedicated power supply for gas cooker ignition.

Designs should aim to provide 8 electric socket outlets with a minimum 6. Switched spur outlets supplying fridges, washing machines (for example) may be included in the socket count. Electric cooker (30/45 amp) outlets should not be counted but any 13 amp socket associated with the cooker outlet should be included. A double electrical socket may be counted as two sockets. All socket outlets must be securely mounted on the wall.

Allow one socket to have a USB connection

Electrical Installations

Electrical installations must be fully tested and appropriate certification will be required on completion. All electrical installation work and testing must be completed by NICEIC or SELECT approved contractors.

Ventilation

Rigid ductwork only to be used for main runs.

Ensure valve with filter is installed to avoid grease getting into system

Where an MVHR is not installed, Kitchen ventilation shall be provided by a ceiling/wall mounted extract fan with continuous silent trickle ventilation with humidistat controlled boost

Dining Area

Window Cills

If the dining area is a separate room, the window cill height should be set at 750mm max to allow an outlook while seated.

Socket Provision

Allow 2 no. double socket outlets if a separate room.

6.11 The Bathroom/Shower Room/ WC's

Sanitaryware

All sanitary appliances must be approved by the Council prior to billing or to ordering.

All sanitary ware must be easily accessed and must be located to provide easy access to the window, where provided, and ducting.

Wall mounted toilet roll holders to be provided at all WC's. Ensure water efficient fittings are specified.

Bath
Bath to be 1700mm x 700mm vitreous enamelled pressed steel with nonslip finish and adjustable cradle. To include handles at below rim height.

The rim of the bath should be not more than 500mm above floor level.

Bath panel to be formed out of moisture resistant MDF, with fully removable access bath panel at tap end, detail to be agreed on site.

Plastic bath panel would also be acceptable as long as it can be removed to provide access

Baths should have a flat bottom with a slip resistant surface.

Baths should be of strong construction which is able to take the weight of any bathing aids and users of a heavy weight.

Baths should be fitted with integral handles which are recessed and flush with the bath profile (so that they do not interfere with the use of bathing aids).

Shower Fittings
Over-bath shower and accessories to be installed as standard. Glass shower screen to be provided to over bath showers.

Where a shower is to be fitted over the bath, it should be positioned so that the controls can be reached at the same time as being below the shower spray.

Showers should have heads that are adjustable in height and have a flexible hose which is demountable and capable of being hand held. Shower Units are to be (Electric) Mira Advance 9.5Kw or (Mixer) Mira Silver or equal equivalent.

Shower controls should be mounted at a height of 1200 - 1350mm from the shower tray or bottom of the bath.

The shower head should be mounted at 1500 – 2000mm from the shower tray or bottom of the bath.Shower controls should be easily grasped, even with wet or soapy hands.

The hot water supply serving the bathroom should be fitted with a device to prevent accidental scalding from hot water

Allow for a weighted nylon 1800mm long shower curtain and rail around the showering area for wet floor showers only. Set the shower curtain rail at 1825 mm from finished floor level.

Level Access Shower Trays
Wet floor shower area to all dwellings unless Council advises otherwise.

Where a shower is not provided initially, allowance should be made in all ground floor accommodation for the future provision of a level access shower tray instead of a bath (e.g. pop-up drainage). Careful floor detailing is required to allow a shower trap to be installed below finished floor level.

WC
Dual flush cistern, fitted with water saving device. To be close coupled cistern and pan, with seat and lid with stainless steel fittings.

6.11 The Bathroom/Shower Room/ WC's

Wash Hand Basins
The front of new wash hand basins should be between 800 and 850mm above floor level.

Wall Finishes
In shower rooms, use moisture resistant plasterboard, taper edged, proprietary joint reinforcement and Ames taped.

All walls, ceilings and woodwork must be presented with attractive, durable, clean and hygienic finishes on completion. Decorative finishes must be suitable for use within a bathroom environment and be washable / resistant to damage by steam etc. (Note: No decoration / disturbance payments will be paid to tenants).

All bathrooms to be provided with moisture resistant plasterboard and full height 18mm thick sheet plywood sheeting behind plasterboard aroundall walls for future fixing of grab-rails.

Windows
All bathroom windows shall be supplied with frosted glass.

Ventilation
Mechanical extract fans to be operated via a humidistat.

Secondary Toilet/Shower Room
A secondary Shower, Toilet and wash hand basin to be provided in all dwellings

A secondary Shower, Toilet and wash hand basin to be provided in all dwellings for 5 or more persons.

Rail and Supports
Rails should have a finish that is easy to grip and comfortable to touch.

Rails should have a diameter of approximately 33mm and a space of 45mm between them and the wall.

Additional strengthening should be provided within walls at designated locations to accommodate additional rails at some future stage.

Any rails should be positioned in accordance with the recommendations contained in 'Housing for Varying Needs' Section 14.7

Floor Finish
Non-slip vinyl flooring should be specified in all bathrooms, wet rooms and shower rooms. Concrete floors should be finished with self-levelling screed prior to installation of the vinyl.

Ironmongery
A bathroom door lock, which is capable of being opened from the outside in an emergency, should be fitted to each bathroom entrance door.

6.12 Electrical Installations

General
Provide a separate mains supply for each house or flat in any development, unless advised otherwise by the Council.

Electrical accessories should not be located on mutual/party walls, however if this is unavoidable, cables and back boxes should be located within a secondary wall lining with additional sound insulation.

Design all installations to minimise the risk of vandalism and allow easy access for maintenance of luminaires and bulbs.

All electrical equipment and appliances to be A rated.

Smart Meters

Smart meters shall be provided to enable residents to check their energy consumption and modify their behaviour accordingly.

Visual displays of energy consumption should be provided and fitted in all units.

Contractor to arrange for utilities companies to install the metres required

Switch Gear and Metering

Meters, consumer units, distribution boards and related mains control and supply equipment must be surface mounted and placed in readily and safely accessible positions, within dwellings, which are easily reached. Not to be installed within wardrobes or kitchen units.

Consumer units and/or distribution boards must be set at 1000mm above finished floor level and incorporate the following:

- Labelled RCBOs
- Integral transformers for doorbell systems
- Spare ways to facilitate future adaptation of or addition to the installation (2 no. min).
- Integral fitted emergency back-up light.
- A Surge Protection Device is required to all consumer units

Ground floor flats to have spur for burglar alarm located in hall cupboard.

Spur for automatic door to be located adjacent to all entrance doors used by residents who use wheelchairs (including flat door and any common entrance doors).

Telephone Installations

System to be fully installed with cabling in both dwelling and externally,ready for telecom company final connection in each dwelling to make system live.

A single telephone jack outlet point in the living room of each dwelling, located adjacent to one of the double wall sockets and TV socket. An additional telephone single jack outlet must be provided in all bedrooms.

Each installation shall comprise high impact PVC conduit with telephone multicore cable from the incoming connection point to the single jack outlets of each dwelling.

Lighting

Exterior Lighting
External lighting to be provided for safety and security reasons to bin stores, common drying areas and similar facilities and to public footpaths which are not adopted by the Local Authority. Agree locations with the Council. Street lighting, where provided, is to be designed for adoption by the Local Authority.

Stair lighting (non-adopted) will be combined with emergency lighting and comply with BS5266. Low energy LEDs lighting is preferable.

External lighting to blocks of flats and common

stair lighting lighting to be designed as follows:

- Low-energy wall mounted bulkhead luminaries activated by photoelectric cell, with manual override.
- Power supply to be to a landlord's supply meter.
- Locate photo-electric cell on north facing wall.
- Luminaires to be minimum IP Rating 44.

Bin store lighting to be controlled by PIR.

Interior Lighting

Low energy pendant light fittings in all rooms except kitchens and bathrooms. Ensure that positions for lamp shades allow doorway clearance.

Low energy, steamproof pandrop-type fittings in bathrooms, WCs, shower rooms and kitchens. Light switches to be located outside the room for bathrooms, shower rooms and WC compartments.

Door Entry Systems

To be provided in flatted developments with common stairs.

Proposed systems and locations of equipment must be approved by the Council prior to tender and suitable for master keying into existing Council systems.

Samples of materials, products and equipment may be required prior to ordering.

Workmanship must comply with current British or equivalent European standards and be in accordance with the manufacturer's printed instructions. Power supply to be taken from the landlord's supply, isolated from other systems at the distribution board.

Door entry system to incorporate magnalocks not latch keepers.

To incorporate all necessary amplifiers, power supply units, electrically operated magnalocks. (Including automatic release in the event of power failure.)

To be fully conduited. Mini trunking is not acceptable.

Door entry system to incorporate the following:

- Timed service entry button;
- Fob reader for access release to front and rear doors;
- Vandal resistant flush mounted stainless steel main door entry panel with etched or digital flat numbers. Residents' names not to be added.

Where fitted to a roughcast wall the door entry system box must be provided with smooth cement render band of 100mm to enable full watertight edge seal.

Fob system must have capacity for more than 1,000 fobs. All master programming fobs to be provided to the Council, not left on site. Software and training on the use of software and the re-programming of fobs to be provided.

Install control panel at 1000mm from ground level externally to bottom edge of panel.

Handset inhibitors to prevent the entire system cut-off if one handset is not replaced on its rest.

Handset to incorporate privacy buttons.

'Drop Key' type Firemans switch should be fitted at high level on the external wall of the home

6.12 Electrical Installations

CCTV

As a minimum, a permanent live 230v AC mains supply, cabling, spurs, phone line, and all other related ducting etc should be allowed for in the design and costing of a suitable CCTV network for the development.

The provision of CCTV cameras may not be required on all schemes and will be discussed with the Council on a scheme by scheme basis.

In general, ducting should enable future installation of camera(s) in common ground floor landings, positioned towards the front door, within lifts, covering external common stair doors, car parks and communal open spaces.

Lift

Machine room-less traction lift designed, manufactured, installed and commissioned in accordance with:

- The Lifts Regulations 1997
- BS EN 81-1 1998+A3 2009 Safety rules for the construction and installation of lifts - Electric lifts
- BS EN 81-28 2003 Remote alarm on passenger and goods passenger lifts
- BS EN 81-58 2003 Examination and tests. Landing doors fire resistance test
- BS EN 81-70 2003 Accessibility to lifts for persons including persons with disability
- BS EN 81-73 2005 - Behaviour of lifts in the event of fire
- Scottish Building Standards Technical Handbook
- IEE Regulation 18th Edition

Lift pits to be fully tanked.
Automatic doors with full height infra-red detector and door pause of 5 seconds minimum. Standard car finish with a handrail on each wall without a door. LED lift car lighting with energy saving shut down feature. Emergency lighting to provide a minimum of 25 lux at floor level for 2 hours.

Dedicated phone line with programmable non-proprietary autodialer in lifts registered in the Council's name. The instructions for re-programming should be included within the owner manual.

Push button control panel in corridor and in car positioned at 1200mm to the centre (high) and at 400mm minimum in from the front wall.

Button controls to have tactile indication.

Doors to have a minimum clear opening of 900mm. Lift car dimensions: depth 1400mm by 1100mm wide (minimum dimensions). If transportation of coffins or stretchers is required, minimum dimensions of car to be 2100mm x 1100mm.
Half height mirror on the rear wall. Safety landing entrance barrier, rubber mat and electric shock notice to be provided.

Trailing cables suitable for a CCTV camera to be installed with each end terminated in a suitable junction box for connection by others.

Access to control panels is not to be concealed behind facias and locks are to be added to the PKC master suite system.

Maintenance: A comprehensive maintenance service will be provided during the 12 months defects period. This will consist of quarterly maintenance visits and call-out cover 24 hours per day.

6.13 Fire Detection Installations

Generally

Specialist detection and alarm systems, if required, are to be designed and specified in conjunction with the Fire Officer and Building Control. Proposed installations must be discussed and agreed with the Council. Fire Brigade switches to be installed at high level above landlord's electrical supply cupboard on ground floor of communal stairwell.

Localised Detectors

All dwellings must be provided with a D1 Category LD2 grade fire detection system. It should incorporate appropriate heat and smoke detectors, which shall be mains powered with an integral backup power supply and hard wire interlinked. Additionally, a test/hush button device should be positioned in the hallway or adjacent to the consumer unit and be integrated into the alarm network.

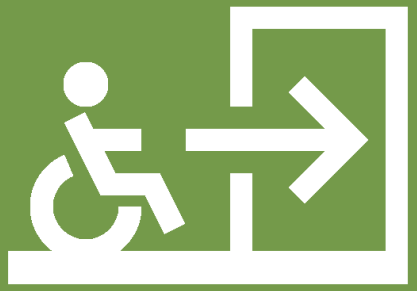
In cases where a solar PV inverter is situated in the attic, a suitable detector must also be installed in the attic and integrated into the existing fire detection system.

Smoke detector interlinked into main system must be fitted in the loft space where the interveter is located

7.0 Additional Design Requirements

7.1 Specific Needs Housing

Figure 16



07

Additional Design Requirements

7.1 Specific Needs Housing

Incorporate the following requirements :

Housing For Varying Needs : A Design Guide Part 1

British Standard 8300 : 2018 Design of an accessible and inclusive built environment

Refer to the following guidance :

Publications on Dementia Services Development Centre https://www.dementia.stir.ac.uk/ with guidance on designing for dementia and sight loss.

PKC Checklists for Independent Living, Appendix 10.1 and 10.2.

Aim
The aim of this section is to ensure that all new adapted housing is designed to be fully accessible by those with specific needs such as dementia, the elderly or wheelchair users, maximising both their independence and self-management.

The design of housing for wheelchair users will be in line with the standard requirements set out within section 5 and 6 of this guide, and as a minimum will also incorporate all the Basic requirements of HfVN Part 1 (Dwellings for Wheelchair Users). These requirements are not therefore replicated in this section.

The following requirements highlight additional requirements by PKC for wheelchair adapted housing in addition to the aforementioned.

Individual requirements will be established per house type and supplementary guidance may be issued when particular needs of occupants are known.

The input of an occupational therapist (OT) will generally be required for the position of grab rails, appliances, fittings specific to individual needs etc.

Location
All wheelchair adapted housing must be provided on the ground floor unless, exceptionally, two lifts are provided. It should normally be main door with access to a private rear garden. However as some wheelchair users prefer the security of being within a common stair, a range of flats types should be provided. Where main door access is not provided, the number of approach doors should be kept to a minimum. Ensure that all kerbs in the vicinity of wheelchair adapted housing are dropped.

Floor Areas
Where possible, two bedroom wheelchair adapted properties should be designed as 4 person dwellings.

Windows_
Windows to be accessible to wheelchair users (for example trickle vents should include pull cords).

Hallway
One of the hallway sockets is to be located adjacent to the wheelchair storage area (refer to HfVN).

Living Room
Provide handset for door entry system.
Keep the number of doors between the kitchen and living room to a minimum.

Kitchen

Any particular requirements for kitchen appliances, workspace, and storage will be discussed on a project specific basis.

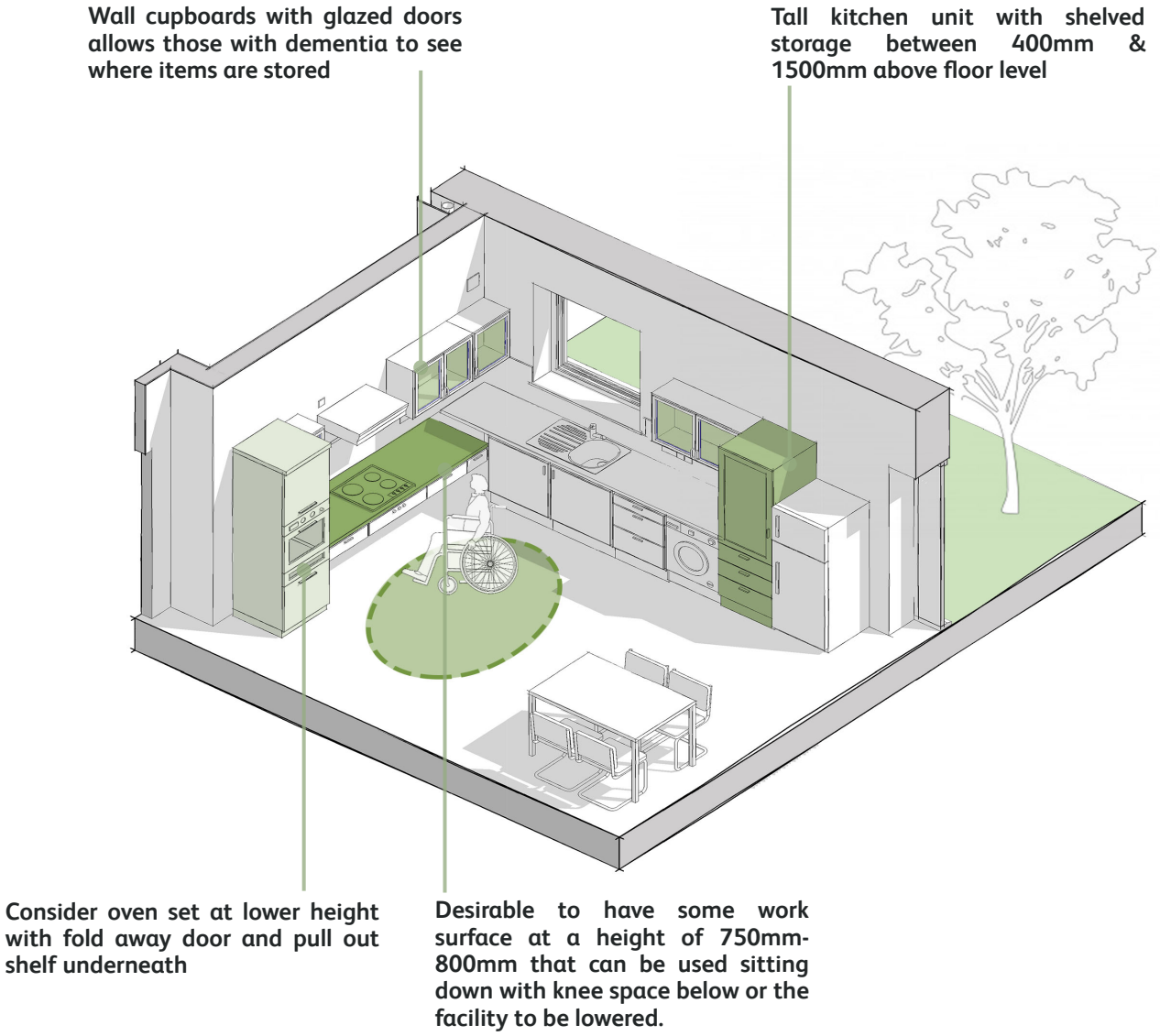
Generally all kitchen units will be fitted at standard height but will have the facility to be lowered.

Where kitchen worktops are initially set at standard height, wall splashbacks should extend 300mm beneath the work surface.

Ideally a combination of ambulant and wheelchair height work surfaces should be provided.

Kitchen sockets and remote switches to be mounted on a profiled duct or located on side walls, adjacent to worktops.

Avoid over-dependence on trolley storage as this can be difficult to manoeuvre. Base units with pull-out wire storage drawers or banks of drawers are more useful than cupboards.



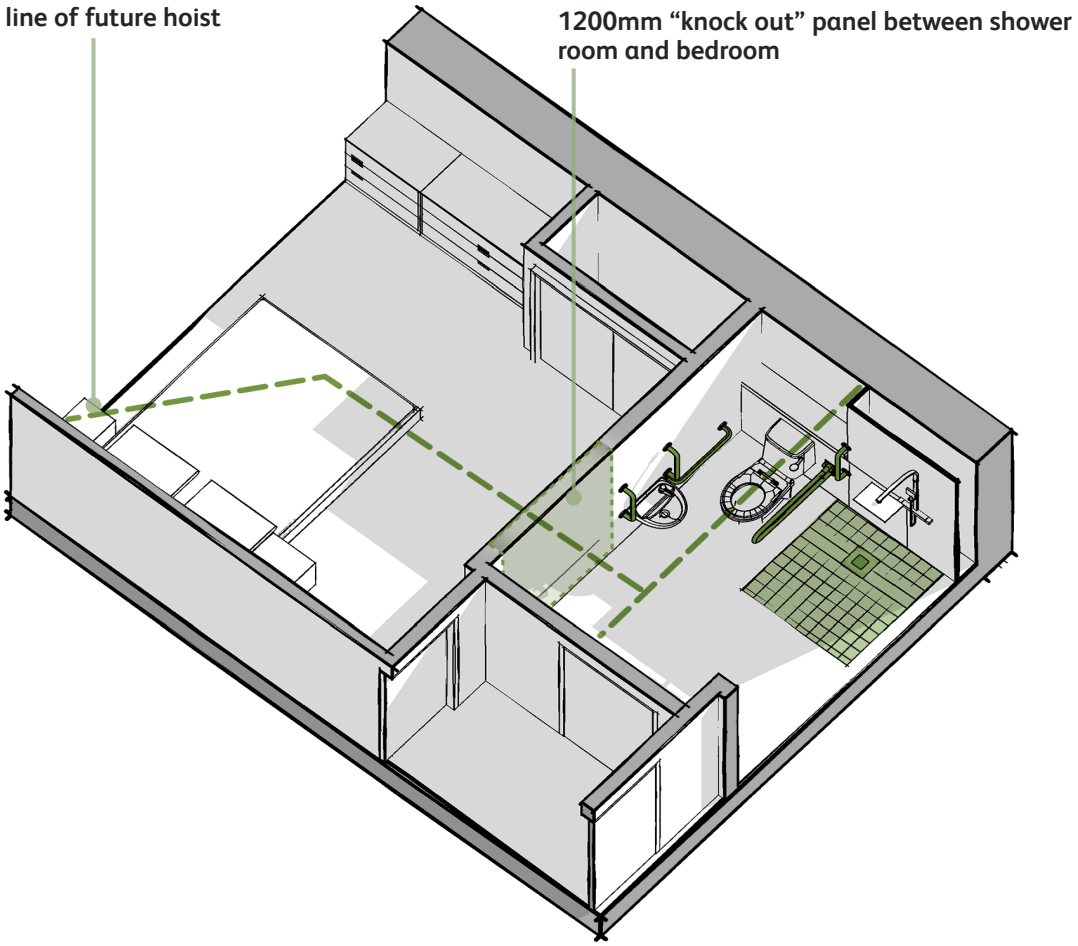
7.1 Specific Needs Housing

Bedroom
Locate double bedroom adjacent to bathroom.

Allow for 1200mm wide knockout / removable panel in the partition between shower room/ bathroom and bedroom for future hoist provision. The knock-out panel should incorporate strengthened roof trusses and floor construction. Ensure no sockets, TV/telephone sockets or radiators are located on or immediately adjacent to the knock out panel.

Provide additional handset for door entry system to the bedroom. If appropriate, lower bedroom cill height to 600mm to allow views out (without compromising privacy).

The hanging space and shelf within the wardrobe should be easily adjustable by the resident.



Bathroom
A wet-floor shower with pre-formed wet-floor base is to be installed, comprising a floor screed, laid to fall to a level access shower area and corner floor gully. Ensure that the shower is located on the wall opposite the door to the bathroom and that the entire floor is laid to fall away from the door towards the floor gully. Non-slip coved vinyl flooring to be provided.

Spur for future installation of a closimat toilet to be provided. Typically 4 no. 35mm diameter, nylon-coated grabrails to be supplied for each wet-floor shower room, with additional grabrails provided for any WC compartments. Grabrails should be provided but not fitted. Details of lengths, types and locations to be agreed with the Council prior to specifying or ordering.

Shower curtains only should be provided, not half-height screens, as these can create an obstacle. Ensure curtains are set at 1800mm standard height (not at 2000mm over-bath height).

Full height proprietary wall panelling to be provided to three walls.

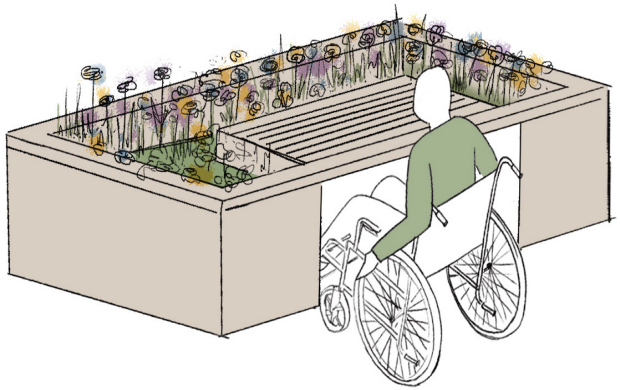
Doors
All main entrance doors, internal flat doors and store cupboard doors to have a 926mm opening leaf, with 550mm clear space beyond opening edge of door. Internal pass doors to have 300mm clear space beyond opening edge of door.
Spurs required adjacent to all flat and common entrance doors (where flat is not main door access) to allow for future fitting of automatic door.
Spur to all houses and main door dwellings for future installation of a door entry system.
Kick plate protection (Perspex or stainless steel) to be supplied.
Two spy holes to be provided, at both wheelchair and ambulant level.
Parcel shelves (currently a HfVN requirement) are not considered necessary and can create an obstruction.

Lighting
Large rocker pad switches required to all rooms.

Heating and Controls
Heating system to have design temperature of 24˚.
To assist with independent living, all controls , cut off handles, switches and programmers must be installed at a height that can be reached from a wheelchair and in an accessible location. Low surface temperature (LST) radiators to be installed within all rooms unless otherwise advised.

External Areas
100 % parking provision, or as required by Planning, whichever is greater.

Gardens to wheelchair dwellings should be to be low maintenance (e.g. paving with raised planters) unless the garden is going to be maintained by the Council through service charges.



Example of raised planter with space below to allow access for wheelchair users

8.0 Completion + Handover

8.1 Handover

8.2 Post Occupancy Evaluation

Figure 17

08

Completion + Handover

8.1 Handover

Incorporate the following requirements :

PKC Handover Programme
PKC Handover Checklist document
PKC Tenants Manual Template

Handover
PKC have a separate Handover Programme & Checklist document which is to be incorporated in the design and construction process.

All other Statutory requirements must be fully complied with prior to handover. This includes full discharge of Planning Permission Conditions, Scottish Water approval of water supply and drainage and full connection of services.

Ensure that all warranties, Building Control Completion certificates, commissioning certificates and insurances are provided prior to Handover.

Failure to present these documents at or before Practical Completion will delay the issue of the completion certificate.

Tenant's Property Manual
PKC have a separate template which is to be used for producing the Tenant's Property Manual for each dwelling. The completed manual must be provided to PKC for review prior to Handover in accordance with the Handover Programme.

Figure 18

8.2 Post Occupancy Evaluation

Post Occupancy Evaluation
Post Occupancy Evaluations help find out how well the home is functioning and they also help identify any problems that can be addressed and resolved. Information for the POE includes

Feedback from End Users Through Surveys
The standards adopted by the Council aim to meet both the needs and the aspirations of its end users. Post-completion satisfaction surveys are carried out as an integral part of the development process for new developments.

The responses from the surveys are used to ensure design standards are continually under review, and are fed back into the next revision of the Design Guide. Where practical, identified end users will participate in the design process.

Energy Consumption Audits
The Council may require energy consumption audits to be carried out one year after Practical Completion. This will be commissioned separately and will not form part of the standard appointment.

The home's total annual operational energy consumption by fuel type should be measured and recorded ie metered electricity consumption, metered heat consumption (if on district heating), and sub-metering for renewables. This data can then be compared to benchmarks and design predictions to see how well the building performs.

The method of collection the annual building energy consumption and generation is to be agreed with PKC.

All of this data can be used to calculate the carbon footprint of the building and determine whether targets are being met or required to be improved on.

9.0 Design Checklist

9.1 Net Zero Design & Construction Checklist

Figure 19

09

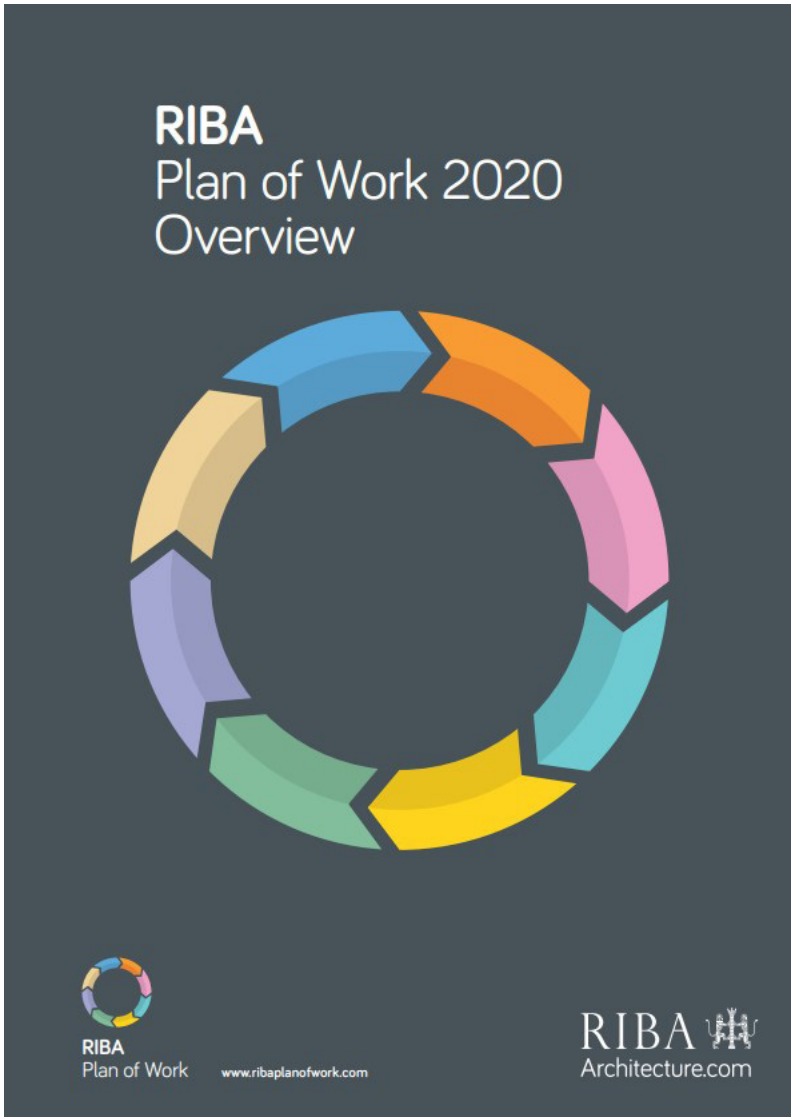
Design Checklist

9.1 Net Zero Design & Construction Checklist

This checklist summarizes the key actions discussed in this guide detailing what should be done, when and at which RIBA stage they should be undertaken in order to deliver a low carbon development and meet with PKC sustainability benchmarks and KPI's.

These are in addition to the standard RIBA plan of work stages which designers utilize and these will assist in achieving low carbon design.

It should be noted that stage 1 is not a design stage. Stage 1 is about layering detail and requirements into the Project Brief, before the actual design process commences at Stage 2.



RIBA STAGE 2 Concept Design Architectural Concept approved by the client & aligned to the Project Brief.	✓
Set energy targets, Net Zero Scope (embodied & operational carbon) & agree which PKC Sustainability Benchmark the design is to target. Hold workshop with client, maintenance team and design team to discuss circular economy strategy.	
Appointment of Passivhaus consultant, if project is using Passivhaus certification.	
Incorporate lessons learned from Post Occupancy Evaluation Feedback and the review of precedents in developing the Architectural Concept.	
Arrange embodied carbon workshops with design team. this is to target lean design principles and reduce waste on large elements. Prioritise low carbon and recycled materials. Consider modular and modern methods of construction. Undertake initial embodied carbon assessment on key elements identifying low carbon options and choices.	
Ensure the design considers the whole life KPI's in section 3	
Maximise building orientation.	
Calculate building form factor for options produced.	
Report on façade glazing ratio and natural ventilation strategy.	
Investigate and maximise renewable energy measures.	
Define the air barrier strategy and how to deliver the target	
Agree and mark up building insulation lines on plans and sections.	
Develop an operational energy strategy. Carry out initial energy modelling to test and refine the concepts.	
Develop design against biodiversity targets and strategy.	
Incorporate strategies for placemaking, social interaction and safety.	

RIBA STAGE 3 Spatial Coordination Architectural and engineering information spatially coordinated.	✓
Undertake full embodied carbon assessment & WLC of whole building. Compare against targets and reduce if necessary.	
Services Engineer to undertake embodied carbon assessment of services. Compare against targets and reduce if necessary.	
Undertake a heating options appraisal with low carbon options and choices.	
Thermal bridge workshop with the structural engineer for masonry support and columns etc. Undertake thermal bridge calculations for key junction types.	
Prepare air barrier drawings, indicate on plan drawings and sections.	
Produce MVHR strategy with layout with ductwork distribution and locate units near external walls.	
Measure heating and hot water pipe lengths. Minimise distribution or standing losses.	
Ensure risk of overheating has been mitigated. Carry out overheating assessment and eliminate through passive strategies where possible.	
Ensure developments are designed in accordance with the design parameters listed in section 2.	
Refine energy modelling alongside SAP calculations.	
Detail external wall constructions with thickness, U-values and conductivity of all materials.	
Include biodiversity design enhancements to local eco-systems, habitat and landscaping.	
Review the expected building lifespan against capital and operational energy, carbon and financial costs.	
Consider artificial lighting and daylighting strategy, indoor air quality, visual and thermal comfort.	

9.1 Net Zero Design & Construction Checklist

RIBA STAGE 4 Technical Design All design information required to manufacture and construct the project completed.	✓
Develop all detail junctions for windows, doors, roofs and walls. Ensure details are long life and robust.	
Ensure low carbon strategies fully incorporated into tender drawings and specification. Clearly detail WLC requirements.	
Incorporate air permeability requirements and strategy into the project specifications. Specifications should detail: • air leakage target and the air barrier strategy • The project requirements for contractor's air barrier drawings, checks of air leakage design, site air leakage audits and preliminary & final air leakage testing • Requirements for management strategies to ensure that workmanship is satisfactory to achieve the airtightness target • Responsibilities for works ie if result of air leakage testing is unsatisfactory and remedial sealing / additional air leakage testing is required	
Measure heating and hot water pipe lengths for all homes.	
Include requirements for Environmental Product Declarations (EPD) in specifications and tender. These should be compulsory for major materials such as primary façade, structural materials and roof etc.	
Undertake embodied carbon assessment using accurate bills of quantities.	
KPI requirements to be included in tender documentation.	
Agree scope of Post Occupancy Evaluation and Contractors role in tender documentation.	
Specify enhancements to local biodiversity and landscaping.	

RIBA STAGE 5 Manufacturing & construction When the building is manufactured and constructed.	✓
Low energy construction and air tightness workshop to be held on site for contractor with low energy strategy incorporated into toolbox talks. For the contractor, consider the appointment of an 'airtightness champion'. This is a good way of ensuring that site operatives remain aware of the importance of the airtight barrier throughout the build. Air barrier delivery to be provided by the contractor. Air permeability tests including report, preferably done by a third party and commissioned by the client.	
Target zero waste construction to landfill.	
Ensure that any alternative materials proposed by the contractor still achieve the project's KPI's.	
Regular inspections to be undertaken on site by Passivhaus certifier, if relevant.	
Ensure actual carbon impacts of the construction process are monitored against the Stage 3 carbon budget taking into account any evolution of the scheme during tender and procurement. It is recommended that reporting intervals of 3-6 months during construction helps ensure delivery of the project requirements.	
Witness commissioning of heating and ventilation systems.	

RIBA STAGE 6 Handover Building handed over, Aftercare initiated and Building Contract concluded.	✓
Provision of tenant's property manuals detailing operation of ventilation and heating systems.	
Undertake a lessons learnt project review with client, contractor and design team.	
Post-completion satisfaction surveys are carried out as an integral part of the development process for new developments.	
Consider embodied carbon as part of future maintenance strategy within the O&M manuals along with a final assessment of WLC impacts of the completed project.	
Provide induction and training of building tenants and facilities managers, with reference to the Sustainability Strategy.	
Ensure the aspects of placemaking and space for social interaction and inclusion are all completed and in place.	

RIBA STAGE 7 In-Use This is the period when the building is in use, lasting until the building reaches the end of its life.	✓
The work of the project team concludes with the closing out of the Building Contract. If tasks are to be undertaken beyond the end of Stage 6, they need to be properly set out in separate professional services contracts. Appointments to complete the Aftercare activities, such as detailed Post Occupancy Evaluation, or providing longer term client advice should be in place	
Undertake more detailed POE or as agreed with PKC. Post Occupancy evaluation to be carried out for a 5-year period of in-use. Verify KPIs have been achieved and publicly report. Any post occupancy evaluation should take account of all WLC impacts Include the actual performance of the building's environmental systems; the fabric's physical performance with respect to durability and fitness for purpose; and an assessment of the maintenance regimes for both.	
Report and mitigate any deviations from the sustainability strategy that arise.	

10.0 Appendices

10.1 Checklist For Independent Living - Wheelchair

10.2 Checklist For Independent Living - Ambulant

Figure 20

10.0

Appendices

10.1 Checklist for Independent Living - Wheelchair

Appendix to PKC Design Guide

Wheelchair Housing Checklist for Independent Living Needs

In general, new build properties should be developed in accordance with Scottish Homes 'Housing for Varying Needs'. This sets out that all housing funded by Housing Grant must comply with Part 1 of Housing for Varying Needs, covering the design of self-contained houses and flats to suit people's different and changing needs over their lifetime or Part 2 of Houses with Integral Support, covering specific design features associated with the provision of communal facilities, shared and grouped accommodation.

The following checklist has been developed in line with good practice recommendations to consider and meet the varying requirements of those with wheelchair housing needs. Only those areas relevant to the individuals should be completed.

If necessary, it can be used in tandem with the Checklist for Independent Living Needs where an individual has wheelchair and additional support needs.

This is to be used as an appendix to the Perth and Kinross Council Design Guide. These standards will be subject to individual requirements and availability of funding and are intended as a guide to communicate our vision for particular needs housing.

Project	
Specification	
Client	

General Internal Features		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Neighbourhood / Location	Homes should be in locations that sustain close links to family and community and provide pathways to social, educational and employment opportunities - Safe neighbourhood with shops, health services and buses within easy walking distance of the home. Except in very rural locations, only provide wheelchair dwellings in locations which are well served by public transport and have easy access to a range of facilities including shops, health and community buildings and services. Ensure that wheelchair homes are dispersed throughout the development, are indistinguishable from other homes externally and as similar as possible internally.	
Accommodation Size	Provide a broad mix of dwelling types and sizes, as required by the local authority, to suit housing need but generally avoid 3 storey houses and one-bedroom flats.	
Wheelchair Accessible	Enough circulation spaces. Aim to 'smooth out' external level changes across the entire site to a manageable gradient and avoid steps unless a lift or equally desirable alternative means of level or gently sloping access is available. Allow for full wheelchair access to all parts of each room or space within the home. Avoid level changes on each floor of the dwelling and provide through-floor lift access to all floors. Thresholds, kitchen and bathroom layout and access to property. Consideration given to those who use other mobility devices that may require equivalent design and space requirements.	
Additional Security:	Provide excellent, but manageable security to all doors and windows, and secure gates and boundaries to private open spaces. • Locks - for windows on 1st floor new build properties, alternatives to locked windows to be explored in line with Building Regulations. For example, window restrictors or an alarm system. • Peep Hole • Door Chain • Intruder alarm system	

General Internal Features		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	• Security Lights • CCTV • Secure Entry System	
Wi-Fi / Data services	Internet required for SMART technology	
Power (fittings, switches, locations)	Ensure that controls, switches, handles etc are located within reach from a seated position. Good provision of data connection points and sockets for home working / learning where possible. All switches/outlets to be flush fittings. Where appropriate - Isolation switches, water thermostat and heating controls accessible to staff, such as located within staff areas, staff wc, etc.	
Smart Assistive Technology	To allow staff to safely monitor residents from a distance • in areas of risk to help protect residents and staff • to support night-time	
Storage Requirements	Ensure plenty of accessible storage (either shallow cupboards with full width doors or wheel-in stores) providing equivalent storage by volume to a mainstream home of the same occupancy but within a height range of 450 - 1500 mm rather than 0 - 2000mm. Plenty of storage within rooms and in shared spaces to maintain an uncluttered environment. Include an area for storing and charging a wheelchair while not in use. Large and lockable cupboard(s). Specifically, for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Interior Decoration / Design	Start by preparing a design for the kitchen and bathroom which suits a wheelchair user and, if no user is identified, produce alternative designs (achieved without major changes) to suit general needs occupants. Design and layout of properties should be innovative, flexible and responsive to the individual's needs. Environments should be robust but easy to clean and repair.	

General Internal Features		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	Ensure good standards of daylight and natural ventilation with views out from all habitable rooms when seated. Increase views of natural features like gardens and trees to enhance alertness and improve mood. Low energy domestic equipment For visual impairment - Appropriate use of colour contrast and tactile surfaces; Excellent and even lighting (both natural and artificial) which avoids shadowing.	
Flooring (coverings, patterns, etc.)	Floor finishes to be appropriate for the individual (e.g. vinyl or carpet as appropriate) bedrooms. All communal areas to have durable and waterproof floorcoverings (slip resistant in wet areas).	
Walls (paint, robustness, etc.)	Wall finishes to be appropriate for the individual and easy to clean.	
Ceiling (coverings, finish, etc.)	Consider ceiling track hoist between bedroom and bathroom where required on an individual basis.	
Doors (ironmongery, robustness, vision panels)	External Secure Door Entry System / Remote Automatic Control System Internal Consider whether automatic doors or pocket doors would meet individual needs better than standard widened doors taking into account cost and ongoing maintenance.	
Windows (toughened, ironmongery, window dressings)	Internally 'washable' vertical blinds should be installed.	
Lighting (fittings, switches, locations)	Low energy light bulbs. LED recessed or flush mounted fittings. Consider addition of dimmable lighting	
Heating / Ventilation	Remember that wheelchair users often spend more time within the home and may be more vulnerable to extremes of temperature. Design for maximum fuel and water efficiency and stable, controllable environmental conditions.	
Sound proofing	Good noise separation between occupancies and between private and shared spaces.	

10.1 Checklist for Independent Living - Wheelchair

General Internal Features		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	The minimum level of airborne sound resistance for dividing walls or floors between homes is 45dB (decibels) in new builds and 43dB in conversion projects.	

Individual Rooms - Kitchen		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Simple and adjustable kitchen	Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining). Well planned kitchen with continuous worktop in 'C' or 'L' shaped configuration. Adjustable work surfaces to ensure safe / comfortable use of cooker or sink. • 760mm minimum height specifically for wheelchair users. A work surface should not be more than 600mm deep to allow wheelchair users to access the preparation area and to reach the back wall. • 700mm minimum clear height from floor to underneath of work surface for knee recess.	
Lockable cupboards	Cupboards with lockable feature if required.	
Storage	Plenty of storage within rooms and in shared spaces to maintain an uncluttered environment. Suitable facilities and storage should be provided for the use of mops, cleaning products, etc. Specific considerations for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes to be at an adjustable level that can be accessed by a wheelchair. Consideration to be given to: • Cabinets with deep pan drawers • Pull out board above floor mounted cupboard unit • Cupboards 1625mm max. height reachable by ambulant disabled people	

Individual Rooms - Kitchen		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	• Fridge freezer 1150mm max. shelf height to allow reach from wheelchair • Cupboards with sliding doors that contain pull-out shelves • Task lighting from ceiling and under cabinet • Lever tap • Controls for an oven and grill intended for use by wheelchair users should be no higher than 1050mm and no lower than 700mm from floor, with display panels no higher than 1200mm from floor. • Microwave ovens should either be located on a work surface or mounted so that the base of the oven is no higher than 850mm from floor and its controls no higher than 1150mm from floor.	

Individual Rooms – Living Room		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Space	Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining).	
Furniture (chairs, tables, etc.)	All furniture should be resistant to soiling, including double seamed and glued & taped joints. Furniture should be robust and not restrict circulation space.	
Fixture & Fittings	Robust fixtures, fittings and finishes.	

Individual Rooms - Bedroom		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Space	Bedrooms to be larger than usual single rooms (suggest 10m2 approx.) with en-suite bath or shower rooms (large enough for one-to-one assistance).	
Furniture (beds, chairs, tables, etc.)	All furniture should be resistant to soiling, including double seamed and glued & taped joints.	

Individual Rooms - Bedroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Built in Wardrobes	If built in wardrobes are to be formed, these should be robust / securely fixed. Specifically for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes. Provision for ceiling mounted track and hoist to allow access between bedroom and en-suite bathroom.	
Windows	Sill height maximum 600mm.	

Individual Rooms - Bathroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Space	Wheelchair turning circle 1500mm	
Wet wall to all 'wet' areas.		
Wet room	Wet rooms with showers instead of a bathroom.	
Bath with shower	Consider if a wet room is more suitable.	
Shower	Removeable / adjustable shower height heads.	
Therapy bathroom	Individual therapy bathroom with provision of therapy bath if required.	
Fixture & Fittings	Robust fixtures, fittings and finishes, including: • Provision for ceiling mounted track and hoist to allow access between bedroom and en-suite bathroom. • Lever tap and wall mounted sink. • Vertical and horizontal grab rails positioned to meet particular needs of user. Guidance suggests 32-35mm diameter and 50-60mm clearance between bar and wall. Vertical grab rails should be 500-700mm apart and 800-1400mm above floor level. Horizontal grab rails should be 600mm wide and 680mm above floor level. Include sustainable design features such as: a. Aim to exceed Building Regulations for fabric performance b. Passive stack ventilation and heat recovery c. Medium flow showers and taps d. Dual flush WCs e. Sensor tap mechanism on bathroom wash basin and sensor flush mechanism.	

Individual Rooms - Bathroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
	Sealed surfaces to withstand water spillages.	
Power supply for hoist	Consider power supply for the addition of ceiling mounted track hoist.	
Flood Detector	Where appropriate.	
WC's in shared housing	Provide at least two accessible WCs in homes for 4 or more people.	

Individual Rooms - Utility Room		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Space	Consideration given to: • Adequate utility / laundry space. • Good drying facilities that don't rely on tumble dryers or hanging clothes in rooms. • Locate laundry facilities so that soiled articles and clothing do not have to be carried through the dining or food preparation and storage area(s).	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear).	

Communal Areas / Other Rooms		
Standard	Requirement Wheelchair Need	Confirm Requirement Yes or No
Multi-purpose room	Accessible shared facilities. Breakout room / Quiet area. A range of shared activity spaces – some passive, some active but each with a clear function. Provision of more than one accessible exit from communal areas.	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear).	

Hall		
Standard	Requirement	

10.1 Checklist for Independent Living - Wheelchair

Hall		
Standard	Requirement	

	Wheelchair Need	Confirm Requirement Yes or No
Circulation space	British standard BS8300 gives figures for self/attendant/electrically propelled wheelchair manoeuvring space. Less is required for self-propelled, more will be required for use of tilt wheelchairs and also consider space for carers required for support.	
Accessible Escape Route	Consider this as and when required.	
Lift Access	Always provide lift access to any wheelchair dwelling above ground; preferably two lifts to cover breakdowns and maintenance.	
Entrance Hall	Provide space within the entrance hall for transferring from an outdoor to an indoor chair (and vice versa).	

External Environment / Access		
Standard	Requirement Wheelchair Need	Confirm Requirement Yes or No
Secure Garden	Access to reasonably sized outdoor space; ideally with a covered area for some wet-weather use. Specific considerations for visual impairment - Space for a guide dog and access to an outdoor space suitable for exercise (ideally a secure, manageable garden).	
Security	Where appropriate – consideration given to • access gates • lights • boundary / perimeter fencing	
Well-lit Entrances	Provide a level, well-lit and sheltered waiting place outside any entrance (shared or private) likely to be used regularly by a wheelchair user.	
Storage	Covered, secure storage areas i.e. for bicycle stores	
Car Port / Parking Facilities	Except in very urban locations, provide a designated, accessible parking space for every dwelling, covered where practical.	
Amenity and Ancillary spaces	Ensure that all amenity and ancillary spaces (including recreational, parking, refuse and recycling areas) within a development are accessible to a wheelchair user.	

10.1 Checklist for Independent Living - Ambulant

Appendix to PKC Design Guide

Checklist for Independent Living Needs

In general, new build properties should be developed in accordance with Scottish Homes 'Housing for Varying Needs'. This sets out that all housing funded by Housing Grant must comply with Part 1 of Housing for Varying Needs, covering the design of self-contained houses and flats to suit people's different and changing needs over their lifetime or Part 2 of Houses with Integral Support, covering specific design features associated with the provision of communal facilities, shared and grouped accommodation.

The following checklist has been developed in line with good practice recommendations to consider and meet the varying requirements of those with particular housing needs.

It differentiates between Enhanced standards for those with mild to moderate needs, and Enhanced + standard for those with complex needs. Only those areas relevant to the individuals should be completed.

If necessary, it can be used in tandem with the wheelchair needs checklist where an individual has wheelchair and additional support needs.

This is to be used as an appendix to the Perth and Kinross Council Design Guide. These standards will be subject to individual requirements and availability of funding and are intended as a guide to communicate our vision for particular needs housing.

Project	
Specification	
Client	

General Internal Features			
Standard	**Details of Requirement**		**Confirm Requirement Yes or No**
	Enhanced (Mild to Moderate needs)	**Enhanced + (Complex Needs)**	
Neighbourhood / Location	Homes should be in locations that sustain close links to family and community and provide pathways to social, educational and employment opportunities - Safe neighbourhood with shops, health services and buses within easy walking distance of the home.	As specified in Enhanced.	
Accommodation Size	Good practice suggests where developing a grouping, small blocks should generally cater for groups of no more than 8 people with mild to moderate needs. Within each self-contained home, good practice recommends there should be a minimum of 2 bedrooms for additional carer requirements. Options for a 1-bedroom home may be appropriate where TEC is utilised and there are no additional carer requirements.	Good practice suggests where developing a grouping, small blocks of 4-6 people are preferable for those with complex needs. Within each self-contained home, there should be a minimum of 2 bedrooms for additional carer requirements.	
Wheelchair Accessible	To consider • Level Access / Ramp • Steps • Enough circulation spaces Consideration given to those who use other mobility devices that may require equivalent design and space requirements.	Thresholds, kitchen and bathroom layout and access to property	
Additional Security	• Secure Entry System • Locks • Peep Hole • Door Chain • Intruder alarm system • Security Lights • CCTV	- Secure Entry System	

General Internal Features			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced (Mild to Moderate needs)	Enhanced + (Complex Needs)	
Wi-Fi / Data services	Internet required for SMART technology	Internet required for SMART technology	
Smart Assistive Technology	Tailored support for anything from a social call when someone is unsupported, medication prompts or appointments, to allow staff to safely monitor residents from a distance; in areas of risk to help protect residents and staff; to support night time. Equipment such as • Electric door opener • Door monitors • Dementia reminders • Pressure mats • Smart Connect Hub • Medication Dispensers • GPS Technology • PIR (Passive infrared sensor) movement sensors • Fall Detectors • Pressure/time sensors • Dual Camera systems	As specified in Enhanced.	
Power (fittings, switches, locations)	Good provision of data connection points and sockets for home working / learning where possible.	All switches/outlets to be flush fittings. Isolation switches, water thermostat and heating controls accessible to staff, such as located within staff areas, staff wc, etc	
Storage Requirements	Plenty of storage within rooms and in shared spaces to maintain an uncluttered environment	Large and lockable cupboard(s) Specifically, for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	

General Internal Features			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced (Mild to Moderate needs)	Enhanced + (Complex Needs)	
Interior Decoration / Design	Design and layout of properties should be innovative, flexible and responsive to the individual's needs. Environments should be robust but easy to clean and repair. Good daylight, use of light, neutral colours generally (to control stress through undue sensory stimulation). Low energy domestic equipment	Increase views of natural features like gardens and trees to enhance alertness and improve mood. Specifically for visual impairment - Appropriate use of colour contrast and tactile surfaces Specifically for visual impairment - Excellent and even lighting (both natural and artificial) which avoids shadowing.	
Flooring (coverings, patterns, etc.)	Standard.	Vinyl covering with coved skirtings with underlay, such as Hush Underlay Floor finishes to be appropriate for the individual (e.g. vinyl or carpet as appropriate) bedrooms. All communal areas to have durable and waterproof floorcoverings (slip resistant in wet areas)	
Walls (paint, robustness, etc.)	Standard.	Paint finish to be antibacterial and durable. Reinforced interior walls using minimum of 12mm robust plasterboard or ply cladding. Installation of additional dwangs for securely fixing furnishings to walls. Extra strengthening around doors frames should be incorporated.	
Ceiling (coverings, finish, etc.)	Standard.	Option of ceiling mounted tracking and hoist to allow access to each room / area.	

10.1 Checklist for Independent Living - Ambulant

General Internal Features			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced (Mild to Moderate needs)	Enhanced + (Complex Needs)	
Doors (ironmongery, robustness, vision panels)	Thresholds – level thresholds to allow smooth wheelchair access Sizes – increasing minimum standard of HVN to 800mm, especially for specialist wheelchairs and equipment Weight – how heavy door is, type of door and whether it opens inwards or outwards Furniture – door knob or lever handle	Flush faced solid core timber doors, incorporating back-to-back fixed handles. Architrave / skirting to be chamfer style with exposed arriss having a rounded finish.	
Windows (toughened, ironmongery, window dressings)	Standard.	Triple glazed unit's PVC/timber windows with locks* and integrated restrictors. Polycarbonate timber screens/shutters to be fitted internally. Internally 'washable' vertical blinds should be installed. Double glazed windows to have laminated or toughened safety glass to both inner and outer panels of windows and glazed doors. Windows to have integrated venetian style blinds and have constrained opening and locking features* and robust window furniture. *For windows on 1st floor new build properties, alternatives to locked windows to be explored in line with Building Regulations. For example, window restrictors or an alarm system.	

General Internal Features			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced (Mild to Moderate needs)	Enhanced + (Complex Needs)	
Lighting (fittings, switches, locations)	Location and type to be considered. Low energy light bulbs.	LED recessed or flush mounted fittings. Consider addition of dimmable lighting Recessed spotlights may be required	
Heating / Ventilation	Stable and controllable internal environmental conditions.	Heating system to be underfloor heating or LST radiators with suitable robust covers. Whole house mechanical ventilation system with appropriate acoustic insulation to minimise fan noise Zonal heating system to allow residents and staff greater control of the temperature in their immediate environment Heating controls and ventilation controls out of reach of residents	
Sound proofing	Good noise separation between occupancies and between private and shared spaces. The minimum level of airborne sound resistance for dividing walls or floors between homes is 45dB (decibels) in new builds and 43dB in conversion projects.	Sound proofing is required to a high level between adjacent dwellings and between adjacent rooms within the dwelling. Can airborne sound resistance be increased to 59db and sound transmission to 50db.	

Individual Rooms - Kitchen			
Standard	**Details of Requirement**		**Confirm Requirement Yes or No**
	Enhanced	**Enhanced +**	
Separate kitchen		Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining). Kitchen to be separate from living room to allow it to be locked, if required. Specific considerations for visual impairment - Well planned kitchen with continuous worktop in 'C' or 'L' shaped configuration and eye-level oven.	
Lockable cupboards (where, how many, key storage)		Locks on some of the kitchen cupboards	
Storage	Plenty of storage within rooms and in shared spaces to maintain an uncluttered environment.	Suitable facilities and storage should be provided for the use of mops, cleaning products, etc. Specific considerations for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear)	Robust construction kitchen fittings. The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling.	
White Goods	Simple to use with handles / openers. Isolations switches for plug points may be required.		

Individual Rooms – Living Room			
Standard	**Details of Requirement**		**Confirm Requirement Yes or No**
	Enhanced	**Enhanced +**	
Space and size		Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining).	
Furniture (chairs, tables, etc.)		All furniture should be resistant to soiling, including double seamed and glued & taped joints. Furniture should be robust and kept to a minimum.	
Fixture & Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear)	The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling.	

Individual Rooms - Bedroom			
Standard	**Details of Requirement**		**Confirm Requirement Yes or No**
	Enhanced	**Enhanced +**	
Space and size	Bedrooms of 10m2 minimum are preferable with en-suite washing facilities.	Bedrooms to be larger than usual single rooms (suggest 10m2 approx.) with en-suite bath or shower rooms (large enough for one-to-one assistance). Ceiling mounted tracking and hoist to allow access to en-suite bathroom.	
Furniture (beds, chairs, tables, etc.)		All furniture should be resistant to soiling, including double seamed and glued & taped joints. Furniture should be robust and kept to a minimum.	
Built in Wardrobes		If built in wardrobes are to be formed, these should be lockable and robust / securely fixed.	

10.1 Checklist for Independent Living - Ambulant

Individual Rooms - Bedroom			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
		Specifically for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear)	The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling.	

Individual Rooms - Bathroom			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Wet wall to all 'wet' areas.			
Wet room	Wet rooms with showers instead of a bathroom.		
Bath with shower	Consider if a wet room is more suitable	Consider if a wet room is more suitable	
Power supply for hoist		Consider power supply for the addition of ceiling mounted track hoist.	
Therapy bathroom		Individual therapy bathroom with provision of therapy bath	
Fixture & Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear) Include sustainable design features such as: a. Aim to exceed Building Regulations for fabric performance b. Passive stack ventilation and heat recovery c. Medium flow showers and spray taps d. Dual flush WCs	Sensor tap mechanism on bathroom wash basin and sensor flush mechanism. Sealed surfaces to withstand water spillages. The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling. Conceal all pipework and toilet cisterns and fit an inspection chamber	

Individual Rooms - Bathroom			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
		behind the toilet to make unblocking easier.	
Flood Detector			

Individual Rooms – Utility Room			
Standard	Details of Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Space	Adequate utility / laundry space Good drying facilities that don't rely on tumble dryers or hanging clothes in rooms.	Locate laundry facilities so that soiled articles and clothing do not have to be carried through the dining or food preparation and storage area(s)	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear) Medium flow spray taps	The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling.	
White Goods	Simple to use with handles / openers. Isolations switches for plug points may be required.		

Communal Areas / Other Rooms			
Standard	Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Multi-purpose room		Accessible shared facilities Breakout room / Quiet area A range of shared activity spaces – some passive, some active but each with a clear function. Provision of more than one exit from communal areas	

Communal Areas / Other Rooms			
Standard	Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear)	The use of durable materials to reduce the impact of heavy or self-injurious behaviour such as jumping, banging, running and fiddling	

Hall			
Standard	Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Circulation space		British standard BS8300 gives figures for self/attendant/electrically propelled wheelchair manoeuvring space. Less is required for self-propelled, more will be required for use of tilt wheelchairs and also number of carers required for support.	
Escape Route			

External Environment / Access			
Standard	Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Secure Garden	Access to outdoor space; ideally a reasonably sized garden Shared outside space, ideally with a covered area for some wet-weather use.	Access to outdoor space and options to incorporate sensory garden Specific considerations for visual impairment - Space for a guide dog and access to an outdoor space suitable for exercise (ideally a secure, manageable garden).	
Security – access gates, lights, boundary / perimeter fencing		Secure fencing required around back garden.	
Storage	Covered, secure storage areas i.e. for bicycle stores		

External Environment / Access			
Standard	Requirement		Confirm Requirement Yes or No
	Enhanced	Enhanced +	
Car Parking Facilities		Enough spaces to accommodate staff and visitors	

10.1 Checklist for Independent Living - Ambulant

General Internal Features		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	The minimum level of airborne sound resistance for dividing walls or floors between homes is 45dB (decibels) in new builds and 43dB in conversion projects.	

Individual Rooms - Kitchen		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Simple and adjustable kitchen	Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining). Well planned kitchen with continuous worktop in 'C' or 'L' shaped configuration. Adjustable work surfaces to ensure safe / comfortable use of cooker or sink. • 760mm minimum height specifically for wheelchair users. A work surface should not be more than 600mm deep to allow wheelchair users to access the preparation area and to reach the back wall. • 700mm minimum clear height from floor to underneath of work surface for knee recess.	
Lockable cupboards	Cupboards with lockable feature if required.	
Storage	Plenty of storage within rooms and in shared spaces to maintain an uncluttered environment. Suitable facilities and storage should be provided for the use of mops, cleaning products, etc. Specific considerations for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes to be at an adjustable level that can be accessed by a wheelchair. Consideration to be given to: • Cabinets with deep pan drawers • Pull out board above floor mounted cupboard unit • Cupboards 1625mm max. height reachable by ambulant disabled people	

Individual Rooms - Kitchen		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
	• Fridge freezer 1150mm max. shelf height to allow reach from wheelchair • Cupboards with sliding doors that contain pull-out shelves • Task lighting from ceiling and under cabinet • Lever tap • Controls for an oven and grill intended for use by wheelchair users should be no higher than 1050mm and no lower than 700mm from floor, with display panels no higher than 1200mm from floor. • Microwave ovens should either be located on a work surface or mounted so that the base of the oven is no higher than 850mm from floor and its controls no higher than 1150mm from floor.	

Individual Rooms – Living Room		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Space	Simple internal layout where each space has a clear function (i.e. avoid open plan living / kitchen / dining).	
Furniture (chairs, tables, etc.)	All furniture should be resistant to soiling, including double seamed and glued & taped joints. Furniture should be robust and not restrict circulation space.	
Fixture & Fittings	Robust fixtures, fittings and finishes.	

Individual Rooms - Bedroom		
Standard	**Details of Requirement** **Wheelchair Need**	**Confirm Requirement Yes or No**
Space	Bedrooms to be larger than usual single rooms (suggest 10m2 approx.) with en-suite bath or shower rooms (large enough for one-to-one assistance).	
Furniture (beds, chairs, tables, etc.)	All furniture should be resistant to soiling, including double seamed and glued & taped joints.	

Individual Rooms - Bedroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Built in Wardrobes	If built in wardrobes are to be formed, these should be robust / securely fixed. Specifically for visual impairment - Plenty of well-lit storage (to help maintain an ordered, clutter-free environment).	
Fixture & Fittings	Robust fixtures, fittings and finishes. Provision for ceiling mounted track and hoist to allow access between bedroom and en-suite bathroom.	
Windows	Sill height maximum 600mm.	

Individual Rooms - Bathroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Space	Wheelchair turning circle 1500mm	
Wet wall to all 'wet' areas.		
Wet room	Wet rooms with showers instead of a bathroom.	
Bath with shower	Consider if a wet room is more suitable.	
Shower	Removeable / adjustable shower height heads.	
Therapy bathroom	Individual therapy bathroom with provision of therapy bath if required.	
Fixture & Fittings	Robust fixtures, fittings and finishes, including: • Provision for ceiling mounted track and hoist to allow access between bedroom and en-suite bathroom. • Lever tap and wall mounted sink. • Vertical and horizontal grab rails positioned to meet particular needs of user. Guidance suggests 32-35mm diameter and 50-60mm clearance between bar and wall. Vertical grab rails should be 500-700mm apart and 800-1400mm above floor level. Horizontal grab rails should be 600mm wide and 680mm above floor level. Include sustainable design features such as: a. Aim to exceed Building Regulations for fabric performance b. Passive stack ventilation and heat recovery c. Medium flow showers and taps d. Dual flush WCs e. Sensor tap mechanism on bathroom wash basin and sensor flush mechanism.	

Individual Rooms - Bathroom		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
	Sealed surfaces to withstand water spillages.	
Power supply for hoist	Consider power supply for the addition of ceiling mounted track hoist.	
Flood Detector	Where appropriate.	
WC's in shared housing	Provide at least two accessible WCs in homes for 4 or more people.	

Individual Rooms - Utility Room		
Standard	Details of Requirement Wheelchair Need	Confirm Requirement Yes or No
Space	Consideration given to: • Adequate utility / laundry space. • Good drying facilities that don't rely on tumble dryers or hanging clothes in rooms. • Locate laundry facilities so that soiled articles and clothing do not have to be carried through the dining or food preparation and storage area(s).	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear).	

Communal Areas / Other Rooms		
Standard	Requirement Wheelchair Need	Confirm Requirement Yes or No
Multi-purpose room	Accessible shared facilities. Breakout room / Quiet area. A range of shared activity spaces – some passive, some active but each with a clear function. Provision of more than one accessible exit from communal areas.	
Fixtures and Fittings	Robust fixtures, fittings and finishes (to withstand above average wear and tear).	

Hall		
Standard	Requirement	

11.0 References

11.1 Figure References

Figure 21

11.0

References

11.1 References

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