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**Family &  
Community Services**  
Ageing, Disability & Home Care

# Environmental Modifications

Practice Guide for Occupational  
Therapists who Support People with  
Disability



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## Disclaimer

This resource was developed by the Clinical Innovation and Governance Directorate of Ageing, Disability and Home Care in the Department of Family and Community Services, New South Wales, Australia (FACS).

This practice guide has been developed to support occupational therapy practitioners who are working with people with disability. It has been designed to promote consistent and efficient good practice. It forms part of the supporting resource material for the Core Standards Program developed by FACS.

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The guide is not considered to be the sole source of information on this topic and as such practitioners should read this document in the context of one of many possible resources to assist them in their work.

Practitioners should always refer to relevant professional practice standards. The information is not intended to replace the application of clinical judgment to each individual person with disability. Each recommendation should be considered within the context of each individual person's circumstances. When using this information, it is strongly recommended practitioners seek input from appropriate senior practitioners and experts before any adaptation or use.

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# 1 Background

## 1.1 Occupational therapy core standards

The [FACS core standards for occupational therapists working with people with disability](#) include:

- Play and Leisure
- Sensory Processing
- Mealtime Management
- 24 Hour Positioning (including seating and wheeled mobility)
- Supporting Sexuality
- Supporting Sleep
- *Environmental Modifications.*

This practice guide is part of the Environmental Modifications Core Standard. It has been developed by the FACS Practice Leader Occupational Therapy, with expert content providers, as a tool for occupational therapists to support people with disability. The information provided may be of interest to others (such as people with disability themselves, carers, educators, and managers) and is available freely in the spirit of sharing.

The occupational therapy core standards and the foundation common core standards (see below) represent some of the more significant core knowledge for occupational therapists supporting people with disability of all ages. Although they cannot cover all the knowledge required, they aim to enhance the capacity of occupational therapy practitioners by providing a convenient and up to date summary of information.

The core standards are intended to form part of a practitioner's learning plan as developed with a professional supervisor (see [Supervision Core Standards](#)). This practice guide provides a starting point for practitioners in accessing knowledge about current evidence in environmental modifications. Good practice integrates practice wisdom (the proficiency and judgment gained from experience) with best available evidence, and knowledge of local and individual circumstances (Straus, Richardson, Glasziou, & Haynes, 2010).

The core standards are designed to be flexible in meeting professional development needs for practitioners. FACS practice guides can be used alone as resources or can form part of an induction program for someone who is new to the area of practice. More comprehensively, the practice guides can be used to extend professional learning, by formal appraisal of knowledge and application of knowledge into practice (see the [Environmental Modifications Appraisal](#)). On completion, within FACS, this is formally recognised with a certificate of achievement. It is highly recommended that the program be incorporated into existing supervision, professional development and work goals, regardless of whether certification takes place.

Readers are encouraged to develop their knowledge through further reading and participation in relevant training opportunities when they arise. Knowledge translation is supported by participating in reflection and appraisal by someone with good content knowledge and clinical skill. This may be via the [core standard appraisal](#) within this Environmental Modifications Core Standard. Readers should also be aware of any of their own organisation's guidelines and resources related to environmental modifications. Some of these are referenced within this document but there may be others such as those only available internally.

## 1.2 Common core standards

This practice guide is enhanced when used with the four common core standards for practitioners supporting people with disability. The common core standards include practice guides, appraisals, as well as video footage of practitioners and family members discussing the relevance of the topic area. Use of the core standards to develop knowledge, skill and recognition is outlined in the [Frequently Asked Questions](#) document.

The four common core standards are: 1) Professional Supervision; 2) The Working Alliance; 3) Philosophy, Values and Beliefs; 4) Service Delivery Approaches. All these resources can be found at: [http://www.adhc.nsw.gov.au/sp/delivering\\_disability\\_services/core\\_standards](http://www.adhc.nsw.gov.au/sp/delivering_disability_services/core_standards).

## 1.3 Professional standards for occupational therapy

In Australia, occupational therapists must be registered and meet [occupational therapy registration standards](#) set by the Occupational Therapy Board of Australia, in terms of need for continuing professional development and regency of practice. The [Australian Minimum Competency Standards for New Graduate Occupational therapists](#) set out required competencies for registration as an occupational therapist.

According to the current evidence (see the common core standard [Professional Supervision](#)), for the entry-level occupational therapist, or practitioner new to a practice area, supervision, ongoing professional development and support is required to translate knowledge into practice and develop clinical expertise. The Environmental Modifications Practice Guide is one method of developing knowledge and skill in the area of environmental modifications.

It is acknowledged and accepted that occupational therapists' expertise lies in their knowledge of occupation and how engaging in occupation can be used to support health and participation in home, school, the workplace, and community life (Siebert, Smallfield, & Stark, 2014).

Roles and responsibilities of an occupational therapist may include:

- seeking information from family, and other key people (remembering the therapist is not an expert on the person with disability)

- comprehensive assessment and evaluation of personal, environmental factors and daily activities
- a functional working knowledge of the required legislation and building requirements
- supporting the person to identify their own goals
- making recommendations and establishing an intervention plan around these goals, in collaboration with the individual, and where relevant their family and/or other key people
- resolve incompatibilities between the person and the environment
- measuring outcomes of relevance to the person and their carer, and making changes to recommendations and interventions as required; this could be through the introduction of equipment, provision of universally designed products, alteration to task and architectural alterations to the residence
- training and educating relevant others about the person's environmental modifications and how it may or may not impact on function
- assessing and reporting on (in a written and diagrammatic format) the person's environmental modifications and impact on function for both the person and the carer.

Factors to consider for effective practice in this area include:

- Explore the meaning of the home/environment, and the objects within, with the person and their family/carer. This will assist in the acceptance, value and usefulness placed on the environmental modification(s).
- Relate the person's occupational activities to the environmental modification intervention.
- Provide education that meets the person and their family/carer on their terms and in their preferred language.
- Record anthropometrics (the person's measurements such as height, reach, and weight) and observe the person engaging in the goal related occupational activities. This assists in informed decision making that will optimise the best fit between the person and their physical environment.
- Communicate effectively with all parties involved including the person and their circle of support, architects, builders, tradesperson and funders.

## 2 Context of environmental modifications

“Occupational therapists understand that the physical environment affects an individual’s ability to engage in meaningful occupation and to derive meaning from occupational engagement”

(Townsend, Polatajko, & Canadian Association of Occupational Therapists, 2013)

This section provides the context for this practice guide. It is important that occupational therapists understand the value of environmental modifications in achieving goals in meaningful occupation, and are aware that people with disability frequently have many barriers in their physical environment. This includes people with mental health, intellectual, and sensory needs, not only those with physical disability.

Consequently, the activity or occupation that an environmental modification aims to support should be the driver of modifications: a person only interacts with their environment through activity.

Modifications may be made to a wide variety of environments, including to a person’s home, school, work place, or shared community facility. The modifications and designs may be the responsibility of the individual, a service provider, or government, amongst others. For instance, one local government in NSW recently consulted with residents to develop universal design principles to inform inclusive playground development [http://www.parracity.nsw.gov.au/live/my\\_community/ourcityyoursay/consultations](http://www.parracity.nsw.gov.au/live/my_community/ourcityyoursay/consultations) (Parramatta City Council, 2016).

The target beneficiary of modifications will influence the decisions made: is the environmental modification for an individual person with disability whose needs are clear, or an unknown population group? In the example of playground design given above, the target is the latter.

Regarding modifications to the home, governments, organisations, and the individual should be aware that the majority of our existing housing stock is likely to require renovation and modification in order to meet the changing requirements of the people who live there over their lifespan. When the existing home design becomes overly problematic, relocating to a new home with a more appropriate design may be the simplest and most economical option (Bridge, 2010).

This section examines the underlying principles of rights, the International Classification of Functioning, Disability and Health, and occupational therapy perspectives that support this practice guide.

People with disability are at risk of having reduced opportunities for participation in all areas of their life. For instance, international evidence has

shown that when compared to typically developing peers, children with disability are more likely to experience restrictions in participation in their activities (e.g. Australia: Imms, Reilly, Carlin, & Dodd, 2008; Imms, Reilly, Carlin, & Dodd, 2009; Canada: King et al., 2006; King, Petrenchik, Law, & Hurley, 2009; Mary Law et al., 2006; USA: Majnemer et al., 2008; Europe: Michelsen et al., 2009).

## 2.1 Rights to environmental access for people with disability

The [Convention on the Rights of Persons with Disabilities](#) (United Nations, 2006) recognises:

- that disability is an evolving concept and that disability results from the interaction between persons with impairments and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others
- the importance of accessibility to the physical, social, economic and cultural environment, to health and education and to information and communication, in enabling people with disability to fully enjoy all human rights and fundamental freedoms
- that to enable people with disability to live independently and participate fully in all aspects of life, we must ensure access, on an equal basis with others, to the physical environment, including facilities and services open or provided to the public, both in urban and in rural areas
- that to ensure access we must include the identification and elimination of obstacles and barriers to accessibility of buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces.

Recent changes in legislation commit service providers to the principles and rights set by the Convention on the Rights of Persons with Disabilities. The Australian [National Standards for Disability Services \(2013\)](#) were endorsed by all state and territory governments and outline how service providers will focus on rights, participation and inclusion, individual outcomes, feedback and complaints, service access and service management. The [Disability Inclusion Act 2014 \(NSW\)](#) has a focus on the provision of individualised supports to enable participation and disability planning within government and organisations to ensure access to community facilities and services for people with disability.

A cost-effectiveness analysis based on the International Classification of Functioning, Disability and Health (known as ICF, covered in detail later in this chapter) explores how to overcome the dilemma posed by the United Nations Convention on the Rights of Persons with Disabilities: the right to reasonable accommodation versus the limitation of disproportionate or undue burden. This comparison identifies the role of assistive technology systems (which

include accessible environments), as well as of universal design (covered later in this chapter), in reducing environmental barriers for users in a way that is cost-effective for society as a whole. It was found that cost-effectiveness analysis based on the ICF can provide powerful economic evidence for how best to allocate existing funding to support the functional needs of people with disability (Schraner, de Jonge, Layton, Bringolf, & Molenda, 2008).

For more information on the rights for people with disability, see the [Philosophies, Values and Beliefs](#) Core Standards Program.

Occupational therapists have an important role in upholding the rights of people with disability. The environmental modifications core standard aims to support this role.

## 2.2 Theoretical models to guide environmental modifications

### 2.2.1 Environmental modifications within the International Classification of Functioning, Disability and Health (ICF)

The [World Health Organization International Classification of Functioning, Disability and Health \(ICF\)](#) combines the major models of disability, recognising the role of environmental factors in the creation of disability. Disability is the umbrella term for any or all of: an impairment of body structure or function, a limitation in activities, or a restriction in participation (Australian Institute of Health and Welfare, 2003).

The ICF defines functioning and disability as multi-dimensional concepts, relating to:

- the body functions and structures of people
- the activities people do and the life areas in which they participate
- the factors in their environment which affect these experiences.

Each of these components is defined in the context of a health condition.

In the ICF, a person's functioning or disability is conceived as a dynamic interaction between health conditions and environmental and personal factors. Environmental factors, an important new component of the ICF, are included in recognition of their influence on functioning and disability. Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives. These are either barriers to or facilitators of the person's functioning (Australian Institute of Health and Welfare, 2003).

The environmental modifications core standard practice guide focuses on the *physical environment*, and is intended to reflect the spirit of the ICF framework through the following two primary principles:

- 1) The primary focus of assessment and intervention must always be on meeting the needs of the individual and their family, based on an

evaluation of how the physical environment impacts on performance and participation.

2) Assessment and intervention must always occur in the context of an ecological model, considering clinical, educational, social, vocational, and community needs.

### 2.2.2 The person-centred approach

The person centred model (See the [Philosophies, Values and Beliefs Core Standards Program](#)) is recommended as a guide to assessment and prescription of environmental modifications. Using the combined expertise of the person with disability, their families/carers, and supporting practitioners (such as occupational therapists, physiotherapists and speech pathologists) is considered best practice and should address common goals for the person.

When prescribing environmental modifications it is essential to consider the diverse needs of the person and their circle of support within the educational, home and community settings. This includes their self-care, and informal and formal care, which correlate to how enabling or disabling an environment is for the occupations that the person wants, needs or has to perform within it (Bridge & Carnemolla, in press).

According to Bridge and Carnemolla (in press):

Person-centered and self-funding approaches to disability and ageing service provision call for more transparency and consistency of principles with practice. This can lead to individualised and occupationally appropriate intervention and facilitation, combined with a more person-focused purchasing and management approach. This service paradigm calls for greater individual, service sector and community knowledge and capacity building. Additionally, many individuals and families continue to be presented with options that do not support occupational lifestyles of choice but instead demand that people stay indefinitely in the family home, or move into more institutional environments. Importantly, living outside institutions and within communities and neighbourhoods does not mean people who have an illness, injury or impairment are truly “at home”. This is because the autonomy, safety and emotional comfort afforded by being able to accomplish valued occupations may not be available.

### 2.2.3 Professional models

These models are also known as generic models of practice as they are able to be applied to all fields of occupational therapy intervention (Conway, 2008). Guided by philosophical ideals such as the value of therapy to health and well-being, these provide a professional ‘blue print’. They describe the unique roles, philosophies or values of a profession. Professional models apply to all people who may seek occupational therapy. These foundation models take many years to develop and to be accepted.

Professional models examples:

- Canadian Model of Occupational Performance (M. Law et al., 2014)
- Occupational performance model of Australia (Chapparo & Ranka 1997)
- Competent Occupational Performance in the Environment Model (Radomski & Latham, 2008)
- Model of Human Occupations (Kielhofner & Burke, 1980)
- The flow model (Csikszentmihalyi, 1990).

#### 2.2.4 Ecological models

These models reflect and incorporate the importance of the environment to the completion of roles and tasks within occupational performance.

The acknowledgement of the dynamic and interactive facets of the person and the environment are considered in practice, and form the basis for a collaborative, person-centred approach to intervention.

Examples include:

- Ecology of Human Performance (Dunn, McClain, Brown, & Youngstrom, 1980).
- Person-Environment-Occupation (M. Law et al., 1996)
- Person-environment-occupational-performance (Christiansen and Baum 1997).
- Ecological model of Aging (Lawton, 1982).
- Person-Environment-Occupation (Law et al. 1996).

Letts and Rigby (2003) note that these models identify that environments can be modified to promote, restore or maintain occupational performance.

#### 2.2.5 Universal design and adaptable housing

The majority of buildings only incorporate dimensions and reaches ranges based on an average healthy, fit adult. This provides reason why so many older people, and people with disability, require modification to their homes, schools and work places, or in many instances are restricted in environmental access. This has led to the emergence of the term *universal design* (or *design for all*) which refers to inclusive design principles.

There are various environmental barriers for many people that need not be erected and environmental facilitators that can be provided for everybody. These can be provided at no or very little extra cost at the design stage of the production of goods, services, and the environment (provided the needs of all people are considered from the beginning) (Schraner et al., 2008).

Universal design aims to cater for people of all ages and abilities to the greatest extent, which relinquishes the need for modification and specialised design. It also takes into consideration important components to accommodate people across their lifespan (Curtin, Molineux, & Supyk-Mellson, 2010).

Universal design aims to create products and environments that accommodate as many people as possible with a variety of sizes, shapes and characteristics.

Universal design consists of seven design principles that allow for a user to interact and be enabled, these include:

- equitable use
- flexibility in use
- simple and intuitive use
- perceptible information
- tolerance for error
- low physical effort
- size and space for approach and use.

(Conway, 2008).

Schraner et al. (2008) note that “there will always be people with impairments that lead to activity limitations and participation restrictions, for which they will need environmental facilitators in the form of assistive technology and care work, and that not providing such assistance can amount to a significant economic cost to society. Yet not using the principles of universal design in the first place is certain to impose economic costs on society overall” (p. 925).

Adaptable housing design includes features that are easily adapted to accommodate the changing needs of the occupants. According to Byles, MacKenzie, Redman, Williamson, and Parkinson (2011):

essential features include: a continuous path of travel; adequate circulation spaces; and appropriate fittings and their placement. These features of adaptable housing are distinct from accessible housing (which is purpose built for people with a disability according to AS 1428 standards for public buildings), or adjustable housing (where features are adjustable – such as heights of door handles, kitchen benches etc). If homes are designed according to AS 4299, any adaptations required later on should require less work at less cost. If adaptable, homes should also be suitable enough that older people will not need to move to more accessible accommodation in the future. Therefore, adaptable housing is referred to as “housing for life.” The Master Builders Association estimates that these principles can be incorporated into the construction of a new home for as little as 2-6% of the cost of construction. Yet, most homes do not currently comply.

## 2.3 Evidence behind environmental modifications

The occupational therapist's role in physical environmental modifications can be diverse and complex and needs to be guided by evidence. A growing body of research evidence indicates that home modifications can:

- reduce institutionalisation and promote participation and community inclusion
- significantly reduce the number of falls in older people
- delay performance loss and dependency
- reduce the overall cost of care by decreasing the risk of injury and hospitalisation or institutionalisation.

(Curtin et al., 2010)

A recent systematic search of literature on the effects of physical environmental modifications is available on [http://www.nswhmms.org.au/sites/default/files/imports/systematic\\_review\\_270415.pdf](http://www.nswhmms.org.au/sites/default/files/imports/systematic_review_270415.pdf). The authors, Carnemolla and Bridge (2015), found that the majority of research reviewed noted positive effects of an environmental modification intervention. While many of the home modification interventions were targeted at older people living in the community, research also investigated the effects of home modifications for people with disability or chronic illness regardless of age.

The effects reported in the 77 studies reviewed by Carnemolla and Bridge (2015) were coded and grouped into thematic clusters. Twenty different individual positive effects or outcomes were identified in the studies, and these were clustered into seven effects themes as shown in the following table.

Table 1: Individual effect, thematic clustering and count of effects indicating prevalence in the body of reviewed evidence

<i>Theme cluster</i>	<i>Positive outcomes of environmental modifications identified</i>	<i>Number of times reported</i>
Falls related evidence	Fall or injury accident reduction	21
	Reduced fear of falling/increased confidence	9
	Improved safety	4
Improved function/ self-care and independence	Improved function outcome/reduced difficulty in activities of daily living	17
	Improved self-care / self-efficacy	5
	Independence autonomy	3
	Supports mobility	1
Physical health and well being	Quality of life well being	7
	Reduced pain	3
	Longevity/ reduced mortality	2
	Decreased breathlessness	1
	Supports rehabilitation	1
Caregiving	Supports/ supplements caregiving in general	7
	Substitutes for informal care	2
	Offsets institutional care	1
	Substitutes for formal care	1
Economic effectiveness	Economic effectiveness	7
Ageing process	Supports ageing in place	6
	Reduces progression of frailty	1
Social Participation	Improves social participation	5

(Carnemolla & Bridge, 2015)

A small study by Byles et al. (2011) noted that:

- Bathrooms are a particular area in need of attention, with many not having adequate levels of access or safety. A focus on bathroom design and modification could be included in education to consumers, suppliers, and legislators.

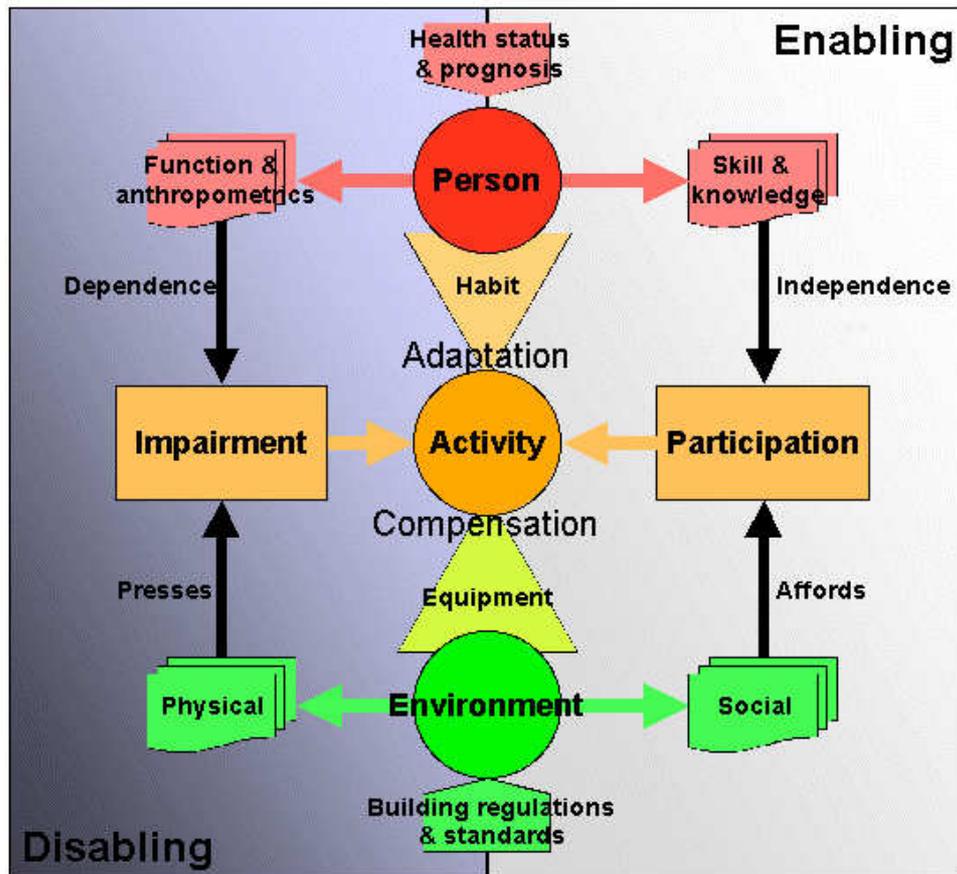
- Home hazards that increase falls risk points to the importance of the home environment in falls prevention strategies. Likewise, associations between higher levels of disability and more home hazards identify those with disability as a particular target group for falls prevention.
- People living in apartments were least likely to rate their homes highly in terms of usability. Further investigation of the appropriateness of the stock of apartments for older people would be useful, particularly since this is a favoured option for many people who chose to move to a smaller dwelling as they grow older.
- Cooling of housing is a potential issue for older people, even for those with air conditioning.
- Access to parking, hospitals, supermarkets, and fresh fruit and vegetables stores are other important considerations in reviewing the suitability of environments, influencing urban design and developments of public spaces such as shopping centres. Transport alternatives for older people, with consideration of safety and shelter, are also required.
- Social connectedness is seen as important in maintaining people in their homes and neighbourhoods as they age. Strategies to enhance social networks as people age, and as their neighbourhoods develop, may be important for enabling people to remain in their own homes.

Occupational therapists are required to demonstrate that their interventions are efficient and effective, fit for purpose and have an evidence base. Through published evidence such as that cited above, physical environmental modifications may be guided and justified.

### 3 Assessment

Good assessment process involves a shift of focus from the physical environmental components to a wider context. For instance, a grab rail should be evaluated in terms of its height, location, and aesthetics, any alternatives, together with the person's requirements (such as balance and stepping) related to their own functional goals. See the [Philosophies, Values and Beliefs core standard](#) for base-line functional goal setting and outcome measurement of these goals. Suitable person-centred outcome measures include the Goal Attainment Scale (Kiresuk, Smith, & Cardillo, 1994) and Canadian Occupational Performance Measure (M. Law et al., 2014).

A framework to assist occupational therapists to understand the dynamic relationship between the person and their physical environment can be seen in the following diagram by Bridge (2008).



**Diagram 1: Relationship between the person and their environment (Bridge, 2008)**

It places the person's activity or occupation at the centre because this determines the type of inter-relationship between the person and the environment. A person's ability to participate in an activity is influenced by their health status and habit/routines. The physical environment shapes the activities by directing the availability of space and equipment. It is this interaction between the person and their environment that enables the fulfillment of valued activities.

### 3.1 Determining eligibility as an assessor

In NSW, a comprehensive assessment of the person's needs and their home by a registered occupational therapist is required before home modification services can be provided.

Occupational therapists need to determine their local or organisational eligibility as an assessor for environmental modifications, for instance in applying for financial support if the person is not self funding. An Australian review of home modification arrangements and service provision in each state and territory (NSW Home Modification and Maintenance Services State Council, 2012) notes that traditionally in New South Wales home modifications are provided at three levels:

- Level 1 – jobs generally costing up to \$5,000 though this limit can be extended to \$7,500
- Level 2 – jobs costing between \$5,000 and \$20,000, sometimes up to \$25,000
- Level 3 – jobs costing over \$20,000.

The report found about 90 local and regional service providers are funded to provide Level 1 and/or Level 2 modifications. Providers can be stand alone home modification services, multi-service outlets or multi-project organisations. Level 2 and Level 3 applications are considered by regional panels with both occupational therapy and builder representation. At the time of the report there was one Level 3 statewide provider that assesses applications from other home modifications providers and allocates funding. Current information (confirming the prices and levels above) can be found in the [Home Modification Service Type Guidelines](#) (Family and Community Services, 2015)

Home modification services in NSW are required to meet a number of contractual and legislative requirements. These include meeting the terms of the Funding Agreement for Disability Service Providers (Funding Agreement), the Community Care Supports Program Guidelines, the Fees Policy, the Home Modification Service Type Guidelines, the Disability Standards, and building codes, safety standards and government legislation. In NSW, a comprehensive assessment of the person's needs and their home by a registered occupational therapist is required before home modification services can be provided (Family and Community Services, 2015).

With the rollout of the National Disability Insurance Scheme (NDIS) in Australia, providers registered with the scheme must meet a range of requirements in relation to qualifications, approvals and experience for the approved supports. See [Operational Guideline – Registered Providers of Supports](#).

Occupational therapists providing support for environmental modification design and construction under the NDIS should consider qualifications required to provide the approved support requested by people with disability, or how to subcontract a third party who does. For more information refer to the [Operational Guidelines – Planning and Assessment – Supports in the Plan – Home Modifications contains operational information on the application of s.34 of the NDIS Act on reasonable and necessary supports in relation to home modifications that may be approved as part of a participant's plan](#).

## 3.2 Consider whether the physical environment is suitable to be modified

Before designing modifications, delegates should assess whether the structure is suitable to be modified. In particular:

- there are no significant structural constraints such as size, surrounding terrain, or the condition of the building
- the property owner agrees and gives permission for modifications to be made
- where applicable, the body corporate gives permission for modifications to be made
- where applicable, the owner of a rental property gives permission for modifications to take place and in the case of complex and extensive modifications gives a lease with a length commensurate to the cost of the modifications.

## 3.3 Preparing for the assessment

A number of factors are required for a successful environmental assessment, these include equipment for the visit such as:

- mobile phone that allows for contact back to base if required, this can also be used as a camera for taking photos of the environment
- 8m retractable tape measure or infrared distance measure
- sample grab rails to determine the required diameter size
- photos of completed modifications to allow the person /carer the opportunity to see what is being recommended
- a manual of fixtures and fittings that are cost effective and fundable under the funding schemes.

Due to the risks of working outside of the controlled work environment, it is important to follow any related work, health and safety policy and procedure guidelines provided by an employer.

In the absence of formal guidelines, the following precautions are suggested for community visits including those for assessing environmental modifications. Prior to any visit it is good practice to complete a pre-home assessment safety checklist. This checklist will include, but is not limited to:

- the location of the house from the road
- the number of people who will be in attendance during the visit
- if domestic animals are to be placed outside or restrained during the course of the visit
- that smoking does not occur during the visit

- property identification and isolation (review the area via satellite maps)
- mobile coverage - identify areas of no reception
- a movement log that clearly identifies location, contact number and expected duration of the visit
- vehicle reliability for safe transport.

If risks are identified, consider attending the site visit with a colleague rather than alone.

Prior to any assessment, informed consent is required from the person/carer. Refer to the relevant organisational guidelines, policies and procedures. To allow for accurate recording of permission a written form is advised.

To aid in comprehensive assessment of the environment, refer to any local environmental report guidelines available for this purpose. Refer to Appendix 1 for an example of a report form used in FACS and more widely in NSW.

### 3.4 Assessment tools

Good environmental modification assessment outcomes depend on consistency and reliability of observations (Curtin et al., 2010). Occupational therapy practitioners are encouraged to select and administer a range of formal assessment tools or frameworks bearing in mind the population being assessed. Using an endorsed form or checklist can assist occupational therapists in their ability to observe, document environmental modification issues. It also helps to ensure all aspects have been identified and facilitates the prioritisation of key issues, and ensures consistency between practitioners and services.

It is important that the most appropriate assessment tool is used based on the person's age and requirements. Every person has a distinct and unique range of abilities and environmental elements that dynamically intertwine and influence their situation. The goal for the occupational therapist is to preserve the uniqueness of both the person and their home whilst problem solving and facilitating occupational performance solutions to enable the person, environment, and occupations to dovetail effectively.

#### 3.4.1 Selected environmental modifications assessments

Children:

- Children's Home Assessment and Modification Protocol (Sanford, 2010).
- Home Observation for measurement of the Environment Inventory (Caldwell & Bradley, 2003).

Adults:

- Craig Hospital Inventory of Environmental Factors (Harrison-Felix, 2001)

Older adults:

- Comprehensive Assessment and Solution Process for Ageing Residents (CASPAR) (Sanford, Pynoos, Tejral, & Browne, 2002)
- Home Falls and Accident Screening Tool (Mackenzie, Byles, & Higginbotham, 2002)
- In-Home Occupational Performance Evaluation (Stark, Somerville, & Morris, 2010)
- Safety Assessment of Function and the Environment for Rehabilitation (Chiu, Oliver, Marshall, & Letts, 2002).

Adults with Dementia:

- Home Environmental Assessment Protocol (Gitlin, Schinfeld, Winter, Corcoran, & Hauck, 2002).

### 3.5 General/preliminary safety check

A general/preliminary safety check is usually done during the course of an environmental assessment. For example, electrical safety (very old power points, no residual-current circuit breaker), smoke alarms (none or inadequate numbers/placement), safe emergency egress (clutter, windows bolted shut), timber/structural damage (sagging or holes in timber floors), slip resistance issues (moss on paths, highly polished floors), leaks (obvious water damage, mould). Any concerns can be raised with the person with the recommendation for a more thorough check by licensed/specialist examiners.

## 4 Design of the environmental modification

### 4.1 Australian Standards

[Standards Australia](#) is an independent, not-for profit body. It is charged by the Commonwealth Government to meet Australia's need for contemporary, internationally aligned standards and related services in a number of areas including environmental modifications. Australian occupational therapy practice in environmental modifications is informed by relevant Australian standards. Most of these standards are guides that the occupational therapist will use designing private or public physical environments; however the design should always suit the unique requirements of the person with disability including their carers' needs. Some standards are regulated and must be adhered to.

Relevant Australian standards for environmental modifications include:

- Australian Standard AS 1428: Design for access and mobility

Part 1 - General requirements for access - New building work.  
Sound clinical judgement should be used if modifying from this Australian standard for public facilities.

Part 2 - Enhanced and additional requirements - Building and facilities

Part 3 - Requirements for children and adolescents with physical disabilities

Part 4 - Means to assist the orientation of people with vision impairment – Tactile ground surface indicators

Part 5 - Communication for people who are deaf or hearing impaired

- AS/NZS 3000-2007 Amendment 2009 Wiring rules: Electrical Installations. Amendment 2-2012- regulated standard, must be adhered to
- AS 3500 2015 Plumbing and drainage: Part 1
- AS3740 2010 Waterproofing of domestic wet areas
- AS 4299 4299—Australian Standard Design for adaptable housing. Designed to inform people making modifications to their home, to assist people to decide if they should stay in their current home or move to a more suitable home, and for those who are considering building a new home.

Australian standards for playgrounds include:

- Australian and New Zealand Standard AS/NZS 4486.1: Playgrounds and playground equipment  
Part 1: Development, installation, inspection, maintenance and operation.
- Australian and New Zealand Standard AS/NZS 4422: Playground surfacing - Specifications, requirements and test methods
- Australian Standard AS 4685 SET:2014: Playground equipment and surfacing Set were recently revised, as an adoption of the European standards with some minor variations that are suited to Australian requirements around sun exposure (Davy, 2014). This change was in response to a review of injury data and concerns that previous versions of the standards were too risk-averse and did not encourage outdoor physical activity.

Part 1 – General safety requirements & test methods

Part 2 – Additional specific safety requirements & test methods for swings

Part 3 - Additional specific safety requirements & test methods for slides

Part 4 - Additional specific safety requirements & test methods for runways

Part 5 - Additional specific requirements & test methods for carousels

Part 6 - Additional specific requirements & test methods for rocking

equipment

Part 11 - Additional specific safety requirements & test methods for spatial networks

- Australian and New Zealand Standard AS/NZS ISO 31000: Risk management - Principles and guidelines;
- Australian Standard AS 4989: Trampolines - Safety aspects
- Australian Standard AS 3533.4.2 - 2013 Amusement rides and devices. Part 4.2: Specific requirements-Contained play facilities.

## 4.2 Factors for consideration in the design

There are a number of factors that require consideration as an occupational therapist undertakes the prescription of equipment, assistive technology or the alteration of the environment.

In the environmental modification process information is gathered in relation to person- occupation-environment fit. This information requires a systematic and accurate approach to the person, their equipment and the environmental constraints that have the potential to impact on completion of their occupations (tasks, roles and skills).

### 4.2.1 Anthropometrics

Anthropometrics is the measurement of the person, their weight, height, width and depth. This is important in determining space, load capacity, clearance, size and location of features and fittings.

Appendix 2 identifies those measurements that may be required in environmental modifications and their functional implications for design.

### 4.2.2 Equipment

The person's foot print is determined not only by their physical size but also any equipment that they use during the performance of a task (Conway, 2008). However, a person's equipment can be changed. During the consideration of a proposed modification, the suitability of current equipment (and whether there is a more appropriate alternative) should also be considered. If the person has a degenerative condition, the size increase of more advanced/complex equipment needs to be anticipated.

### 4.2.3 Bathroom design principles

Appendix 3 provides factors that an occupational therapist should consider when designing a bathroom and toilet – considering function, habitual movement patterns and anthropometrics.

An example of occupational therapy written specifications for major bathroom modifications is available from Home Modifications Australia (MOD.A) on <http://www.moda.org.au/>.

#### 4.2.4 Access design considerations

The ability to access the environment allows for meaningful activity, integration, and participation in the community.

The external area of a person's home is required to be compliant with:

- local council ordinance
- the National Construction Code (2015, 2016 as of May 2016) (see below).

Therefore, best practice involves a working relationship with the local council and their town planner.

The National Construction Code (2015 and 2016) is free to download; [register on the Australian Building Codes Board website](#). This document provides the minimum necessary requirements for safety, health, amenity and sustainability in the design and construction of new buildings (and new building work in existing buildings) throughout Australia. The National Construction Code was developed to incorporate all on-site construction requirements into a single code. It covers the Building Code of Australia and Plumbing Code of Australia and is managed by the Australian Building Codes Board.

Occupational therapists should also refer to the following Australian standards when considering design: AS 1428.1 (2009) and AS 1428.2 (1992).

However, note that access standards and building codes while useful for general guidance cannot account for individual need as they do not account for the person's occupational habits and preferences and generally assume standardised mobility device usage and/or full upper-limb reach ranges (Bridge & Carnemolla, in press).

#### 4.2.5 Grabrails

These provide a safe means of weight bearing support and are used to assist with balance and support and to aid and assist with transfers. Refer to AS 1428.1 2009 for guidelines.

When prescribing a grabrail it is important to consider the following:

- *Material/finish* - rails come in a variety of different finishes and textures, these include stainless steel, diamond embossed, peened, suregrip and powder coated
- *Environment where the rail will be used* - rails will retain heat and also can be very cold. Consideration of a temperature retardant coating is recommended
- *Weight of the person* - rails have weight limitations, so the occupational therapist must be aware of the load capacity for the rail prescribed. If over the weight limit, a heavy duty rail will be required
- *Fabric of the building* - as rails are to be attached to studwork, rails are unable to be attached to fibreglass, permaclad buildings or caravans

- *Functional capacity of the user* - do they know how to use the rail? If the person has decreased cognition, habit will guide rail placement
- *Attachment* - rails are to withstand a force that is applied to it, and into a stud. This will secure the rail and allow for weight to be distributed
- *Lead in requirement (horizontal section)* - to allow for guidance and a lead off
- *Visual contrast requirement*
- *No obstruction* - the rail is to not obstruct or impede a path of travel and to ensure even height measurement is taken from the nosing of the tread
- *Concealed fixings and smooth unbroken joins* - recommended to prevent skin tears
- *Distance from the wall and from objects around them* - necessary to ensure that the person can grip the rail firmly. AS 1428.1 (2009) recommends between 50-60mm from a wall and a vertical clearance of at least 600mm from the top of a horizontal grabrail
- *Diameter* - assess if the person is able to hold a 25mm, 32mm or 40mm rail. Palmar traction is required to ensure a firm grip
- *Length* - modular units allow for the configuration of a rail to suit both studwork and person requirements.

#### 4.2.6 Handrails

A handrail is used to provide guidance in a motion, such as walking up steps or ramps and corridors. See AS 1428.1 2009 for recommendations.

Features for consideration are as for grabrails (see above).

#### 4.2.7 Ramps

A ramp is used to bridge surfaces. AS 1428.1 (2009) provides suggested requirements of a ramp.

Clinical indicators for ramps include:

- use of a wheelchair as the primary means of mobility
- a person is unable to ascend and descend steps safely
- there are visual issues result in decreased figure ground and depth perception
- the required path of travel cannot be provided through another suitable route or grading of the landscape
- balance is declined and centre of gravity impaired.

Ramps – other considerations:

- materials such as wood, concrete, metal
- anthropometrics of the person and weight of carer and equipment
- diagnosis and prognosis of the person, this may for instance impact on the length of a ramp
- area available
- equipment used such as electric wheelchair, walking frame
- other users

- exposure to the elements
- vertical clearance
- direction of ramp
- most appropriate access
- need for cover
- local council regulations and ordinances
- property boundary lines.

#### 4.2.8 Maintenance

The occupational therapist should specify all required maintenance in their report, and include assessment of the person's capability to do/outsource this maintenance. Maintenance issues depend on the environment and may include:

- *Grabrails and handrails* - regular inspection to remove organic matter and soap build up in showers; regular inspection of fixation points; and regular inspection for corrosion
- *Ramps* - oiling or staining annually if wood; regular checks of all joints and struts
- *Flooring* - slip resistance
- *Temperature controls* - as per manufactures' requirements require inspection, generally annually for thermostatic mixing valves and replacement every five years for tempering valves.

## 5 Documentation and drawing of environmental modifications

To ensure that modifications are installed to specifications it is important that the occupational therapist not only draws the conceptual design, but also states the recommendations. These form the basis of your contract with the person and service providing the modifications.

Until review of the design is undertaken by the nominated builder, any plan that is drawn is a concept or option. The following need confirmation by the builder:

- feasibility
- structural considerations such as bulk heads, weight bearing loads and walls, sewer connections, integrity of the building structure
- current and proposed building materials
- location requirements
- costings.

In regards to design, measurement and drawing, the occupational therapist should provide the following information:

## 5.1 Handrails

- Handrails are measured from the centre of one flange to the centre of the other.
- State the length, the diameter, the finish, and the height of the rail.

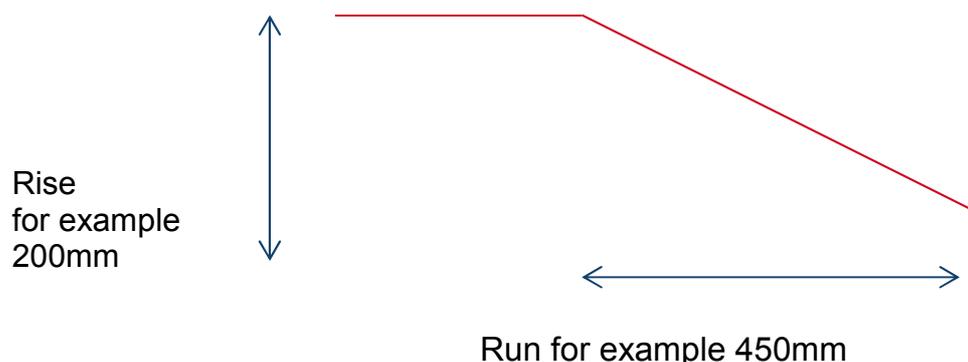
## 5.2 Steps

- State the rise (height) and the tread (where the foot is placed) requirements.

## 5.3 Ramps

- Determine the height rise (this will determine the gradient requirement).
- Determine the landing size based on door operations and angle of approach (refer to AS 1428.1 2009).
- Establish the flush base pad size, and whether a footpath or driveway is suitable.

To determine if an existing ramp is compliant: Gradient is rise/run.



$200/450 = 0.44$  requirements  $1/14 = 0.071$  therefore this is too steep

## 5.4 Diagrams

Once the measurements have been determined then it is important to display this diagrammatically. The use of lines follow technical drawings specifications.

Refer to local requirements and specifications. Generally, drawings present the existing and the proposed floor plans, they give the person's name, address, date of birth, contact details, along with the contact details of the occupational therapist.

A unit of scale and measurement should be provided (for example: 1:20; all measurements are in mm; builder to verify).

A variety of computer assisted drawing (or CAD) packages are available. It is necessary to ensure that they are fit for the purpose, and that they are accurate in their lines of drawing. Millikan (2012) outlines four of the many available in their [report](#).

Minor modifications can be drawn to proportion and can utilise a proforma. Refer to the [MOD.A website](#) for proformas.

Occupational therapists need to ensure that they can continue to work should technology fail, and having a knowledge of drawing by hand is necessary.

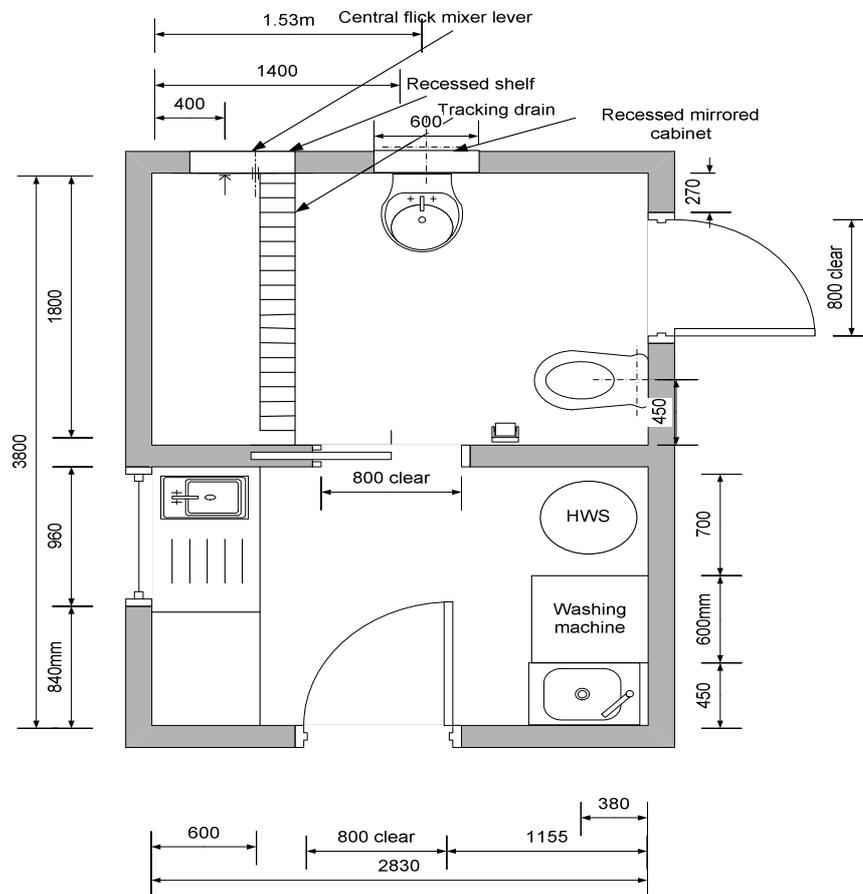
Materials to draw by hand include paper, a scale rule and a pencil.

Table 3: Drawing ledger

Lines of drawing	Function
 heavy thick lines	Outline of the structure
 thin lines	Outline of windows, fixtures and fittings.
 broken lines	Outline of hob free shower,
 dimension lines	Measure the objects and structure.

Bielefeld and Skiba (2013).

Annotations are also used in drawing to label non-standard items and indicate meaning, as seen in Diagram 1 below: Example of a bathroom modification



Measurements are approximate  
 Measured by M. Sullivan  
 Scale 1:25  
 All measurements in mm

## 5.5 Reporting

The primary responsibility of the occupational therapist when writing a report is to outline the consequences of the problem identified by the person with disability and the expected benefits of the corresponding solution. The report documents the occupational therapy services provided within the time frames, format, and clinical standards established by the practice, settings, agencies, external accreditation programs, and funding body (Millikan, 2012).

The report should be presented in a professional format, being objective in nature (organised, concise, clear, and current). Keep in mind that the report may be reviewed and critiqued at various levels over a number of years including in court.

To allow for clear understanding of the occupational therapist's clinical reasoning the use of an action table may be used as in the example below:

Statement of functional goal	Assessment finding	Recommendation	Clinical reasoning for modification
To safely access front of house in a wheelchair.	Steps at front (total 240mm rise), no ramp.	Ramp installation, adhering to AS1428.2.	To facilitate safe entry and egress of residence for the person and their carer.

Refer to Appendix 1 for an example of a major modifications report form used in NSW. Millikan (2012) also provides a sample in their [practice guide](#).

## 5.6 Disclaimer

The following disclaimer is provided as an example for environmental modification reports. It has been endorsed for occupational therapists working within Family and Community Services, and requires local endorsement for external users. Occupational therapists and their managers need to decide whether or not a disclaimer is required for their documentation, and ensure that the body that oversees clinical governance in that organisation is satisfied with their choice.

When using a disclaimer, occupational therapists should ensure there is a written record that they have discussed this with the person with disability and their relevant support people.

This disclaimer is modified from that provided by Occupational Therapy Australia at their workshops on environmental modification (Houen, 1999). The disclaimer incorporates legal advice from Family and Community Services and advice from Occupational Therapy Australia, February 2014.

The recommendations contained in this report are made after consultation with the person with disability and their carers and in investigation of the person's circumstances and needs. The report's purpose is to outline steps to be taken for the benefit of the person and having regard to their disability. They do not purport to reflect other than limited knowledge on the part of the occupational therapist of structural considerations and building codes. The occupational therapist accepts no responsibility for supervision of the work or for quality of the workmanship. If you have any queries or concerns regarding this report's recommendations as far as compliance with current building regulations or Australian standards you should discuss these with the occupational therapist.

An additional example is provided in Appendix 1.

A benefit of using a disclaimer on home modifications work is that it provides some assurance that the issue of risk was covered in the advice. A written disclaimer, supported by documentation of the related conversation, provides evidence that advice was given in the event that there is a dispute. Given that any building modification carries risks that can result in significant expense it is always sensible to seek to minimise these.

However, disclaimers rarely offer fail-safe protection against liability for negligent provision of professional advice. A court hearing a claim will generally want to consider the overall context in which advice was given and whether the person could be expected to be aware of the implications of a written disclaimer. It would not necessarily protect the practitioner or organisation if the advice provided itself ignored an obvious risk.

## 6 Support and funding bodies

Funding is usually required for environmental modifications and may come from a variety of sources. The role of the occupational therapist is to make recommendations for environmental modifications to suit the person's functional goals. There may also be a role to support funding applications and identifying funding options for the person.

There are multiple government programs and departments which fund home modifications. These programs have different eligibility requirements and consideration must be given to these by the referrer. Examples of these in NSW include services provided to eligible veterans through the Department of Veterans Affairs, and services for participants in the Young People in Residential Aged Care (YPIRAC) program.

In NSW, if a person with disability is not already receiving home modifications through such programs, a Community Care Supports Program funded service may be an option. This program has replaced the NSW Home and Community Care (HACC) Home Modification scheme. It aims to provide basic maintenance

and support services to people with disability and their carers in order to prevent inappropriate or premature admission to residential care, and promote independent community living. Community Care Supports Program funded home modification services provide minor modifications (such as grab rails and access ramps) and major modifications (such as improving access into and within the home) to enable people with disability to continue to live in and move safely about their home. These home modification services do not include general repairs to the home but do include explicit changes to improve safety or accessibility for a person with disability.

Further information is available via the [Home Modification Service Type Guidelines](#), [Guidelines for NSW Community Care Supports Program](#) and the [Home Modification Fees Policy](#) which are available on the Ageing, Disability and Home Care website [www.adhc.nsw.gov.au](http://www.adhc.nsw.gov.au). These tools are designed to assist home modification services in NSW with the provision of home modifications to people with disability and their carers, a standard approach to determining client fees for home modifications funded through the NSW Community Care Supports Program (Family and Community Services, 2015).

With the roll out of the National Disability Insurance Scheme relevant services that are registered as providers can prescribe and install modifications for people with disability under this scheme. Refer to <http://www.ndis.gov.au> for further information.

WorkFocus Australia delivers [JobAccess](#) on behalf of the Australian Government and administers the Employment Assistance Fund. This includes assessment of, and funding for, solutions to remove disability specific barriers in the workplace. For example the fund pays for the assessment, design, building costs, and equipment modifications and some services (such as disability awareness training). The fund covers up to \$33,000 (including GST) for building modifications, although equipment requirements are uncapped. To be considered, environmental modifications cannot be seen to be purely ergonomic or to be the employer's duty of care. For further information and full eligibility criteria refer to the guidelines <http://www.jobaccess.gov.au/publication/employment-assistance-guidelines>.

# 7 Completion and review of environmental modifications

## 7.1 Goal review

In providing environmental modification services, regular consultation with the person (and their support people where relevant) is necessary. Data should be collected and analysed to evaluate the effectiveness of intervention in achieving the functional goals that were set. Suitable person-centred outcome measures include the Goal Attainment Scale (Kiresuk et al., 1994) and Canadian Occupational Performance Measure (M. Law et al., 2014).

If the person's goals have not been achieved, interventions used should be re-examined and other options should be considered. This may also promote the need for re-considering other domains (for example medical, environment, communication and behaviour).

When the person's goals are met, a final evaluation of the intervention is necessary and future recommendations may be provided. Relevant recording and communication of findings is required. See the [Philosophies, Values and Beliefs Core Standards Program](#).

## 7.2 Sign off

As the prescribing occupational therapist, it is important to sign and sign off on work once completed to ensure work meets the person's requirements. If the prescribing occupational therapist is not available, this may be completed by their clinical supervisor or a nominated occupational therapist. Refer to the [MOD.A website](#) for examples of major modifications and post modifications sign off forms used in NSW.

There are local arrangements relating to sign off on modifications to buildings run by accommodation and respite services, Housing NSW and Department of Education. The occupational therapist will need to refer to local guidelines around these.

# 8 Conclusion

When considering environmental modifications, the occupational therapist must adopt contemporary philosophies values and beliefs, and contemporary evidence based practices. These have been summarised for the occupational therapist within this guide.

Feedback regarding this practice guide is welcomed via the core standards web site at:

[http://www.adhc.nsw.gov.au/sp/delivering\\_disability\\_services/core\\_standards](http://www.adhc.nsw.gov.au/sp/delivering_disability_services/core_standards)

Quote from an occupational therapist: “Over the years, as an occupational therapist working with people with disability, I have really enjoyed my role in changing the physical environment to better suit the person’s needs. It’s such a tangible contribution. Working with the team: the person themselves, their family and carers, builders, and funding organisations. I love seeing the end result, having a tour of the new rooms and facilities and seeing the joy that the changes bring.

My first modification was designing a removable ramp into a centre; I couldn’t believe how well it fitted and worked when installed! I used the Australian Standards to work out the dimensions and design, and negotiated with a manufacturer around materials and construction.

One of my more recent modifications involved demolishing the back of a family home and redesigning the living spaces, bedrooms and bathroom for a little girl with cerebral palsy. The outcome was that she no longer slept alone at the back of the house in a little add-on, but had a lovely new bathroom and ensuite next to her siblings in the main part of the house. I designed the home with her future growth and needs in mind, as well as her personal goals and preferences. I worked closely with the parents and builder on the design, and closely with the child and her mother in choosing the fittings, colours, etc. It really was a lovely home in the end, with a flexible and modern design that anyone would be happy to live in.”

## 9 Resources

A number of additional resources can be found at:

- [Home Modification Information Clearinghouse](#) (HMInfo): a non-government organisation tasked to collate, review, develop and disseminate evidence-based home modification knowledge in order to enhance the independence and wellbeing of older people and younger people with disability, provide safe working environments for their carers and careworkers, and promote evidence-based best practice among home modification practitioners and prescribers. This service provides free practice guides including a [summary bulletin on environmental assessment and modification for Australian occupational therapists](#). Consumer Fact Sheets and a service finder are available on this site to assist people with disability and their carers when planning and undertaking home modifications.
- [Independent Living Centre NSW](#): a not-for-profit, community based organisation providing information, education, and advise in [assistive technology](#) and the [built environment](#). Information on their environmental modifications training can be found [here](#).
- [OT fact sheets developed by Home Modification and Maintenance Services \(HMMS\) with ADHC occupational therapy consultation.](#)

- [SCOPE access](#) advice on environmental modifications including a [home modification assessment and planning tool](#).
- [OT Australia](#): peak body offering regular training in home modifications.
- [Home Modifications Australia \(MOD.A\)](#): an Australian national body that represents home modification providers for the frail aged and people with disability.
- [Standards Australia](#) as outlined in section 4.1.
- [Building Code of Australia](#): This is a joint initiative by all levels of Australian government and includes members from the building industry. It is a regulatory body that is constantly evolving to meet the needs and provisions of current technology. The Building Code of Australia which should act as a guideline for any modifications made to the home.
- [Association of Consultants in Access](#): The Association of Consultants in Access Australia is a national association of people working to achieve higher standards in accessibility in the built environment for people with disability. It is the peak national body in Australia for access consultancy. The website has a directory through which you can find the nearest ACA consultant by entering a postcode.
- [The NSW Community Care Supports Program](#) funded home modification services provide minor modifications (such as grab rails and access ramps) and major modifications (such as improving access into and within the home). The aim of modifications services is to assist younger people with disability to remain living in their own home by providing affordable modifications designed to change the home environment to make it safer and easier to carry out tasks of daily living and maintain independence. For more information to assist home modification services in NSW refer to [Guidelines for the delivery of home modification services in NSW](#): These guidelines should be read in conjunction with the Guidelines for NSW Community Care Supports Program (CCSP Guidelines) and the Home Modification Fees Policy (Fees Policy) both of which are available on the [Ageing, Disability and Home Care website](#) (Family and Community Services, 2015).



## 1. Eligibility

Explain how the person and carer meet funding guidelines.

- Is the home the person's primary residence and how long have they resided here?
- What alternative accommodation is available if needed during the modification?
- Do the person and/or carer understand the home modification process?

Funding application to NSW Community Care Supports Program, DVA, NDIS, Housing NSW, Aboriginal Land Council, group home, compensable, other (specify)

Please contact your local home modification service if clarification is required.

## 2. Person's health and medical condition

**Describe the person's current health and long term medical history**

*Diagnosis, prognosis, long term conditions and co-morbidities, mental health issues, cognition such as short term memory loss/capacity for new learning, results of geriatric depression scale.*

*Anthropometrics relevant to the requested modification, such as weight of the person, and implications.*

**Describe any anticipated medical intervention and the functional implications of this intervention.**

If the person is an inpatient, include the discharge date and discharge plan.

## 3. Social situation

**Describe the person's living and social arrangements**

- Who else lives in the home?
- Role/responsibilities of those in the home - does the person care for anyone?
- Carer health and needs - physical and mental health status, ability to sustain carer role?
- Secondary users of the modification such as service providers, carers, others in family.
- Cultural considerations.
- Does the person intend to move house or permanent residential care placement in the near future?

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**4. Home environment**

**Describe the type of dwelling**

- Type e.g. freestanding, unit, villa, relocatable home, caravan, single story, split level, two storeys.
- Construction of dwelling e.g. brick/timber tile/tin roof.
- Condition of dwelling and age e.g. well maintained, repair required.

**Describe access to dwelling**

- Level access; number of steps at front, back and side access/entrances; gate/fence line; garage/vehicle drop off point; slope of the land.

**Describe internal access**

- Level access; locations and number of internal steps, circulation spaces including doorways.
- If external access not being addressed please explain why.

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**5. Person's functional status**

**Describe the functional implications of the person's health and medical conditions when undertaking the following**

**5.1 Functional mobility**

- Equipment used, endurance, balance, assistance required – by whom?
- Mobility - both indoors and outdoors, falls, transfers.

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**5.2 Personal activities of daily living**

- Equipment used endurance upper limb function.
- Assistance required and who provides the assistance.
- Accessing and using the shower recess, toilet, grooming, and dressing.

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<p><b>5.3 Domestic activities of daily living</b></p> <ul style="list-style-type: none"> <li>• Include only if relevant to modification request. Include if assistance is required and who provides the assistance.</li> <li>• Meal preparation/housework/laundry/accessing and using kitchen.</li> <li>• Accessing and using the living room/play areas.</li> </ul>
<p><b>5.4 Community access/participation</b></p> <ul style="list-style-type: none"> <li>• Include if assistance is required and who provides the assistance.</li> <li>• Transport/driving.</li> <li>• Community participation/ work/leisure/shopping.</li> <li>• Play/access to yard.</li> </ul>
<p><b>6. Problems identified</b></p> <ul style="list-style-type: none"> <li>• List those problems relating to the need for the home modification and how often they occur e.g. daily, weekly.</li> </ul>
<p><b>7. Equipment trialled and other alternatives considered</b>  <b>Demonstrate other options trialled and why these were not suitable</b>  e.g. use of equipment, minor modifications, management strategies such as retraining options</p> <ul style="list-style-type: none"> <li>• For multi-level houses, ensure that modification to the most accessible level has been considered.</li> <li>• For bathroom modifications to homes with more than one bathroom, ensure all bathrooms have been considered.</li> </ul>
<p><b>8. Interim solutions</b></p> <ul style="list-style-type: none"> <li>• Describe what management strategies are currently in place and why they are not long term solutions.</li> <li>• How is the person going to manage until the modifications are completed?</li> <li>• Describe temporary equipment required during the modification process. Does equipment need to be hired? Can the person meet the</li> </ul>

<p>cost of hiring equipment?</p> <ul style="list-style-type: none"> <li>• How sustainable is the current situation, with or without the proposed modifications?</li> <li>• Note that major modifications are unlikely to be of benefit for people with rapidly deteriorating conditions.</li> </ul>
<p><b>9. List recommendations</b></p> <ul style="list-style-type: none"> <li>• Summary of the overall recommendations e.g. bathroom modifications; ramp at front access and should not include the written specifications that accompany the diagrams.</li> <li>• Include a brief outline of the clinical justification for the recommendations and frequency of use of the proposed modification.</li> <li>• Note: Do not include the written specifications for the home modification here. Specifications are a separate document.</li> </ul>
<p><b>10. Implications for the person and/or carer should the modifications not be implemented</b>  e.g. safety concerns; increased care burden; additional services required to fill gap; housebound; restriction to person/carers lifestyle/mental health</p>
<p><b>11. Other factors or considerations</b></p> <ul style="list-style-type: none"> <li>• Consideration of Work Health and Safety risks, as appropriate.</li> <li>• Is there any additional information the occupational therapist is able to provide that may be relevant to the home modification?</li> <li>• Person and/or carers foreseeable needs e.g. equipment required to meet foreseeable change in function.</li> </ul>

**12. Signed**

This application has had peer review by an experienced occupational therapist.

The assessment of the person and carer and their home environment is the responsibility of the referring occupational therapist.

This peer review can only be based on the information provided.

Name of occupational therapist consulted: \_\_\_\_\_

Signature and designation: \_\_\_\_\_

Disclaimer: The recommendations contained in this form are made after consultation with the person and an investigation of the person's circumstances and needs. Their purpose is to outline steps required to be taken for the benefit of the person, having regard to his or her disability. They do not purport to reflect other than limited knowledge on the part of the occupational therapist of structural considerations and building codes. Any queries, concerns or alterations considered necessary for compliance with current building regulations must be discussed with the occupational therapist before quoting for the cost of the work and before the work proceeds. The occupational therapist accepts no responsibility for supervision of the work or for the quality of workmanship.

## 10.2 Appendix 2: Anthropometric measurements

Feature	Measurement	Design features
<b>General measurements of the person- seated or standing</b>		
Height Standing Seated	From top of the head to the floor	Clearance below overhead obstructions Height of windows and awnings Height of windowsills, mirrors above vanities
Orbital Height	Distance from the corner of the eye to the floor (sitting or standing)	Centre of visual field either in sitting or standing
Height above floor level shoulder height Standing and seated.	Vertical distance from floor to acromion	Height of fixtures and fittings Comfortable reach ranges
Elbow height	Taken from the olecranon process to floor	Determines work surface heights Determines height of armrests
Height above floor level- knee height	From the floor to the upper surface of the knee (quads)	Required for the underside of tables, sinks
Popliteal height- seated	Vertical distance from the floor to the rear crease of the knees	Height of toilet, shower seat
Popliteal crease to the back of buttocks	From the back of the buttock to the front of the kneecap	Dimension required for seat length, depth of shower seat
Hip width	Measurement taken from the widest part of the hips in a seated position.	Width of shower seat and benches
Thigh thickness	Vertical height from the seat surface to the top of the uncompressed thigh, i.e the thickest part	Clearance required between the seat and the underside of the table, sink
Palmar grip, hand	Distance between the tip of the longest	Ideal size of diameter of grab rails and handrails

width	3 <sup>rd</sup> metacarpal ( ±π or 3.14 to give actual dimension)	
<b>Functional reach range measurement of the person- seated or standing</b>		
Distance between chest and edge of fingertips- horizontal reach	Measured with the arm out to the front in a horizontal neutral movement	Width of counters
Forward horizontal reach	Seated: From anterior aspect of seat to the tip of fingers taken – <i>seated upright</i> reaching directly forward.  Standing: From the posterior aspect of the scapula to the tips of fingers- <i>standing upright</i> , reaching directly forward.	Height of power points above bench, door handles, light switches, shelving, towel rails  Reach range to determine heights required for cupboards, handrails and grab rails
Height above floor level- forward diagonal down	Seated leaning forward as low as possible	Height of power points, cupboards, side on approach
Height above floor- side horizontal reach	Seated leaning to the side	Height of power points above bench, height of shelving, width of laundry tub, handles, height of window latches
Height above floor level- forward diagonal (up) reach	Seated leaning upward as high as possible	Height of hanging rail, clothesline power points, or cupboards, with straight on approach

Source: Ainsworth (2011); Conway (2008)

## 10.3 Appendix 3: Checklist for bathrooms

### Structure of the house

- Joists and bearers
- Slab

### Approach and entry to bathroom

- Consider the approach to the bathroom. Is there enough circulation space to negotiate hallways, approach bathroom door, turn and enter bathroom?
- Is width of door clearance suitable for current equipment and foreseeable equipment needs?
- Consider circulation space leaving bathroom for example to hallway/bedroom.
- Ensure the bathroom door be opened/closed/operated by the person. Simulate if the person has not used before for example sliding door.
- Is handle suitable and at functional height.
- Consider who will operate privacy latch if required.
- Is a 2 way door (for example smart door) required for clinical reasons?
- If there is a lip at doorway due to structural requirements, how will it be negotiated?
- Will a wedge likely to be required at the doorway lip?
- Can the person /carer negotiate wedge at doorway with equipment?

### Floor surface

- Location of floor wastes: at least one should be external to bath/shower, centrally draining to allow for no water pooling, and one inside the bath/shower. Are there any clinical reasons why one or the other is contraindicated?
- Is colour contrast of floor with wall tiles necessary?
- Consider the flooring slip resistance.
- Temperature controls: As per manufactures' requirements require inspection, generally annually for thermostatic mixing valves and replacement every five years for tempering valves.

### Window

- Consider who will be opening/closing window.
- Can they functionally reach and manage type of window opening? Simulate if necessary?

### Toilet

- Location of toilet: Is it in the bathroom, included in the bathroom area with separate toilet for others, adjacent to the bathroom, external to house?
- Consider how the person transfers on/off the toilet. Is the toilet in the best position in the bathroom? Is there enough room for type of transfer – for instance side on or front?

- Consider if the toilet is in the best position in the bathroom in regard to what wall grab rails will be required to be located on. Are the person's transfers on/off the toilet safer/more functional with grab rails on their left/right side?
- Does the toilet have to suit current ambulant transfers but be suitable for wheelchair use, shower/commode use in the future?
- Consider height of toilet in relation to function. What height does the person need now and in the foreseeable future?
- Height of pan suggested as: 460-480mm to lid; 450-460mm to centre of toilet; 800mm distance from rear wall (AS 1428.1 2009).
- Flushing controls and location.
- Is toilet height suitable if using shower/commode? Consider under-hang?
- Will the toilet need to accommodate a raised toilet seat or electric bidet in future?
- Consider the shape of the bowl in relation to equipment.
- Can the person /carer reach toilet paper?
- Can the person /carer reach flush controls?

### **Taps**

- Central mixing spout, side location, wall mounted, basin mounted.
- Capstan style head; ½ or ¼ turn.
- Long or short lever

### **Soap**

- Location of soap holder

### **Shower recess**

- Separate shower and bath or shower over the bath?
- Size and type: Minimum hob free/ curb free shower recess for attendant care 1200mm x 1200mm (AS 1428.2 1992) located diagonal to doorway preferred
- Consider which direction the person will be facing to shower? Does the layout, size of shower facility suit?
- How will the person mobilise/manoeuvre to position in/out of shower area?
- If carer - Is there enough room for the carer to carry out task?
- Who will be operating taps? Are they within easy reach of the person, if seated or standing? Are they within easy reach of the carer (if required)?
- Can taps be operated easily? Has the type of handle and type of tap been considered?
- Will the person /carer need a hand held shower hose? What length? Usually longer if carer assisted.
- Will the hand held shower hose need a hook within reach of the person when seated or standing or both?
- Who will need to access soap holder? Is it within easy reach?
- Consider grab rails: are they for support only or for specific transfer or task? Will grab rails suit foreseeable needs?

- Consider position of grab rails in relation to tap zone, hand held shower hose hook, soap holder. Can all items be accessed easily? Is there enough clearance between items?
- Shower screen or curtain? Length, ceiling suspended. Location of window?

### **Bath**

- Consider everyone who needs to access the bath.
- How will they transfer in/out of bath?
- If carer - Is there enough room for carer to carry out task?
- Who will be operating taps? Are they within easy reach of the person, if seated or standing? Are they within easy reach of carer (if required)?
- Can taps be operated easily? Has type of handle and type of tap been considered?
- Will the person /carer need a hand held shower hose? What length? Usually longer if carer assisted.
- Will the hand held shower hose need a hook within reach of the person when seated or standing or both?
- Who will need to access soap holder? Is it within easy reach?
- Consider grab rails: are they for support only or for specific transfer or task? Will grab rails suit foreseeable needs?
- Consider position of grab rails in relation to tap zone, hand held shower hose hook, soap holder and such. Can all items be accessed easily? Is there enough clearance between items?

### **Water temperature**

- Consider if the person's condition requires specific water temperature requirements.
- Thermostatic mixing valve or tempering valve?
- At one site or whole house?
- Tempering valves: Not designed to deliver blended warm water for direct ablution purposes; designed to lower the temperature of water to the tap mixing set; required to be replaced not greater than five year intervals.
- Thermostatic mixing valves: Blend hot and cold water for direct use; reacts to water temperature entering the valve; needs to be installed by a plumber in accordance to AS3500.4, and local code requirements

### **Basin/Vanity**

- Consider which tasks have to be done at basin for example hand washing, hair washing, and shaving.
- Is the size, depth, style of basin suitable for the above tasks?
- If not suitable can tasks for example make up, electric shaving, hair drying, be done elsewhere, such as in bedroom, laundry?
- Is leg and knee clearance a consideration?
- Can the person approach and access basin with their equipment - walking frame or wheelchair? Is there enough circulation space in front of basin/vanity?

- Consider the position of drawers, cupboards. Is storage required on left hand side/right hand side?
- Can the person open/close drawers/cupboard doors?
- Will the person need to reach electrical general purpose outlet inside cupboard of vanity?
- Minimum size requirements. Can be 600mm, 900mm 1200mm in length 350 depth.
- Consider vanity on legs.
- Consider other users.
- Consider wall hung, floor mounted basins.
- Consider semi-recessed basins.

### **Mirror**

- Does it need to be viewable from both a seated and standing position?
- Is a mirror above the basin the best position for the person or is it easier for the person to use a mirror elsewhere in the bathroom or another room?

### **Storage**

- What items do the person have to store in bathroom? Will they be stored on a vanity bench top, on a shelf, or in drawer or cupboard?
- Will all items be able to be reached by the person /carer? Consider heights, depths of storage shelves and drawers.
- Does any storage need to be child proof?
- Does the person need extra grab rails for storage of towels?
- Do any hooks need to be installed in bathroom for example for hanging clothes?

### **Lighting/Electricals**

- Have all electrical requirements been discussed with the person?
- Have all electrical requirements been discussed with builder?
- Consider light switches- what type can the person operate and what is the functional height/reach for any such switches?
- If general purpose outlet (power point) will be required in bathroom, can it be accessed easily? Why is it required? Does it comply with legislation for location? Cognition of person and users
- Heating/cooling- is this a consideration for the person? What does the person require?

### **Other Considerations**

- Bariatric Requirements
- Other users
- Privacy requirements
- Work, health and safety requirements

## References

- Ainsworth, E. (2011). Ethical, legal and reporting variables – Pathways to best practice. In E. Ainsworth & D. d. Jonge (Eds.), *An occupational therapist's guide to home modification practice* (pp. 239-260). Thorofare, NJ.: Slack Inc.
- Australian Institute of Health and Welfare. (2003). *ICF Australian User Guide. Disability Series* [1.0 version]. Retrieved from <http://www.aihw.gov.au/publication-detail/?id=6442467517>.
- Bielefeld, B., & Skiba, I. (2013). *Basics Fundamentals of Presentation Technical Drawing*. Germany: Birkhauser Verlag.
- Bridge, C. (2008). *Computational case-based redesign for people with ability impairment: Rethinking, reuse and redesign learning for home modification practice*. Germany: VDM Verlag: Distinguished thesis series, Sarrbrucken.
- Bridge, C. (2010). Home adaptations and modifications. In M. Curtin, M. Molineux & J. Supyk (Eds.), *Occupational Therapy and Physical Dysfunction - Enabling Occupation* (6th ed., pp. 409-429). London: Elsevier Press.
- Bridge, C., & Carnemolla, P. (in press). Effective home modification practice. In Elsevier Press (Ed.), *Occupational Therapy and Physical Dysfunction* (7th ed.).
- Byles, J., MacKenzie, L., Redman, S., Williamson, A., & Parkinson, L. (2011). *Environmental and built factors for maintaining independence in older age*. Sydney: Ageing Disability and Home Care.
- Caldwell, B. M., & Bradley, R. H. (2003). *Home Observation for Measurement of the Environment: Administration Manual*. Tempe, AZ: Family & Human Dynamics Research Institute, Arizona State University.
- Carnemolla, P., & Bridge, C. (2015). *Systematic Review: Evidence on Home Modifications* (1st ed.). Sydney: Enabling Built Environment Program, University of New South Wales.
- Chapparo, C., & Ranka, J. (1997). Illustration of the first order construct of the Occupational Performance Model (Australia) Retrieved 15/11/2015, from [www.occupationalperformance.com/model-illustration/](http://www.occupationalperformance.com/model-illustration/)
- Chiu, T., Oliver, R., Marshall, I., & Letts, L. (2002). *Safer tool* Ottawa, Ontario: Candian Occupational Therapy Association.

- Conway, M. (2008). *Occupational Therapy and Inclusive Design: Principles for Practice*. London: Wiley-Blackwell.
- Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience*. New York: Harper & Row.
- Curtin, M., Molineux, M., & Supyk-Mellson, J. (2010). *Occupational therapy and physical dysfunction: Enabling occupation (6th ed.)*. London: Churchill Livingstone Elsevier.
- Davy, N. (2014). New playground standards. Retrieved from <http://www.standards.org.au/AnalyticsReports/140416%20Playground%20Standards%20AS%204685%20MR%20final.pdf>
- Dunn, W., McClain, L. H., Brown, C., & Youngstrom, M. J. (1980). The ecology of Human performance. In M. E. Neistadt & E. B. Crepeau (Eds.), *Willard and Spackman's Occupational Therapy*. Philadelphia: Lippincott Williams and Wilkins.
- Family and Community Services. (2015). *Home Modification Service Type Guidelines*. Ageing, Disability and Home Care: Community and Sector Engagement Directorate Retrieved from [https://www.adhc.nsw.gov.au/\\_data/assets/file/0009/257157/Home\\_Modification\\_Service\\_Type\\_Guidelines.pdf](https://www.adhc.nsw.gov.au/_data/assets/file/0009/257157/Home_Modification_Service_Type_Guidelines.pdf).
- Gitlin, L. N., Schinfeld, S., Winter, L., Corcoran, M., & Hauck, W. (2002). Evaluating home environments of person with dementia: Interrater reliability and validity of the home environmental assessment protocol (HEAP). *Disability and Rehabilitation*, 24, 59-71.
- Harrison-Felix, C. (2001). *The Craig Hospital Inventory of Environmental Factors*. Santa Clara, CA: Santa Clara Valley Medical Centre, Centre for Outcomes Measure in Brain Injury.
- Houen, T. (1999). Occupational Therapist: Home Assessment Recommendation Form Disclaimer. *AAOT-NSW Newsletter*.
- Imms, C., Reilly, S., Carlin, J., & Dodd, K. (2008). Diversity of participation in children with cerebral palsy. *Developmental Medicine & Child Neurology*, 50(5), 363-369. doi: 10.1111/j.1469-8749.2008.02051.x
- Imms, C., Reilly, S., Carlin, J., & Dodd, K. J. (2009). Characteristics influencing participation of Australian children with cerebral palsy. *Disability and Rehabilitation*, 31(26), 2204-2215. doi: doi:10.3109/09638280902971406
- Kielhofner, G., & Burke, J. P. (1980). A Model of Human Occupation: Part 1. Conceptual framework and Content. *American journal of Occupational Therapy*, 34, 572-581.
- King, G., Law, M., Hanna, S., King, S., Hurley, P., Rosenbaum, P., . . . Petrenchik, T. (2006). Predictors of the Leisure and Recreation

Participation of Children With Physical Disabilities: A Structural Equation Modeling Analysis. *Children's Health Care*, 35(3), 209-234. doi: 10.1207/s15326888chc3503\_2

- King, G., Petrenchik, T., Law, M., & Hurley, P. (2009). The Enjoyment of Formal and Informal Recreation and Leisure Activities: A comparison of school-aged children with and without physical disabilities. *International Journal of Disability, Development and Education*, 56(2), 109-130. doi: 10.1080/10349120902868558
- Kiresuk, T. J., Smith, A., & Cardillo, J. E. (1994). *Goal Attainment Scaling: applications, theory, and measurement*: L. Erlbaum Associates.
- Law, M., Baptiste, S., Carswell, A., McColl, M. A., Polatajko, H., & Pollock, N. (2014). *The Canadian Occupational Performance Measure* (5th Edition ed.): CAOT Publications ACE.
- Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The Person-Environment-Occupation Model: A Transactive Approach to Occupational Performance. *Canadian Journal of Occupational Therapy*, 63(1), 9-23. doi: 10.1177/000841749606300103
- Law, M., King, G., King, S., Kertoy, M., Hurley, P., Young, N., & et al. (2006). Patterns of participation in recreational and leisure activities among children with complex physical disabilities. *Developmental Medicine and Child Neurology*, 48, 337-342.
- Lawton, M. P. (1982). Competence, environmental press, and the adaption of older people. In M. P. Lawton, P. G. Windley & B. T. O. (Eds.), *Aging and the environment: Theoretical approaches* (pp. 35-59). New York: Springer.
- Letts, L., & Rigby, P. (2003). Environment and occupational performance: Theoretical considerations. In L. Letts, P. Rigby & D. Stewart (Eds.), *Using environment to enable occupation performance* (pp. 97-115). Thorafare, NJ: Slack Inc.
- Mackenzie, L., Byles, J., & Higginbotham, N. (2002). Reliability of the Home Falls and Accidents Screening Tool (HOME FAST) for identifying older people at increased risk of falls. *Disability and Rehabilitation*, 24, 266-274.
- Majnemer, A., Shevell, M., Law, M., Birnbaum, R., Chilingaryan, G., Rosenbaum, P., & Poulin, C. (2008). Participation and enjoyment of leisure activities in school-aged children with cerebral palsy. *Developmental medicine and child neurology*, 50(10), 751-758.
- Michelsen, S. I., Flachs, E. M., Uldall, P., Eriksen, E. L., McManus, V., Parkes, J., . . . Colver, A. (2009). Frequency of participation of 8-12-year-old children with cerebral palsy: a multi-centre cross-sectional European study. [Multicenter Study

- Research Support, Non-U.S. Gov't]. *Eur J Paediatr Neurol*, 13(2), 165-177.  
doi: 10.1016/j.ejpn.2008.03.005
- Millikan, L. (2012). Environmental Assessment & Modification for Australian Occupational Therapists. Retrieved from [www.homemods.info](http://www.homemods.info)
- NSW Home Modification and Maintenance Services State Council. (2012). Home Modifications – A National Perspective.
- Parramatta City Council. (2016). Guiding principles to inform future all abilities playground development. Retrieved from [http://www.parracity.nsw.gov.au/live/my\\_community/ourcityyoursay/con-sultations](http://www.parracity.nsw.gov.au/live/my_community/ourcityyoursay/con-sultations)
- Radomski, M., & Latham, C. A. (Eds.). (2008). *Occupational therapy for physical dysfunction* (6th ed.). Baltimore, MD: Lippincott Williams & Wilkins.
- Sanford, J. (2010). *Children's Home Assessment and Modification Protocol*. Unpublished Manuscript.
- Sanford, J., Pynoos, J., Tejral, A., & Browne, A. (2002). Development of a Comprehensive Assessment to Enhance Delivery of Home Modifications Nationwide. *Journal of Physical Therapy and Occupational Therapy in Geriatrics*, 20, 43-54.
- Schranner, I., de Jonge, D., Layton, N., Bringolf, J., & Molenda, A. (2008). Using the ICF in economic analyses of Assistive Technology systems: Methodological implications of a user standpoint. *Disability and Rehabilitation*, 30(12-13), 916-926. doi: 10.1080/09638280701800293
- Siebert, C., Smallfield, S., & Stark, S. (2014). *Occupational therapy practice guidelines for home modifications*. Bethesda, MD: AOTA Press.
- Stark, S. L., Somerville, E. K., & Morris, J. C. (2010). *In-Home Occupational Performance Evaluation (I-HOPE)* (Vol. 64).
- Straus, S., Richardson, W., Glasziou, P., & Haynes, B. (2010). *Evidence-based Medicine: How to Practice and Teach it*. (4 ed.). Edinburgh: Churchill Livingstone.
- Townsend, E. A., Polatajko, H. J., & Canadian Association of Occupational Therapists. (2013). *Enabling occupation II: Advancing an occupational therapy vision for health, well-being, and justice through occupation*.
- United Nations. (2006). *Convention on the Rights of Persons with Disabilities*. Retrieved from <http://www.un.org/esa/socdev/enable/rights/convtexte.htm>.