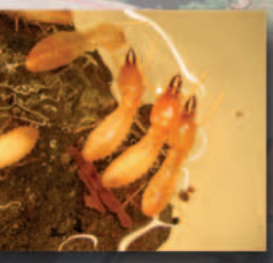
Termite Risk Management



A step-by-step guide for the Building Industry

Australian Government

Forest and Wood Products Research and Development Corporation

Contents

Cover Photographs: All termite photos by Martin Horwood, NSW Department of Primary Industries

Introduction

Good risk management practices can help reduce the risk of damage from termite attack on buildings. This handbook details how, and is orientated towards helping builders and designers involved in housing construction across Australia. It starts by outlining regulatory and statutory requirements. It then provides guidelines to use in the building process. It finishes by discussing the risk of damage to houses from termites. Three major issues require special mention because of the underlying impact on the above issues:

1. **Builders and designers should work together to limit possible damage by termites.**
2. **The Principal Certifying Authority should check and ensure that installed systems comply with the requirements of the Building Code of Australia (BCA), and in most cases, AS3660.1 as well.**
3. **Consumers should be advised that they are responsible for organising post-construction management of termite risk.**

Termite mud shelter tube

Termite Behaviour

There are more than three hundred and fifty species of termites in Australia but only about twenty or so cause economic damage to houses. These species are mainly subterranean termites. They set up nests underground and in the trunks of trees, and prefer damp dark habitats. They tunnel through the soil then build mud shelter tubes up the side of structures to gain access to the building.

Termites will travel a considerable distance underground to attack buildings in search of food. Up to 50m is realistic – some species in the north of Australia are known to travel further. Termites can therefore attack from beyond the property boundaries, so when assessing the risk of attack, bear this in mind.

Termites don't just attack timber houses. The overall risk of major damage to houses is low, but all types of houses are at risk. A recent CSIRO study (Cookson 1999) found that steel and masonry houses had virtually the same chances of attack as timber houses.

Termites don't just infest structural timbers. Termites can also damage plasterboard, carpets, plastics, books, artwork, clothes, electrical insulation and fitout timbers.

Not all termites have the same feeding habits. Some species are more aggressive than others. Those in the far north of Australia are particularly voracious feeders. Older and larger colonies will also have a greater impact than newly established colonies.

The risk of termite attack varies according to where you are in Australia. The risk varies from being negligible in Tasmania, to high in far northern Australia.

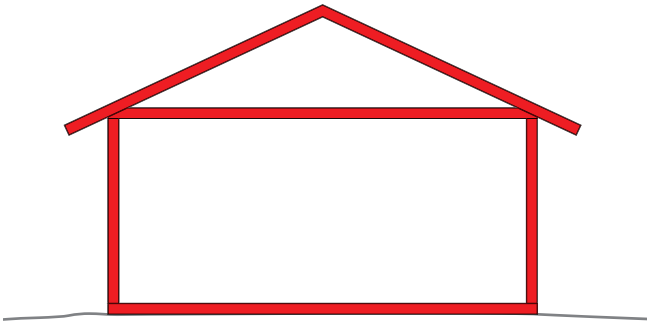
Termites usually swarm in summer in an attempt to start new nests. New nests created by this means are rarely established in buildings unless there is a permanent source of moisture – the main threat is therefore from underground. In any event, it usually takes at least 3 years for a new nest to grow to a size large enough to be capable of causing economic damage.

Termite Risk Management Requirements in the Building Code of Australia (BCA)

The Building Code of Australia states that if primary building elements in new building work (including extensions) are susceptible to termite attack, protective measures must be taken. If there is no potential risk, then no protective measures are necessary. Tasmania is the only state where no protective measures are necessary.

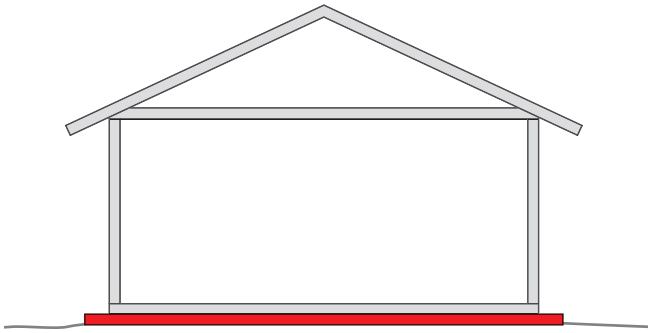
Termite resistant primary elements are those specifically designed to take building loads. If these elements are constructed of one or a combination of termite resistant materials, no other termite risk management is required by the BCA (although this leaves other parts of the building unprotected). Materials deemed to satisfy this requirement include concrete, masonry, steel (and other metals) as well as treated timbers and naturally resistant timbers. Details on these timbers are specified in Australian Standard AS3660.1 and a summarised list is in Appendix A. Manufacturers of treated timbers can also provide details relating to their products.

Fig 1: Resistant materials approach



Termite management systems are another method accepted under the BCA. This approach focuses on heading termites off when they come out of the ground by using termite barriers to deter concealed entry into buildings. This approach tends to be more popular than termite resistant materials because of the ability to address the whole of the house, not just the primary structural elements. Barrier systems deemed to satisfy BCA requirements are in Australian Standard AS3660.1.

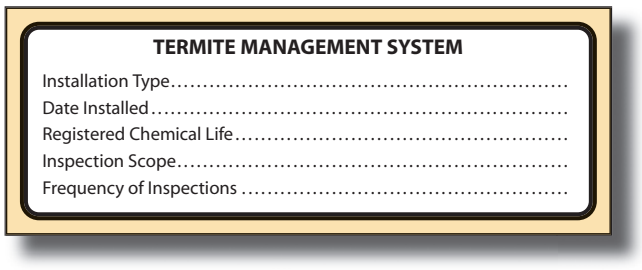
Fig 2: Barrier approach



Alternative solutions are also possible under the BCA's performance requirements. Under this approach, approval authorities can assess whether a system complies with the BCA by using a number of recognised assessment methods (check the BCA for details and ensure suppliers of such systems have documentary proof of BCA certification).

The BCA requires that a notice be fixed permanently to the building in a prominent location (e.g. the meter box) providing information about the termite management system used. The notice must be of durable material, and include the specific method, date of installation, the registered life expectancy of chemicals (if used), the installer's recommended scope and frequency of termite inspections.

Fig 3:
Typical termite management system notice



In addition to the above, variations to the BCA occur due to state/territory specific requirements. The Northern Territory and Queensland are two such cases where variations place extra conditions on the use of termite resistant materials, barrier systems, and the requirements for termite management notices. A summary is provided in Appendix B. The BCA should be consulted for specific details.

Other Statutory & Legal Implication

State legislation can impose additional statutory requirements to those mentioned previously. This is mainly in the form of fair trading legislation relating to the home building industry. This legislation typically requires designers and builders to show a duty of care towards customers, and though this does not stipulate specific methods of termite management, standards may ultimately need to be higher than those in the BCA in order to satisfy expectations. For instance, the NSW Office of Fair Trading's publication, '*Protect Your Home From Termites*' (OFT 2003, page 4) requires protection of the whole house, not just primary structural elements. Queensland's Building Services Authority is less specific but emphasises that homeowners must be made aware of the limitations of solely protecting primary structural elements (QBSA 2001, page 15). Ultimately the choice is up to personal judgement, but most seem to choose whole of house options, and some include the use of termite resistant materials for primary structural elements as an additional precaution.

Local councils provide yet another impact on termite management requirements. Councils do not necessarily accept all systems, especially those perceived to adversely impact on the environment – this is sometimes the case where chemicals are involved.

The National Registration Scheme for Agricultural and Veterinary Chemicals impacts via the Australian Pesticides and Veterinary Medicines Authority which evaluates the safety and performance of chemicals where used in barrier systems. It constantly monitors the market for compliance, and also stipulates the life expectancy of chemicals used in barriers, thus determining when re-application is required.

Licensing of barrier installers may represent another statutory requirement depending on the state in question. Most states focus on licensing installers according to health and safety requirements for handling and installing chemicals. Licensing for quality of workmanship is less common. Queensland is one example where installers must have an operating licence issued by the Building Services Authority. In this case, licensees must have attained prescribed competencies and carry professional indemnity insurance (QBSA 2001).

Aside from statutory requirements, contractual stipulations create obligations between the builder and customer. For instance, design documentation may make it necessary to comply with specific Australian Standards, or use specific termite management systems. Where this occurs, the first priority is to check that the specified system meets regulatory, statutory and site specific requirements. If not, the situation should be discussed to negotiate a more appropriate solution.

Termite Management Standards

In addressing the previous requirements it is relevant to note that a suite of three termite management standards (published by Standards Australia) cover the spectrum of termite management issues. Not all are specified in regulatory documents, so details are given below:

- **AS3660.1 is deemed to satisfy BCA requirements for new construction and is therefore the main document of relevance to designers and builders.** It is explained in greater detail later in this guide.
- **AS3660.2 is not referenced in the BCA because it focuses on inspection and detection requirements once the building is completed.** Despite this, it works in conjunction with AS3660.1, and is important in recommending that building owners inspect for termites at a maximum of 12 monthly intervals, and more frequently for high risk sites. It also deals with termite barrier maintenance and inspection requirements.
- **AS3660.3 sets out criteria for the assessment of termite management systems,** and can be used to develop alternative systems to those already in AS3660.1.

A Focus on AS3660.1

AS3660.1 offers a variety of physical and chemical barrier systems deemed to meet BCA requirements. It is important to realise these barriers only deter hidden entry by termites into buildings – they do not keep termites out. Therefore the longer term emphasis is on using the barriers to identify termite entry, and this relies on the building owner having regular inspections conducted – usually by engaging a termite management professional.

Physical barriers involve installing an impregnable material wherever subterranean termites might enter the building from underground. The barrier blocks termite access, forcing them to build visible mud shelter tubes around the outside of the barrier. Regular inspections can detect the mud shelter tubes which can then be dealt with accordingly. Barrier options under this approach include:

- Concrete slabs (slab) – solid concrete units constructed to prevent termite penetration; must be built to Australian Standard AS2870 (with effective termite barriers fitted to all slab penetrations).
- Crushed stone (stone) – layer of stone particles too hard and heavy for termites to penetrate or move.
- Sheet capping (cap) – sheet material (e.g. metal) used as an isolated or continuous sub-floor barrier.

- Stainless steel mesh (mesh) – termite proof mesh used as an isolated or continuous barrier.

Chemical barriers use termiticides that kill or repel termites before they enter the building. The barriers are commonly applied to the soil immediately around and beneath slabs and footings. Long life chemicals are no longer registered for this use due to the impact they were found to have on health and the environment. These days, the chemicals do not last the life of the building, and must be periodically re-applied to maintain protection. Options arising from this include:

- Hand sprayed chemicals – this approach generally requires permanent access to all areas of the barrier for re-application purposes.
- Reticulation systems – this approach uses dedicated pipework hidden in the construction or beneath it, which allows re-application without the same need for access.

Examples of physical and chemical barriers applied to common floor construction situations are shown in Fig 4 to Fig 8.

Important Note:

Combinations of the following options may be used as required. The options may also be used in combination with termite resistant materials. In all cases a continuous system must be achieved. Systems suppliers should be consulted to obtain appropriate design details as required.

All barriers or combinations of barriers are 'detection systems' intended to expose concealed termite activity. Consequently, they must be complemented by appropriate 'inspection zones'. Regular inspections must be undertaken to detect evidence of termites, and therefore complete the system.

Fig 4:
Suspended floors with ant cappings

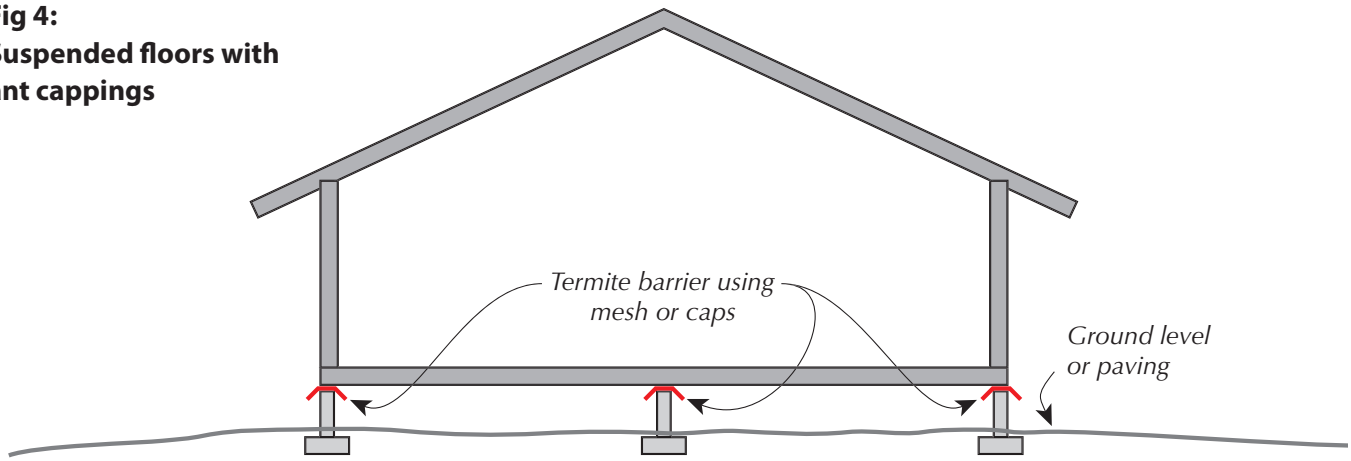


Fig 5:
Suspended floors with alternative barrier system

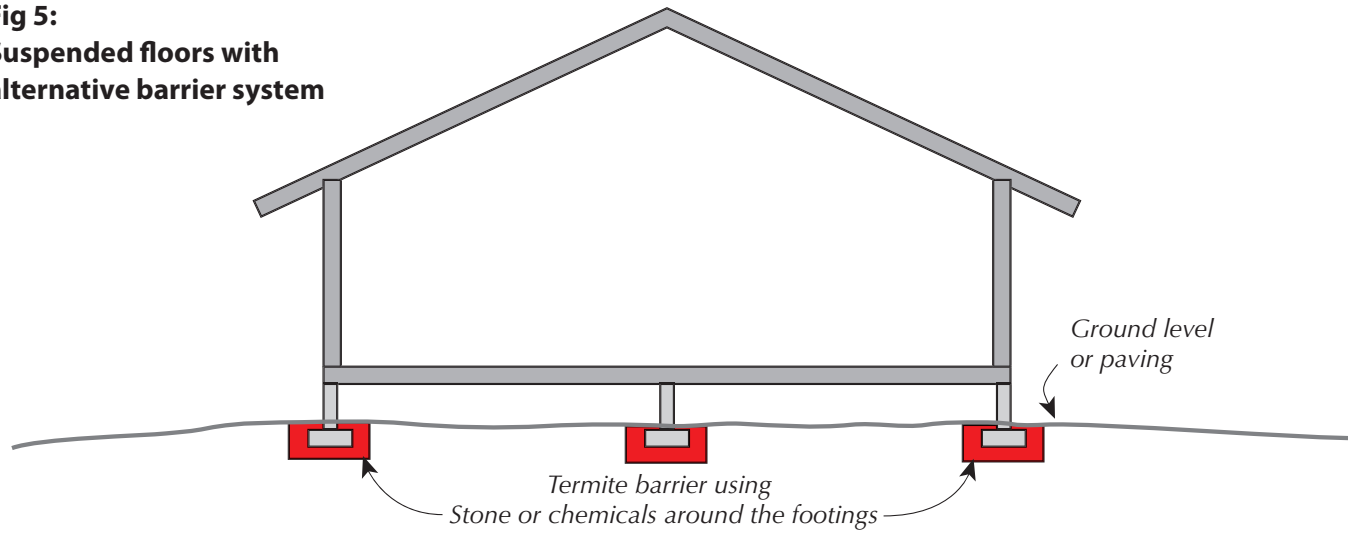


Fig 6:
Slab on-ground with exposed edge

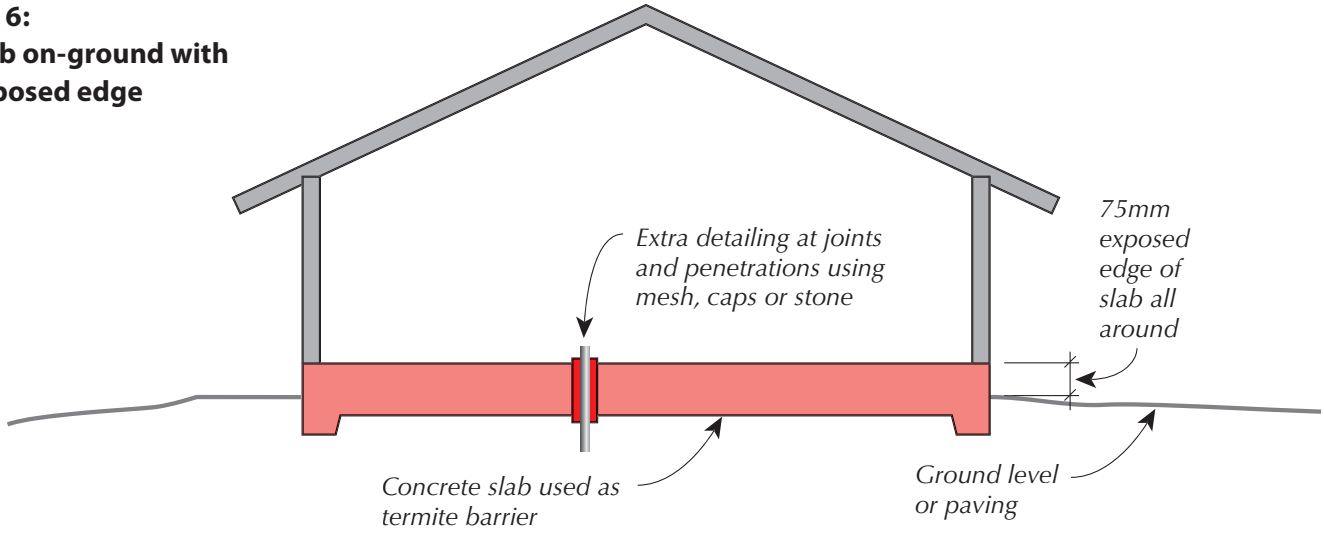


Fig 7:
Slab on-ground with covered edge

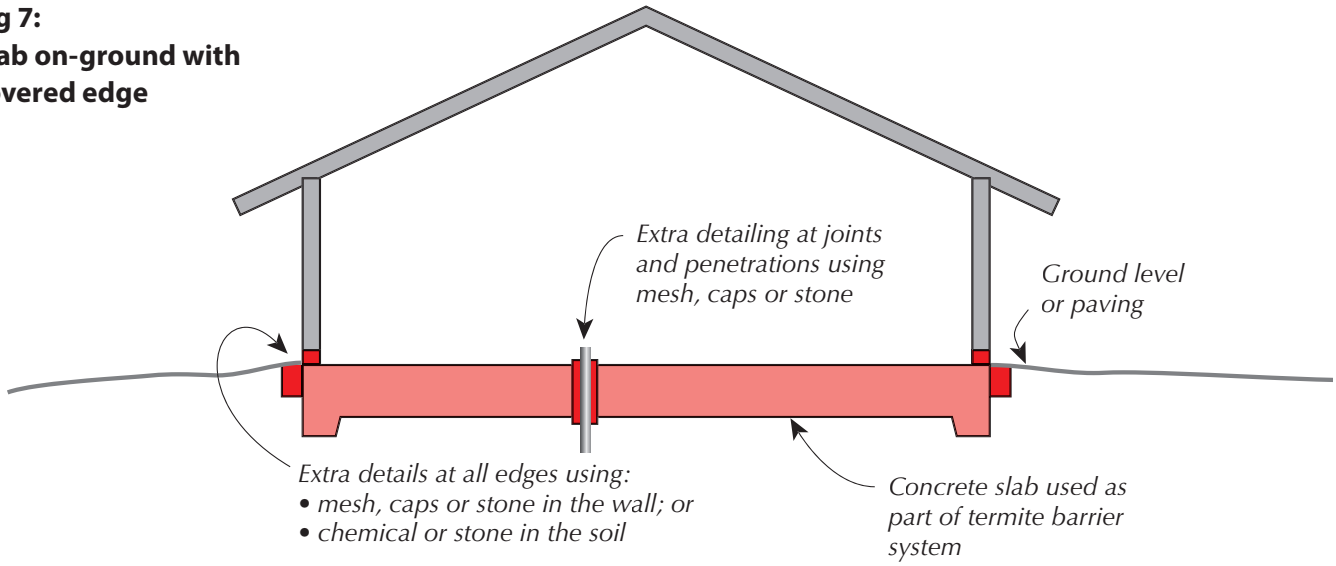
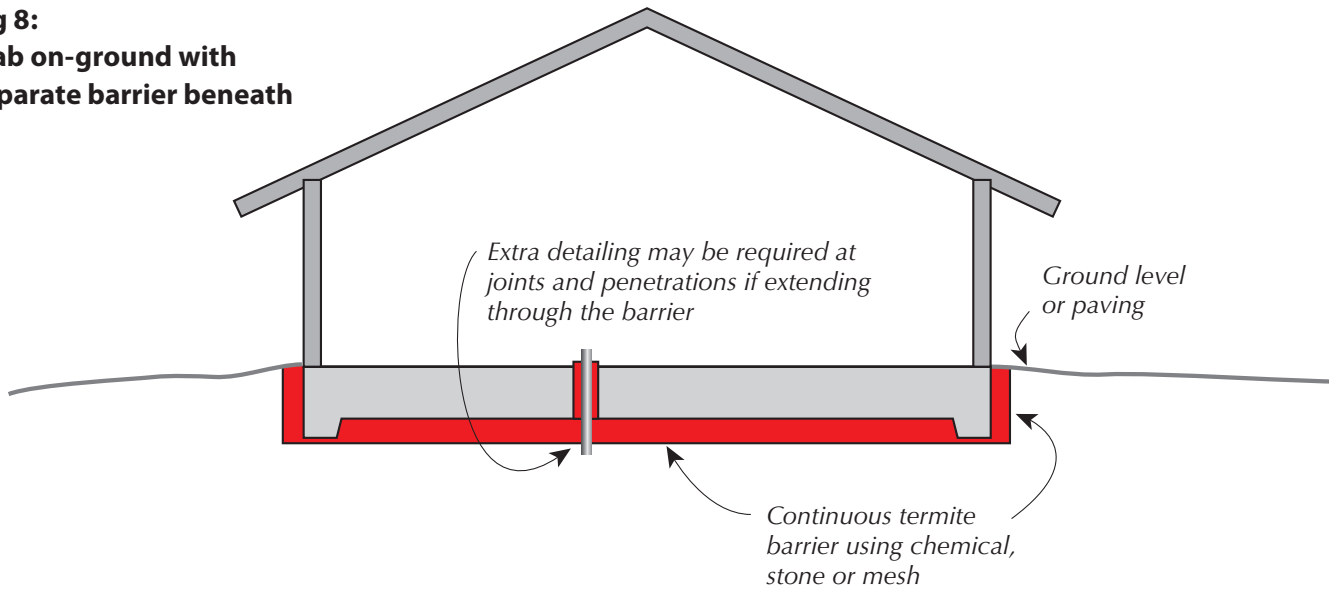


Fig 8:
Slab on-ground with separate barrier beneath



Sub-floor Ventilation Requirements

Sub-floor ventilation is often a forgotten part of termite management. The BCA (Vol. 2) requires the sub-floor between a suspended floor and the ground to be ventilated. This minimises sub-floor moisture which helps to prevent timber decay, and creates an environment that discourages termite attack. To be effective, acceptable sub-floor construction must:

- Be free of building debris and vegetation,
- Provide cross ventilation,
- Contain no dead air spaces,
- Be graded to prevent ponding and be above the external ground level,
- Have evenly spaced openings.

Unless full underfloor physical or chemical barriers are provided (refer Fig 4 to 8), sub-floor clearance must be provided to enable regular inspection.

Where required, sub-floor clearance must be a minimum of 400mm to the underside of bearer, except on sloping sites where part of the area may be a minimum of 150mm clearance as shown in Fig. 9 (refer to page 10).

The amount of ventilation depends on the location of the site in Australia. This is governed by relative humidity, and the relevant zone can be read off Map 1. Using Table 1, select the appropriate climate zone and read off the required ventilation area per metre of sub-floor wall. Amounts vary depending on whether a sealed impervious ground membrane is used or not.

Table 1 (Source: BCA 1996)

	Minimum sub-floor ventilation (mm^2/m of wall)	
Climate Zone	No impervious membrane over sub-floor ground	Sub-floor ground sealed with impervious membrane
1	2000	1000
2	4000	2000
3	6000	3000

The sealed ground membrane option assists where special consideration is required for sub-floor ground which is subject to excessive dampness or frequent flooding. Care must also be taken to ensure patios, paving and similar construction does not limit the effectiveness of ventilation. Further details are in the BCA.

Map 1: Climatic zones based on relative humidity (Source: BCA 1996)

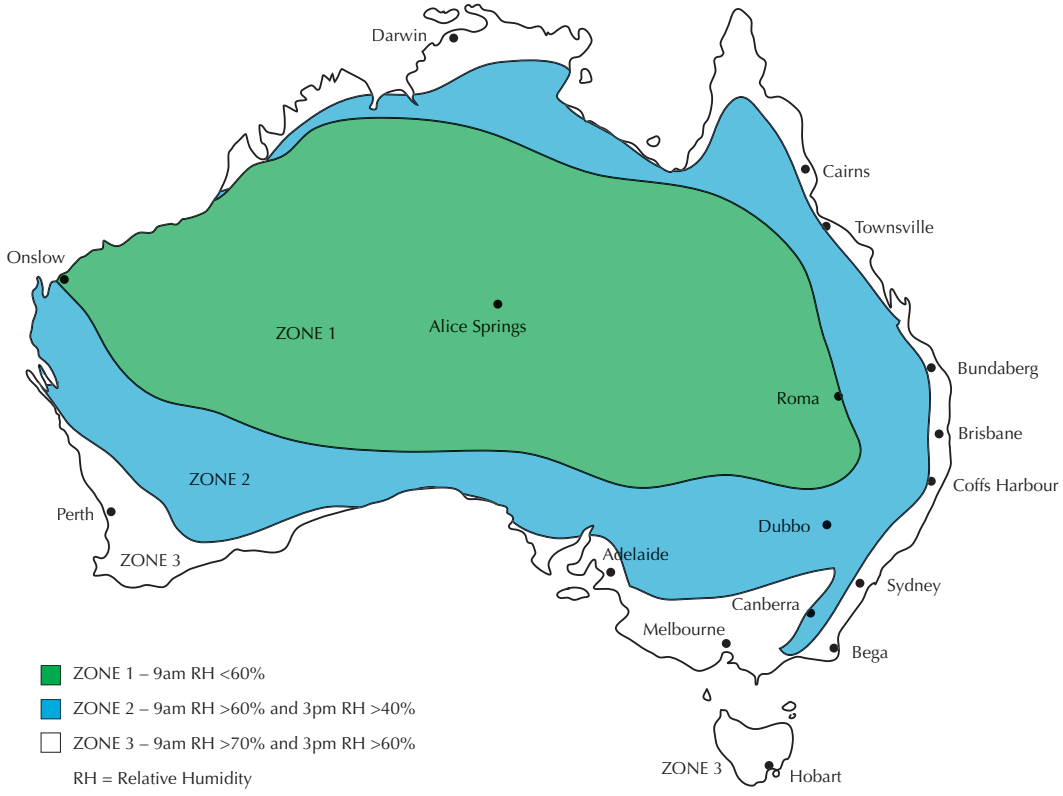
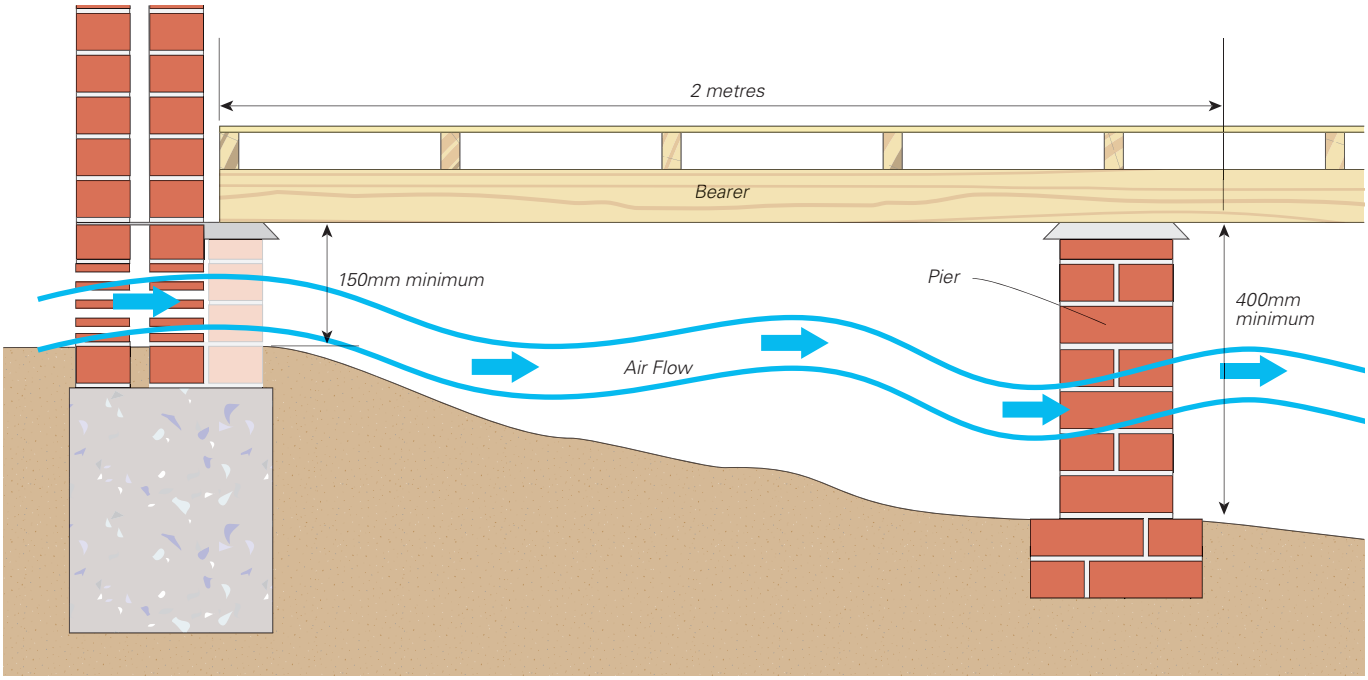


Fig 9: Minimum underfloor clearance – Refer to AS3660.1



High Risk Sites Require Special Attention

Even with appropriate sub-floor ventilation and the whole of house approach provided by termite barriers in AS3660.1, high risk sites still need special attention. This is not a statutory requirement but a common sense approach. It makes sense to boost requirements where termites are known to have a high risk of attack. Project specific design problems may also make it hard to provide construction that conforms to BCA and AS3660.1 requirements (e.g. alterations to buildings that have no barrier in place, or buildings built hard up against the boundary with no allowance for inspection). These points are dealt with in detail later in the handbook, but below are some measures that improve the ability to manage these high risk situations:

- Use termite resistant structural materials as well as termite barriers (refer Appendix A for timber options).
- Use a high-set open sub-floor to keep areas dry, well ventilated, and capable of enabling natural light beneath the house (consult your local authority as other design controls may affect the ability to apply this option).
- Specify inspections at closer than recommended intervals (i.e. less than 12 monthly intervals) and recommend including trees (drill testing if considered necessary) during regular inspections.
- Encourage the building owner to:
  - have termite monitoring systems (e.g. baits) installed after completion of the building,
  - have these monitored in conjunction with the normal inspection regime,
  - include neighbours and their properties in termite pest inspection/prevention measures,
  - consider specialist termite insurance which typically includes regular inspections, use of monitoring systems, and financial cover against damage.
- Consider using removable skirtings where external access for barrier inspection is not possible, or, incorporate internal inspection holes.

Creating a Manageable Process

The previous regulations, statutory requirements and details on high risk sites cover the main issues in termite management. However these factors come from fragmented sources and do not necessarily reflect the way buildings are actually constructed. To remedy this, a step-by-step approach is shown in Figure 10. It aims to simplify the key issues by placing them in a context that suits the way buildings are constructed. The approach allows elaboration on key issues at relevant stages during the process. It is also more inclusive of those who are not adept at understanding legal, regulatory or technical documents. For instance, there are many parties involved in decision making, including designers, builders, pest managers and building owners. Each of these people have varying levels of knowledge about termites, degrees of involvement, understanding of constraints, and varying levels of stakeholder interest. All parties need to have a common language for understanding who should be involved, what needs to be done, when things need to be done and who is responsible. The steps detailed below aim to make this possible, and in doing so, make sure there are no gaps along the way.

Fig 10: Step-by-step termite management process

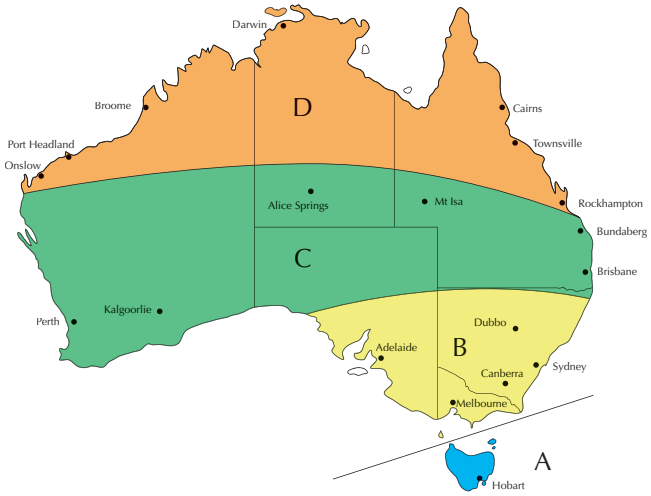
Step 1: Assessing Site Risks

As previously discussed, high risk sites require special attention. This needs to be done at the very start of the project. AS3660.1 calls for an investigation within the property for active termite nests up to 50m from the proposed building. If found, action should be taken to eliminate the colony before construction of the building commences.

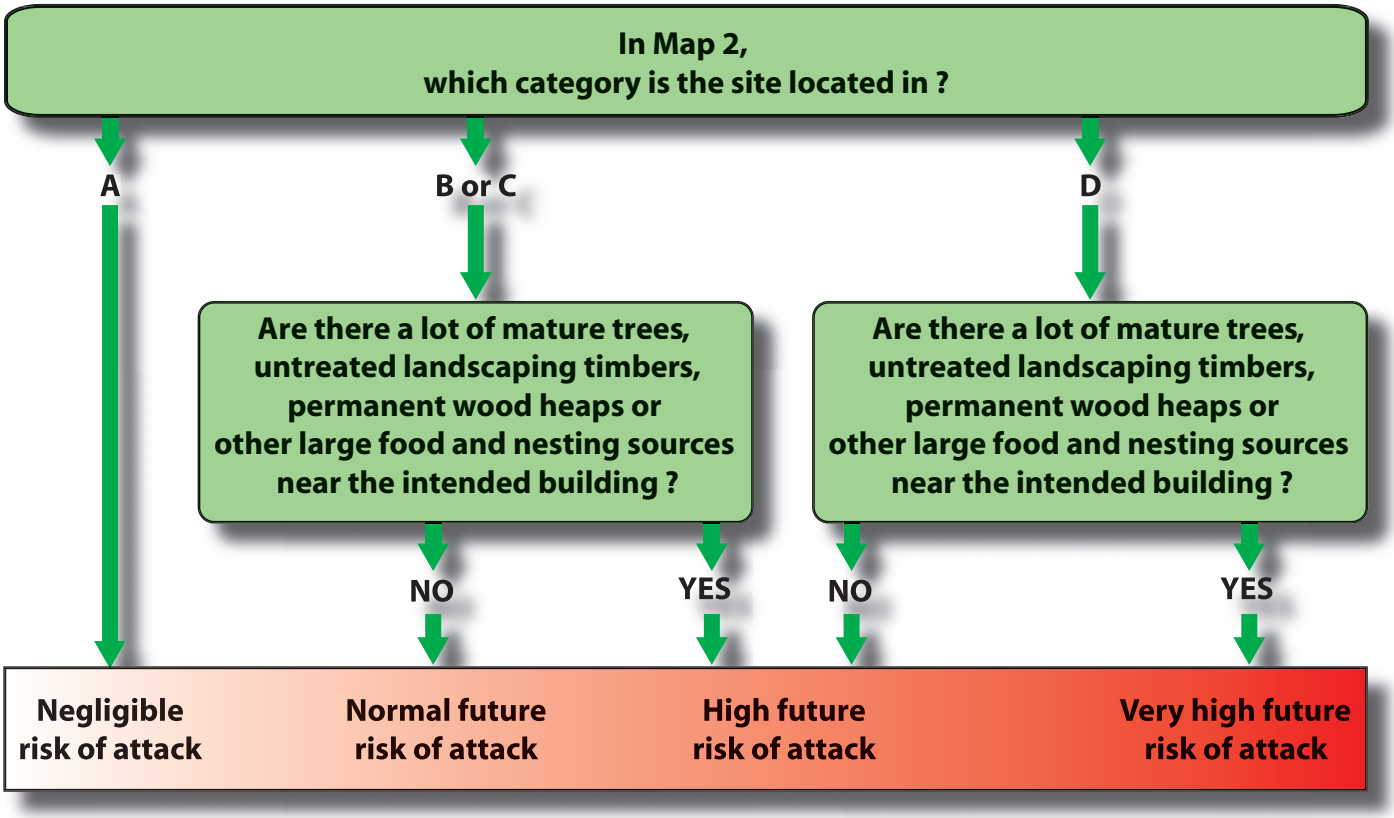
Though this goes some way to handling obvious risks, nests are hard to find – especially where located beneath the ground or on a neighbouring property. Time may also change circumstances. To deal with these issues other indicators based on the earlier discussion about termite behaviour are useful. Map 2 followed by Decision Chart 1 apply the main points by way of key questions that aim to provide a ready reckoner for identifying high risk sites.

Check Map 1 to determine in which category your building site is located. Use this information to determine the path to be taken in Decision Chart 2. For 'high' and 'very high' risk sites, extra precautions to minimum BCA and AS3660.1 requirements are recommended. Take this into account when undertaking Step 2 (assessing and acting upon design risks) and Step 3 (selecting an appropriate termite management system).

Map 2: Termite map of Australia (Source: Leicester *et al.*, 2003)



Decision Chart 1: Assessing if the site has a high risk of attack



Step 2: Assessing & Acting Upon Design Risks

Subject to the site risk assessment, choose a building design that suits. Of note, suspended timber floors with high ground clearance and good sub-floor ventilation are known to perform well in resisting termite attack. It is also important to check the design for problems that may compromise the effectiveness of the termite management system, and act accordingly. The following questions and answers cover problematic areas:

Q Will the building be accessible for inspection and maintenance – especially if building close to the boundary or another building? If not accessible:

Use reticulated systems for chemical barriers. Consider removable skirtings to allow inspection of physical barriers or incorporate inspection holes. Use termite resistant materials where barriers are not viable/visible, or where elements occur below barrier systems (refer Appendix A for timber options).

Q Will the building have access to all areas under the floors?

Patios and similar structures poured on fill often pose problems. Consider pouring continuous suspended slabs where patios are attached to floor slabs.

Q Will the building have attached structures such as steps, porches, verandahs, hot water systems, air conditioning units and trellises?

Make sure these are included in the barrier system or incorporate a 25mm gap (min) to allow clear and uninterrupted inspection at the same height as the main barrier. Or use a monolithic slab to include these additional areas

Q Does the project involve connections between new and existing work?

If yes, check joints between old and new work. AS3660.1 requires a barrier although alternative courses of action are also possible. Involvement from a termite expert is recommended at design stage where difficulties are likely to be encountered.

Q Does the building involve split level or different floor types?

Check these locations for potential problems in barrier continuity. Amend the design using standard design details from system suppliers (if possible).

Q Does the building involve dividing walls between units and/or garages?

These situations often pose problems to barrier continuity. Consider pouring continuous slabs beneath the walls or amend the design using standard design details from system suppliers.

Q Does the building involve a basement?

Barrier locations require careful consideration at design stage – especially placement of vertical barriers. The choice of basement construction and fitout materials is also important – expert advice is recommended.

Q Does the construction involve infill slabs?

Infill slabs often cause problems. Edges are hidden from view, and it is hard to avoid inconsistencies in the overall barrier system. Lack of access for inspection means chemical barriers must be re-treatable. Applying chemicals through drill holes is also possible but is rarely a viable option. Avoid infill slabs or seek specialist advice.

Q How will excessive moisture in dark sub-floor spaces be avoided?

Moist soil under the house allows termites to make the mud shelter tubes they use to advance up the sub-floor structure and into the house. Consider effective perimeter drainage, especially at the base of cut areas. Consider using impervious ground membranes or open sub-floor construction to keep the sub-floor dry and naturally lit.

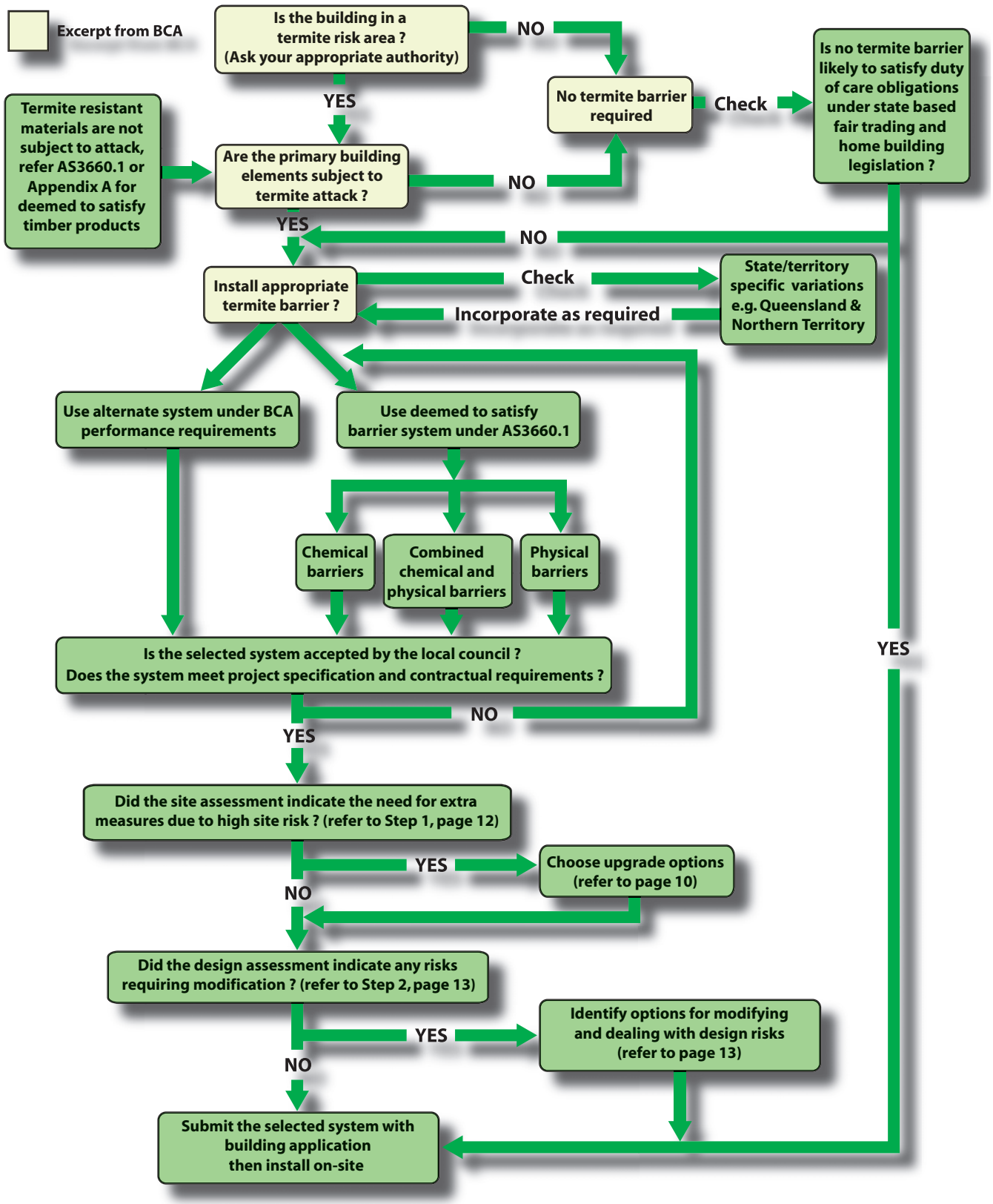
Q Does the project include landscaping and paving works?

Plan finished ground and paving heights so as not to disrupt or bypass barriers. Also make sure that this construction does not obstruct sub-floor ventilation.

Step 3: Selecting an Appropriate Termite Management System

Selecting a Termite Management System should be fine tuned according to site needs and design issues (i.e. Steps 1 and 2). Such needs must be acted upon in accordance with BCA regulations, statutory and local council requirements, legal requirements, and use of AS3660.1. The decision chart below aims to assist.

Decision Chart 2: Selecting an appropriate termite management system



Step 4: Quality of System Installation

A system is only as good as the quality of its installation. The following points highlight some key issues:

- Where possible use one contractor to install the entire termite management system to reduce confusion about accountability for quality.
- Before beginning the building, care must be taken to clear the footprint area of tree roots, stumps, logs, loose timber and other termite food sources.
- Check that the 'Termite Management Notice' containing system information has been fixed to the building before allowing the installer to finish on-site.
- The approving authority may require certification from the installer stating that the system complies with AS3660.1. This certificate is a good thing to have in the project records as well. It replicates some of the data in the previous 'Termite Management Notice'. Extra information includes chemical barrier details on the concentration and volume of chemicals, the name of physical barriers and methods of installation, if the barrier is a single or integrated system, a diagram showing the location of the barrier, limitations of the barrier or the ability to maintain or inspect it, contact details for further information on the system installed.
- For concrete slabs used as physical barriers, cracking and air voids present concerns for hidden termite entry. AS3660.1 states that cracks passing through slabs must not exceed 1mm. To avoid problems, mechanical vibration of concrete is recommended throughout the slab, edge beams, etc. Good curing practices will also help.
- Pay special attention to slab edge detailing and vibration where concrete slab on-ground floors include a split level (formed by concrete upstand or masonry retaining wall).
- Rigorously protect barriers from damage during construction e.g. don't allow sand/mortar to contaminate crushed stone barriers, carefully parge any penetrations through mesh barriers.
- Joints in concrete slabs represent another path for hidden termite entry. Avoid joints if possible. If not, consider using special barrier details along the joint line, e.g. stainless steel mesh.
- Chemical barriers pose a concern in terms of the quality of chemical application. AS3660.1 provides a test regime that can check the quality of application but unfortunately it is not a realistic test for day to day site checking. It is perhaps best to use reputable companies who conduct their own checking regimes, and seek periodic reports on their test results.
- Sub-floor ventilation is often poor, especially cross flow ventilation. Ensure good ventilation by regularly spacing vents and using vents with sufficient cross sectional area. If possible check the work from the inside looking out. Being able to see daylight through the vents (or lack thereof) helps identify problems.
- Professional indemnity insurance is increasingly required of system installers, and offers a significant form of quality control against defective work. Its attainment is often conditional upon installers maintaining professional development education, thus assisting installers to maintain up to date knowledge.
- Use installers licensed under government fair trading legislation where operational (e.g. Queensland Building Services Authority).

Step 5: Preventing Problems During Landscaping, Paving & Site Works

Barriers can easily be rendered useless if hidden, damaged or bypassed by landscaping, paving or site works. This same construction can also hamper sub-floor ventilation. It is best to design landscaping, paving and site works at the same time as selecting the barrier system. Frequently asked questions associated with problematic issues are dealt with in this section.

Q The plans call for exterior paving, planter boxes and garden beds next to the building. Does this pose a problem?

Do not let paving, planter boxes, mulch or garden beds cover physical barriers, weep holes or inspection zones such as slab edges. Barriers must be visually inspectable.

For chemical barriers be particularly careful not to disrupt treated soil during excavations. Also do not cover these barriers with garden beds as this will create a hidden pathway around the barrier.

Seek additional advice for paving in the Northern Territory and Queensland as paving is required to protect chemical soil barriers but must be positioned correctly.

Fig 11: Treatment of paving and planter boxes

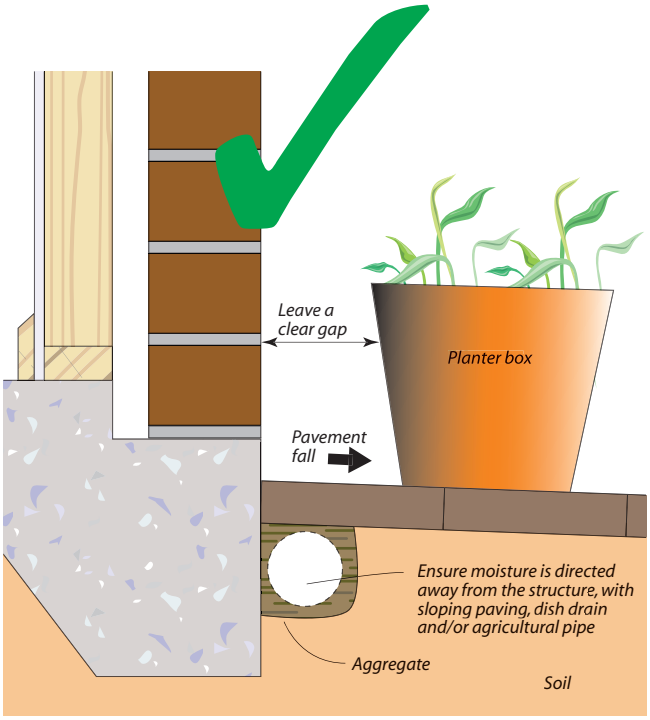
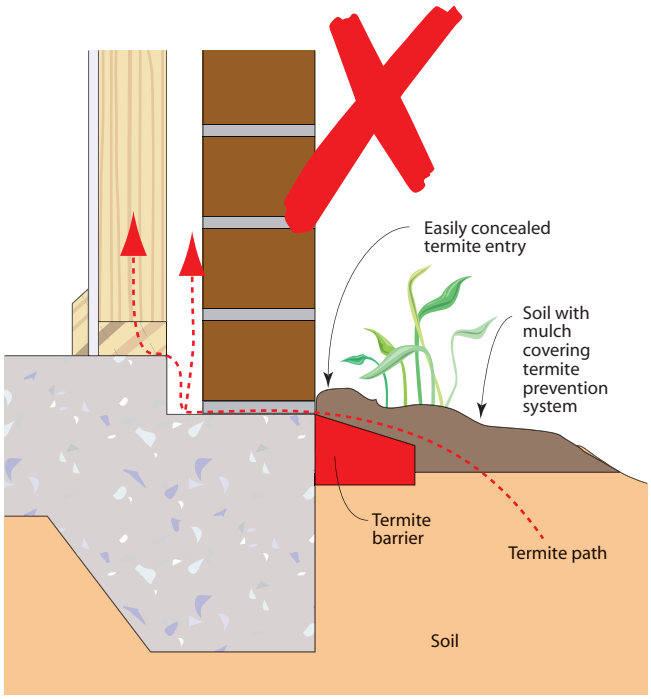


Fig 12: Don't allow garden beds to cover chemical barriers



Q What type of timber can I use for landscaping?

Use only treated timber or naturally termite resistant timber. Other timbers only encourage termite attack. For appropriate timbers refer to AS3660.1 or to Appendix A for a summarised list.

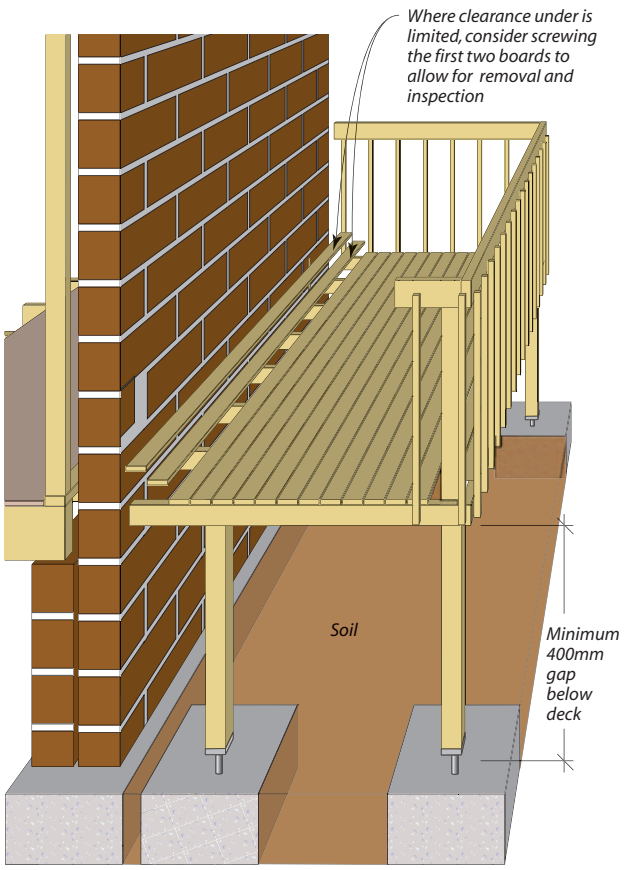
Q What do I need to look out for when adding a deck or balcony to the house?

Ensure the structure is either isolated from the main house or has a barrier system that integrates with the house barrier. It must not breach the existing system. Ensure that stairs, posts, landings and porches can be inspected for termites.

Q Does rendering or painting the exposed edge of a concrete slab pose a problem?

These treatments potentially allow hidden termite entry behind the paint film or render. It is best to avoid these practices if at all possible.

Fig 13:
Decks should be isolated from the building



For landscaping, use only treated or naturally termite resistant timbers

Step 6: Handing Over to the Building Owner

Barrier systems are essentially detection systems not prevention systems. Effectiveness is entirely dependent on regular inspection and maintenance organised by the building owner.

Providing information to building owners on this subject is important. It helps owners know what they must do and delineates this from the builder's responsibilities. The organisations detailed at the end of this handbook provide home owner brochures covering the main issues. It is also useful to have the building owner sign an acknowledgement stating that they understand their responsibilities for the system installed – an example is provided in Appendix C. Further to this, it is important they know that:

- Australian Standard AS3660.2 recommends that inspections be conducted at intervals of not more than 12 months – more frequent inspections are strongly recommended, especially for high risk sites.
- Their landscaping, paving and site works can damage or render barriers ineffective if not done properly.
- Chemical barriers do not last forever, they need to be re-applied at regular intervals – refer them to the 'Termite Management Notice' fixed to the building.

Builders can assist in helping owners meet their responsibilities by using installers who provide on-going maintenance and inspection services.

What is the Risk of Major Damage from Termites?

Major damage to buildings from termite attack is rare – fences and landscaping timbers have a higher risk of attack. The issue of termite damage to houses is placed in perspective by a nationwide survey of households carried out by the Australian Bureau of Statistics (1999). It questioned householders on the causes of major structural damage including an option to select termite and wood rot damage. To further investigate the severity of termite damage, the Australian Bureau of Statistics were asked to undertake a special data request by looking specifically at houses built since the inception of termite construction standards in 1967. Other research was used to determine the separate proportions of termite and rot damage (Tyrrells Property Inspections, 1995). From the combined data it was found that major structural damage from 'termites' was only present in 0.3% of households in Australia and this occurred over a 9.1 year period of ownership. Comparative findings are shown in Table. 2.

Table 2: Degree of risk

Causes of major problems to the structure	Number of time more common than termite damage
Major cracks in walls/floors	8.3
Sinking/moving foundations	6.0
Rising damp	4.7
Walls/windows out of plumb	4.7
Major plumbing problems	4.7
Rot	3.3
Major roof defects	3.0
Sagging floors	2.0
Major electrical problems	1.0
Termites	N/A

It can be seen that major termite damage is less common than most other problems identified in the survey. For instance cracks in walls and floors were 8 times more likely to occur than termite damage. All other categories (except 'major electrical problems) are at least twice as likely to occur.

Conclusions

The risk of major structural damage from termites is very low. Maintaining barriers and regular inspections organised by building owners are critical. This can only happen if the building is prepared correctly. The BCA and AS3660.1 provide the underlying principles to do this. Six important steps help convert these requirements to a manageable process on-site:

1. Assess the site to determine if it is a high risk site.
2. Assess the building design to see if it poses problems to termite management.
3. Select a termite management system to suit legal, regulatory, site and design needs.
4. Make sure the system is installed correctly.
5. Make sure landscaping paving and site works do not compromise barrier systems.
6. Ensure homeowners are aware they must maintain barriers (including the importance of 'inspection zones' as barriers) and arrange regular inspections.

Appendix A
Termite Resistant Timbers (naturally resistant and treated)

The timbers listed below represent a summarised account of those in AS3660.1 (2000) and have been guided by commercial availability in different locations in Australia.

Timbers exhibiting natural resistance to subterranean termites in Australia do so with a number of conditions attached. Detailed conditions are in AS3660.1 but some notable aspects are that:

- Resistance relates to the heartwood only.
- Resistance varies from tree to tree as well as within the same tree.
- Resistance will be better for timber used above ground compared to below ground.
- Different timber species have different levels of resistance to various species of termite.

Table 3:
Naturally Resistant Australian Hardwoods

Red bloodwood
Spotted gum
White mahogany
New England blackbutt
Forest red gum
Coast grey box
Southern mahogany
River red gum
Grey gum
Gympie messmate
Jarrah
Tallowwood
Grey box
Stringybark
Grey ironbark
Blackbutt
Red mahogany
Red ironbark
Forest red gum
Brush box
Turpentine
Cypress (Australian)

Timbers treated against termite attack must attain appropriate levels of treatment to suit the application involved. Further details are in AS1604 but a selection guide is shown below:

Application	Treatment Level
Interior, above the ground	H2 or H2F*
Exterior, above the ground	H3
Exterior in ground contact	H4 or H5**

NOTES:
* H2F is only resistant to termites below the Tropic of Capricorn.
** Use H5 where ground water is present.

Appendix B State/Territory Variations to the BCA

Queensland variations to BCA requirements

- Primary structural elements include door jambs, window frames, reveals, architraves and skirtings.
- Chemical barriers must be able to be replenished if the life of the chemical is significantly different to that of the building.
- If using a perimeter chemical barrier, trenches must be excavated and treated while exposed, then backfilled with suitable material, and the backfill treated. On completion, a 300mm wide x 50mm deep concrete cap must be installed to protect against damage to the barrier.
- Two durable notices instead of the normal BCA requirement of one, must be displayed in prominent locations.
- Accessibility for re-application of chemicals, inspections and system maintenance must be assured e.g. hand sprayed perimeter chemical barriers for zero lot houses are not allowed.

Northern Territory variations to BCA requirements

- Naturally termite resistant timbers can only be used if the voracious Mastotermes species of termite is not present.
- If using barrier systems from AS3660.1, additional termite management measures are required in areas where Mastotermes darwiniensis is present.

Appendix C
Termite Management System Handover Form

Fig 14: Typical handover form

Home Owner Acknowledgement of the Termite Protection System for

_____
(type of works, eg. new dwelling/extension/decking)

at _____
(site address)

Lot No: _____ **Plan No:** _____

I/We _____
being the owners/purchasers of the above described property, acknowledge that I/we have been fully counselled by the licensed contractor named below, in relation to:

- **The termite management system for the above described building work;**
- **The durability features of the described system;**
- **The requirements for an ongoing inspection programme and maintenance responsibilities;**

and that;

the agreed system of protection for this building work is: _____

_____
(description/type of system as shown on durability notice)

I/We have received the following documentation, being: _____

_____
(one or more of the following:
system details/public information brochures/AS3660.1 certificate/durability notice on building)

Signature/s: _____ **Date:** _____

I/We _____ **Licence No:** _____
confirm having provided the abovenamed with counselling and documentation as described herein.

Signature/s: _____ **Date:** _____

References

- Australian Building Codes Board (ABCB), 1996, *'Building Code of Australia'*, Canprint Communication, Canberra.
- Australian Bureau of Statistics (ABS), 1999, *Australian Housing Survey*, Cat No. 4182.0, Australian Bureau of Statistics, Canberra
- Australian Standard AS3660.1 (2000) *'Termite management Part 1: New building Work'*, Standards Australia, Sydney.
- Australian Standard AS3660.2 (2000) *'Termite management Part 2: In and around existing buildings and structures – guidelines'*, Standards Australia, Sydney.
- Australian Standard AS3660.3 (2000) *'Termite management Part 3: Assessment criteria for termite management systems'*, Standards Australia, Sydney.
- Cookson, L., 1999, *'Termite survey and hazard mapping'*, report, CSIRO Forestry and Forest Products, Melbourne, Report No. 99/664.
- Leicester, B., Wang, C.H. & Cookson, L.J., 2003, *'A risk management model for termite attack in Australia'*, 34th Meeting, IRG Secretariat, 18-23 May, Brisbane.
- Office of Fair Trading, 2003, *'Protecting your home from termites'*, Sydney.
- Queensland Building Services Authority (QBSA), 2001, *'Protection of Buildings Against Subterranean Termites'*, Author, Queensland.
- Tyrrells Property Inspection, 1992, *'Building Failure Report'*, Tyrrells Property Inspections, Sydney.

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- Housing Industry Association
- Master Builders Association (NSW)

For additional assistance, please contact:

NEW SOUTH WALES
Timber Development Association
60 York St, Sydney, NSW, 2000.
Tel: (02) 8303 0577,
Fax: (02) 9279 2377
Website: www.timber.net.au

QUEENSLAND
Timber Queensland
500 Brunswick Street, Fortitude Valley, QLD 4006
Tel: (07) 3254 1989
Fax: (07) 3254 1964
Website: www.timberqueensland.com.au

SOUTH AUSTRALIA
Timber Development Association of SA
113 Anzac Highway, Ashford, SA 5035
Tel: (08) 8297 0044
Fax: (08) 8297 2772
Timber Information Line: 1902 282 000
Website: www.tda.asn.au

TASMANIA
Tasmanian Timber Promotion Board
1st Floor, Knopwood House
38 Montpellier Retreat, Battery Point, TAS 7004
Tel: (03) 6324 3135
Fax: (03) 6224 1030
Timber Information Line: 1800 244 870
Website: www.tastimber.tas.gov.au

VICTORIA
Timber Advisory Centre
180 Whitehorse Road, Blackburn, VIC 3130
Tel: (03) 9875 5010
Fax: (03) 9877 6663
Website: www.timber.asn.au

Timber Promotion Council
320 Russell Street, Melbourne, VIC 3000
Tel: (03) 9665 9255
Fax: (03) 9255 9266
Website: www.tpcvic.org.au

WESTERN AUSTRALIA
Timber Advisory Centre
Homebase Expo,
55 Salvado Road, Subiaco WA 6008
Tel: (08) 9380 4411
Fax: (08) 9380 4477

Remember… termite barriers are of little use without regular inspection and maintenance.

Australian Government
Forest and Wood Products Research and Development Corporation

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