



PRELIMINARY IMPACT ANALYSIS

PROPOSAL: This proposal seeks to review Australian Standard AS/NZS3500.2, *Plumbing and Drainage, Part 2: Sanitary Plumbing and Drainage*, to include informative provisions for the installation of flexible joints in unstable soils.

Responsible Technical committee: Australian Standard Committee WS-14, Plumbing and Drainage

NCC REFERENCE:	BCA Volume One: N/A
For revisions or amendments to existing National Construction Code (NCC) referenced documents, provide additional information	BCA Volume Two: N/A
	PCA Volume Three: C1.3, CV2.2, C2.3, C2.4

PROPONENT:	Nominating organisation: Independent Chair
	Nominating individual: Fred Reynolds
	Position: Chair
	Contact email: fredreyn@tpg.com.au

DATE OF PIA:	Date: 28 January 2020
To differentiate between versions include the document date and/or version number	Version: 1.0
	Status: DRAFT

NATURE AND EXTENT OF THE PROBLEM:

Nature of the problem

AS/NZS 3500.2:2018 and the National Construction Code (NCC) 2019 does not currently reference any requirements or provide any guidance on the construction requirements of drainage systems laid in M, H1, H2 and E type soils. The installation of sanitary drainage in these site conditions are undertaken through the development of Performance Solutions often developed by geotechnical engineers.

The structural integrity of a building depends on its foundations. Structural engineers design stable foundations to suit all types of soil and land conditions. If inadequate flexibility is provided pipes can be damaged and leakage occur either below or adjacent to a building which can then introduce excessive moisture into reactive soils inducing excessive ground movements and damage to the building beyond that expected by designed tolerances. Fortunately there has been no widespread evidence of this occurring.

The costs associated with both the rectification of damaged drainage systems and that to the building itself can be significant for both building, plumbing contractors and homeowners alike during the intended design life of a residential building of 50 years.

Evidence has been provided to the WS-14 committee that they are regularly encountering the problems associated with unstable soils, but a nationally consistent regulatory approach is not available due to geographically differing conditions.

The original project proposal contained indicative costs associated with the problem in one jurisdiction as follows:

Queensland currently provides protection to homeowners for subsidence and since 1998 the costs associated with the rectification of residential dwellings affected by heave/subsidence is in excess of \$125 million.

Unfortunately, there is nothing anyone can do about the natural interaction between the weather and soil. In 2005, Australians had to shell out \$350+ million dollars in home repairs because drought conditions dried out the soil and caused house foundations located in expansive soils to shift. When rainfall events occur, the soil expands and further swells the ground starting the heave/subsidence cycle again. There has also been recent litigation in other states and greater demands for consumer protection in this area are being strongly advocated throughout the country.

The proposal was not enacted in the last cycle of amendments, and the problem has persisted for a further three years. Some jurisdictions have issued their own guidance statements such as the VBA Technical Solution Sheet 3.06, 2015. But a nationally consistent approach remains elusive.

The problem of connecting drainage in unstable soils continues to impact consumers, especially as construction is often undertaken on lower quality soils as populations increase. Guidance was provided that the Queensland Government scheme which provides protection for homeowners for subsidence, has already provided in excess of \$125M since 1998 in rectification works alone.

So, while the problem has been identified, the committee determined it was not appropriate to make it a mandatory requirement due to the lack of connection between sanitary drainage failures as a result of ground movement being the cause of the failures described above.

The costs associated with failures of the slabs and footings in unstable soils is considered to be a result of the slab and footing not being appropriately engineered for the site conditions rather than caused by the sanitary drainage system.

OBJECTIVES:

The objective of the proposal is to provide guidance on methods for the laying of drains in unstable soil. More specifically the use of flexible joints to allow for differential movement between drains and foundations in reactive soils.

OPTIONS:

The options considered for this proposal are:

- **Option 1: Retain the Status Quo**
Maintain the 'Status Quo'. This has been in effect for the last amendment cycle and when the proposal came back to the committee, it was decided that it was more appropriate to provide guidance.

- **Option 2: Include new mandatory requirements for flexible joints in unstable soils in AS/NZS 3500.2 (Regulatory option)**
The option of making the requirements mandatory was initially considered. There was a strong feeling on the committee that this was not acceptable since it would introduce extremely high costs to consumers and the plumbing industry which may not in all cases be justified due to the lack of evidence presented that plumbing systems failing has been the cause of issues with the slabs and footing failures occurring. For this reason, this option has been discounted from further analysis.

- **Option 3: Include an informative appendix on the installation of flexible joints in unstable soils (Non-regulatory option)**
This option is to provide informative provisions for flexible joints in an informative appendix of AS/NZS 3500.2.

IMPACT ANALYSIS (OF ALL OPTIONS):

Analysis of the impacts of these options is as follows:

Option 1: Retain the Status Quo

The impact of the proposal put forward would be to allow the 'Status Quo' to persist where seen as being acceptable e.g. sanitary drainage solutions be designed by a suitably qualified engineer either through the use of flexible joints or other engineering solutions. It is considered that this would also continue to be undertaken in an inconsistent manner across the country.

Option 2: Include new mandatory requirements for flexible joints in unstable soils in AS/NZS 3500.2 (Regulatory option)

Note: This option has been discontinued from further analysis on the basis of evidence and cost. Should this option be preferred a Regulation Impact Statement (RIS) will be required.

Option 3: Include an informative appendix on the installation of flexible joints in unstable soils (Non-regulatory option)

By providing only informative guidance, the impact of the proposal will only apply to circumstances deemed as requiring such drainage solutions. This option may also see an increase in innovation in

plumbing systems ability to be designed and installed in a way to suitably manage unstable site conditions.

The additional benefit of providing guidance within AS/NZS 3500.2 is for the state and territory plumbing regulators who assess Performance Solutions, as this process would be simpler if nationally accepted guidance was provided on how this type of system should be designed and installed.

TRANSITIONAL MEASURES

Given that the appendix is informative only, transitional measures are not considered relevant.

CONSULTATION:

A concise list of the professional and technical bodies consulted by the proponent, was provided in the original project proposal which is attached. The proposal also benefited from the work of WG-6 of WS-14 who provided additional flexible joint types for inclusion. The members of WG-6 included members of WS-014 in addition to Chris Ferguson, a representative from Plastec.

Organisations consulted on this proposal include those on WS-014 as well as the ABCB's Plumbing Code Committee.

This proposed amendment will be released for public consultation in the first half of 2020.

CONCLUSION AND RECOMMENDED OPTION:

The recommendation of this analysis is the non-regulatory option - to include informative guidance as an appendix to AS/NZS 3500.2. The inclusion of the informative appendix provides necessary guidance where required without making a mandatory impost on consumers who do not require such measures owing to favourable site conditions.

IMPLEMENTATION AND REVIEW:

The preferred option will be included in the upcoming public comment draft and pending acceptance would be included in the next amendment cycle of AS/NZS 3500.2, and subsequently NCC 2022. Changes will be reviewed pending outcome of comments from public comment draft.

LIST OF ATTACHMENTS:

- Attachment A – Schedule of major changes
- PP14 Proposal – Drains in Unstable Soils

Attachment A: SCHEDULE OF MAJOR CHANGES

No.	Clause / Ref	Proposed Change	Justification / Reason for Change	Cost implications
1	AS3500.2, Clause 1.4.1	Add new definition of Flexible Joint	Raises awareness that flexible joints are now dealt with in the standard.	Since this will be informative appendix cost impact is optional.
2	AS3500.2 Clause 3.2	Add new clause dealing with differential soil movement	Draws attention to location in new Appendix of guidance on flexible joints	Guidance only, cost is optional
3	New Appendix	Add new informative appendix for 'Drains in Unstable Soil'	Provides guidance on identifying and measures to deal with drainage methods in unstable soils	Guidance only, cost is optional

Standards Australia Proposal Form – Standards Development Projects

Version: 4.3
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Please click [here](#) for guidance on the proposal submission process.

Proposal title	Drains in Unstable Soils
Your name	Fred Reynolds
Preferred contact number	0401 939 294
Email address	fredreyn@tpg.com.au
Name of employer	
Job title or position	Independent Chair WS-014
Postal address	221 Eastern Rd
Suburb	Wahroonga
State	NSW
Postal code	2076
Web address	

If you are submitting on behalf of an organisation that is different than your current employer, please fill out the information below.

Nominating organisation	
Primary contact name	
Primary contact position	
Primary contact email	
Primary contact phone	

Section 1: Scope

1A: Provide details of the proposed documents				
#	Title (e.g. Masonry cement)	Project type (e.g. revision, amendment ¹ or new ²)	Designation (e.g. AS 1316:2003) ³	Product type (E.g. AS, AS Int, SA TS, etc...) ⁴
1	Plumbing and drainage Part 2: Sanitary plumbing and drainage	Amendment	AS/NZS 3500.2:2018	AS/NZS
2				

¹ An amendment is usually only possible for small changes to recently created documents. See Section 4 of Standardisation Guide [SG-003: Standards and Other Publications](#) for more details.

² If you are proposing to create a new document, please provide a suggested Title.

³ Use the Standards Australia Webstore to obtain the full designation and name of existing documents.

⁴ Standards Australia mainly develops Australian Standards (AS) but it also develops the following Product types: Australian Interim Standard (AS Int), Australian Technical Specification (SA TS), Australian Technical Report (SA TR), Handbook (SA HB), Miscellaneous Publication (SA MP), Supplement (Normative), Supplement (Informative), Australian Standard Certified Reference Material (ASCRM). For guidance, see Standardisation Guide [SG-003: Standards and Other Publications](#).

1B: Write a clear and concise statement of the nature of the issue to be addressed by your proposal.

Describe who is affected e.g. businesses, community organisations or individuals affected by the problem. What are the consequences of no action?

[NOTE this proposal is based on *Proposal-Form-Standards-Drains in Unstable Soils 2018 (002) PP14* prepared by Peter Bayetto from FMG Engineering. This current proposal includes enhanced justification provided by Stephen Jennison from the Backflow Prevention Association, and comments from WS-014 who had extensively discussed the earlier version.]

AS/NZS3500.2:2018 and the National Construction Code (NCC) 2019 currently do not reference AS2870 Residential Slab and Footings.

In AS2870 site classification is based on characteristic surface movements (Table 2.3) from S (0-20mm) to E (>76mm). AS2870 stipulates a number of construction requirements for drainage systems laid in ground on H (40 to 75mm movement) to E relative sites which are:

- Surface drainage considerations;
- Grading to the base of drainage trenches;
- Backfilling requirements of trenches; water barriers (clay plugs or plastic membrane);
- Lagging of pipework passing through edge footings or beams;
- Flexible joints to be installed within 1m of a building perimeter.

AS 2870 provides performance requirements for the installation of flexible fittings but does not provide deemed to satisfy provisions for the location of these fittings.

The structural integrity of a building depends on its foundations. Structural engineers design stable foundations to suit all types of soil and land conditions. If inadequate flexibility is provided pipes can be damaged and leakage occur either below or adjacent to a building which can then introduce excessive moisture into reactive soils inducing excessive ground movements and damage to the building beyond that expected by designed tolerances.

The costs associated with both the rectification of damaged drainage systems and that to the building itself can be significant for both building, plumbing contractors and homeowners alike during the intended design life of a residential building of 50 years.

Queensland currently provides protection to homeowners for subsidence and since 1998 the costs associated with the rectification of residential dwellings affected by heave/subsidence is in excess of \$125

million.

Unfortunately, there is nothing anyone can do about the natural interaction between the weather and soil. In 2005, Australians had to shell out \$350+ million dollars in home repairs because drought conditions dried out the soil and caused house foundations located in expansive soils to shift. When rainfall events occur, the soil expands and further swells the ground starting the heave/subsidence cycle again. There has also been recent litigation in other states and greater demands for consumer protection in this area are being strongly advocated throughout the country.

1C: Write a clear and concise proposed scope that will outline how to address the identified issue(s). Unless this is a proposal for a new document, this should not be a scope of the document, but a scope of the work which you propose to undertake.

Include what is going to be changed from the status quo and summarise the specific intent of the change.

If you wish to include proposed revisions as tracked changes in the Standard, or an outline of a new Standard, please summarise the scope and note the attachment here, and include the document as an appendix to this form.

Provide deemed to satisfy provisions for the installation of plumbing and drainage systems for site classifications M, M-D, H1, H1-D, H2, H2-D, E and E-D in AS/NZS 3500.2 relating to unstable soils.

The work will consist of including specific definitions, requirements where flexible joints will be installed on H and E sites, protecting the underside of the slab from moisture and addressing lagging requirements for M, E and H sites. The work will also revise Clause 4.8.4 Differential Movement to include other areas such as pre-treatment devices, wet wells, septic tanks or similar structures that are subject to differential movement.

Most of the drafting has been completed and submitted to the PCC for their consideration. But a number of State and Territory plumbing regulators have raised concerns with the impacts and increased costs of sanitary drainage compliance and enforcement of the requirements of the proposed provisions which was previously regulated through building legislation. The inclusion of the proposed provisions as a normative requirement for sanitary drainage installations and the expansion of the scope of these requirements from Class 1 and Class 10 buildings to all building classes has been raised as areas of concern and on this basis plumbing regulators believe this option is not viable.

WS-014 discussed the comments from the PCC and agreed that it was not appropriate to just rely on 2870, particularly given the extensive costs of rectification. Since AS2870 does not give detail of generally where to construct the flexible connections so that installers must follow the manufacturer's recommendations in conjunction with the general recommendations of AS 2870. A review of various manufacturer's recommendations shows variation in the extent of flexible connections recommended. (Variations range from mirroring the proposed amendments to requiring substantially more flexible connections than the proposed amendments).

The committee therefore considered the most appropriate approach was to use the existing text that had been developed and agreed to in 2017-18. The wording would be varied so that it would be easy for states (or other regulatory authorities) to make it mandatory to address the issues of reactive soils should they wish to do so, i.e. include the installation of flexible joints in plumbing and drainage installations on specific soil classifications. Once it was decided by a regulatory authority to address the problems of reactive soils then 3500.2 would provide the necessary deemed to satisfy requirements for the jointing. In this way it would not be mandatory for all jurisdictions to comply, but only those who considered there was a positive benefit in applying the requirements.

1D: Are you proposing an adoption of an International Standard (i.e. ISO or IEC)?	
NO	
If so answer the following: ⁵	
Is it a Modified or Identical Adoption? Note: if Identical please use the Proposal Form – Identical Adoption	
What is the designation? e.g. ISO 10303.212-2004	

⁵ Use the [Standards Australia Webstore](#) to obtain the full designation and name of existing documents.

1E: Is the existing document referenced in Australian State, Territory or Commonwealth legislation or regulatory framework?	
For joint documents, also consider New Zealand legislation. ⁶	
Yes (List all legislation or regulation that refer to the existing document. ⁷) Note: For National Construction Code (NCC) and WaterMark proposals, the Australian Building Codes Board (ABCB) needs to be consulted prior to submission.	YES NCC Volume 3 and the NZ plumbing regulations.
No (Go to 1F)	

⁶ To search for Standards in Australasian legislation, use our search function [here](#), under 'Standards and the Law'.

⁷ Use the full formal designation for the relevant legislation, e.g. Explosives Regulation 2013 (NSW). If more than four items of legislation are affected, provide a list as an attachment to this proposal form.

Note: All relevant regulatory authorities must be consulted in the stakeholder consultation.

1F: Is there an ISO/IEC document that also covers the issues in question?	
Yes (Go to 1G)	
No (Go to 1G)	No

1G: Will the proposed document include any conformity assessment requirements? ⁸	
Yes	
No	No

⁸ See Standardisation Guide [SG-006: Rules for the structure and drafting of Australian Standards](#). Note that conformity assessment requirements are rarely permitted in a Standard. If you selected "yes," please discuss with the relevant [Stakeholder Engagement Manager](#) prior to submission.

Section 2: Net benefit

2A: What will be the impact of the proposed project in the below categories? Explain this in terms of a positive or negative impact on the following “Net Benefit” criteria.⁹

Public health and safety (max 200 words)

There will be no negative public health or safety impacts. The proposed amendments will provide health and safety benefits to consumers by reducing the number of installations that have failed due to not addressing the issues where who have drains installed in buildings built in unstable soil areas. Broken drains leach untreated black water into the environment and have the potential to affect the ground water system. Blocked drains can be a hazard to the health of occupants and users of public buildings including schools and hospitals.

Social and community impact (max 200 words)

This proposal will provide confidence to homeowners building on unstable soils throughout Australia that the risk/incidence of breakage of in ground drainage installations will be mitigated or eliminated for the design life of their dwelling. Avoidable repairs or maintenance of broken or blocked plumbing systems and the repair of consequent structural damage places negative pressures on the economy and causes hardship and loss of amenity for consumers.

Household Insurers (for example AAMI) exclude the repair of building damage caused by “soil movement”. Historically the building damage consequent from broken pipes (which caused soil movement) has been covered. A recent Court case (2017) has found that such an exclusion “was intended to exclude indemnity for building damage caused by soil movement of whatever kind”. A large percentage of Homeowners who may historically have had their structural damage repaired from pipe failures may not now be covered by Insurance.

Environmental impact (max 200 words)

There are many positive environmental impacts to be gained by plumbers having ready access to clear deemed to satisfy provisions. The results of substandard drainage plumbing systems can result in untreated black water leaching into the environment and has the potential to adversely affect the ground water system and the environment.

Competition (max 200 words)

This proposal will encourage competition and further research and development of plumbing fittings that allow the necessary flexibility, movement and articulation to prevent breakage of pipework in unstable soil. Since the original proposal was submitted to Standards Australia manufactures have developed new and innovative products which can and are being installed in drains in unstable soils areas.

Implementation of this proposal will provide clear and concise minimum requirements that all industry stakeholders must comply with as a deemed to satisfy provision. Compared to the relatively low level of detail currently provided by AS2870.

In the above regards a level playing field will be created for designers, building regulators, building and plumbing contractors as well as plumbing fitting manufacturers across the nation, which will promote increased competition based upon a set of uniform standards

Economic impact (max 200 words)

There should be no additional cost of plumbing and drainage installations as the requirements are included as performance requirements in AS 2870 are limited to those soil classifications listed in its scope. Some engineers already stipulate requirements for the construction of drainage systems to allow for the required flexibility to meet the requirements of AS2870.

The VBA Technical Solution Sheet 3.06, 2015, requires plumbers to install flexible joints but gives no guidance as to the arrangements of joints and presumes that some document has been provided “describing in adequate detail” the requirements. It provides an example which is “not to be used as a solution” (this example in fact shows flexible joints within the building footprint which AS 2870 does not mention and the proposed draft of AS/NZS 3500.2 did not include (although it was considered). Not including internal flexible joints in accordance with the experience of several jurisdictions should represent a saving compared to ill-informed design of such connections.

The cost for installations to comply with the performance requirements of the PCA will be substantially reduced in some States and Territories that impose a cost of \$800 plus for each alternative performance solution due to there being no deemed to satisfy solution included in AS/NZS 3500.2.

There will be a positive economic impact by reducing repairs or maintenance of broken or blocked plumbing systems and repairing consequent structural damage to buildings which places negative pressures on the economy and causes hard ship and loss of amenity for consumers.

⁹ Add specific facts and examples if possible. Refer to the [Guide to Net Benefit](#). Not all categories may be affected, in which case, leave these blank.

Section 3: Evidence of support — Stakeholder support

3A: Describe the process taken to gain stakeholder support for your proposal (max 100 words)

The original proposal was endorsed The ABCB's Plumbing Code Committee and the WS-014 committee. Support for the proposal has also been received from: Engineers Australia (South Australian Division), All regulatory controlling bodies, Master Builders Association, Association of Hydraulic Services Consultants Australia, HIA, Australia Fire and Emergency Services Authorities Council, Engineers Australia, Master Plumbers Association, Property Council of Australia, Standards Australia and Air-Conditioning and Mechanical Contractors Association. Storm Plastics and Plastec product manufacturers.

3B: Identify the Australian stakeholder organisations that you have consulted with.

Evidence of stakeholder support MUST be provided in a letter (on company letterhead) or email (company email only).

At least two New Zealand-based stakeholders must be included for projects relating to joint AS/NZS Standards. Include those that do, and those that do not, support the proposal.

Key stakeholder groups	Organisation Name	Contact name	Position	Letter or email evidence is attached: Y/N	Interested in membership of standards committee: Y/N
<i>Research and academic organisations</i>	Phil Woolhouse Hydraulics	Phil Woolhouse	Manager	phil@cavrim.com.au	
	HEDRA Housing Engineering Design & Research Association	Bruce Hargreaves	Chairperson HEDRA	bruce2@ozemail.com.au	
	Swinburne University of Technology	Professor Emad Gad	Chair of Department of Civil & Construction Engineering	egad@swin.edu.au	
	Tonsley TAFE	David Vertue	Principal Lecturer	david.vertue@tafesa.edu.au	
<i>Manufacturer associations</i>	Plumbing Products	Dr Steve Cummings			

	Industry Group				
<i>Testing bodies</i>					
<i>Certification and auditing bodies</i>					
<i>Supplier associations</i>					
<i>User and purchaser associations</i>					
<i>Employer and industry associations</i>					
<i>Professional and technical bodies</i>	Hydraulic Association of SA	Paul Lind	Executive Officer	Andrew.clarke@mpasa.com.au	
	Engineers South Australia	Peter Bayetto	Chair, Footings Group SA Division	peter.bayetto@fmgeengineering.com.au	
	Master Plumbers Association Australia	Andrew Clarke	Executive Officer	Andrew.clarke@mpasa.com.au	
	Master Plumbers Association of Queensland	Ernie Kretschmer	Technical Services Manager	Ernie.kretschmer@mpaq.com.au	
	Housing Industry Association Ltd	Simon Croft	Executive Director – Building Policy	s.croft@hia.com.au	
	Engineers Australia	Ron Watts	Executive General Manager Professional Standards & Practice	rwatts@engineersaustralia.org.au	
<i>Unions and employee associations</i>					
<i>Consumer and community groups</i>					

<i>Government and regulatory agencies</i>	Department of Mines, Industry Regulation and Safety	Mike Read	Senior Technical Officer (plumbing)	Mike.read@dmirs.wa.gov.au	
	Victorian Building Authority	Matt Wilson	Senior Technical Advisor	Matt.wilson@vba.vic.gov.au	
	Queensland Building and Construction Commission	Gary Stick	Manager Technical Standards Unit	Gary.stick@qbcc.qld.gov.au	
<i>Independent experts</i>	Storm Plastics	Marco Elbe	Manager	marco@stormplastics.com.au	
	Plastec	Chris Ferguson	Specialist Product Manager	cferguson@plastec.com.au	
<i>New Zealand stakeholders</i>					
<i>Other</i>					

