qbcc
queensland building and construction commission

DEFECTIVE RESIDENTIAL CONSTRUCTION WORK CAUSING SUBSIDENCE

CONTRACTOR'S RESPONSIBILITIES

THIS FACT BOOK

This fact book is intended to assist contractors, designers and engineers to understand their responsibilities in relation to the QBCC *Rectification of Building Work Policy* in so far as it relates to Subsidence.

Note that this Policy was amended on 1 July 2010 and contractors, designers and engineers should ensure they are familiar with the Policy including the recent amendments. The provisions of the Policy are discussed later in this publication.

A copy of the policy is available on our website at ***www.qbcc.qld.gov.au***

Understanding and compliance with these requirements and ensuring homeowners are aware of their maintenance responsibilities, will help minimise the incidence of footing and slab movement and subsequent damage to homes. This in turn will reduce contractor's rectification costs, and ultimately, the burden that industry bears due to problems created by defective work.

The performance of footing and slab systems and the continued serviceability of buildings, relies on the contractor complying with appropriate construction practices, and the contractor and homeowner providing and maintaining good site drainage conditions.

ADDITIONAL INFORMATION

Both the contractor and the homeowner have a duty to know and perform their individual responsibilities.

A copy of the *Rectification of Building Work Policy* and a homeowner's booklet 'A Simple Guide to Preventing Structural Damage to Your Home' is available on our website - ***www.qbcc.qld.gov.au***.

NOTE: The diagrams and photographic material in this publication are indicative only and are not intended to address specific requirements.

THE CONTRACTOR'S RESPONSIBILITY

The *Rectification of Building Work Policy* in relation to rectification of defective residential construction work causing subsidence places responsibility on contractors in three strategic areas:

- site identification
- site classification and Engineer design, and
- construction in accordance with the design.

These requirements are provided in detail in Schedule 1 of the Policy.

To comply with all sections of the Policy the building contractor must obtain written confirmation from a registered professional engineer in Queensland (RPEQ) that compliance with all items (identified in sections (a) to (f) of Schedule 1) in each of these three strategic areas, has been satisfied.

SITE IDENTIFICATION

(a) To comply with this section of the Policy, the building contractor must give the following information to the engineer for the work, or if the engineer has been given the information by someone other than the building contractor, obtain written confirmation from the engineer that the engineer has the following information:

(i) ***Location*** – a site address, plan of survey or photograph to correctly identify the site.

This information indicates to the engineer, through the use of photographs or other means, any trees and vegetation in the vicinity of the footing or slab system, including those adjacent to the footing or slab system on adjoining sites, have been taken into account. It is noted, however, that an additional site visit by the engineer may still be necessary to determine whether design precautions are needed.

(ii) **Site identification -** information relevant to the contours of the site; the location of trees on the site and adjoining sites, existing overland flow provisions, footprint location of the proposed building and indication of platform levels, location of proposed cut and fill and identification and extent of subdivisional fill.

(iii) Land searches - searches where available necessary to establish impediments to the proper performance or function of the footing or slab system having regard to the site's location and condition.

These searches may include flooding, underground infrastructure, easements, vegetation protection and subdivisional fill. The nature of the searches, however, will always be dependant on the site's location and condition.

The Site identification information required in section (a), (i), (ii) and (iii) will assist the engineer to correctly locate boreholes over the area of the building platform and to consider the effects of cut and fill operations and other influences that may affect the proposed structure. It will also assist in alleviating one of the key factors in footing failures being the design engineer and/or site classifier failing to take into account all of the conditions on the site and adjacent sites.

The information provided to the engineer will also assist the contractor to determine the extent of work required under the contract and responsibility for that work. For example; responsibility for retaining walls, and paths and spoon drains that may be necessary to provide good site drainage conditions. Early identification and resolution of such issues will assist in avoiding contractual disagreements at a later stage.

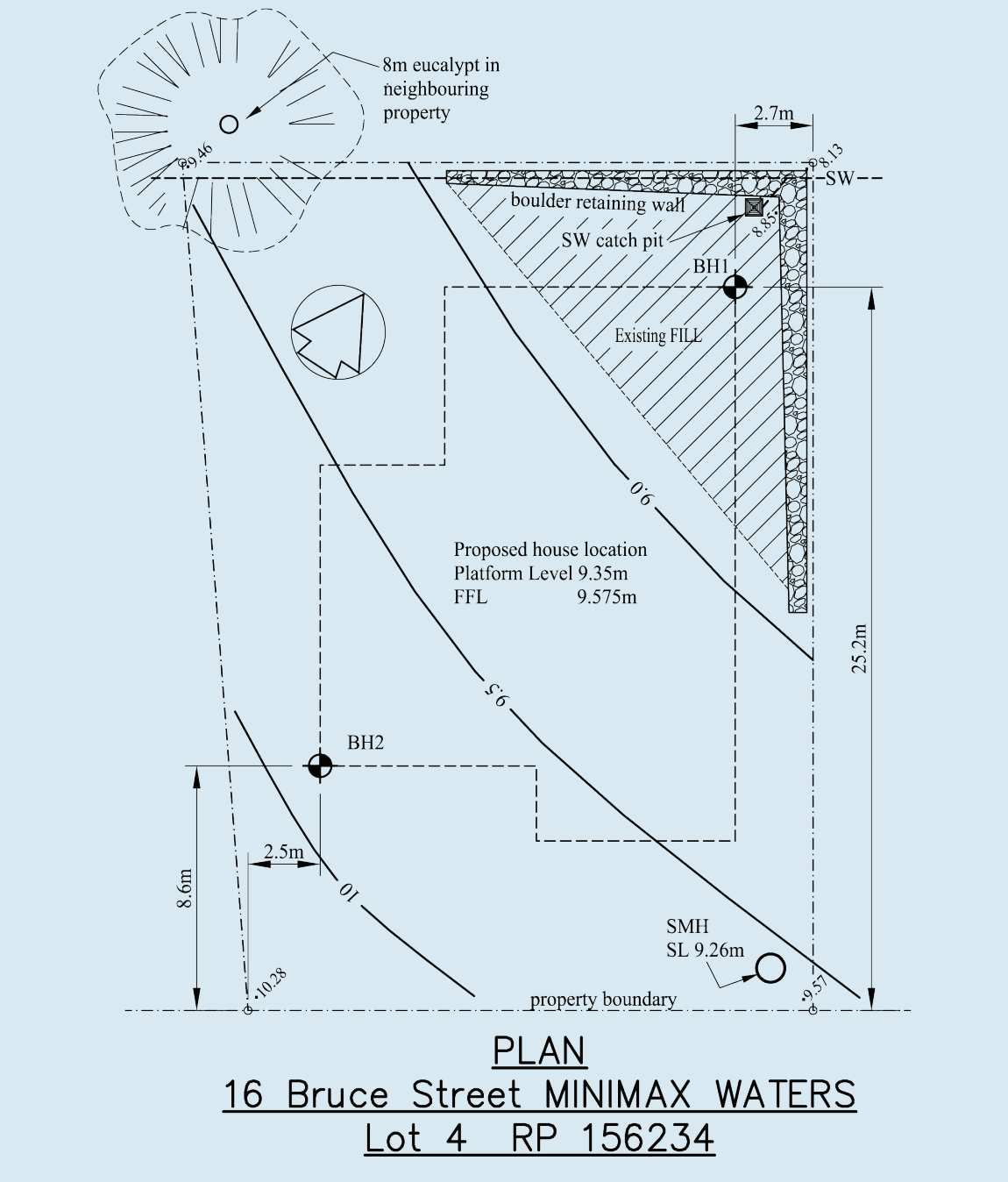
NOTE: *Where the owner has engaged the site classifier and/or engineer, the contractor must ensure that the engineer certifies that the Site Identification information was obtained and taken into account for the purpose of site classification and/or design in accordance with the Rectification of Building Work Policy.*

Typical site information required

Information on drawings for reactive sites shall include site classification, selected footing system and any special site work and site drainage. (Clause 1.10 AS2870 1996.) Additional requirements for H & E site classifications shall be included in accordance with AS 2870 1996, Clause 5.5.

NOTE: *Examples of information that should typically be specified is shown in Figure 1 - Example of Site Identification Plan*

FIG. 1 - EXAMPLE OF SITE IDENTIFICATION PLAN



SITE CLASSIFICATION AND ENGINEER DESIGN

Site classification

To comply with this section of the policy, the contractor must:

(b) obtain written confirmation from the engineer that:

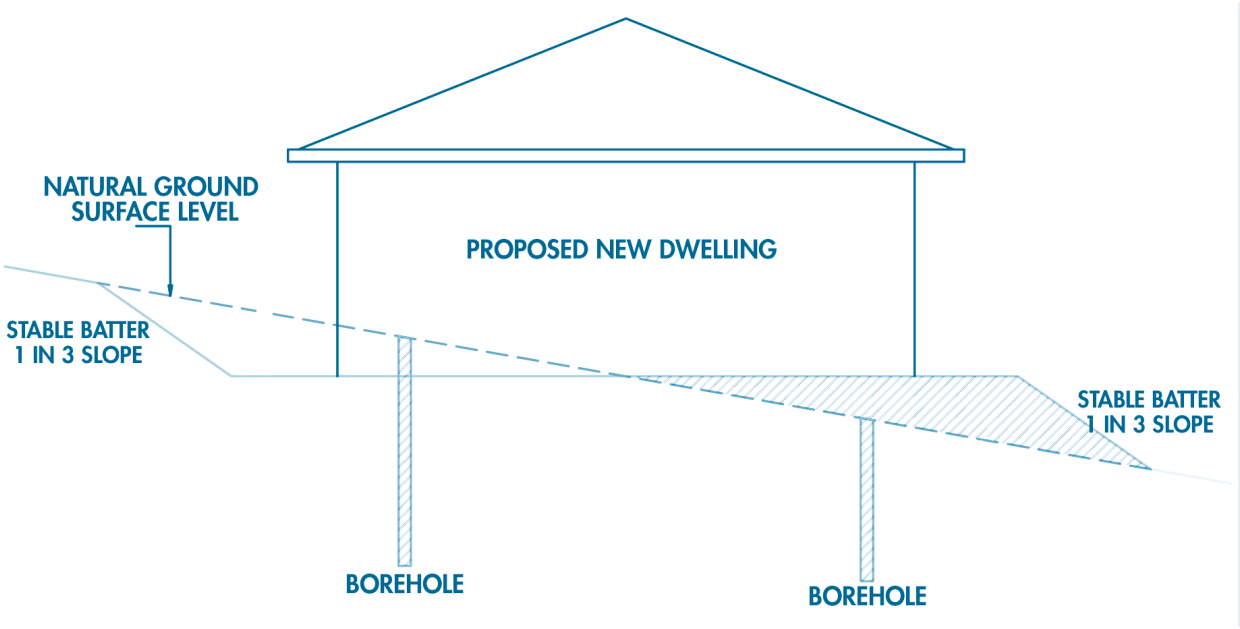
(i) the engineer or their representative has visited the site;

(ii) the site investigation for soil testing has been undertaken by an engineer or a soil tester icensed under the Act;

(iii) exploration positions or bore holes conducted by the site investigator have been undertaken in the proposed footprint of the building and below final platform level in accordance with Australian Standard AS2870;

A minimum of two exploration positions or bore holes are required as part of any site

FIG. 2 - LOCATION OF EXPLORATORY BOREHOLES



investigation, as well as any other additional investigation necessary to determine the characteristics of the site. It is also required that the bore holes extend to a depth to refusal on rock or to the depth of zone of seasonal influence and below final platform level. (Figure 2)

(iv) soil samples have been taken for laboratory testing in accordance with Australian Standard AS1289 to determine the site classification;

(v) if the proposed footing is supported on filling and the engineer's design does not include piers through the filling, irrespective of whether or not the filling is part of the building contract or Level 1 compaction certificates are available, the engineer has documented requirements for further testing of or improvements to the filling such that piers are not required, or the engineer has provided written advice of the reason why the engineer has determined that piers are not required.

Engineer Design

(vi) for reactive clay sites the laboratory test and soil test report include ISS and YS values (obtained by shrink and swell tests) in accordance with Australian Standard AS1289 and AS2870.

(vii) the design takes into account site conditions (eg location of trees, easements, fill etc) including all information provided to the engineer about location, site identification and land searches referred to in paragraphs (a)(i), (a)(ii) and (a)(iii);

(viii) the design includes photographs of the site to correctly identify onsite and adjoining site topography prior to site specific earthworks;

(ix) the design complies with all relevant Australian Standards including AS2870, AS3600 and AS3700;

(x) the design is certified by an engineer (RPEQ); and

(xi) the design drawings include the selected footing systems, any special site works, means of diverting surface water away from the slab, actual location of control joints in brick and masonry construction (including necessary control joints in internal linings), location of retaining walls, and requirements for articulation (flexible joints) in storm water and sanitary drainage.

NOTE: *Irrespective of whether these details (articulated joints, control joints, special site works, etc), are shown on the engineer's or architectural drawings, they must be certified by an engineer (RPEQ).*

NOTE:
- THE GROUND IN THE IMMEDIATE VICINITY OF THE PERIMETER FOOTING, INCLUDING THE GROUND UPHILL OF THE SLAB ON CUT & FILL SITES, SHALL BE GRADED TO FALL 50mm MINIMUM AWAY FROM THE FOOTING OVER A DISTANCE OF 1m.
- REFER TO SPECIFICATION SHEET FOR CONCRETE NOTES, ALTERNATIVE REINFORCING & GENERAL NOTES.

ALL FOOTINGS ARE TO BE FOUNDED **300MM** INTO:
FIRM NATURAL GROUND.
(VIA PIERS WHERE NECESSARY)

NOTES

FOUNDING MATERIALS

ALL FOOTINGS REQUIRED INTO
FIRM NATURAL GROUND.
(VIA PIERS WHERE NECESSARY)
SLAB REQUIRED INTO
FIRM NATURAL GROUND.
(VIA PIERS WHERE NECESSARY)

EXISTING FILL MATERIALS

(PRIOR TO CUT/FILL)
TO APPROX. **500** mm

R.C.SLAB (ON GROUND)

100mm THICK
SL92 FABRIC
20 TOP COVER (INTERNAL)
40 TOP COVER (EXTERNAL)

STRIP FOOTING

SF: 700 DEEP x 300 WIDE (2–N24 T+B)

INTERNAL BEAM

IB: 950 DEEP x 300 WIDE (2–N24 T+B)

RE–ENTRANT CORNERS

DENOTES **3L11TM** x 2000 LONG TIED TO UNDERSIDE OF SLAB REINF. (TYP. ALL RE–ENTRANT & RECESS CORNERS)

THE NUMBER AND LOCATION OF PIERS SHOWN HAVE BEEN ESTIMATED FROM THE LIMITED SITE INVESTIGATION AND MAY DIFFER ON SITE. IT IS THE RESPONSIBILITY OF THE BUILDER TO DETERMINE THE EXACT NUMBER AND LOCATION OF PIERS BASED UPON THE CONDITIONS ENCOUNTERED ON SITE AT THE TIME OF CONSTRUCTION.

WHERE WALLS ARE LOAD BEARING AND ARE NOT SUPPORTED WITHIN 1m OF AN INTERNAL BEAM OR A POINT LOAD IS SUPPORTED BY SLAB ONLY CONTACT ENGINEER IMMEDIATELY FOR POSSIBLE REDESIGN.

NOTE: EXISTING TREES WERE ENCOUNTERED ON SITE AT THE TIME OF SOIL TESTING. REMOVAL OF THESE TREES MAY FACILITATE THE NEED FOR PIERING. THE EXACT NUMBER AND LOCATION OF THESE PIERS SHOULD BE DETERMINED AT THE TIME OF CONSTRUCTION. IF TREES WITHIN THE INFLUENCE OF THE PROPOSED HOUSE ARE TO REMAIN, ROOT BARRIERS OR ADDITIONAL PIERS MAY BE REQUIRED.

ARTICULATION.

See elevations for location of articulation joints in external brick veneer.
See architectural plan for location of articulation joints in ceilings and walls.
Refer to Drainage articulation drawing for requirements for flexibility in waste water AND stormwater drains.

ADVISED SITE SCRAPE

CONCRETE SPECIFICATION

- 20mm MAX. AGGREGATE
- 25MPa
- 100mm SLUMP

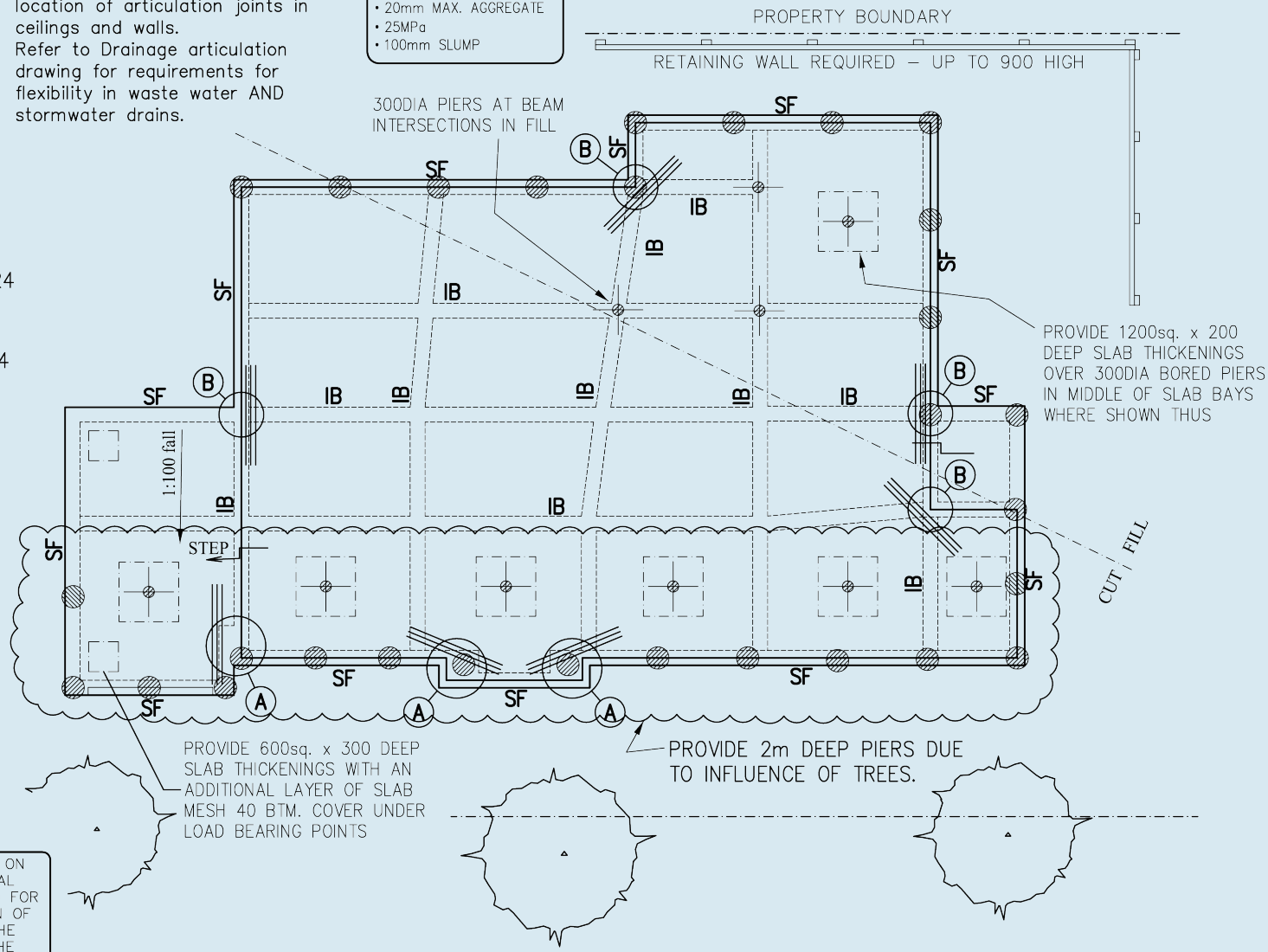


FIG 3 - EXAMPLE OF FOOTING PLAN

CONSTRUCTION IN ACCORDANCE WITH THE DESIGN

To comply with this section of the policy, the contractor must:

(c) obtain from the engineer the design drawings

(d) comply with all components of the design, including the selected footing systems, any special site works, means of diverting surface water away from the slab, location of control joints in brick and masonry construction (including necessary control joints in internal linings), location of retaining walls, and requirements for articulation (flexible joints) in storm water and sanitary drainage.

(e) construct the footing or slab system in accordance with all relevant Australian Standards, including AS2870, AS3600, AS3700 and AS3500

(f) ensure that an engineer or building certifier has certified that the design has been complied with by the contractor.

ALTERNATIVE FOOTING SYSTEMS

Where an alternative footing system is proposed as an *Alternative Solution* to that described in Part3.2 of the Building Code of Australia (BCA) , it must comply with Performance Requirement 2.1 and Performance Requirement P2.2.3 in Volume 2 of the BCA.

Where alternate footing systems other than those recognised by AS 2870 and described in the BCA are proposed, the contractor must obtain from the engineer, certification that the design meets the relevant performance requirements of the BCA.

NOTE: *The provisions of AS2870 stipulate that the expectations and parameters of the design of all footing and slab systems including alternate footing systems using engineering principles should take into consideration that: "foundation movement shall be assessed as the level which has less than a 5% chance of being exceeded in the life of the structure which may be taken as 50 years. " Clause 1.4.2 AS2870 1996*

ABNORMAL SITE CONDITIONS

Where abnormal conditions exist on a site it is usual that an engineer classify the site as Class "P" and indicate the expected movement potential depending on the reactive soil characteristics, i.e . A, S, M, H & E Classifications.

Design of the footing systems on "P" sites shall use conforming engineering principles detailed in AS2870 and the Australian Standard for Concrete Structures - AS3600.

Abnormal site conditions and abnormal moisture conditions should be identified as part of site identification and investigation. Abnormal site conditions may include:

- soft soil - such as uncontrolled fill or development fill sites including soft clay or silt or loose sand (bearing capacity less than 100 kpa)
- landslip
- mine subsidence and collapsing soils
- soils subject to erosion
- reactive sites subject to abnormal moisture conditions
- sites that cannot be classified as A, S, M, H or E
- abnormal moisture conditions that affect the site classification for the design assessment may include:
- recent removal of an existing building structure
- unusual moisture conditions caused by drains, channels, ponds, dams or tanks which are to be maintained or removed from the site. Canal developments that have deep seated clays are an example where abnormal moisture conditions may prevail over time.
- removal of large trees prior to construction
- trees located too close to a footing (including trees on adjoining sites within the relevant distance of the mature height of the tree from the building depending on site classification.

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TELEPHONE STATEWIDE

1300 272 272