Kingborough Council

Taroona Landslide Risk Assessment & Mitigation Stages 2 & 3

Report for Stage 2A

June 2013

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1. Introduction

This report has been prepared to satisfy Stage 2, Part A of the Kingborough Council Tender Brief, 'Taroona Landslide Risk Assessment and Mitigation Plan – Stages 2 & 3, AB-1223. A previous stage 1 investigation by GHD number 32/15950/55683, 'Report for Technical Review for Taroona Landslide – Risk Assessment & Mitigation Stage 1' prepared for Kingborough Council, March 20102 presents the findings of a desktop review of previously published reports and data on the slope movements identified in the vicinity of the Taroona Primary and High Schools. The data review included survey monitoring points and boreholes, including inclinometer readings and also InSAR (Synthetic Aperture Radar) analyses.

This stage 2 report presents the findings of visual structural site surveys of properties, CCTV remote camera survey of underground drainage pipes and analysis of InSAR data over a 4 year period to further understand the movements of the hillside in the Taroona area. The study area is defined in the site plan provided in Appendix A, Figure 1 and the slope movements observed in the area is also referred to as the School Creek Landslide

1.1 Purpose of this Report

The purpose of this report is to present the findings of:

- The Structural survey of 81 buildings plus the Taroona Primary & High Schools buildings;
- The analysis of InSAR (Synthetic Aperture Radar) surface movements over a 4 year period by Fugro; and
- A survey of underground stormwater pipes (using remote CCTV cameras).

These investigations have been undertaken to assist in determining the risks posed by the Taroona Landslide and to document the extent and type of damage observed on properties and stormwater infrastructure situated within the School Creek Landslide which may be attributed to this feature.

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1.2 Scope and Limitations

This report: has been prepared by GHD for Kingborough Council and may only be used and relied on by Kingborough Council for the purpose agreed between GHD and the Kingborough Council as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Kingborough Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.3 and 3.0 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Assumptions

GHD have relied on the following information provided by other consultants, and in presenting this information rely on its accuracy and take no responsibility for any errors or omissions:

- InSAR satellite imagery mapping of surface movements
- CCTV remote controlled camera views of underground pipelines

GHD have also undertaken field surveys of existing structures and properties and the findings assume conditions do not change under differing weather conditions or at different seasons of the year.

2. Previous Studies

As noted above, GHD prepared a stage 1 report in March 2012 which outlined all previous studies and investigations undertaken in the vicinity of the School Creek landslide. These include reports by Coffey Geosciences and Mineral Resources Tasmania (MRT) which present different models of landslide activity in the study area. It is noted that numerous survey monitoring sites have been installed and partially monitored over many years and more recently boreholes have been drilled with inclinometers installed to record slope movements. One inclinometer has failed due to excessive movements and it is proposed this this be replaced during Stage 2B of this study. The position of this inclinometer is near the entrance to the school grounds below the Channel Highway.

3. Recent GHD Studies for Stage 2A

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3.1 InSAR Survey by Fugro

Fugro Spatial Solutions Pty Ltd (Fugro) was engaged by GHD to undertake an InSAR survey to quantify surface movement over the study area since 2008 and subsequently improve the delineation of land sliding in the school creek area. A full copy of the Fugro Report is provided in Appendix C. .

The basic methodology used by Fugro for processing of the InSAR data (Persistent Scatter Interferometry or PSI) is dependent on collection of multiple satellite images over a sufficient time interval, containing a sufficient network of persistently reflecting ground features. The Fugro report also points out that the basic output is an annual average velocity plot, with analysis of individual point time-series plots enabling expression of temporal displacement behaviour. The report emphasises that the InSAR results should be interpreted alongside complimentary deformation datasets (e.g. ground based survey data) to gain the greatest value from the results.

3.1.1 Comments on Survey Results

The InSAR survey has utilised satellite data collected between January 2007 and March 2011, and Fugro notes that the data stack derived from these images was sub-optimal (18 images) and the majority of reflecting points able to be used had errors within ± 2 mm/year. It is noted that the data set is noisy, probably due to variable atmospheric conditions.

Based on the PSI results in the Fugro Report, and despite the dataset issues, a spatially consistent area of deformation was delineated which is broadly consistent with the previously interpreted extent of the School Creek Landslide. There is no apparent active movement

detected south of the interpreted landslide, however the low density of persistent reflectors in this area does little to improve the accuracy of the southern boundary of the landslide.

Preliminary time-series analysis by MRT (C. Mazengarb) of the InSAR data points against inclinometer displacements suggests that the majority of InSAR data points with strong correlation to the inclinometer data lie within the current landslide area, and conversely, the InSAR points with minimal or no movement lie outside the landslide area.

Based on the Fugro Report, there appears to be movements in the order of 8 mm/year near to (upslope) the Taroona Primary School with smaller movements upslope from the main high school buildings.

It should be noted in Figure 6 of the Fugro Report (reproduced as Figure 1 below) that accelerated movements occur in late 2009 through to late 2010. This temporal pattern of ground displacement recorded by the InSAR data correlates well with rainfall records presented in Figure 2 which shows inclinometer movement correlated with rainfall events for MRT's inclinometer MRT108-01.

The Bureau of Meteorology rainfall records for the Taroona station (94111) indicate abnormally high rainfall in June (156 mm) and September of 2009 (121.8 mm). The months of January through to July 2010 are particularly dry months and then heavy rainfalls were recorded in September (103.4 mm) and November 2010 (105.2 mm). The year 2008 recorded very low total rainfall.

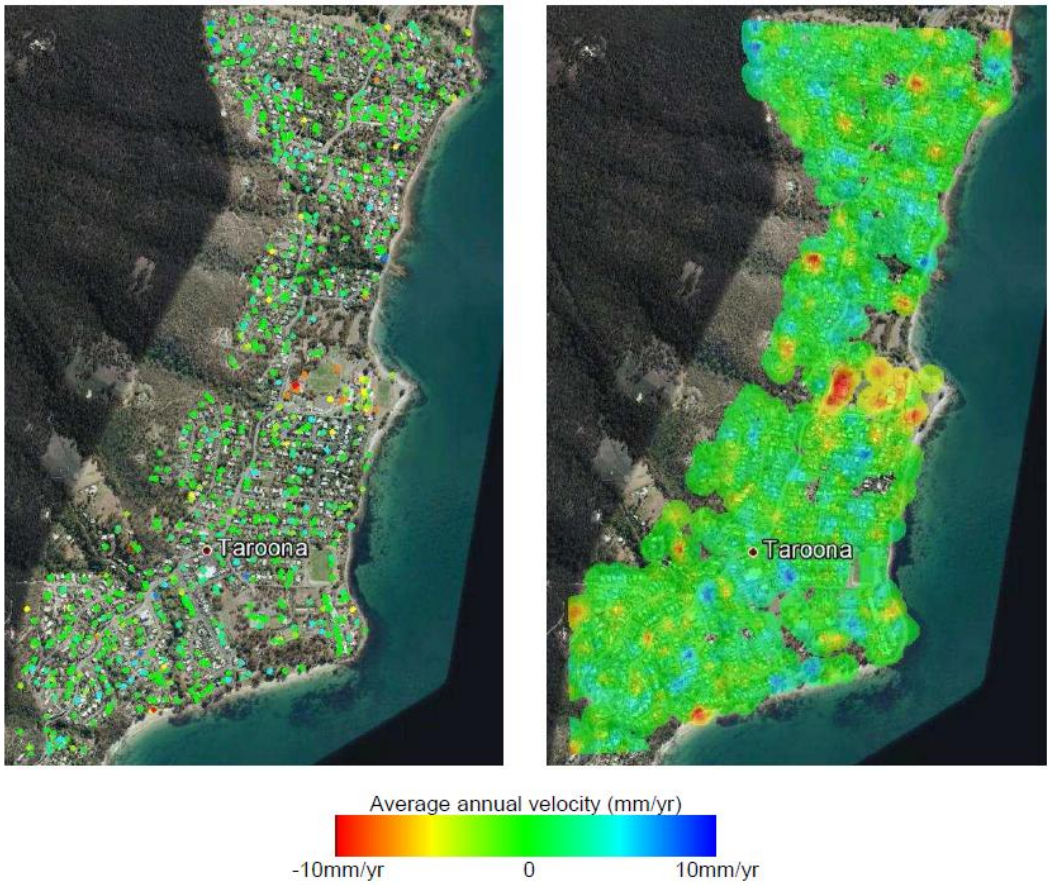

Figure 6: PS points and spatially interpolated average annual motion rate (mm/yr)

Background image © Google 2013, TerraMetrics 2013, DigitalGlobe 2013

Figure 1 Time series graph with InSAR (adapted from Figure 6 of the Fugro report)

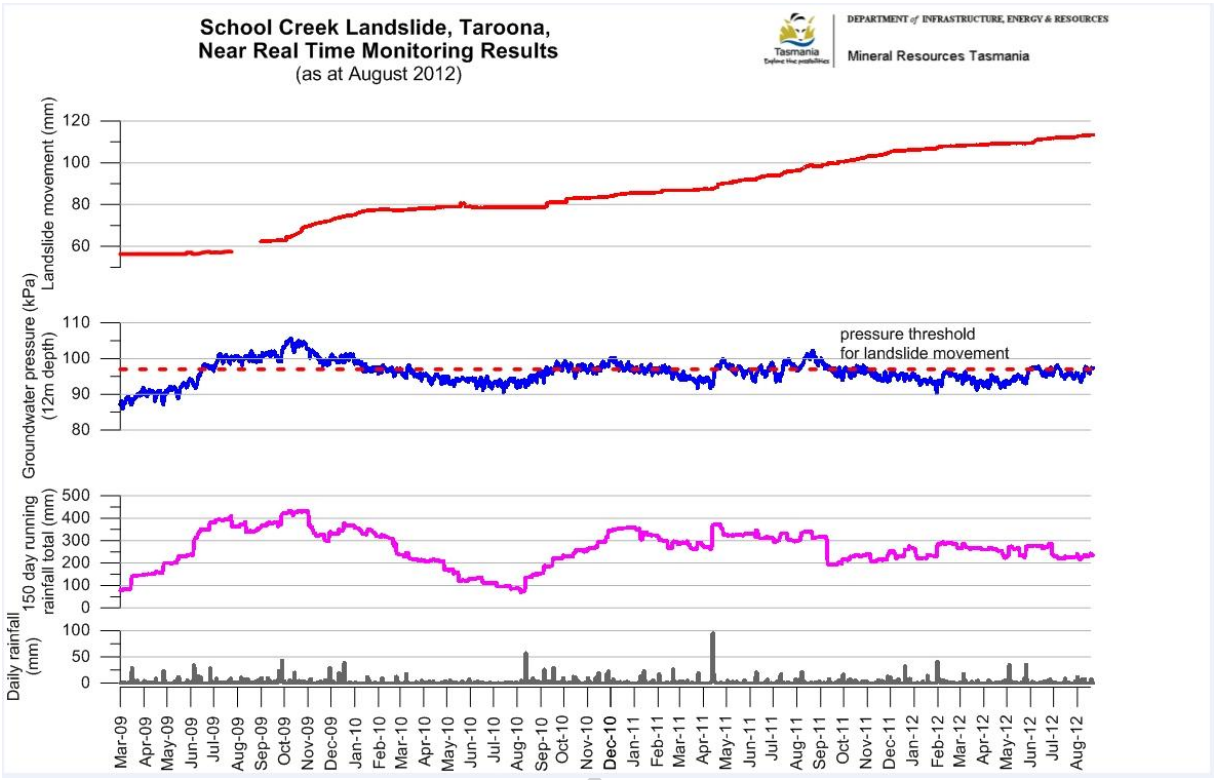

Figure 2 Rainfall and Inclinometer Movement from MRTI08-01

Figure 2 presents an abstract of some of the recent inclinometer readings conducted by Tony Miner for MRT in September 2012.

The graph shows the movement recorded by inclinometer MRTI08_01 in response to daily rainfall events and changing pore water pressure as recorded by the real-time monitoring vibrating wire piezometer in this installation. The September 2012 report noted that the shear plane is at a depth of 11.5 m below the ground surface and 37 mm of creep movement has been recorded since October 2010 to September 2012.

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3.2 CCTV Condition Survey of Stormwater Drains

NU-JET Pty Ltd (NU-JET) were engaged by GHD to undertake a CCTV survey of the stormwater drains (plans shown in Appendix B) in order to identify the location of any damage to the existing stormwater pipes such as cracking or separation at the pipe joints that may be attributed to landslide movement.

Approximately 1,600 m of stormwater drains have been surveyed. The sections surveyed are situated near the Channel Highway, Meath Avenue and Belhaven Avenue in Taroona.

The condition data has been recorded on Compact Disc (CD) showing unique identification codes including the street name, pipe run number and starting and end location with manhole numbers. This CD has been provided as a separate report.

The lighting and lens used on the CCTV camera allowed the full circumference of the pipe to be easily viewed.

3.2.1 Comments on Survey Results

The following provides a summary of the pipe condition for each of the sections surveyed as observed from the CCTV data. Significant cracking or separation at the pipe joints may indicate ground movement due to the landslide. Other explanations for this movement could be loose fill, poor construction, or localised ground movement due to factors such as clay expansion/contraction.

In this analysis the three modes of displacement have been identified as longitudinal, radial and angular displacement. Longitudinal displacement constitutes pipes separating horizontally away from each other in the direction of the pipeline. In order to discount minor displacement of pipes which would not provide significant evidence of soil movement, longitudinal displacement of less than 10 mm have been ignored. Radial displacement constitutes displacement perpendicular to the direction of the pipeline. Angular displacement constitutes rotation of a pipe about the point of intersection with the adjoining pipe.

Channel Highway

There are two significant longitudinal displacements in the Channel highway section. Both pipe displacements occur in the vicinity of 104 Channel Highway. The first of these is nearer to 100 Channel Highway, where the survey indicates longitudinal movement in a North-Easterly direction. The other movement location is adjacent to 145 Channel Highway and the direction of longitudinal displacement is also in a North-Easterly direction. Both displacements may be an indication of soil displacement.

Some minor cracking was identified along this section of the pipeline but are not considered to be indicative of significant displacement.

Meath Avenue

There are six significant radial pipe displacements, five significant longitudinally displacements and four radial displacements recorded in the area south of the intersection of Meath Avenue and the Channel Highway. This pipeline was not identified in the GIS data provided by Kingborough Council.

In this area of 110 Channel Highway, 3 and 5 Meath Avenue there is a concentration of four radial displacements. This pipeline runs approximately North-West to South-East. The radial displacement may indicate soil movement in a North-Easterly direction. Two other radial displacements have been identified on a connecting pipeline that runs on the boundary of 3 and 5 Meath Avenue running approximately North-East to South-West. This radial displacement may indicate soil movement in a South-Easterly direction. It is possible that the movement of soil has caused these pipes to move downhill. If this downhill shift was not consistent across the slope this would cause the pipes to shift apart radially.

Angular displacement has occurred in the storm water pipe in the vicinity of 1 Malinga Place, where the pipeline runs in an Easterly direction. This could indicate soil movement in a North to North-Easterly direction. Displacement of these pipes may indicate soil movement.

A mixture of major and minor cracking was observed on these sections of pipe. It was considered that the cracks do not appear to be indicative of significant displacement.

Belhaven Avenue

A number of longitudinal displacements were observed in the pipeline on Belhaven Avenue. There are two longitudinal displacements which occur in North Easterly direction in Flinders Esplanade adjacent to 16 Belhaven Avenue. There are also two longitudinal displacements adjacent to 12 and 16 Belhaven Avenue which may indicate soil movement in an Easterly direction. Similarly there are three longitudinal displacements in a concentrated area 21 Belhaven Avenue near the shoreline indicating movement in an Easterly direction. Adjacent to 20 Belhaven Avenue there is longitudinal displacement consistent with soil movement in a Northerly direction. On the boundary between 21 and 23 Belhaven Avenue there is longitudinal displacement which may indicate movement in a South-Westerly direction. All of the noted longitudinal displacements occur in the direction consistent with soil movement downhill.

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A mixture of major and minor cracking was noticed on sections of the pipe. It was considered that the cracks do not appear be indicative of significant displacement.

3.3 Visual Survey of Buildings

A total of 81 domestic properties plus the primary school and high school were inspected with visual defects recorded electronically in a standard field sheet and also by photograph. The scope of works specified inspecting 84 properties, but at the time of writing the owners of 3 properties had not responded to acceptance of inspections of their properties. The survey focused on the main structures at each property and also included other site conditions relevant to distress in buildings (slope, vegetation, paving condition etc). Generally residential dwellings were inspected but both the Taroona Primary and Taroona High Schools were also inspected. The visual assessments were performed by a Structural Engineer from GHD Hobart office with an assistant technician in attendance. The inspection entailed a brief walkover of the site and then a careful viewing of the external walls of the buildings. Defects and site features were recorded on a pro forma sheet reproduced in Appendix E.

The visual inspections recorded any structural defects to the exterior of buildings however no inspections were performed over roofs or in the subfloor areas and internal inspections were not performed but some internal features were seen through open windows. Typically defects consisted of cracking in brickwork and movements in window frames and tilting or cracking of perimeter verandas and paving. Photographs of the defects were also recorded.

On completion of the visual inspections, the reports were reviewed by a Principal Geotechnical Engineer who undertook follow up inspections of selected properties. After this review, a rating on the degree of damage for the entire buildings was assigned according to tables C1 and C2 of Australian Standard AS2870-2011, the residential slabs and footings code. A probable cause of distress associated with the overall building rating was then applied according to the following criteria:

- R – Reactive Foundations
- L – Landslide
- S – Structural
- I – Indeterminate

It is noted that the structural inspections were visual only and no subsurface conditions such as foundation conditions, soil types and moisture condition or footing dimensions were investigated. A report by William C Cromer (May 2010) on 2 Meath Avenue, Taroona which provided subsurface soils and moisture condition has been sighted.

3.3.1 Comments on Survey Results

The completed reports for each property, including the distress rating and probable cause of distress are provided in Appendix E. The visual assessment indicates most distress in the buildings is due to reactive foundations with some structural defects in others. There are no buildings with a definitive cause of distress from land slide activity.

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4. Summary of Results of the Stage 2A Studies

4.1 InSAR Survey

The InSAR survey has provided a strong confirmation of both the existence and general movement rate previously interpreted from ground based information. What the InSAR fails to do is provide accurate information on the exact aerial extent (especially northern and southern boundaries) of the landslide, and sufficiently accurate displacement points to enable knowledge of landslide type (intact, or multiple?) or prediction of expected rate of movement.

The cost-effectiveness of continued use of InSAR at this site is questionable. Improved accuracy using InSAR would require establishment of a network of more persistent reflectors, especially around the northern and southern boundaries of the landslide, and secondly a much larger data stack (at short temporal frequencies) would need to be acquired. This would require a different satellite, and therefore a considerable cost and longer time frame as we would effectively be starting again. The required number, distribution and accuracy of displacement monitoring could be achieved by renovating and extending our current survey network.

Therefore it is recommended that further expenditure is directed towards the following tasks:

- Installing an inclinometer and coupled vibrating wire piezometer – (see plan in Appendix F for location),
- Renovating the current PDA permanent survey point network to a sufficient standard.
- Installing additional permanent survey points in locations indicated on the accompanying plan (refer to Appendix F).

The Fugro InSAR survey does not add greatly to the known landslide activity over the site but does confirm the significant movements near to the primary school. Further monitoring points and even subsurface investigations are recommended immediately upslope of the primary school buildings but down slope from the existing monitoring bore (MRT-108-1).

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4.2 CCTV Condition Survey of Stormwater Drains

As indicated above, angular displacement has occurred in the storm water pipe in the vicinity of 1 Malinga Place which could be attributed to landslide movement. A number of longitudinal displacements on Belhaven Avenue could be associated with landslide movement and also two longitudinal displacements in Flinders Esplanade are moving in a parallel direction with the landslide. These observations may identify longer term movements and combined with the InSAR survey may show the direction of movements and recent activity. These locations identified in Appendix F are ideal to place future survey monitoring locations.

4.3 Structural Surveys

The visual assessment reports for the 81 properties are presented in Appendix E. This assessment identifies the most probable cause of distress in all buildings to be attributable to reactive foundations. Some distress in footpaths in Meath Avenue and the road pavement in Channel Highway may be attributable to landslide movement; however the Channel Highway distress is also consistent with instability of local fill embankments below the roadway.

As discussed above, a report by William C Cromer (May, 2010) for 2 Meath Avenue identifies a foundation profile of greater than 1.4 m depth of high plasticity clay. This information, together with the associated vegetation and crack configurations, provides a high confidence that the

reactive clays are the predominant cause of distress in the dwellings and other buildings in the vicinity. It is therefore recommended that no further assessment of the distress in the inspected buildings is required to assist with the study of the landslide(s) at Taroona.

5. Recommendation for Stage 2B

5.1 Improvements to the Current Survey Network

GHD and MRT (C. Mazengarb) have been in discussions with PDA surveyors and are working towards the development of a plan for the installation of approximately 17 permanent survey monuments to allow ongoing monitoring of surface movements within the site. The locations for these proposed new points are shown on the plan in Appendix F.

These permanent survey marks will be installed as robust installations so that they can remain as useful monitoring points well into the future. The anticipated scheduling of these works is mid July 2013.

5.2 Installation of an Additional Inclinometer & Vibrating Wire Piezometer

As noted in the stage 1 report and previously in this report, an additional borehole/inclinometer taken to greater than 70 m is recommended to be installed at approximately 528900E, 5245350N. This inclinometer will assist in defining the localised landslide in the vicinity of the primary school. The installation of a coupled vibrating wire piezometer is also planned in the vicinity of 5280900E, 5245500N. This will involve the drilling of a 60m+ borehole followed by the installation of two vibrating wire piezometers; one at the full depth of the hole and the other at half this depth i.e. 30 m. The vibrating wire piezometers will monitor pore water pressure from groundwater movements and this data will be very useful in correlating observed movements from the inclinometers with rainfall records. The vibrating wire piezometers will be linked to a datalogger to allow real time monitoring. Additional survey monitoring points are also planned to be installed in these areas (refer to the site plans in Appendix F).

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5.3 Additional Considerations

The proposed locations of the new inclinometer and piezometers (refer to site plans in Appendix F) are approximate only, and will be confirmed on site to provide appropriate surface readout installation etc. The inclinometer bore will need to at least 70 m in depth. The vibrating wire piezometer will be installed in relatively close proximity to the inclinometer, and two piezometers are planned to be installed in the one bore. It is proposed that one piezometer be installed near the slip plane (depth to be confirmed based on drilling results, and possibly initial inclinometer results), and the other about half the depth of the slip plane.

The plan in Appendix F shows the proposed replacement installation positions for the new permanent survey marks. The intention of the additional marks is to establish a transect along the coastline and to allow the ongoing monitoring of these point well into the future.

During a recent site inspection there was not sufficient time to inspect all the current survey marks (listed as PDA58 etc), however those that were inspected were found to be generally inadequate in that they were placed in inappropriate positions, were damaged, or were simply a nail or pin placed in surface material.

The following provides some brief notes to illustrate some of the issues identified with the current network during a recent site inspection undertaken by C. Mazengarb (MRT) and Graham Granger (GHD).

- PDA 18 – could not find, very suspect, possibly located on boulder (floater).
- PDA 17 – not found, needs better marker and SPM standard?
- PDA 15 – not found, needs better marker and SPM standard? Maybe move further uphill to avoid surface creep.
- PDA 14 – on top of fill embankment and probably subject to settlement in fill. Needs to be relocated onto flat, natural ground below toe of fill.
- PDA 13 – Currently within area of extensive soil shrinkage cracking. Probably within transported clay overburden. Needs to be relocated to east to be within natural profile.
- PDA 12 – Probably needs to be relocated onto flat terrace below.

It is proposed that a program of permanent survey mark upgrade/replacement will be undertaken for Stage 2B of this project. The permanent survey mark records must contain information such as date of construction and photo of installation (for ease of identifying location in the future).

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Appendices

Appendix A – Figure 1 - Site Plan Showing Structural Damage to Properties

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LEGEND

Damage Category *

- No Observed Damage
- Negligable Damage
- Very Slight Damage
- Slight Damage
- Moderate Damage
- Severe Damage

Probable Cause

- (R) Reactive Foundations
- (S) Structural
- (O) Other
- (U) Undetermined
- (-) N/A

Surveyed Building/Property Boundary

* Damage Category was assigned in accordance with Appendix C of AS2870.
The assigned Damage Category was based on the single worst item observed on the property.

Paper Size A4
0 25 50 100
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 28 May 2013

Damage Category and Probable Causes of Surveyed Properties / Buildings

Figure 1

G:\32\16698\GIS\Maps\3216698_04_PropertyDamage_Rev0.mxd

2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations and damage data, 2013. Created by: jtoregan, updated by jpulford

Appendix B - Stormwater Pipe Survey Movements

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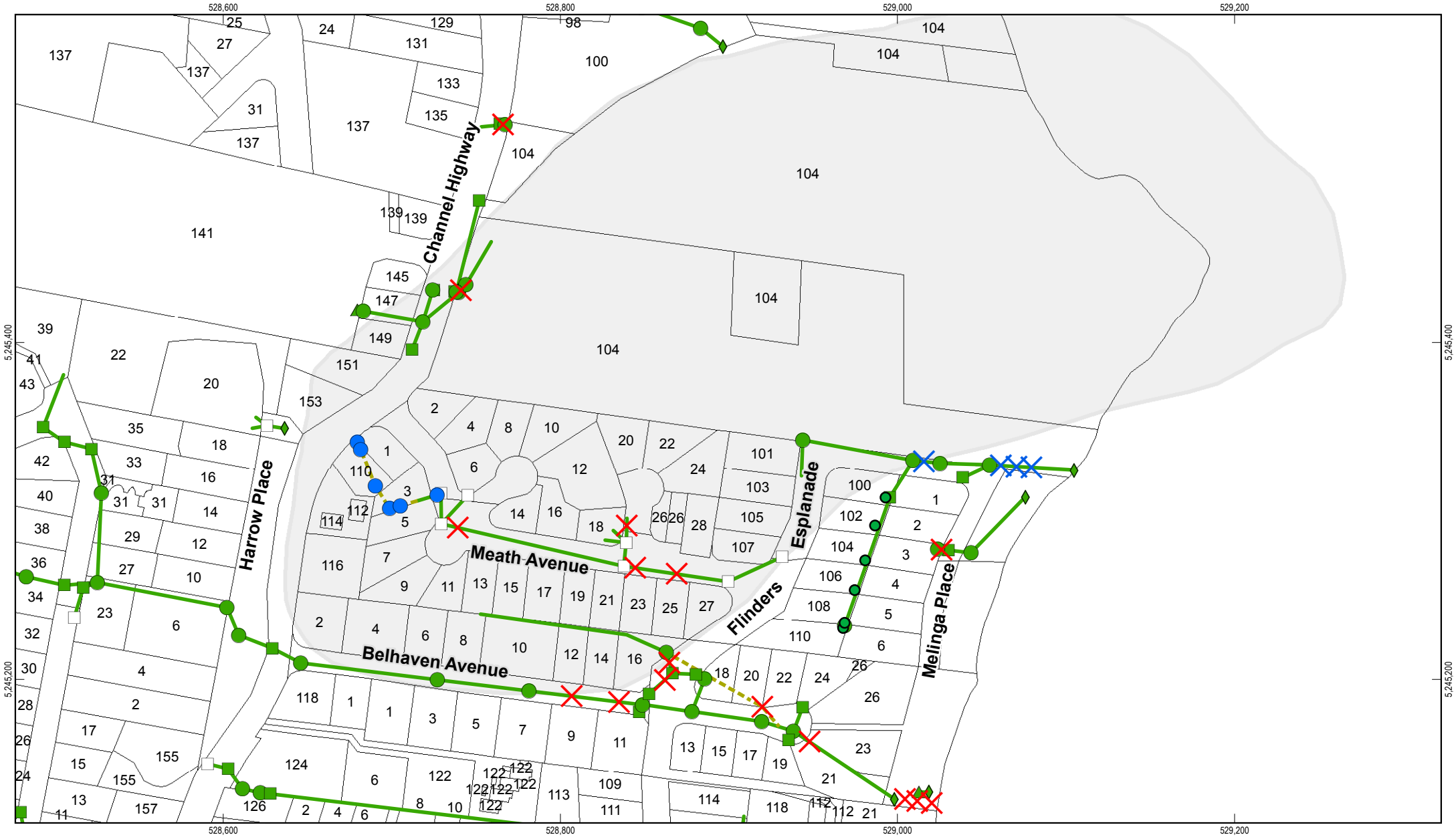

Paper Size A4

0 10 20 40 60 80 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

Displacement Type
- Angular
- Longitudinal
- Radial

- Stormwater Pipe
- Stormwater Pipe (digitised)
- Manhole

- Grated Entry Pit
- Side Entry Pit
- Headwall
- Outfall

4 Cadastre

Landslide Area

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 08 Apr 2013

Condition Survey of Stormwater Pipes Showing Identified Displacements

Appendix B

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2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: GHD damage locations 2013, KCC stormwater pipes, cadastre and roads 2012. Created by: jpulford

Appendix C - Fugro In SAR Report

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Technical Report:

Satellite InSAR Historical Surface Deformation and Feasibility Study for the School Creek Landslide, Taroona

Version 1.1

10th April 2013

ISO 9001 FS 520485
OHSAS18001 OHS 539921

Summary
This document constitutes the technical report for a satellite InSAR historical surface deformation and feasibility study for the School Creek Landslide, Taroona.

Document Change Record			
Revision	Date	Changes	Author
1.1	9th April 2013	- Text amendments following feedback from MRT - Re-defining conversion from Line-of-Sight motion to horizontal motion - Addition of appendix detailing PSI processing	HL, HM

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1. Background

Satellite InSAR involves the interferometric processing of the phase component of multiple Synthetic Aperture Radar (SAR) scenes of the same location of the Earth's surface captured at different times. It is capable of remotely detecting millimetres to metres of surface deformation spanning a wide range of temporal and spatial scales.

This report presents the results of a comprehensive satellite InSAR analysis of an archive of satellite SAR data acquired over the study area between 2007 and 2011. An overview of satellite InSAR and a breakdown of the technical processing approach are provided as appendices.

2. Objectives

The study aims to improve delineation of the extents of the School Creek Landslide and quantify known movement through the application of satellite InSAR.

It is understood that the landslide expressed approximately 80 mm of horizontal movement between 2008 and 2012.

3. Study Area

The study area (Figure 1) is located in the south-east Tasmania, south of Hobart, covering an area of approximately 500 x 400 metres.

The ground cover consists of buildings and infrastructure with small amounts of low-lying vegetation.

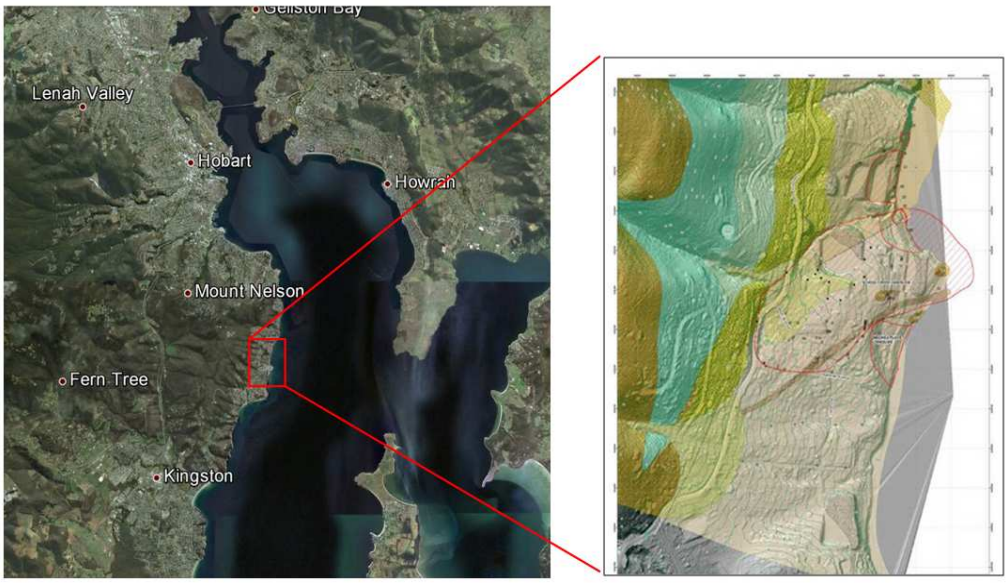


Figure 1: Left: Regional overview of the Hobart area of Tasmania. Right: Current mapped extents of the School Creek Landslide (red hatched polygon) in Taroona, Tasmania.

Background image © Google 2013, Cnes/Spot Image 2013, Whereis Sensis Pty Ltd 201

4. SAR Data

The study utilised a historical archive of L-band SAR (23.6 cm) data acquired by the PALSAR instrument onboard the ALOS satellite between January 2007 and March 2011. The study area is covered by a single SAR scene footprint comprised of a data stack of 23 scenes. The SAR data has a spatial resolution of 10 m or 20 m (depending on whether it is a single or dual polarisation scene) and a footprint size of 70 x 70 km. The data was acquired on the ascending orbit pass of the satellite.

Archive SAR data was not available over the full 2008 to 2012 time period due to the ALOS mission ending in April 2011, however the data stack extends to 14th March 2011.

Figure 2 shows the SAR scene footprint with respect to the School Creek Landslide and Figure 3 shows the temporal distribution of the 23 scene data stack.

Figure 2: SAR scene footprint (white polygon) with School Creek Landslide clearly marked.

Background image © Google 2013, Cnes/Spot Image 2013, Whereis Sensis Pty Ltd 2013

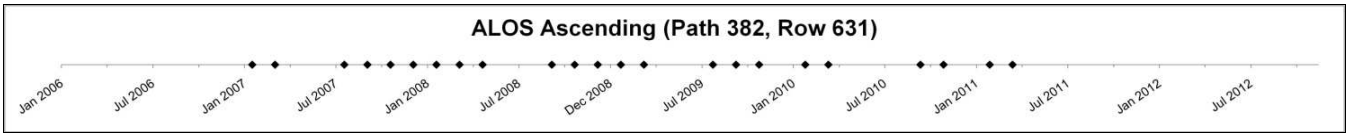


Figure 3: SAR data temporal distribution.

5. Processing

Due to the unique characteristics of each site and the variable specifications of available SAR data stacks it can be difficult to predetermine which interferometric processing technique will yield the best result. In order to fully exploit the available data stack and extract the maximum amount of surface deformation information contained within it, the data stack was analysed using NPA's Time Series DifSAR (TSD) and Persistent Scatter Interferometry (PSI) processing chains. The PSI processing approach was found to be optimal for this data stack.

5.1. Persistent Scatterer Interferometry

PSI is an advanced differential interferometric technique involving the processing of a collection of multi-temporal SAR images (typically 20 or more) to identify networks of persistently reflecting ground features (such as buildings, bridges, infrastructure and rocky outcrops) called Persistent Scatterers (PS), against which precise, millimetric measurements of deformation can be made.

PS are points on the ground that consistently reflect the SAR signal back to the satellite in every image of the data stack. Throughout processing, points are repeatedly checked for quality and those with low quality measures are discarded. In a small data stack such as the one used in this study, a high proportion of the PS initially detected are discarded during quality control. Therefore the number and location of PS points is specific to each data stack. Furthermore, a ground feature that is a PS at one radar wavelength or spatial resolution may not be at another, or vice versa.

5.2. Precision and Accuracy

InSAR deformation measurements are relative in both time and space, and an absolute accuracy can only be established using ground data over the site. Given optimal conditions, PSI has sub-millimetric precision. This precision is however determined by a number of variables which differ from site to site, including the temporal distribution of the SAR images, the spatial distribution and radar reflectivity characteristics of the target, land cover characteristics, rates of motion and linearity of motion.

Given the quantity and temporal distribution of the input SAR data, and under the conditions that any deformation is slow and at a steady rate, then 99.7% of the data has an error of ±1.65 mm/yr. Those conditions are not always held and as a result the accuracy is lowered. In this project error values were found up to ±3 mm/yr, however the majority of points had errors within ±2 mm/yr.

5.3. Stable Reference Area

PSI processing is undertaken relative to a reference area that is assumed to be stable. The reference area is chosen based on a number of criteria that indicate it should provide a robust reference point for the dataset. All measurements within the PSI database are relative to the chosen 'stable' area. For this study, a reference location was chosen in the suburbs south of Hobart. The reference area was chosen outside of the study area as it was apparent that all areas near the School Creek Landslide were at risk of movement. Preliminary results showed that south Hobart appeared to be stable. As the reference area was chosen outside of the study area it does not appear in the supplied results, however for reference the area is located at -42.8869082 S 147.3242795 E.

5.4. Error Sources

Despite the fact that SAR data can be acquired night or day and in all weather conditions, atmospheric conditions can adversely affect InSAR results. SAR scenes are not captured simultaneously meaning the travel path of the radar signal through space can be affected differently by the atmosphere (particularly the three-dimensional water vapour column). Atmospheric artefacts can be seen as subtle changes with smooth spatial variability across individual interferograms

Processing was undertaken using the 1 metre LiDAR DEM acquired in 2011 which improved results over the study area. The high quality DEM helped to reduce topographic errors and artefacts in the PSI results. The PSI database supplied contains a 'height' field which indicates the refined height estimate for each individual PS point. These height estimates may contain an offset if the DEM height for the reference point was incorrect. The database also contains the estimated uncertainty in the height estimation ('error_hgt').

Unfortunately five of the 23 available archive ALOS PALSAR scenes had processing parameters that made them incompatible with the remaining 18 scenes. Therefore they had to be excluded from some parts of the processing chain.

PSI estimates are statistical and therefore at their most accurate when a large input data stack is available. Small input data stacks, such as in this case, result in higher error terms for atmosphere, height and deformation estimates.

5.5. Motion Vector

Satellite InSAR samples deformation expressed in the line-of-sight (LOS) viewing geometry of the satellite radar instrument, yielding a single motion vector (Figure 4).

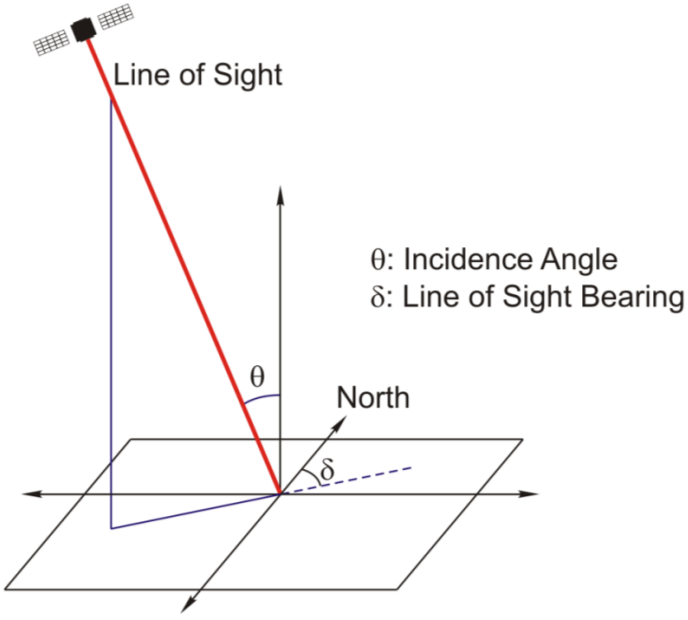


Figure 4: Viewing geometry of a SAR satellite

The SAR data stack was acquired on the ascending (~ south to north) orbit pass of the satellite. The satellite is right looking resulting in a LOS bearing of ~72 degrees. The incidence angle of observation is ~34.3 degrees from nadir (vertical). Motion not matching the same LOS viewing geometry of the satellite will be underestimated. This incidence angle means that observations are slightly more sensitive to vertical movement than horizontal movement (expressed in the LOS).

Across landslides varying degrees of vertical and horizontal movement may be expected. Without both ascending and descending datasets it is not possible to fully resolve the vertical and horizontal components of LOS measurement.

As stated, the surface deformation results derived during PSI processing are in the satellite line-of-sight (LOS). Positive velocity values indicate movement towards the satellite along the LOS and negative velocity values indicate movement away from the satellite along the LOS. If all motion is assumed to be horizontal, the surface deformation results can be reprojected using the incidence angle of the satellite, PS point heights and trigonometric calculations (Figure). Note that the horizontal surface deformation results are still in the LOS with respect to the satellite heading (~72 degrees in this case), therefore positive velocity values indicate surface deformation in a ~WSW direction and negative velocity values indicate surface deformation in a ~ENE direction.

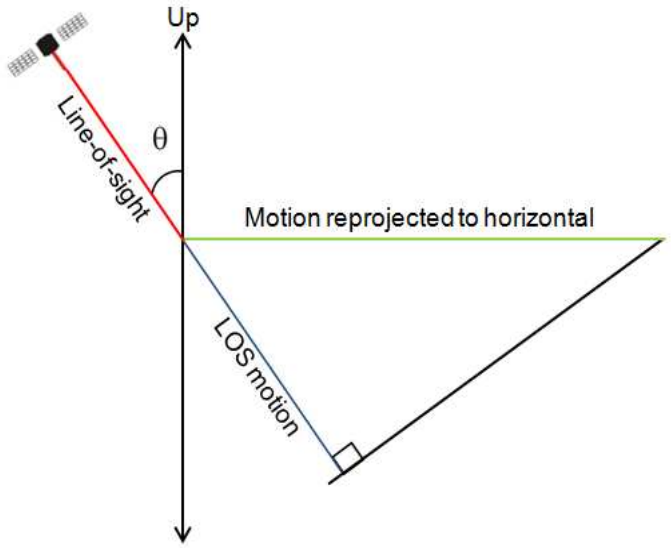


Figure 5: Reprojecting LOS motion to purely horizontal motion.

6. Results and Discussion

This section presents and discusses the PSI result generated for the study area spanning 16th January 2007 to 14th March 2011.

6.1. PSI Result - 2007 to 2011

Figure 6 shows the PSI result generated for the study area. The PS are styled according to their average annual velocity (mm/yr). The left hand image is the 'raw' result, whilst the right hand image contains a spatially interpolated version of the result. Table 1 summarises the key parameters and statistics of this result.

Figure 7 shows the result cropped to the estimated School Creek Landslide extents where the velocity has been reprojected based upon the assumption that the LOS motion is purely attributable to horizontal movement. The slope of the School Creek Landslide is very shallow and it can be assumed that landslide movement is predominantly horizontal in nature (downslope but very shallow). Outside of this area it is not sensible to assume that all motion expressed in the LOS is horizontal in origin. Please note the different colour map used to better visualise the PS velocity across the landslide. Table 2 summarises the key parameters and statistics of this cropped horizontally reprojected result.

6.1.1. Line-Of-Sight Results

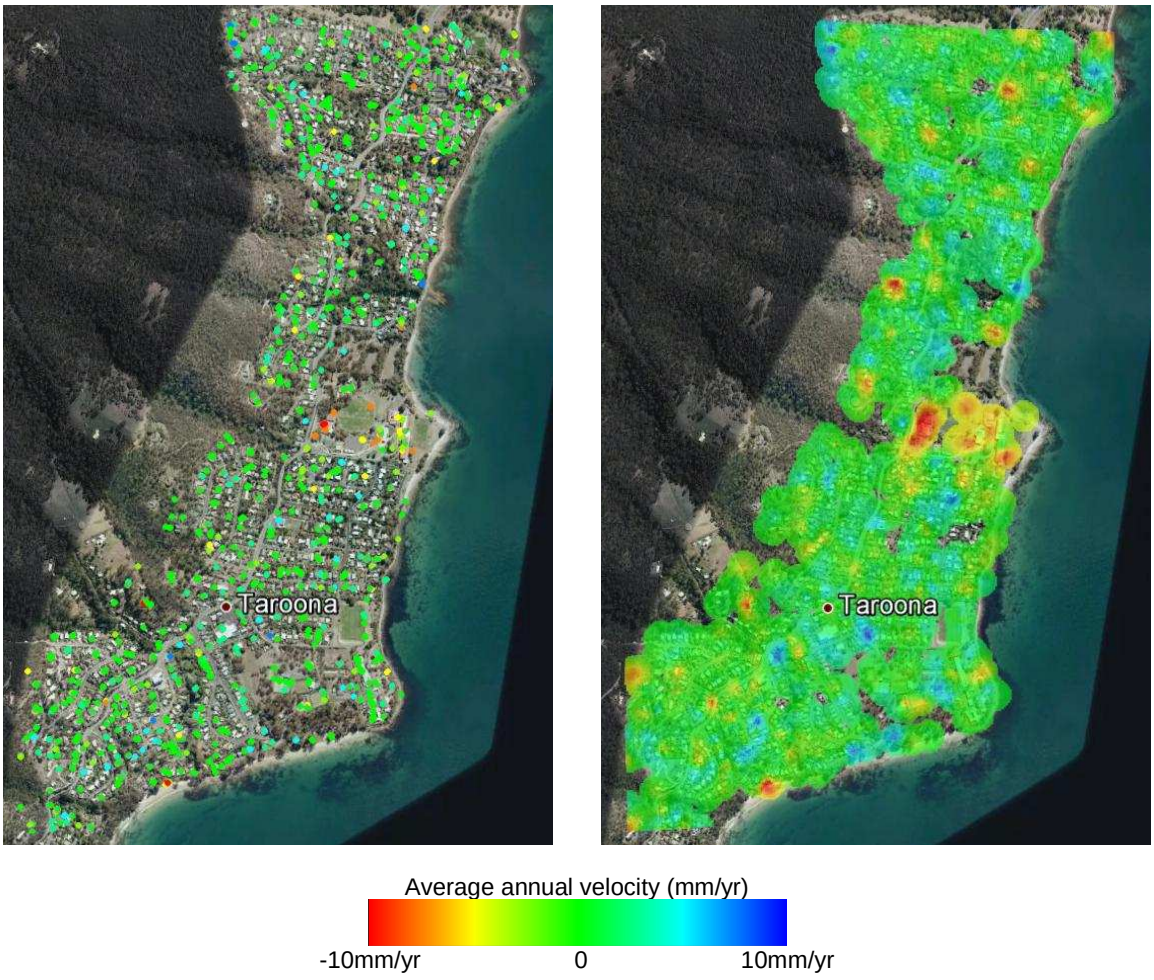


Figure 6: PS points and spatially interpolated average annual motion rate (mm/yr)

Background image © Google 2013, TerraMetrics 2013, DigitalGlobe 2013

Date range of analysis		16th January 2007 - 14th March 2011	
Satellite data used		ALOS PALSAR	
Georeference (X,Y) accuracy		<10m	
Reference data used for georeference		LiDAR/SRTM fused DEM + internal SAR location information. Refinement through the use of satellite optical imagery (Google Earth)	
Projection system used		GDA94/MGA55	
Area of result		1.95 km^2	
Number of PS identified		1394	
Mean density		714 points per km^2	
Point motion statistics (mm/year motion classes)		Points in each motion class	
		Count	%
'High' downward (away from the satellite) motion	-10 and more	6	0.43
	-10 to -7.5	24	1.73
	-7.5 to -5	41	2.96
	-5 to -2.5	112	8.07
Stable	-2.5 to +2.5	929	66.98
	+2.5 to +5	213	15.36
	+5 to +7.5	53	3.82
'High' upward (towards the satellite) motion	+7.5 to +10	9	0.65
	+10 and more	0	0.00
Regions not covered by InSAR results		Primarily forested or low quality points	
Processing notes		A small input data stack was used (18 images)	

Table 1: Summary statistics for the PSI result over the study area.

6.1.2. Horizontally Reprojected Results

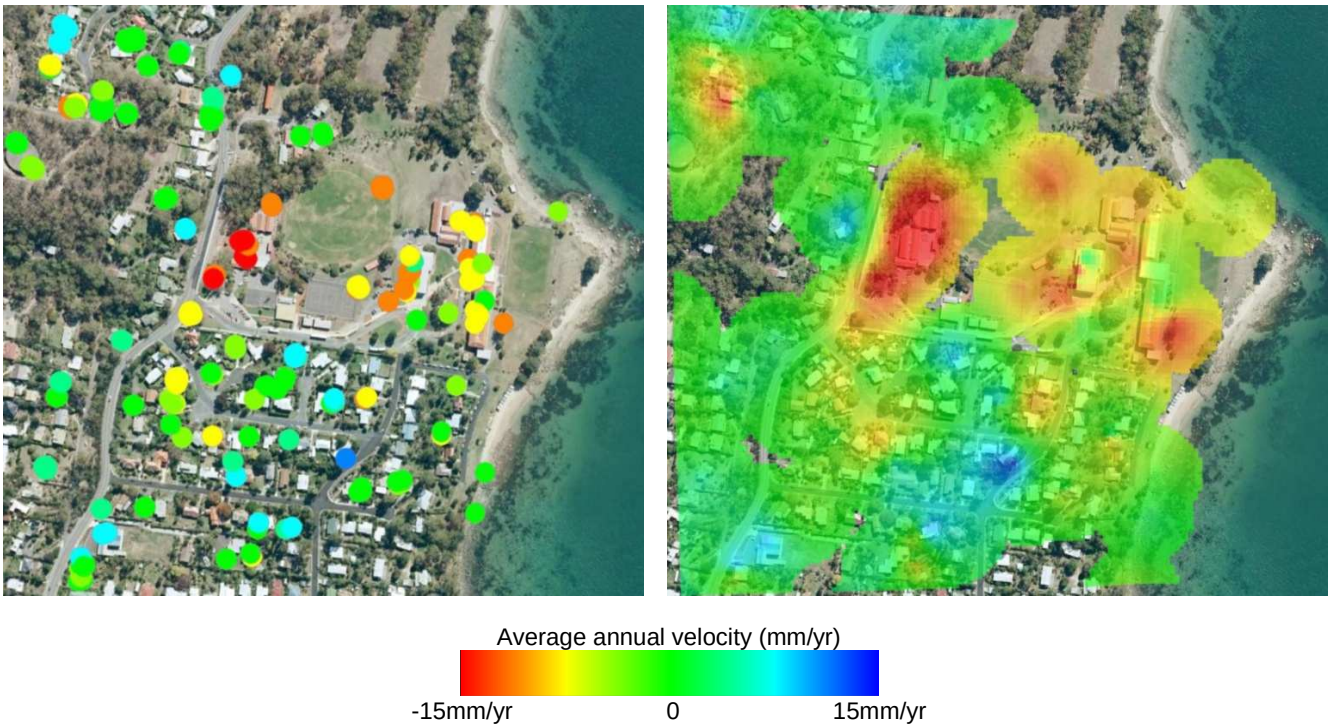


Figure 7. Horizontally reprojected PSI result over the School Creek Landslide

Background image © Google 2013, TerraMetrics 2013, DigitalGlobe 2013

Date range of analysis		16th January 2007 - 14th March 2011	
Satellite data used		ALOS PALSAR	
Georeference (X,Y) accuracy		<10m	
Reference data used for georeference		LiDAR/SRTM fused DEM + internal SAR location information. Refinement through the use of satellite optical imagery (Google Earth)	
Projection system used		GDA94/MGA55	
Area of result		0.33 km^2	
Number of PS identified		173	
Mean density		524 points per km^2	
Point motion statistics (mm/year motion classes)		Points in each motion class	
		Count	%
'High' horizontal (eastward at 72 degrees) motion	-10 and more	28	16.37
	-10 to -7.5	15	8.77
	-7.5 to -5	21	12.28
	-5 to -2.5	20	11.70
Stable	-2.5 to +2.5	55	32.16
	+2.5 to +5	16	9.36
	+5 to +7.5	6	3.51
'High' horizontal (westward at 252 degrees) motion	+7.5 to +10	9	5.26
	+10 and more	1	0.58
Regions not covered by InSAR results		Areas of grass and poor quality reflectors	
Processing notes		A small input data stack was used (18 images)	

Table 2. Summary statistics for the horizontally reprojected PSI result over the School Creek Landslide

6.2. Discussion

The PSI result clearly maps a deformation phenomenon located in the study area whose characteristics are very different to the surrounding area. The location correlated to the known location of the School Creek Landslide.

Velocity is the most robust and reliable output of PSI processing and provides a good indication of the spatial extent of the landslide. Velocity varies across the landslide. The highest rates (LOS ~ -13 mm/yr, horizontally reprojected ~ -21 mm/yr) are found in the north-west of the landslide, and the rate decreases eastward towards the ocean (~ -3 mm/yr, horizontally reprojected ~ -4 mm/yr). Higher magnitudes are also found on the north of the landslide compared to the south.

The deformation magnitudes contained within the horizontally reprojected PSI result correlate well with known magnitudes captured by ground based monitoring.

In addition to velocity, the PS results also contain time-series. The time-series provides an insight into the temporal evolution of deformation for each PS across the time period spanned by the processed SAR data stack. Given the small input data stack the time-series is significantly less reliable than the velocity however they do contain some useful information (given a larger, 25+, data stack and consistent temporal distribution the accuracy of the time-series would increase dramatically).

The time-series of PS located across the landslide express correlated temporal behaviour, suggesting that after a period of minimal movement, the entire landslide began to move between January and October 2009 and continued to until the end of the SAR data stack (Figure 8). This phenomena is not represented in the time-series of PS located outside the extents of landslide and is considered reliable compared to other shorter term and/or more random time-series variation.

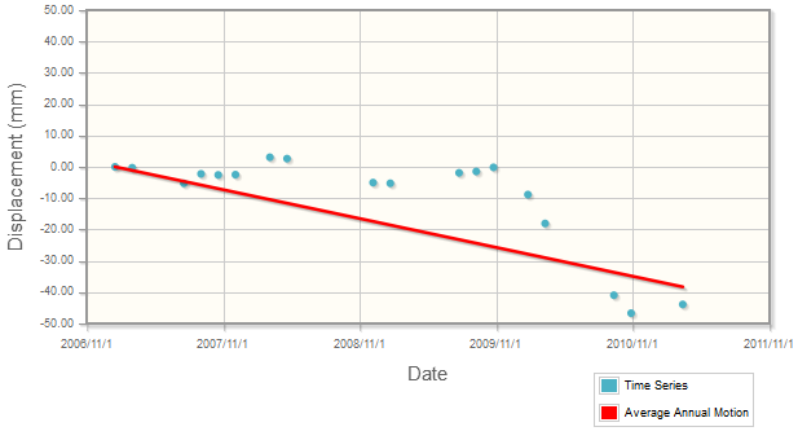


Figure 8. PS time-series for Point ID 139724

When reviewing the result it should be noted that this study has exploited a SAR data archive that was acquired as part of the satellite's background scientific mission, not one tailored to the specific requirements of the project (as would be achieved in an operational monitoring scenario). Such data stacks are rarely optimal (in terms of stack-size, acquisition frequency, spatial resolution and sensor wavelength etc), however they present a unique, relatively low-cost opportunity to detect historical deformation trends, as well as to provide an indication of the performance of satellite InSAR across a study area. For this study only 18 of the original 23 SAR scenes could be used to derive the final result.

7. Georeferencing

The results were georeferenced using a combination of LiDAR/SRTM elevation data and the internal SAR location information. The data were subsequently re-projected to WGS84/Geographic. The georeferencing was refined and verified against Google Earth imagery before being projected into the GDA94/MGA 55 co-ordinate reference system.

8. Deliverables, GIS Integration and Interpretation

The PSI databases have been supplied in both the satellite LOS and as horizontal motion. For the horizontal motion, the assumption is made that the motion detected is purely horizontal and that there is no vertical motion. Calculation of the horizontal motion component is made using the LOS motion and the incidence angle of the satellite on a point-wise basis taking into account the point heights.

8.1. Velocity and Time-Series for PSI Data

The PSI databases covering the study area contain the following fields:

- CODE – PS unique identifier
- EASTING – Easting coordinate of PS in GDA94/MGA 55
- NORTHING – Northing coordinate of PS in GDA94/MGA 55
- HEIGHT – Height estimate of PS (m) with respect to the stable reference area
- VEL – Average annual motion rate (mm/year) in the satellite LOS (LOS database) and horizontal direction (horizontal database)
- ERROR_HGT – Estimated height uncertainty (m)
- ERROR_VEL – Estimated average annual motion rate uncertainty (mm/year)
- Date of SAR image 1 – PS motion relative to date of SAR image 1 and stable reference area (mm)
- Dates of SAR images 2 to (n-1) - PS motion relative to date of SAR image 1 and stable reference area (mm)
- Date of SAR image n – PS motion relative to date of SAR image 1 and stable reference area (mm)

The PSI data is provided in the following data formats:

- Database (.dbf)
- Google Earth (.kmz) - in WGS84 projection.

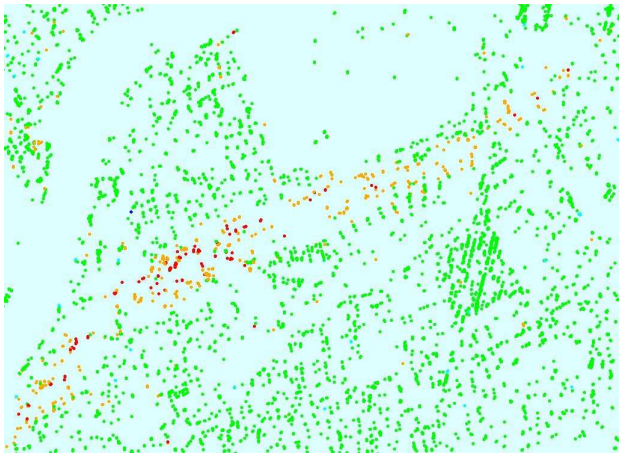
8.2. GIS Integration

The deliverables can be easily ingested into a GIS using the Easting and Northing coordinates of the PS. PS points can then be styled and analysed according to their average annual motion rate. Time-series can be created for each PS by plotting the PS motion relative to the first SAR image and stable reference area for each of the analysed SAR image dates.

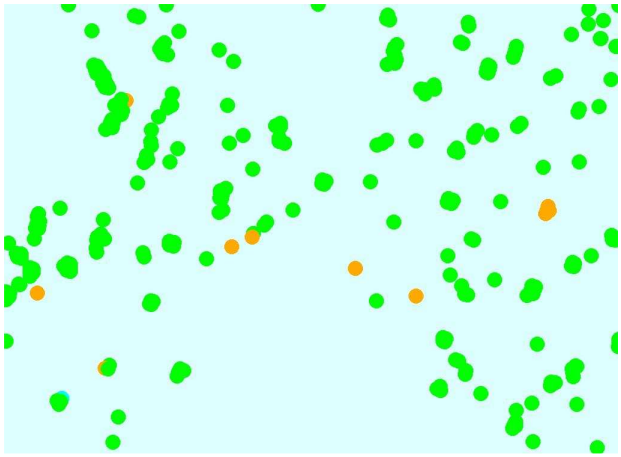
8.3. Interpretation

PSI is a complex dataset and users should consider the following information in any subsequent interpretations of the provided data:

- Deformation recorded for an individual or collection of PS point may be an expression of the ground, a feature on the ground or a combination of the two. The deformation source may be attributed to a variety of factors.
- Users should consider the spatial and temporal consistency of motion exhibited by PS points when interpreting PSI results. PS points exhibiting significantly different levels of motion when compared to the surrounding PS points are more likely to contain unresolved errors and be of lower accuracy than clusters of points exhibiting similar motion.



An example of a linear cluster of PS points all indicating similar deformation.



An example of isolated PS points showing different deformation compared to the surrounding PS points.

- If PS exhibit deformation, this does not mean that features across the study area are at risk. If PS points are not moving away or towards the satellite, this does not mean they won't in the future.
- Analysis of time-series may reveal episodic changes and or changes in acceleration of deformation. It is worth noting that time-series may contain residual errors (such as uncompensated atmosphere) and are less precise than the average annual motion rate.
- PSI results should be analysed and interpreted alongside other complimentary datasets.
- Estimates of PS height may be useful in determining the potential position of PS across targets e.g. base or top of building.
- The spatially interpolated velocity graphic may help to reveal broad domains of deformation.

9. Conclusions & Recommendations

This study has provided information relevant to both the improved delineation of the School Creek Landslide and the quantification of known historical movement.

During the temporal period analysed, a spatially contiguous deformation phenomenon was detected which correlates to the known location of the School Creek Landslide. The southern and western extents of landslide movement are relatively well defined by a reasonable density of PS. The PS density to the north is lower which makes it more difficult to assess how far the landslide extends in this direction.

Deformation velocities of the horizontally reprojected PSI result range from -13 mm/yr at the top (west) of the landslide, to -3 mm/yr towards the bottom (east) of the landslide. The PS time-series suggest that landslide movement initiated somewhere between January and October 2009 and continued until the end of the dataset. It is worth re-stating that the horizontally reprojected result makes the assumption that all motion expressed in the LOS is horizontal in origin, with no vertical component.

Given the sub-optimal SAR data stack the study has yielded very positive results, providing insight into landslide extent, quantification of historical movement and satellite InSAR performance. Satellite InSAR appears very well suited to remotely monitoring deformation across the School Creek Landslide.

10. Future Monitoring Work

Processing of larger SAR data stacks acquired systematically over long periods, at short-temporal sampling, and at a higher spatial resolution, would yield much higher quality results, with greater PS coverage and lower errors.

There are 3 viable options for on-going monitoring using InSAR. The choice of which will depend upon available budget, level of detail required and when the monitoring needs to begin.

Each option uses a different satellite that provides input data with varying spatial resolution and temporal sampling. Higher spatial resolution will allow a more accurate delineation of landslide deformation and higher temporal sampling will capture the deformation more accurately.

Appendix A: InSAR overview

Brief Overview:

The satellite orbits the Earth and uses radar to image the ground. Every time the satellite passes over the area of interest an image is acquired. For this project, the satellite used could return to image the same location on the ground every 45 days. Each image taken contains a record of the height of the ground at the time taken. By taking multiple images and analysing the change in height (i.e. deformation) through time we can determine the surface deformation across a site.

Technical Overview:

Satellite Interferometric Synthetic Aperture Radar (InSAR) is a remote sensing technology that involves the interferometric processing of multi-temporal Synthetic Aperture Radar (SAR) images acquired by earth observation satellites to detect, map and monitor surface deformation. SAR is a type of active remote sensing instrument that transmit a series of radar pulses, using the microwave region of the electromagnetic spectrum, and records the reflections from the Earth's surface. The reflected signal is processed to form an image with each pixel containing the radar response of a particular location. A SAR signal can be imagined as a sine wave that contains amplitude and phase (Figure). The amplitude is the strength of the radar response and the phase is the fraction of a complete sine wave cycle (when the sine wave starts to repeat itself, one cycle of phase has occurred). InSAR utilises the phase information of the SAR signal to derive surface deformation information. Depending on many factors including the quantity and quality of the data available, ground cover and the deformation characteristics, the data can be processed in different ways to optimise results. Two processing approaches, DifSAR and PSI, are outlined below.

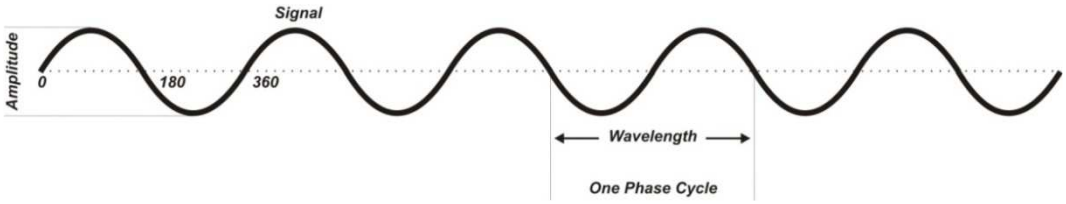


Figure 9: Diagram showing the phase and amplitude of a radar wave

DifSAR

Differential Interferometric SAR (DifSAR) compares the phase values in pairs of SAR images for the same point on the ground, generating the interference between returned phase values to produce an interferogram. The phase contribution from known topography can be calculated and removed using a Digital Elevation Model (DEM) to create a differential interferogram. Any remaining phase variations represent changes in topography (i.e. displacement or ground motion) that have occurred in a specific timeframe (Figure). Other contributions to the remaining phase result from changes in atmospheric conditions between image acquisitions, topographic errors within the DEM, orbital errors and noise.

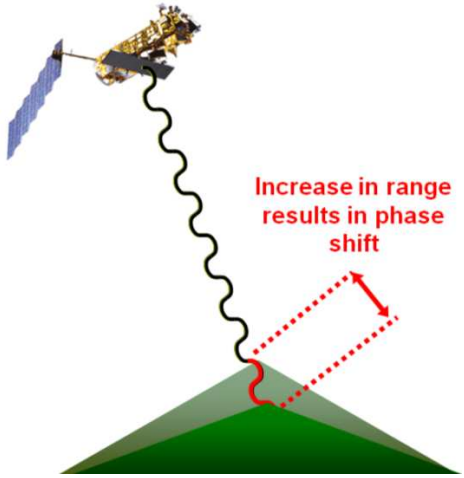


Figure 10: Surface deformation changes the distance the radar wave travels from the satellite to the ground and back.

Persistent Scatterer InSAR

Persistent Scatterer InSAR (PSI) is an advanced differential technique involving the processing of a collection of multi-temporal SAR images (typically 20-25 or more) to identify networks of persistently reflecting ground features (such as buildings, bridges, infrastructure and rocky outcrops) called Persistent Scatterers (PS). PS density is generally high in urban and semi-urban areas, but will usually be very low in rural and densely vegetated areas, limiting coverage of the final result.

Signals from the network of points are analysed in the spatial and temporal domain to produce a time-series and accurate deformation rate estimate. Advanced processing of large data stacks helps to significantly reduce a number of error sources, including atmospheric and topographic error, typically improving the accuracy of the time-series measurements to sub-centimetric levels. Average deformation rate estimates have millimetric accuracy (typically 1-1.8mm/yr).

Appendix B: PSI processing technical workflow

The technical workflow covers the complete product generation cycle (from data procurement, through processing to generation of the final deliverables). Processing forms the most significant component and quality controls checks (statistical and visual) are embedded into all stages of product generation. NPA Satellite Mapping's Quality Management System is certified to ISO 9001:2008 standards. This section outlines the key processing steps for the DifSAR and PSI processing chains. For this study, the PSI processing chain was found to be optimal.

The key steps and quality control milestones for DifSAR processing are:

- *Raw data processing:* SAR scenes are processed from raw SAR scenes (where available), to enable tuning of processing parameters for InSAR applications. Precise orbit files are sourced where available to minimise phase trends from orbital positioning errors. Resulting single look complex (SLC) data can be used to produce SAR intensity images for visual analysis and quality control checks.
- *Interferogram generation:* The phase difference between two SAR scenes is calculated, and can be used to produce an interferometric coherence map. Phase contributions from orbital and topographic effects are modelled and removed, to give a differential interferogram.
- *Wavelength-adaptive filtering:* To reduce noise and increase fringe definition, differential interferograms are filtered. The algorithm is wavelength-adaptive to enhance underlying motion signatures and reduce the high frequency noise without smoothing across fringe boundaries.
- *Phase unwrapping:* Phase fringes are unwrapped and converted to a motion (deformation) map, considered relative to a given reference location. The unwrapping algorithm uses a

'minimum cost flow' (MCF) approach to statistically optimise unwrapping in areas where phase lacks spatial continuity.

- *Geocoding:* Images are orthorectified using a DEM, and projected from the native radar geometry into the chosen map projection. The georeference quality of the initial geocoded processing result will depend on the resolution and accuracy of the DEM used. This will be further refined where possible using a reference data layer, for example optical imagery.

The key steps and quality control milestones for PSI processing are:

- *Raw Data Processing:* Raw SAR scenes are used to ensure continuity of processing across each SAR scene in the PSI stack. Precise orbit state vector files are sourced where available. SAR intensity images produced for visual analysis and quality control checks.
- *Master Image Selection:* A master image is selected from a stack of single look complex (SLC) images to act as a stable reference against which motion measurements can be made. To reduce the effects of temporal and geometric decorrelation the image is central within the spread of SAR scene dates and absolute baseline values. Weather conditions at the time of acquisition are also checked to minimise the risk of atmospheric artefacts in the master scene. All remaining SAR scenes are precisely co-registered to the master.
- *Initial Selection of PS:* The identification of PS candidates is performed based on the low temporal variability of the SAR amplitude. Alternative criteria, mainly of interest for small data stacks, are high SAR amplitude and low spectral phase diversity.
- *Reference PS:* A reference PS is identified within the study area, against which all ground velocity measurements are relative. As such, it is crucial that this PS is itself not moving over time. Moreover, since the accuracy of PS velocity measurements are proportional to their distance from the reference PS it is best to locate it as near as possible to the centre of the study area being processed.
- *Selection of PS and Retrieval of Motion:* The phase response of each candidate PS is examined across each SAR scene in the dataset. A phase model is produced at each PS point, which is refined throughout the process. During processing, the phase is corrected for atmospheric and orbital errors and the resulting motion and velocity measurements are retrieved. Not all PS points and their measured motions are of the same quality. Those with a low phase standard deviation from the phase model are likely to exhibit measurements that are less noisy and more reliable. A threshold on the standard deviation of the phase with respect to the phase model is applied to retain only those points deemed to be reliable.
- *Geocoding:* PS locations are orthorectified using a DEM, and projected from the native radar geometry into the chosen map projection. The georeference quality of the initial geocoded processing result will depend on the resolution and accuracy of the DEM used. This will be further refined where possible using a reference data layer, for example optical imagery.

Figure 5 reviews the main PSI and DifSAR processing steps of the service chain, including the core quality control (QC) milestones.

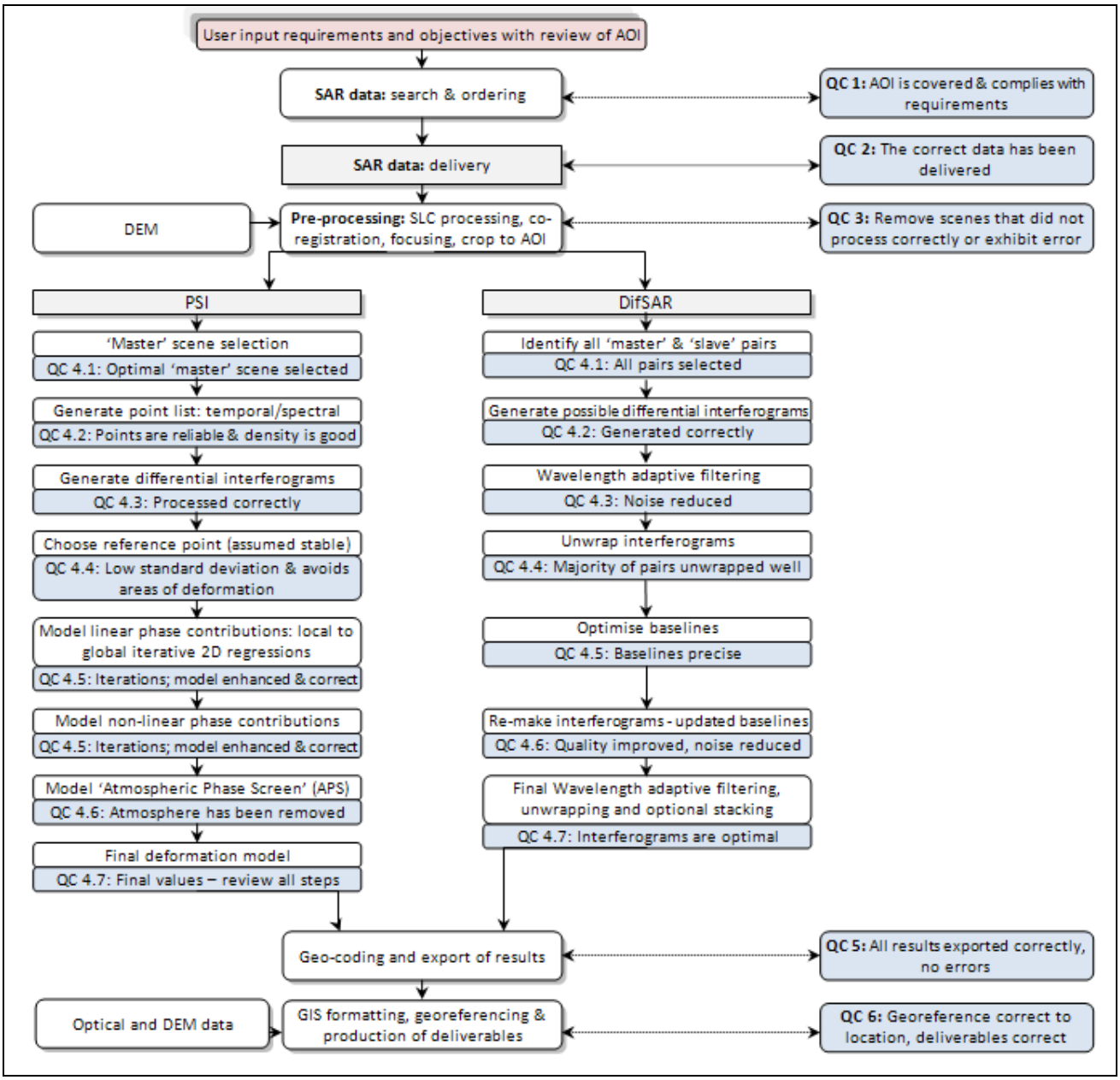


Figure 5: Flowchart illustrating the main processing steps of the service chain.

Appendix D - Structural Survey Field Sheet

DRAFT

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

Client:	**Kingborough Council**	Job Number: **3216698**
Project:	**Taroona Landslide Risk Assessment and Mitigation Plan Stages 2 & 3**	
Subject:	**External Property Inspection Checklist**	

Property Address: _____

Date: _____ **Time:** _____

Property Access	YES	NO
Has Permit to Enter form been received	☐	☐

HS&E	YES	NO	N/A	
Are there any hazards on site that were not identified in the JSEA	☐	☐	☐	If yes, see Multi-Day Pre-Work Assessment If no, hazards are as per JSEA

Type of Structure

Brick	☐	_____
Brick Veneer	☐	_____
Concrete Blockwork	☐	_____
Timber	☐	_____

Type of footing

Slab on ground	☐	_____
Strip/pad footings	☐	_____

Surrounding Landscape

Garden adjacent to building	☐	_____
Paving surrounds	☐	_____
Other	☐	_____

General

Have notes & photos been made of:	YES	NO	N/A	
Damage to footpaths	☐	☐	☐	_____
Damage to driveways	☐	☐	☐	_____
Damage to downpipes	☐	☐	☐	_____
Proximity of significant trees	☐	☐	☐	_____
Impact of summer/winter cycle	☐	☐	☐	_____
Cracks/gaps in the ground	☐	☐	☐	_____

Brick/Brick Veneer/Concrete Blockwork Structures

Have notes & photos been made of:	YES	NO	N/A	
Building articulation (ie. presence of control joints)	☐	☐	☐	
Location and oritenation of cracks	☐	☐	☐	_____

Timber Clad Structures

Have notes & photos been made of:	YES	NO	N/A	
Gaps either side of openings	☐	☐	☐	_____
Straigthness of cladding	☐	☐	☐	_____

Resident Contact	YES	NO	N/A	
Was contact made with the resident	☐	☐	☐	_____
Was a calling card left?	☐	☐	☐	_____

Appendix E - Structural Reports for all Properties Surveyed

DRAFT

PART A – BELHAVEN AVENUE

Contents

Property Address
1 Belhaven Avenue
2 Belhaven Avenue
3 Belhaven Avenue
6 Belhaven Avenue
8 Belhaven Avenue
13 Belhaven Avenue
14 Belhaven Avenue
15 Belhaven Avenue
17 Belhaven Avenue
18 Belhaven Avenue
19 Belhaven Avenue
21 Belhaven Avenue
23 Belhaven Avenue
24 Belhaven Avenue
26 Belhaven Avenue

1. Property Details

1.1 Inspection Details

Address:	1 Belhaven Avenue, Taroona
Inspection Time and Date:	9:00am, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	S - Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
1 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 2

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
310	0724 0725	Gap between pavers at the front paths. Gap between soil and edge of pavers. May have been caused by drying and skrinkage of soil.	-	-
311	0726 0727	Moderate crack in carport slab.There seems to be hogging at the crack most likely due to settlement of an edge.	1	R
312	0728 0729	Stone path around carport appears to have sunk ~45mm. Most likely settlement.	-	R
313	0730	Diagonal hairline crack in brickwork. Wooden stairs are obscuring view making it difficult to determine extent of crack and cause.	0	U
314	0731	Crack in timber at front door awning. Appears to be caused by sagging of the awning roof.	2	S
315	0732	Mortar is in poor condition on the western wall making it difficult to locate cracks. Some bricks appear to show some movement.	-	S
316	0733 0734	~1mm cracks either side of brick column. On the left the gap is wider at the bottom tapering to hairline at mid height. On the right crack is wider at the top. This indicates the column has rotated slightly to the left at the top. Most likely settlement.	1	R

Legend:

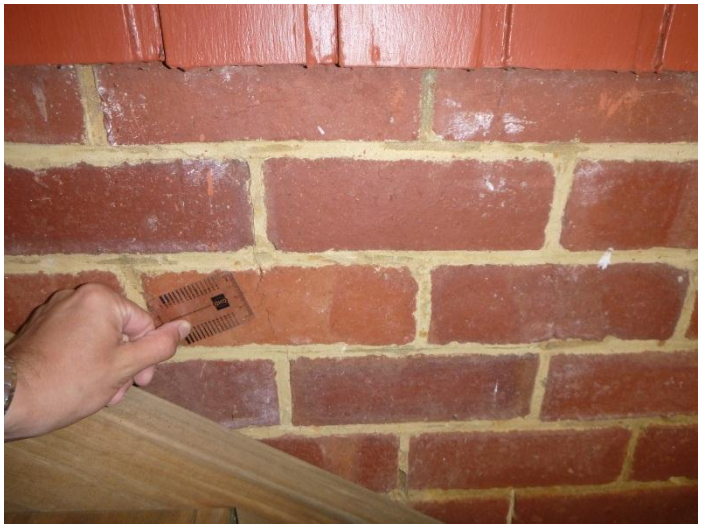
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

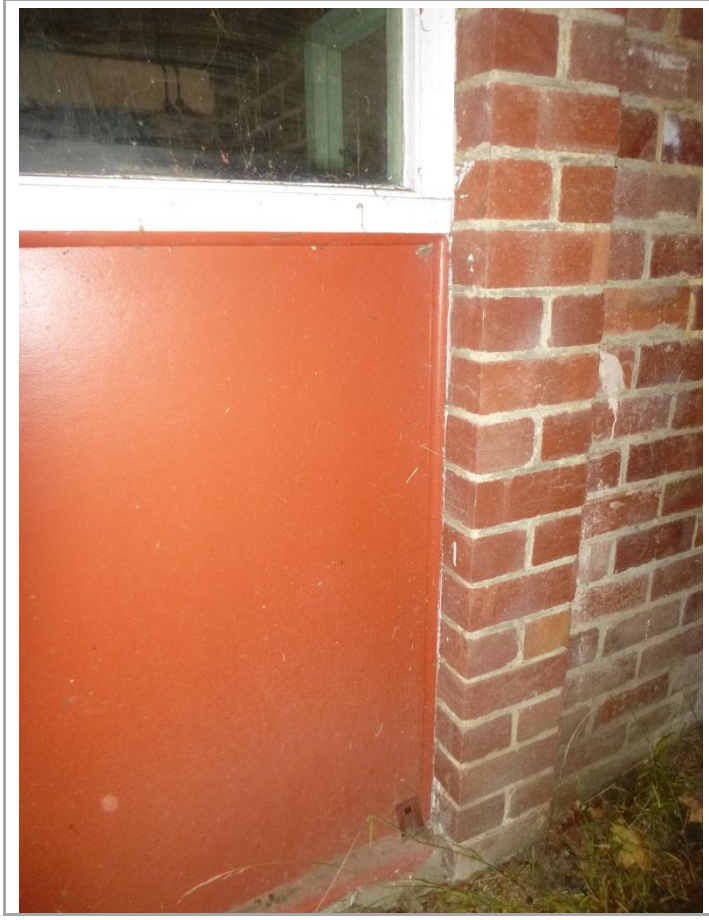
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 309 – Photo 0723	Reference 310 – Photo 0724
Reference 310 – Photo 0725	**Reference 311 – Photo 0726**

Reference 311 – Photo 0727	Reference 312 – Photo 0728
Reference 312 – Photo 0729	Reference 313 – Photo 0730
	

Reference 314 – Photo 0731	Reference 315 – Photo 0732
Reference 316 – Photo 0733	Reference 316 – Photo 0734
	

Reference 317 – Photo 0735	

6. Disclaimer

This report has been prepared by GHD for Kingborough Council and may only be used and relied on by Kingborough Council for the purpose agreed between GHD and the Kingborough Council as set out in the original agreement between the two parties.

GHD otherwise disclaims responsibility to any person other than Kingborough Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. GHD disclaims liability arising from any of the opinions, conclusions or recommendations being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from the on-site assessments. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.
Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1. Property Details

1.1 Inspection Details

Address:	2 Belhaven Avenue, Taroona
Inspection Time and Date:	10:30am, 13 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
2 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 3

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
76	0322	Diagonal crack at top of south western corner. Crack is ~5mm wide at the top and hairline ~400mm down.	2	R
76	0323 0325 0326	Cracks on either face of south western corner below window. Crack on western face is ~25mm wide. Crack on southern face is ~4mm. Corner appears to have settled. Numerous morerately sized trees in close proximity.	4	R
76	0324 0327	Diagonal crack on western face of corner from the top of the wall down to the top of the window. Crack is wider at the top (~6mm). Crack continues vertically down beside window. Shows approx 15mm movement near bottom.	3	R
77	0328	Small diagonal crack below window ~3mm wide at top tapering to hairline approx 300mm down. Wall below appears to be bulging out.	2	R
77	0329	Diagonal crack above window, ~4mm wide at bottom and narrowing at the top.	2	R
77	0330	~1mm diagonal crack extending from top right of window up to top of wall near corner.	1	R
77	0331 0332 0333 0334	Horizontal crack near base of front column. Approx ~6mm wide at front and hairline at back. Crack at top of column is ~3mm wide at back and hairline at front. Base of column appears to have moved independently to the top as column is no longer plumb. Likely due to settlement of supporting front porch slab.	3	R
77	0335 0336 0337	Top course of brickwork is not in-line with bricks below. Bricks below have moved ~12mm. The top course of bricks are likely being restrained by ceiling framing.	3	R
78	0338 0339 0340 0341	Crack in stairs to right of front door linking to vertical crack at corner of wall approx 3mm wide. Repointed crack above shows signs of movement (likely roatation due to settlement).	2	R
79	0342	Vertical crack in corner ~40mm wide at top. Again, lower bricks appear to have rotated to the south due to settlement of the footing and the top courses of brick are restrained by the roof/ceiling framing.	4	R
79	0343 0344 0345	Long horizontal crack near top of wall. Caused by settlement and lateral restraint of top courses of bricks.	2	R
80	0346 0347 0348 0349	Horizontal crack extending from inside layer of double brick to outer layer. Indicated settlement of corner.	4	R
81	0351 0352	Eastern section of house appears to be a more recent extension. Diagonal crack near corner. Horizontal cracks uniformly hairline, perpend are uniformly 3mm wide. At corner top bricks extend over bottom ones indicating horizontal movement of corner. Eastern wall may have settled and it rotating out.	2	R
83	0353 0354			
84	0355	Diagonal crack near back corner. Horizontal cracks uniformly hairline, perpend are uniformly ~7mm wide.	3	R
85	0356 0357 0358			

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
85	0359 0360	Construction joint between original brick and extension is in good condition with no observable damage. Glass strips have been glued to wall at various locations to measure long term movement.	-	-
86	0361 0362 0363 0364	~5m long horizontal crack near top of wall caused by bulging out. Similar to the other side of the house, the top few courses of bricks appear to be restrained by the rood framing.	2	R
86	0365 0366	Vertical & diagonal cracks between back stairs and wall. Crack is up to ~10mm wide and appears to be caused by settlement of outer wall.	3	R
87	0367	Double brick wall is on a noticeable angle. May have been caused by settlement or plants forcing their way between wall and concrete ramp.	-	O
88	0368	Diagonal crack predominantly uniform 3mm perpend cracks & hairline horizontal. Appears to be settlement of corner.	2	R
89	0369	~30mm gap between eaves and wall in corner. Unsure if wall or roof has moved.	4	U
90	0370	Diagonal crack in western wall with uniform ~1mm width. Vegetation located directly adjacent.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

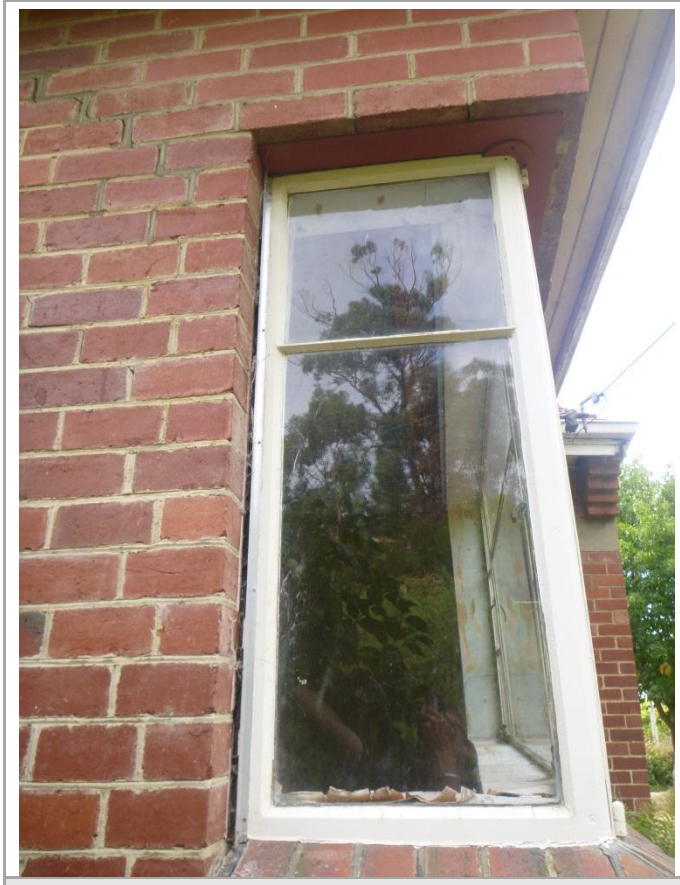
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 75 - Photo 0320	Reference 76 – Photo 0321
Reference 76 – Photo 0322	**Reference 76 – Photo 0323**

Reference 76 – Photo 0324



Reference 76 – Photo 0325

Reference 76 – Photo 0326

Reference 76 – Photo 0327

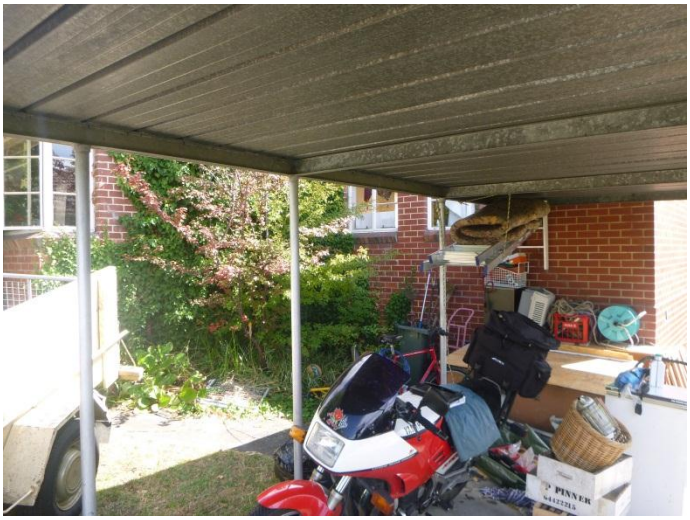
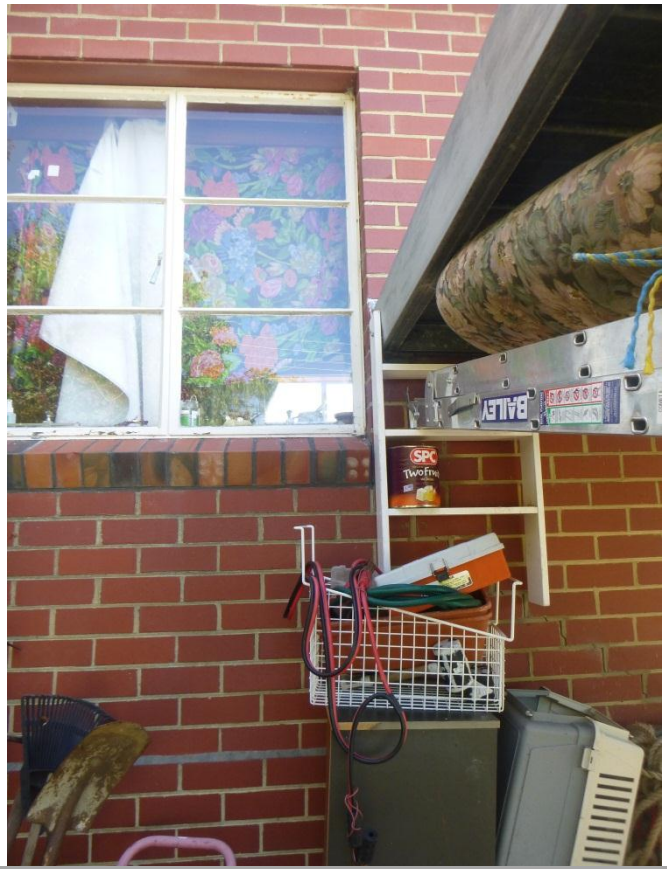
Reference 77 – Photo 0328	Reference 77 – Photo 0329
Reference 77 – Photo 0330	**Reference 77 – Photo 0331**

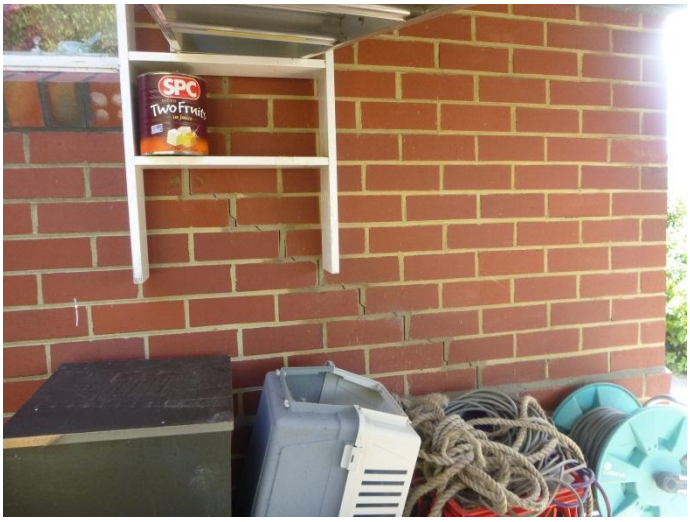
Reference 77 – Photo 0332	Reference 77 – Photo 0333
Reference 77 – Photo 0334	Reference 77 – Photo 0335

Reference 77 – Photo 0336	Reference 77 – Photo 0337
Reference 78 – Photo 0338	Reference 78 – Photo 0339

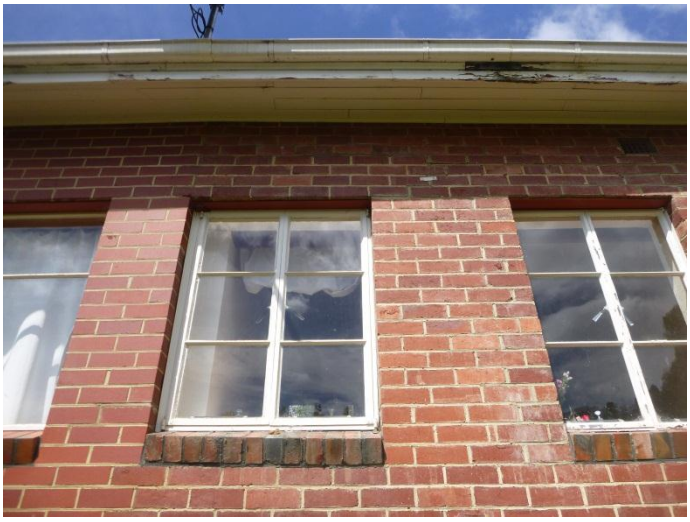
Reference 78 – Photo 0340	Reference 78 – Photo 0341
Reference 79 – Photo 0342	**Reference 79 – Photo 0343**

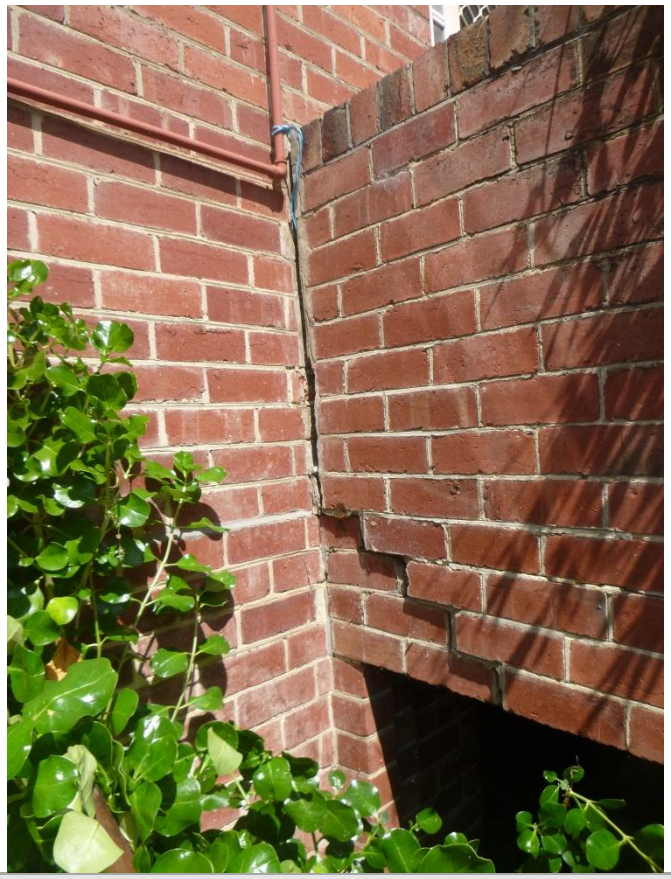
Reference 79 – Photo 0344	Reference 79 – Photo 0345
Reference 80 – Photo 0346	Reference 80 – Photo 0347

Reference 80 – Photo 0348	Reference 80 – Photo 0349
Reference 81 – Photo 0350	Reference 81 – Photo 0351
	

Reference 81 – Photo 0352	Reference 83 – Photo 0353
	
Reference 83 – Photo 0354	**Reference 84 – Photo 0355**

Reference 85 – Photo 0356	Reference 85 – Photo 0357
Reference 85 – Photo 0358	Reference 85 – Photo 0359

Reference 85 – Photo 0360	Reference 86 – Photo 0361
	
Reference 86 – Photo 0362	Reference 86 – Photo 0363

Reference 86 – Photo 0364	Reference 86 – Photo 0365
	
Reference 86 – Photo 0366	Reference 87 – Photo 0367

Reference 88 – Photo 0368	Reference 89 – Photo 0369
Reference 90 – Photo 0370	

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1. Property Details

1.1 Inspection Details

Address:	3 Belhaven Avenue, Taroona
Inspection Time and Date:	10:00am, 13 February 2013.

1.2 Property Details

Building:	Brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
3 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 4

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd
2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
960	1677 1678 1679	Driveway generall in good condition. Minor observable settlement of footpath.	-	R
961	1680	~1mm diagonal crack extending from top right of garage door up to the top of the corner on the right. Crack has been repointed in the past making it difficult to determine cause.	1	U
962	1681	~1.5mm diagonal crack top left side of garage door. This has also been repointed in the past.	2	U
963	1682	Down pipe has broken and no longer drains into stormwater. There doesn't appear to be any horizontal movement of supporting slab.	-	-
965	1684 1685	Diagonal crack below window on eastern wall. Crack tapers from ~1.5mm wide at windown sill down to hairline near ground. Settlement or heaving is the most likely cause.	2	R
966	1686	Concrete path has moved ~25mm away from wall. Likely due to settlement.	-	R
968	1688	Concrete path on southern side also shows signs of settlement.	-	R
969	1689			
969	1690	Diagonal crack in brickwork supporting ramp. Mortar is in poor condition so is difficult to assess degree of damage. Crack orientation indicates settlement as likely cause.	2	R
971	1691	Horizontal crack in brickwork near ground. Bricks below crack appear to have moved horizontally ~4mm out of plane.	2	R
967	1692	Diagonal crack inside back porch. Difficult to assess damage and cause due to a lack of access but crack appears to be ~10mm wide.	3	U
970	1693	Diagonal crack ~12mm wide near top of wall. Again, the back porch structure is obscuring view.	3	U
972	1694	Minor vertical crack in brick wall adjacent to vent. Crack is ~3mm wide at ground level and hairline ~400mm up. No observable horizontal cracks so is likely caused by settlement/heaving.	2	R
973	1695	~1mm diagonal crack near south western corner. Crack has been repointed in the past but appear to have been caused by settlement of the corner.	1	R
974	1698	~1mm diagonal crack on western face of south western corner. Again appears to indiciate settlement of corner.	1	R
979	1699	Two diagonal cracks ~8mm wide at the north western corner of the building. Damage is likely a result of a combination of reactive foundations and the large adjacent tree.	3	R
977	1700 1701 1702 1703			
978	1704 1705			
981	1706	~5mm gap between window frame and brickwork.	2	U
982	1708	Small crack through window sill. Damage is localised to the sill.	0	U
983	1709	Horizontal gap in brickwork top right of front door. Bricks appear to have dropped ~8mm likely due to localised settlement.	3	R
984	1710 1711	Horizontal crack beside front door ~ 5mm wide on right and tapering to hairline on the left. There appears to be some rotaion of the wall above the crack.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

984	1711	Diagonal crack top right of window ~5mm wide. Right side of sill may have dropped causing the damage. Possible due to settlement.	2	R
985	1712	Diagonal crack above window on eastern wall. Crack is ~3mm wide at top of window and hairline at top of wall. Potentially due to sagging of lintel.	1	S

Legend:

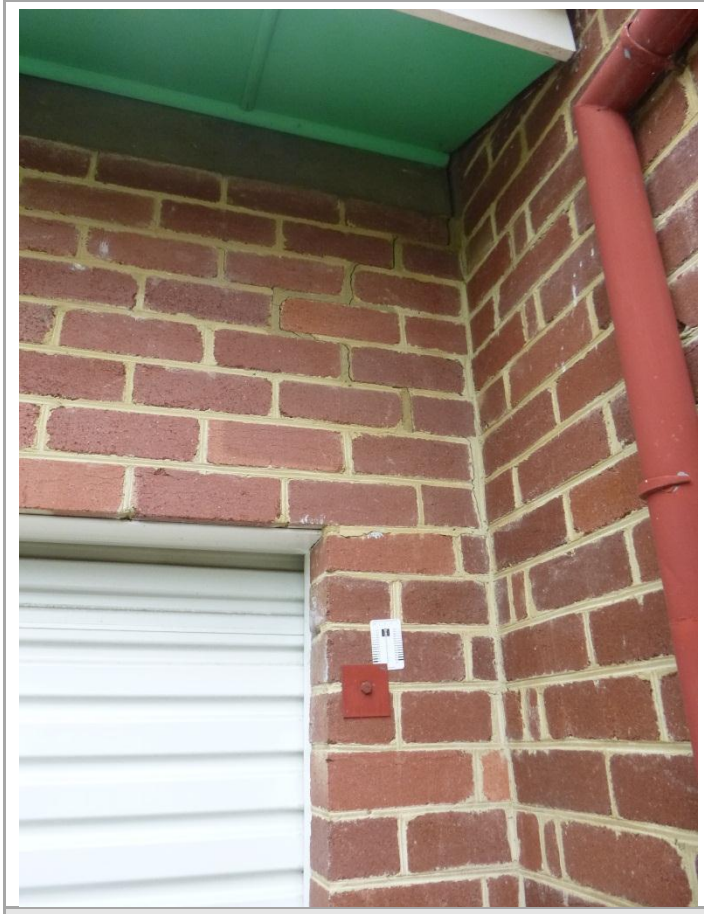
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

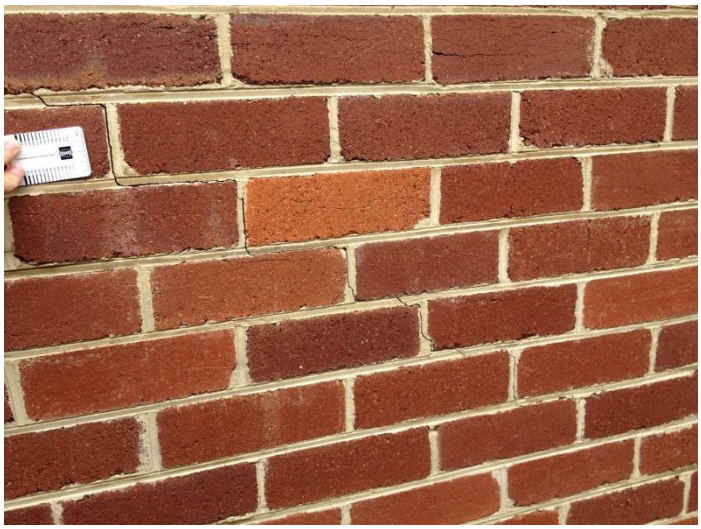
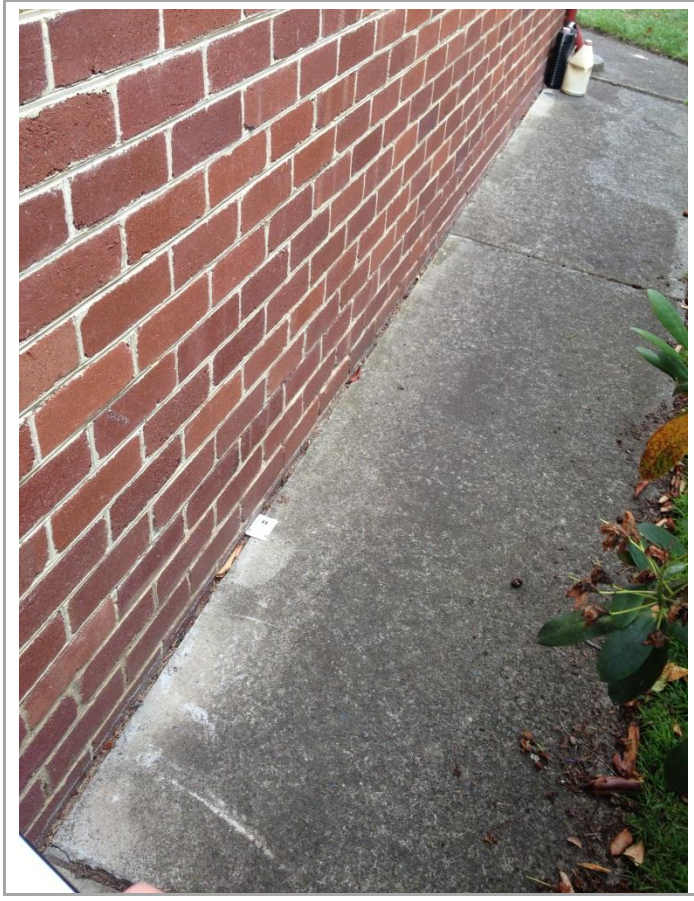
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

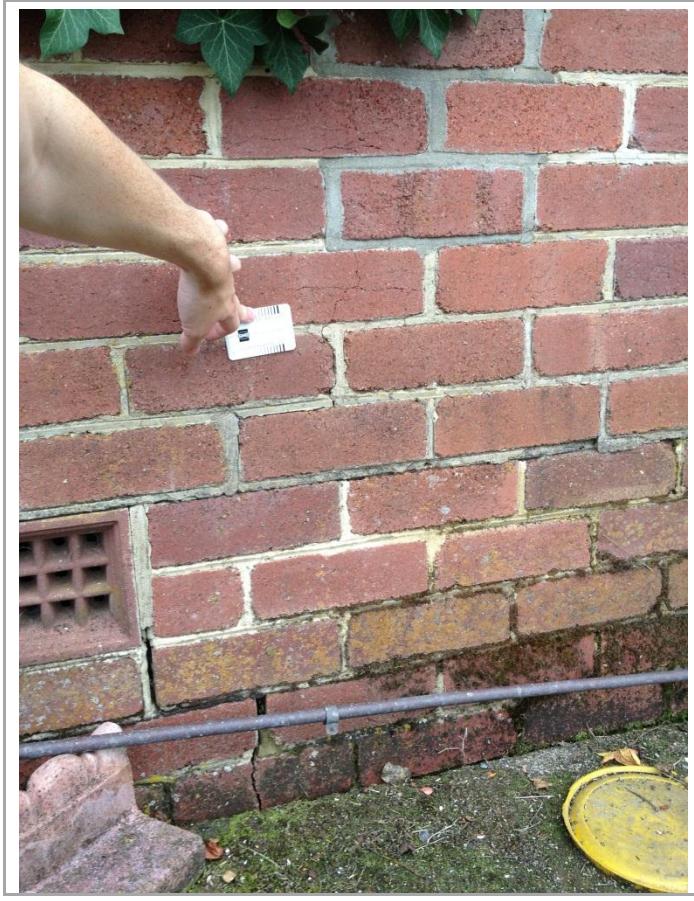
5. Photographs

Reference 959 – Photo 1676	Reference 960 – Photo 1677
Reference 960 – Photo 1678	**Reference 960 – Photo 1679**

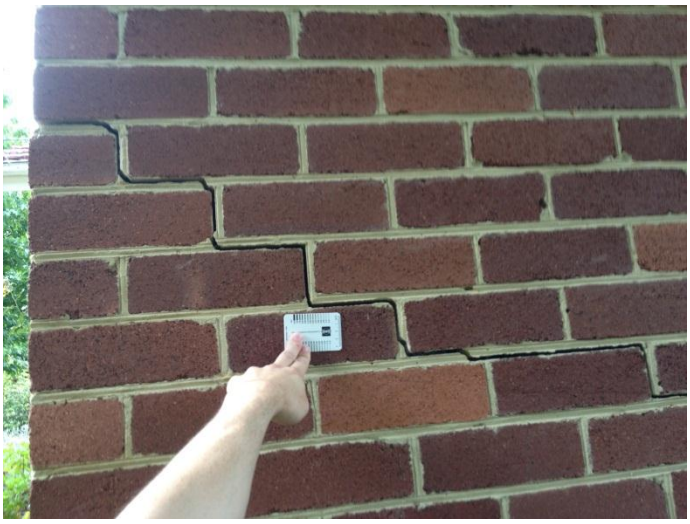
Reference 961 – Photo 1680	Reference 962 – Photo 1681
	
Reference 963 – Photo 1682	Reference 964 – Photo 1683

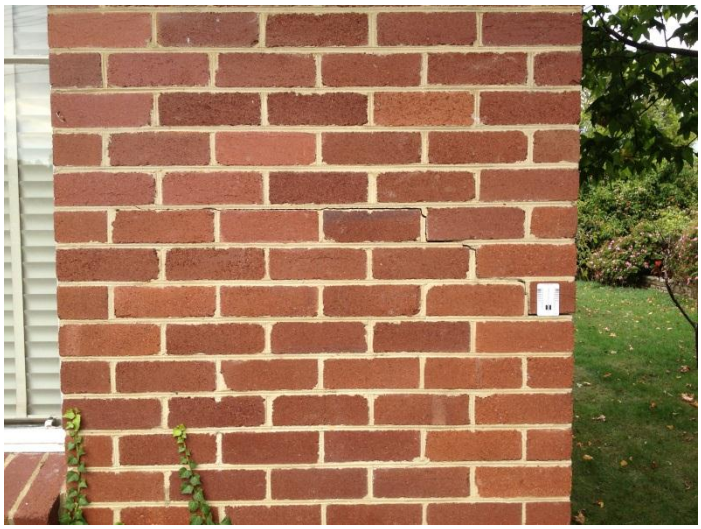
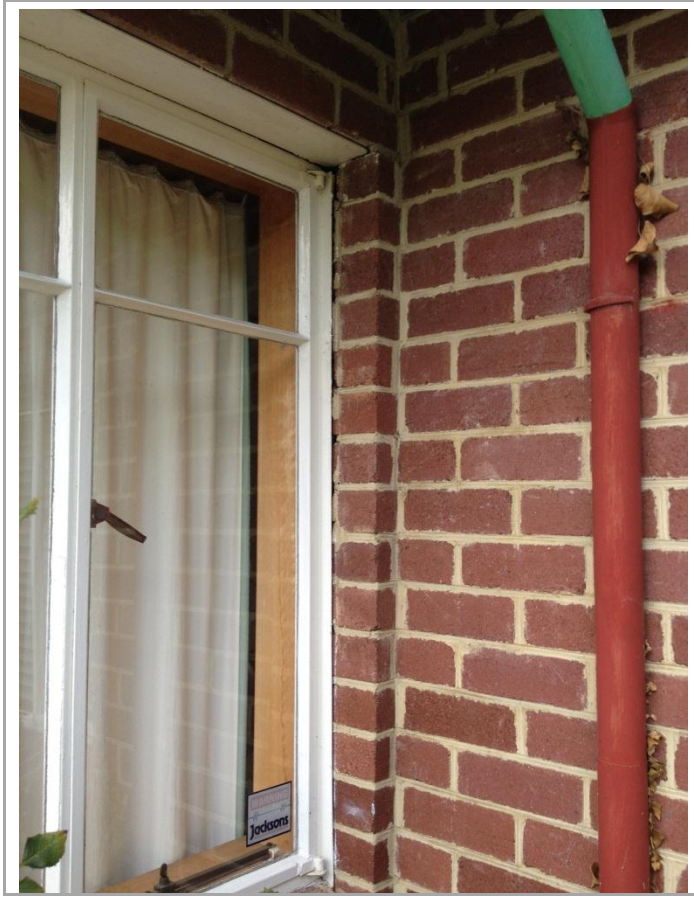
Reference 965 – Photo 1684	Reference 965 – Photo 1685
	
Reference 966 – Photo 1686	Reference 976 – Photo 1687
	

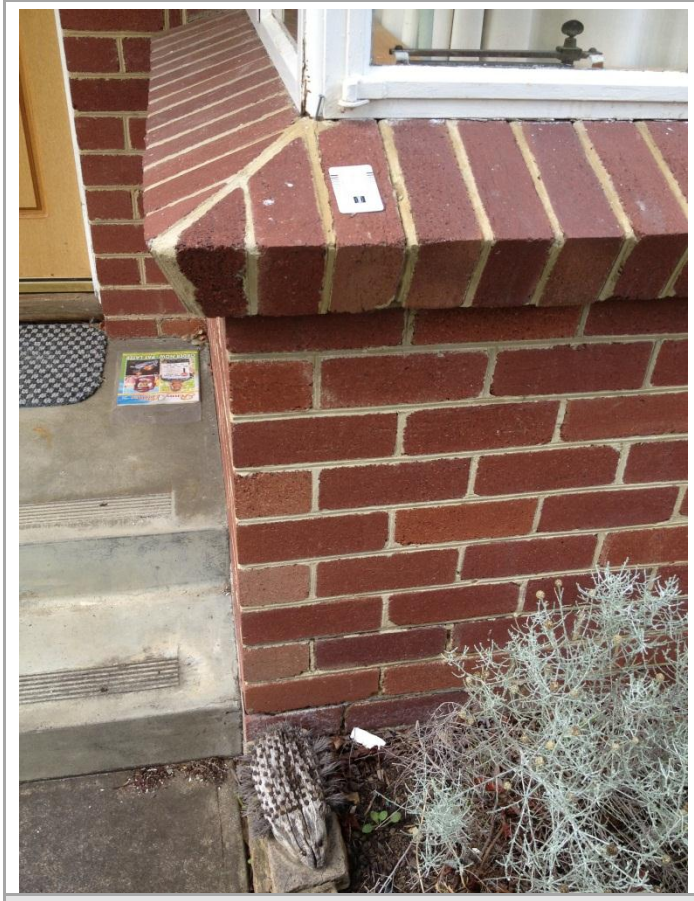
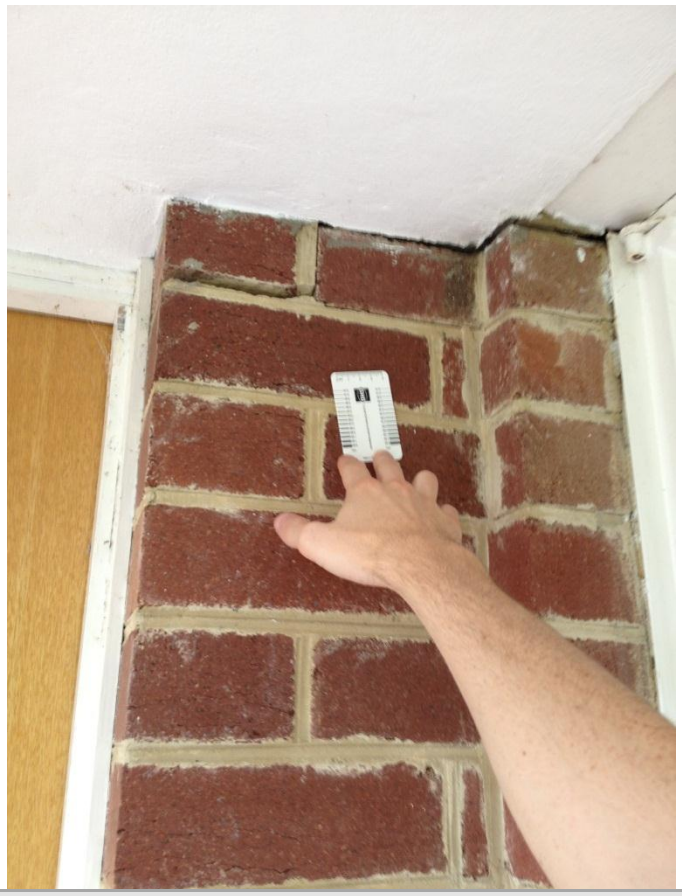
Reference 968 – Photo 1688	Reference 969 – Photo 1689
Reference 969 – Photo 1690	Reference 971 – Photo 1691

Reference 967 – Photo 1692	Reference 970 – Photo 1693
Reference 972 – Photo 1694	Reference 973 – Photo 1695
	

Reference 975 – Photo 1696	Reference 975 – Photo 1697
Reference 974 – Photo 1698	Reference 979 – Photo 1699

Reference 977 – Photo 1700	Reference 977 – Photo 1701
Reference 977 – Photo 1702	Reference 977 – Photo 1703
	

Reference 978 – Photo 1704	Reference 979 – Photo 1705
	
Reference 981 – Photo 1706	**Reference 980 – Photo 1707**
	

Reference 982 – Photo 1708	Reference 983 – Photo 1709
	
Reference 984 – Photo 1710	**Reference 984 – Photo 1711**

Reference 985 – Photo 1712	

6. Disclaimer

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1. Property Details

1.1 Inspection Details

Address:	6 Belhaven Avenue, Taroona
Inspection Time and Date:	9:50am, 19 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
6 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 5

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
319	0737	~2mm vertical crack beside window and through brickwork at bottom of wall.	2	U
320	0738 0739 0740	Minor diagonal crack in brickwork beside front door. Hairline at mid height and ~1.5mm at top. Possibly due to settlement.	2	R
321	0741 0742 0743 0744	Cracks in front porch slab. Cracks maybe due to shrinkage as slab is ~10m long with no crack control joints. Western slab shows some vertical movement and there is a corresponding diagonal crack in the supporting brickwork directly below. Brickwork crack is larger at the top than the bottom and vertical & horizontal cracks are approx. the same width. Likely vertical movement.	2	R
322	0745	Concrete drain has moved ~30mm away from wall on downhill side.	-	-
322	0746 0747	Diagonal arracks on either side of north eastern corner have been repointed relatively recently and have not yet re-cracked. Orientation of repointing indicates that damage was caused by settlement of corner.	-	R
324	0749 0750 0751	Back door ramp is rotating away from wall. Cracks in concrete ramp. Most likely settlement.	-	R

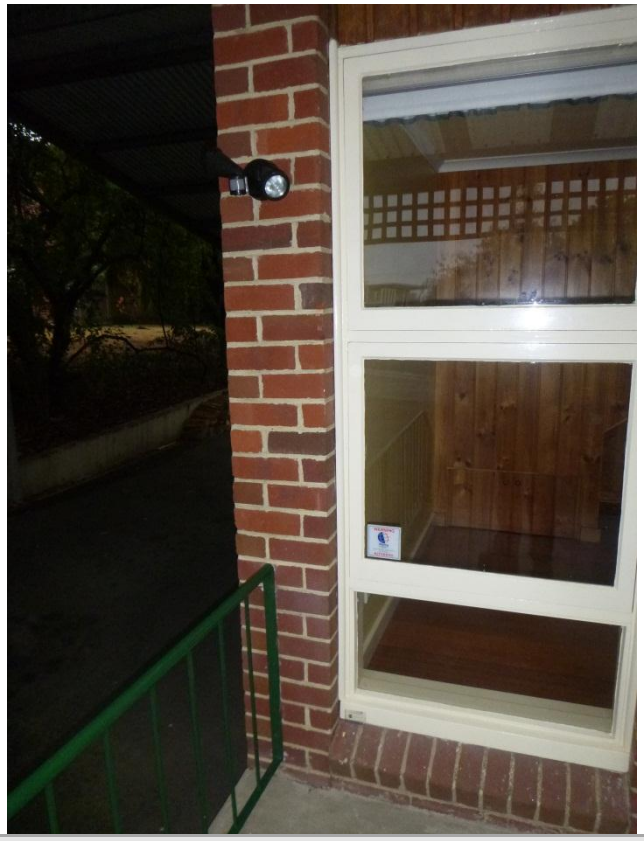
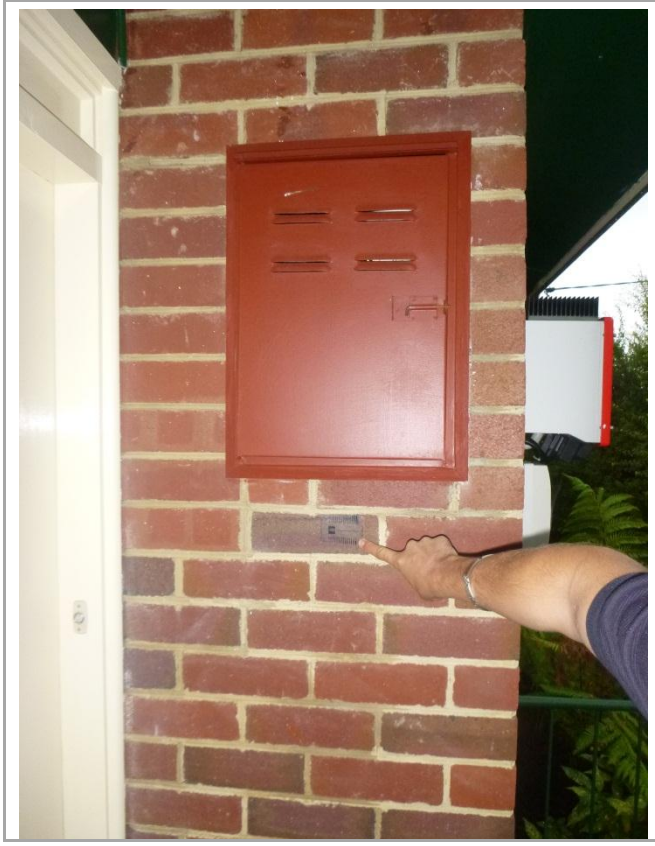
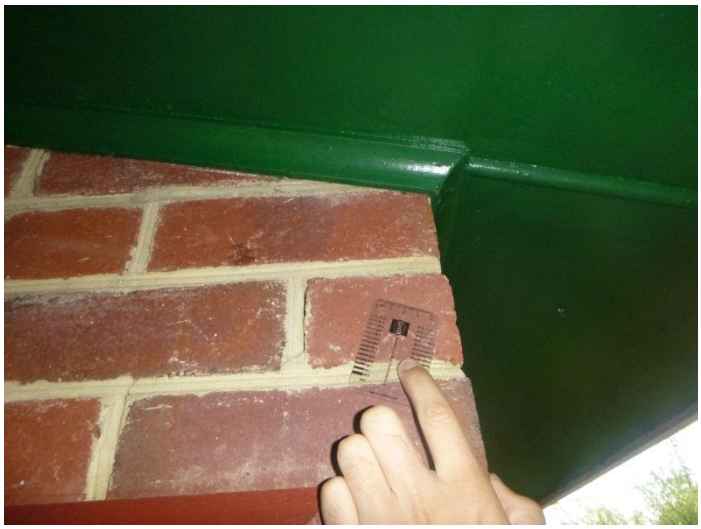
Legend:

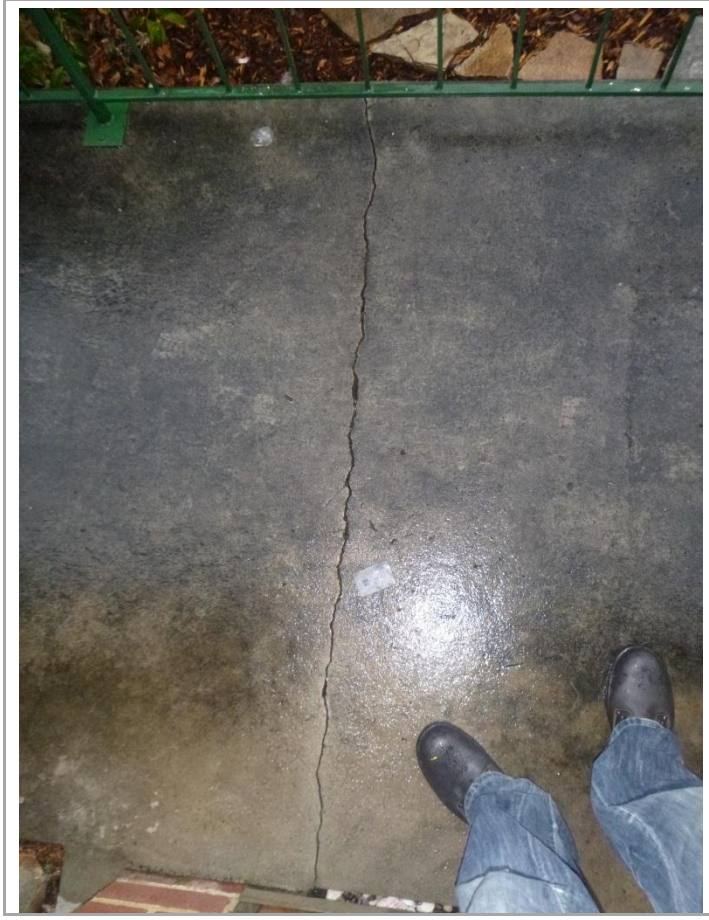
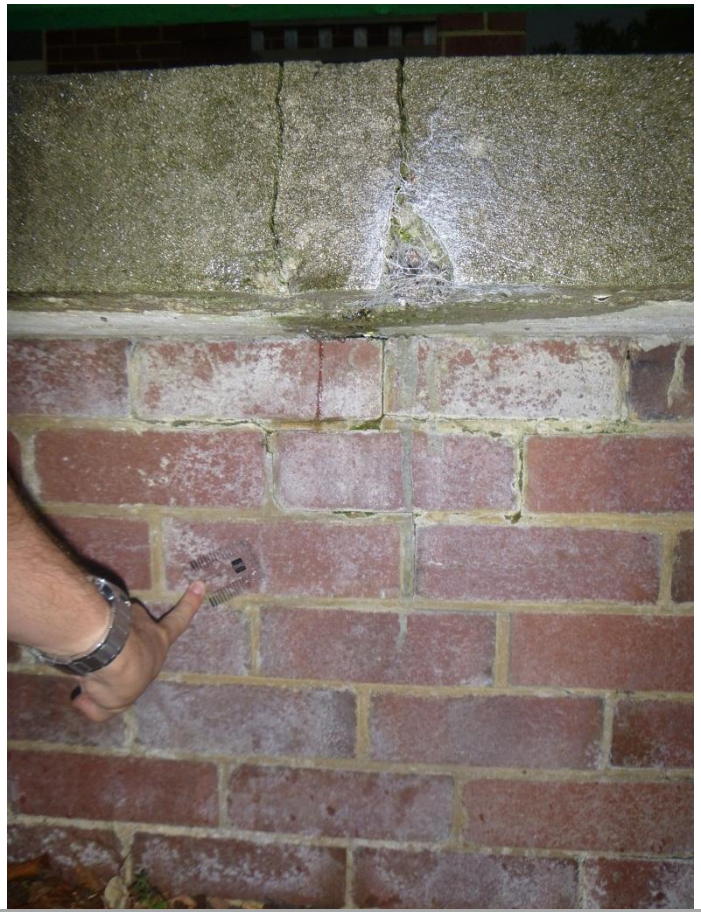
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

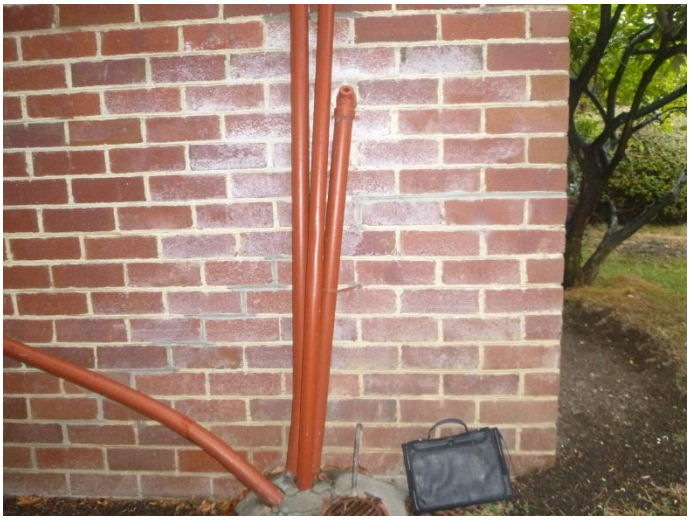
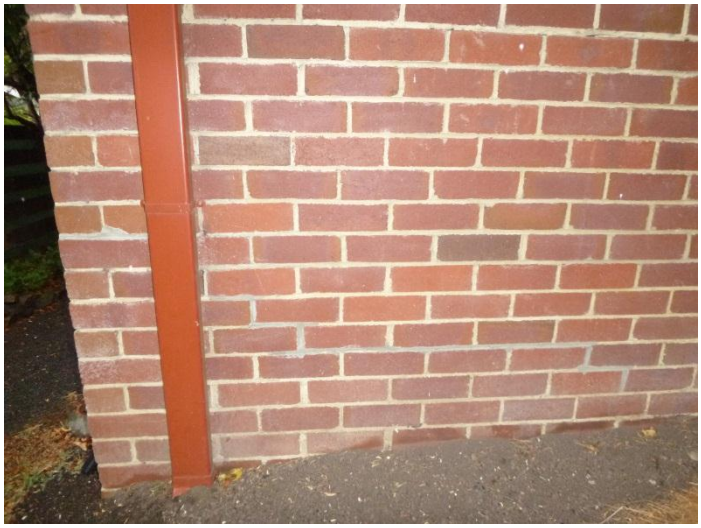
Notes:

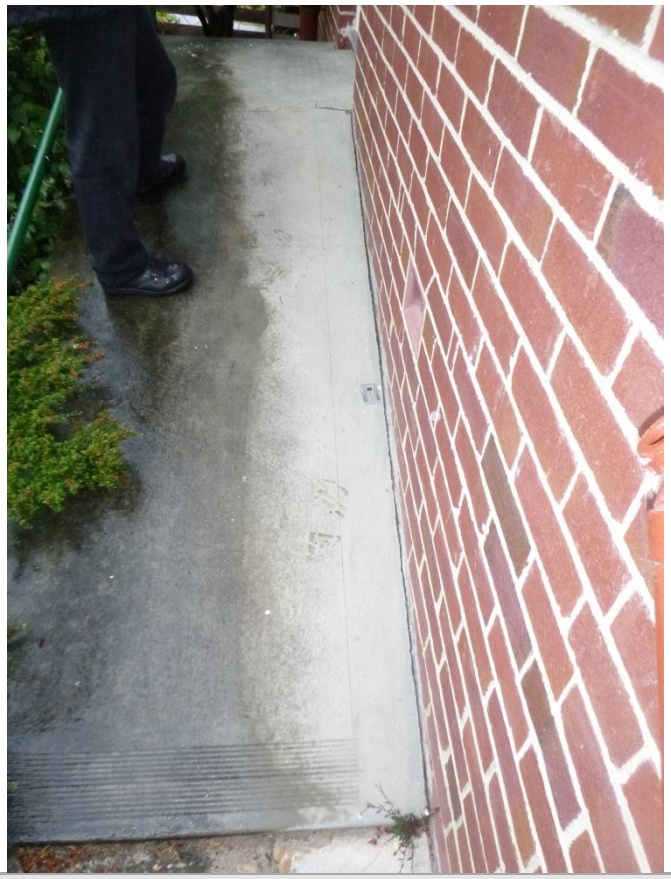
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

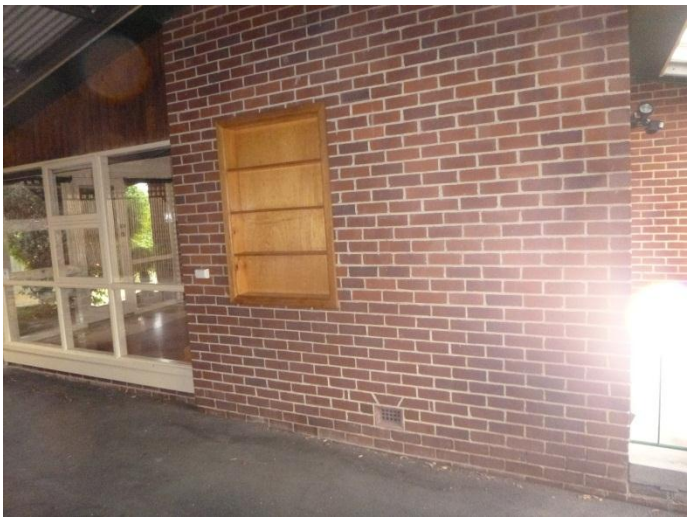
5. Photographs

Reference 318 - Photo 0736	Reference 319 – Photo 0737
	
Reference 320 – Photo 0738	**Reference 320 – Photo 0739**
	

Reference 320 – Photo 0740	Reference 321 – Photo 0741
Reference 321 – Photo 0742	Reference 321 – Photo 0743
	

Reference 321 – Photo 0744	Reference 322 – Photo 0745
Reference 322 – Photo 0746	Reference 322 – Photo 0747
	

Reference 323 – Photo 0748	Reference 324 – Photo 0749
	
Reference 324 – Photo 0750	Reference 324 – Photo 0751

Reference 325 – Photo 0752	
	

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1. Property Details

1.1 Inspection Details

Address:	8 Belhaven Avenue, Taroona
Inspection Time and Date:	10:30am, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
8 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 6

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
329	0756 0757	Room out the back is a timber frame extension on slab on ground. Large gap betweens original structure and extension ~20mm wide at the top and hairline at bottom. Small crack in footing also wider at top than the bottom. Could be caused by settlement and possibly racking of the timber frame.	3	R
331	0760	Crack under eves at north west corner of extension. Down pipe appears to have been bent. The northern wall may be racking to the east.	2	R
332	0761	More cracks under eves of extension. The northern wall may be racking to the east. Also vertical cracks between extension and original building on eastern side.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 326 - Photo 0753	Reference 327 – Photo 0754
Reference 328 – Photo 0755	**Reference 329 – Photo 0756**

Reference 329 – Photo 0757	Reference 329 – Photo 0758
Reference 330 – Photo 0759	Reference 331 – Photo 0760

Reference 332 – Photo 0761	Reference 333 – Photo 0762

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1. Property Details

1.1 Inspection Details

Address:	13 Belhaven Avenue, Taroona
Inspection Time and Date:	11:30am, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
13 BELHAVEN AV

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 7

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
499	0992	Vertical crack in brickwork below window. Vent has sheared through and bricks on the left have dropped ~2mm. Little horizontal movement so is likely settlement.	2	R
500	0993	Minor settlement of garage floor slab which has caused a crack.	2	R
503	0996 0997	Two hairline diagonal cracks in southern wall brickwork. Only indicate negligible movement.	0	U
504	0998	Diagonal crack near south eastern corner which has been partially repaired. Crack is ~1mm at top and hairline near bottom. Indicates potential settlement of corner.	1	R
506	1001	Diagonal crack in brickwork under deck on eastern side with or horizontal crack above. Bricks appear to be bulging out causing the diagonal crack. The top course of bricks is restrained by a suspended slab which has caused the horizontal crack.	1	U
506	1002	Footing for downpipes & drain has moved ~45mm horizontally downhill away from house.	-	-
507	1003	Diagonal cracks below concrete ramp. Wider at the top which likely indicates settlement.	1	R
508	1004 1005 1006 1007	Concrete path on eastern side has moved horizontally ~40mm to the east and vertically ~20mm. Likely caused by shrink/swell cycle.	-	R
509	1008	Diagonal crack near north eastern corner. ~1mm wide at top, hairline at bottom. Likely due to settlement.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

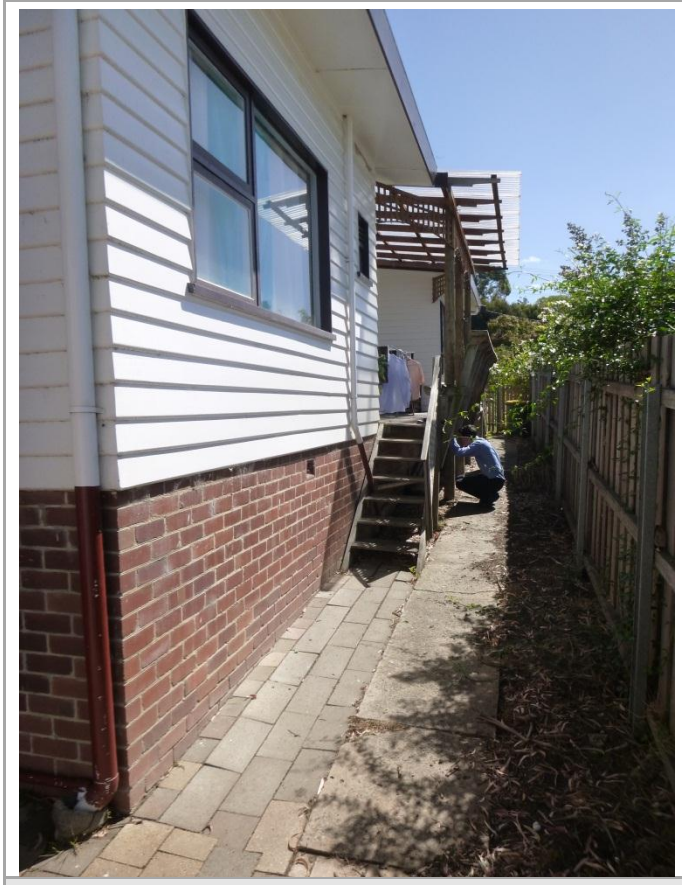
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 498 - Photo 0991	Reference 499 – Photo 0992
Reference 500 – Photo 0993	**Reference 501 – Photo 0994**

Reference 502 – Photo 0995	Reference 503 – Photo 0996
Reference 503 – Photo 0997	Reference 504 – Photo 0998

Reference 505 – Photo 0999	Reference 506 – Photo 1001
	
Reference 506 – Photo 1002	Reference 507 – Photo 1003

Reference 508 – Photo 1004	Reference 508 – Photo 1005
Reference 508 – Photo 1006	Reference 508 – Photo 1007

Reference 509 – Photo 1008	

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1. Property Details

1.1 Inspection Details

Address:	14 Belhaven Avenue, Taroona
Inspection Time and Date:	11:10am, 19 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations U – Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
14 BELHAVEN AV

Figure 8

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
335	0764 0765 0766	Driveway slab near front door has settled ~25mm. No observable horizontal movement.	-	R
337	0768 0769	Diagonal crack below window. ~5mm wide at top, hairline at bottom. Likely due to settlement of adjacent corner.	2	R
338	0770 0771 0772 0773	Vertical crack starting hairline at top of wall, moving around corner and changing to ~3mm at mid height then moving back around corner and changing to diagonal. Diagonal crack is wider at top than the bottom. The vertical crack shows the eastern wall has moved vertically up slightly.	2	U
339	0774 0775	Partially collapsed stone retaining wall is supporting severely undulating paving. Retaining wall is very porous which has likely caused the paving foundations to be washed away and led to the observed damage.	-	S
340	0776			
342	0778	Ramp near back door sloping away from house. Likely due to settlement.	-	R

Legend:

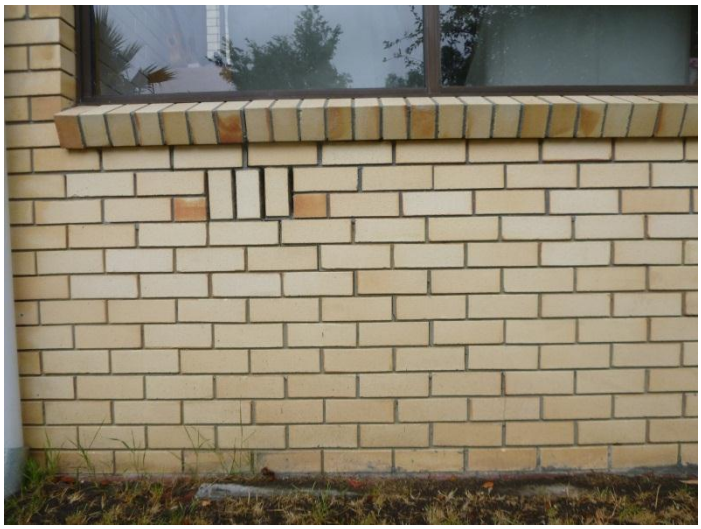
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 334 - Photo 0763	Reference 335 – Photo 0764
Reference 335 – Photo 0765	**Reference 335 – Photo 0766**

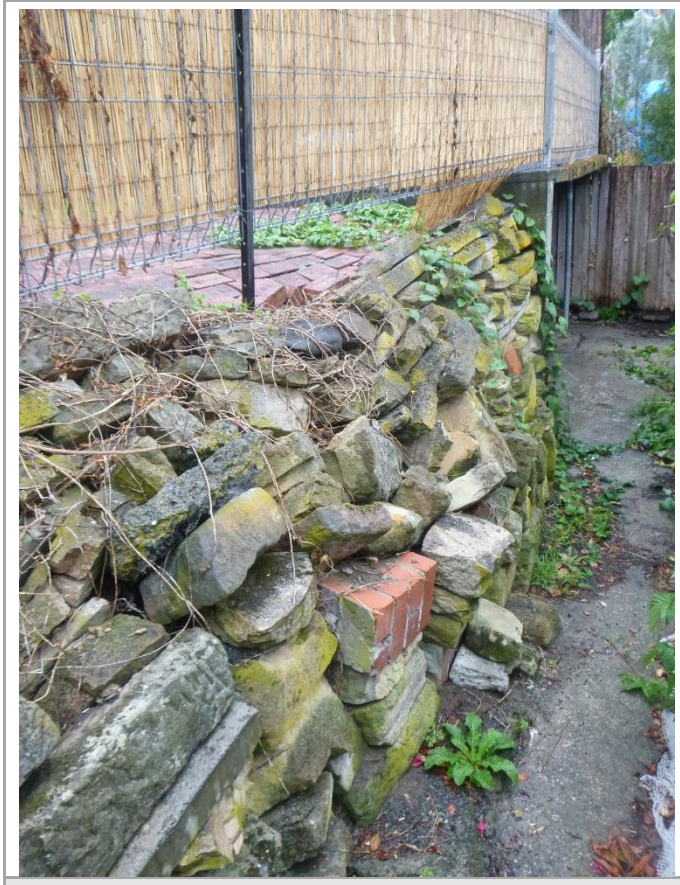
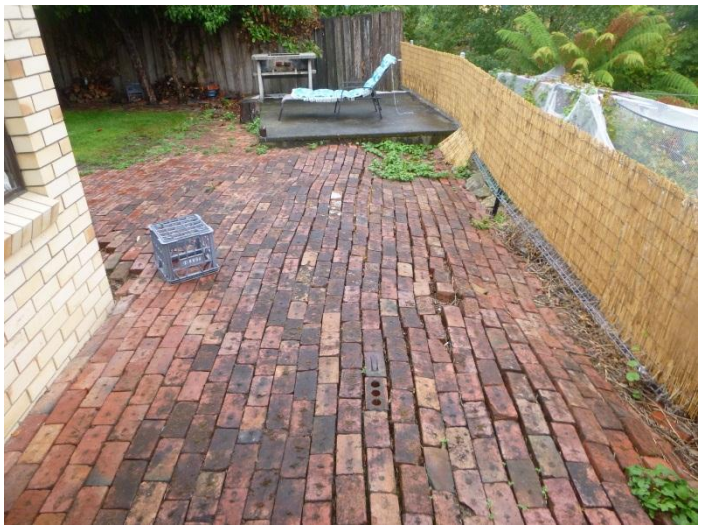
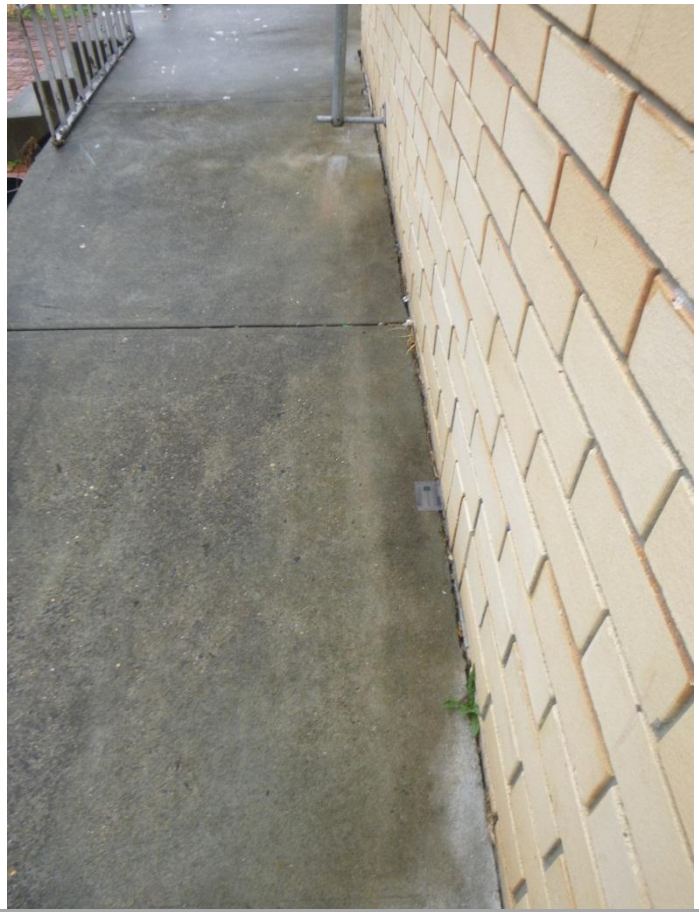
Reference 336 – Photo 0767	Reference 337 – Photo 0768
	
Reference 337 – Photo 0769	Reference 338 – Photo 0770

Reference 338 – Photo 0771

Reference 338 – Photo 0772

Reference 338 – Photo 0773

Reference 339 – Photo 0774

Reference 339 – Photo 0775	Reference 340 – Photo 0776
	
Reference 341 – Photo 0777	Reference 342 – Photo 0778
	

Reference 343 – Photo 0779	

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1. Property Details

1.1 Inspection Details

Address:	15 Belhaven Avenue, Taroona
Inspection Time and Date:	2:30pm, 13 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
15 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 9

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
104	0389	Various cracks in natural soil 30mm wide, 100mm deep. Possibly caused by old roots from nearby free stump.	-	U
105	0391	Vertical gap between timber cladding varying from 20mm at bottom. To hairline at mid height.	3	R
107	0393 0394	Timber door jamb to under house access has moved leaving a ~30mm gap on right side.	4	U
108	0395	Possible cracks in brickwork. Entire house has been recently painted so it difficult to tell.	-	-
109	0396	Small crack in brickwork near corner. Crack appears to have been ~1mm but has been painted over obstructing view.	1	U
110	0397	Gap between ramp and wall. Ramp seems to slope away from house. Outer side of ramp appears to have settled.	-	R
111	0398 0399	Outer brick wall has gap at top between brick & timber cladding. Small crack in brickwork near ground also indicates outer wall has rotated outwards. Plumb line also reveals bricks have rotated out. Most likely caused by settlement of bricks.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

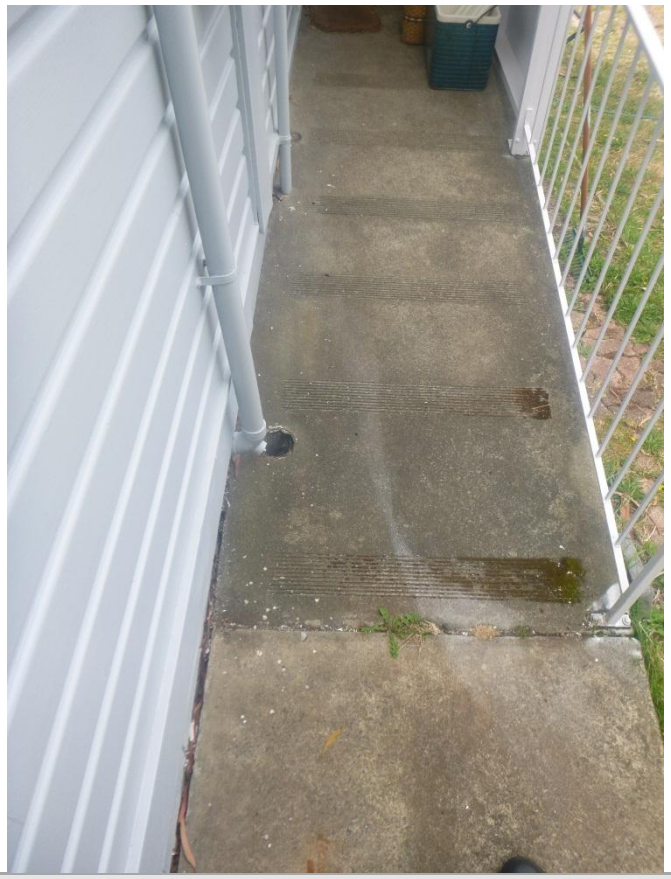
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference - Photo 0388	Reference – Photo 0389
Reference – Photo 0390	Reference – Photo 0391

Reference – Photo 0392	Reference – Photo 0393
Reference – Photo 0394	Reference – Photo 0395

Reference – Photo 0396	Reference – Photo 0397
	
Reference – Photo 0398	**Reference – Photo 0399**

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1. Property Details

1.1 Inspection Details

Address:	17 Belhaven Avenue, Taroona
Inspection Time and Date:	10:30am, 12 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
17 BELHAVEN AV

Figure 10

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
22	0178 0179 0180	~15mm differential vertical movement between slabs near front door. Likely caused by reactive foundations and the numerous medium sized trees in the vacinity.	-	R
23	0181 0182	Minor cracks in front driveway. Crack are located inbetwee two control joints spaced apart by ~10m.	-	R
24	0183 0184	Diagonal crack in brickwork ~5mm wide at bottom and narrower at the top. Appears to be caused by heaving of corner of wall.	2	R
26	0186	Vertical and diagonal crack in corner that had been repaired in the past. Crackis wider at the top. Likely due to differential vertical movement.	1	R
26	0187	Diagonal crack near corner with hairline horizontal cracks and ~1mm wide vertical cracks.	1	R
27	0188	Diagonal crack near vent with hairline horizontal cracks and ~1mm wide vertical cracks.	1	R
27	0189 0190	Mortar in poor condition. Diagonal crack extending up from bottom of corner. Vertical cracks are wider at the top and horizontal cracks hairline. Probable Caused by settlement of corner.	2	R
27	0191	Numerous cracks in concrete footpath path. Undulating surface indicating vertical movement.	-	R
28	0192 0193 0194	Mortar in poor condition. Diagonal near corner with perpend cracks of uniform ~4mm width. Corner appear to have moved horizontally. Most likely due to repeated cyclic vertical movements.	2	R
29	0195			
30	0196	Mortar in poor condition. Difficult to determine if there has been any movement.	-	-
31	0197	Small crack near bottom of brick subfloor wall. Mortar is in poor condition so it is difficult to determine size or cause of crack.	2	U

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

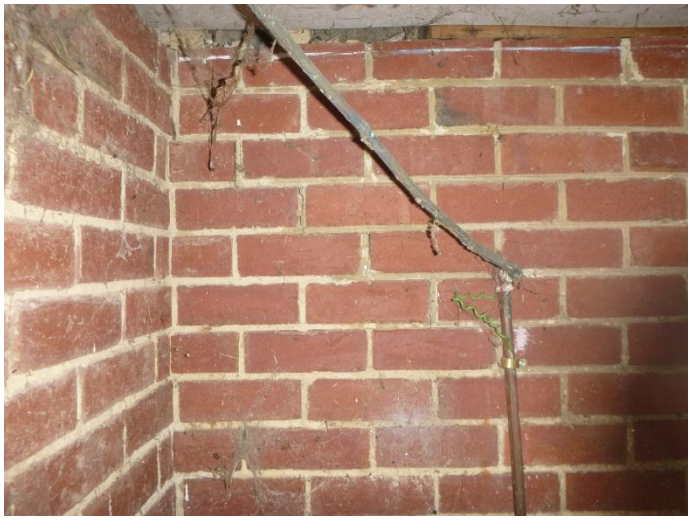
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 21 - Photo 0177	Reference 22 – Photo 0178
Reference 22 – Photo 0179	Reference 22 – Photo 0180

Reference 23 – Photo 0181	Reference 23 – Photo 0182
Reference 24 – Photo 0183	Reference 24 – Photo 0184

Reference 25 – Photo 0185	Reference 26 – Photo 0186
Reference 26 – Photo 0187	Reference 27 – Photo 0188
	

Reference 27 – Photo 0189

Reference 27 – Photo 0190

Reference 27 – Photo 0191

Reference 28 – Photo 0192

Reference 28 – Photo 0193	Reference 28 – Photo 0194
Reference 29 – Photo 0195	Reference 30 – Photo 0196

Reference 31 – Photo 0197	Reference 32 – Photo 0198

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1. Property Details

1.1 Inspection Details

Address:	18 Belhaven Avenue, Taroona
Inspection Time and Date:	9:30am, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations U – Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
18 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 11

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
481	0967	Vertical crack below window, ~1.5mm at the top, hairline further down. Most likely a result of reactive soils and the large adjacent tree.	2	R
481	0968	Diagonal crack at top of brickwork wider at the top and likely caused by nearby tree. Also evidence of flexible sealant repair which is obscuring other cracks.	1	R
483	0970 0971	Diagonal crack in brickwork below back door. Vertical cracks are of uniform ~3mm with, horizontal cracks are hairline.	2	U
483	0972	Small diagonal crack has been painted over and has not opened up. Appears to have stopped moving.	-	R
484	0973	Driveway & paths are gravel rather than concrete and don't show any clear signs of damage.	-	-

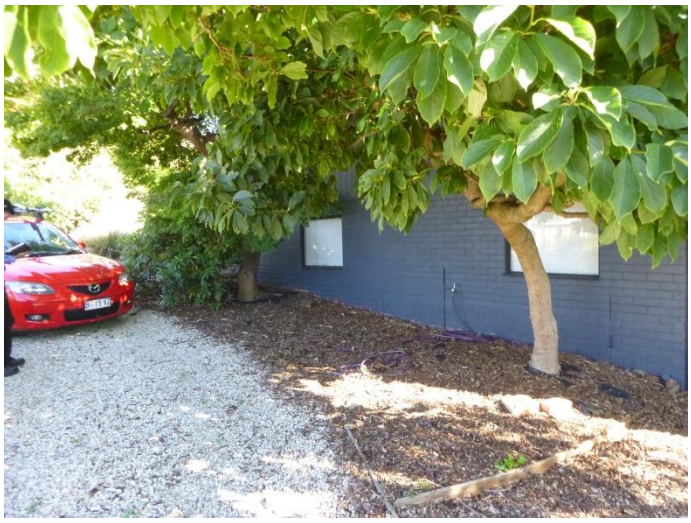
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 478 - Photo 0964	Reference 479 – Photo 0965
Reference 480 – Photo 0966	**Reference 481 – Photo 0967**
	

Reference 481 – Photo 0968	Reference 482 – Photo 0969
Reference 483 – Photo 0970	Reference 483 – Photo 0971

Reference 483 – Photo 0972	Reference 484 – Photo 0973

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1. Property Details

1.1 Inspection Details

Address:	19 Belhaven Avenue, Taroona
Inspection Time and Date:	11:15am, 12 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
19 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 12

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2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
34	0200	Small diagonal crack near corner. Most likely due to settlement of corner.	1	R
36	0202	Rising damp observable on bricks at south eastern corner of house.	-	-
37	0203 0204	Mortar in southern subfloor wall in poor condition. ~1mm wide cracks in various orientations.	1	R
38	0207 0208 0209 0210 0211 0212	Various cracks in natrual soil. Consistent with drying of soil causing shrinkage tension cracks.	-	-
39	0213	Horizontal crack near corner north western corner of building. Crack is ~10mm wide and 300mm long. May be caused by settlement of corner.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

GHD	KINGBOROUGH COUNCIL TAROONA LANDSLIDE RISK ASSESSMENT STAGE 2 19 BELHAVEN AVE, TAROONA LIST OF IDENTIFIED ISSUES	JOB NUMBER: 3216698 REVISON: 0 DATE: 12/02/13 SHEET 1 of 1

5. Photographs

Reference 33 - Photo 0199	Reference 34 – Photo 0200
Reference 35 – Photo 0201	**Reference 36 – Photo 0202**

Reference 37 – Photo 0203	Reference 37 – Photo 0204
Reference 35 – Photo 0205	Reference 35 – Photo 0206

Reference 38 – Photo 0207	Reference 38 – Photo 0208
Reference 38 – Photo 0209	Reference 38 – Photo 0210

Reference 38 – Photo 0211	Reference 38 – Photo 0212
Reference 39 – Photo 0213	

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1. Property Details

1.1 Inspection Details

Address:	21 Belhaven Avenue, Taroona
Inspection Time and Date:	12:00pm, 12 February 2013.

1.2 Property Details

Building:	Brick veneer, partial weatherboard
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Steep
Amount of vegetation:	High
Site Drainage:	Good
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
21 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 13

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
41	0215	Cracks in concrete driveway appear to be caused by large gum tree roots.	-	O
42	0216	Minor horizontal crack through outer layer of bricks.	0	U
42	0217	Another horizontal crack through outer layer of bricks. No apparent cause.	1	U
43	0218 0219 0220	Diagonal crack indicating corner has settled. Consistent with reactive soils and the amount of vegetation nearby.	1	R
42	0221	Horizontal crack between paveing and wall. Paving has likely settled.	-	R
42	0222	Crack in floor tiles again indicating that the corner of the pavers has dropped.	-	R
45	0226 0227 0228 0229	~20mm gap top and bottom of wooden window frame. Gaps between edge of glass and midheight horizontal member. Doesn't appear to be any movement of slab footing so may be an issue with construction of timber framing.	3	S
46	0230 0231	~10mm horizontal crack in floor slab but appears to be little vertical movement. Likely due to differential settlement of slab. Resident indicated that slab was constructed on fill.	3	R
47	0232	Cracks in natural soil likely due to drying of the soil and downhill creep.	-	O
48	0233 0234	Garage was constructed on fill with an embankment on the water side. Significant	-	-

Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 40 - Photo 0214	Reference 41 – Photo 0215
Reference 42 – Photo 0216	**Reference 42 – Photo 0217**

Reference 43 – Photo 0218	Reference 43 – Photo 0219
Reference 43 – Photo 0220	Reference 42 – Photo 0221

Reference 42 – Photo 0222

Reference 44 – Photo 0223

Reference 45 – Photo 0224

Reference 45 – Photo 0225

Reference 45 – Photo 0226

Reference 45 – Photo 0227

Reference 45 – Photo 0228

Reference 45 – Photo 0229

Reference 46 – Photo 0230	Reference 46 – Photo 0231
Reference 47 – Photo 0232	Reference 48 – Photo 0233

Reference 48 – Photo 0234	

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1. Property Details

1.1 Inspection Details

Address:	23 Belhaven Avenue, Taroona
Inspection Time and Date:	2:45pm, 13 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
23 BELHAVEN AV

Figure 14

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd
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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
114	0402 0403	30mm movement between concrete stairs and large rocks.	-	R
116	0406	Driveway has settled and moved ~40mm downhill. Foundation is embankment of large rocks retaining FCR fill . More then one rock has fallen leaving part of the slab unsupported.	-	R
115	0404 0405	Diagonal crack extending down on the left side of lintel. Cracks is of uniform ~8mm wide perpend cracks, 1mm wide horizontal cracks.	3	R
118	0408 0409	Slab on eastern side of the house was originally cast against ground but foundation has since been undermined. Slab is now mostly unsupported.	-	R
118	0409	Vertical perpend crack in bricks ~6mm wide indicating horizontal movement.	3	R
119	0410	Gap between concrete slab and house ~40mm wide near north eastern corner. Slab & step are supported by stone retaining wall. The retaining wall may have moved and caused supported elements to move.	-	S
120	0411 0412 0413 0414		-	S
121	0415 0416		-	-
122	0417 0418	Evidence of movement of bottom bricks near corner. No cracks is surrounding slabs which indicates that there has little to no movement in recent years.	1	R

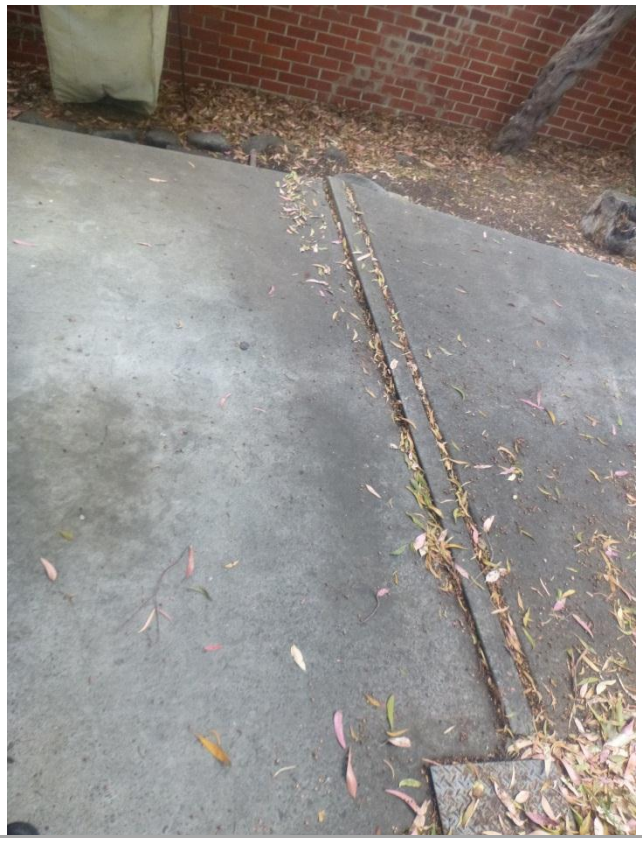
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 112 - Photo 0400	Reference 113 – Photo 0401
Reference 114 – Photo 0402	**Reference 114 – Photo 0403**
	

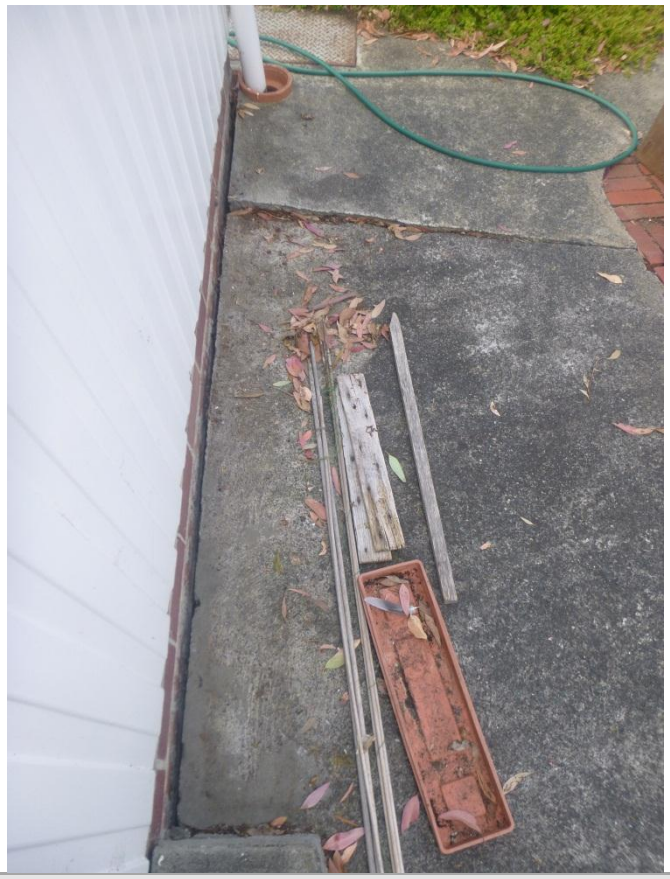
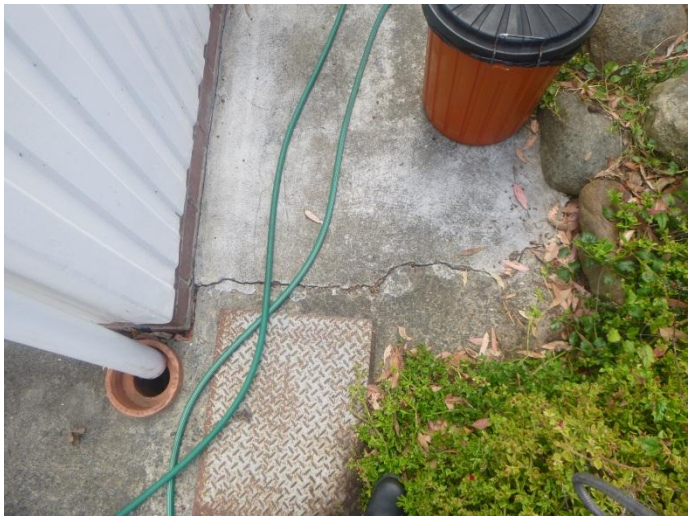
Reference 115 – Photo 0404

Reference 115 – Photo 0405

Reference 116 – Photo 0406

Reference 117 – Photo 0407

Reference 118 – Photo 0408	Reference 118 – Photo 0409
Reference 119 – Photo 0410	Reference 120 – Photo 0411

Reference 120 – Photo 0412	Reference 120 – Photo 0413
	
Reference 120 – Photo 0414	Reference 121 – Photo 0415
	

Reference 121 – Photo 0416

Reference 122 – Photo 0417

Reference 122 – Photo 0418

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1. Property Details

1.1 Inspection Details

Address:	24 Belhaven Avenue, Taroona
Inspection Time and Date:	3:30pm, 13 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
24 BELHAVEN AV

Figure 15

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
125	0421 0422	Entire front slab has moved ~7mm away from the house in a southerly direction.	-	U
126	0423		-	U
127	0424		-	U
128	0425 0426	~3mm vertical crack near bottom of south eastern corner. Shows minor out of plane movement of bricks on the eastern face.	2	R
128	0427 0428	Mid height cracks also show differential horizontal movement of ~2mm.	2	R
128	0429	Small ~1.5mm wide diagonal crack tending to vertical at the right. Perpend cracks are slightly larger than horizontal cracks.	2	U
129	0430	Diagonal crack with hairline horizontal cracks and ~1mm perpend cracks. Indicates slight differential horizontal movement.	1	R
130	0431 0432	Diagonal crack near corner. Uniformly widthed horizontal & vertical cracks. Bricks below crack have moved ~2mm out of plane to the North.	2	R
131	0433	Vertical cracks at top of wall ~4mm at top transitioning to hairline at ~700mm down.	2	R

Legend:

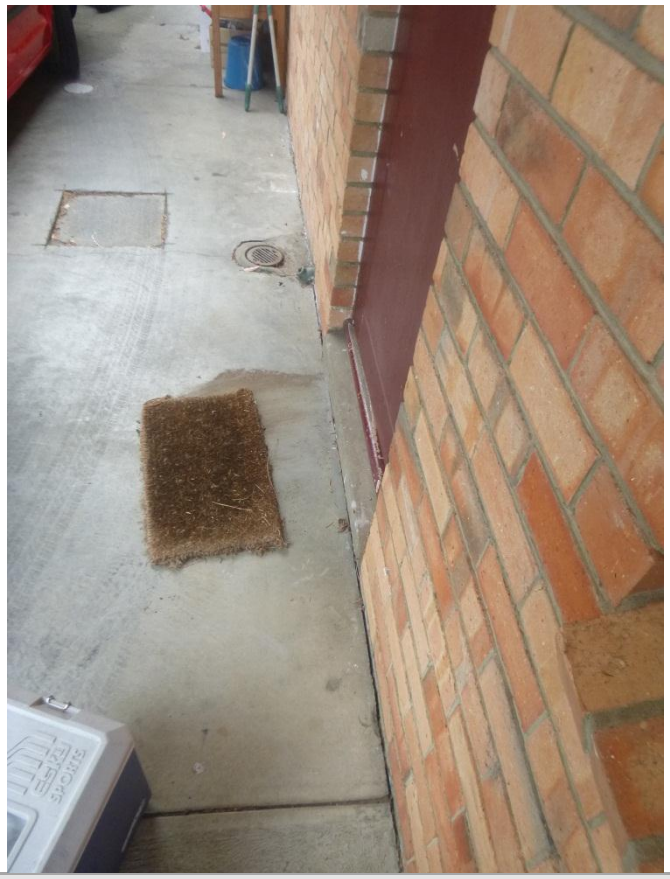
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 123 - Photo 0419	Reference 124 – Photo 0420
Reference 125 – Photo 0421	**Reference 125 – Photo 0422**

Reference 126 – Photo 0423	Reference 127 – Photo 0424
	
Reference 128 – Photo 0425	Reference 128 – Photo 0426

Reference 128 – Photo 0427

Reference 128 – Photo 0428

Reference 128 – Photo 0429

Reference 129 – Photo 0430

Reference 130 – Photo 0431	Reference 130 - Photo
Reference 131 - Photo	**Reference 132 - Photo**

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1. Property Details

1.1 Inspection Details

Address:	26 Belhaven Avenue, Taroona
Inspection Time and Date:	10:00am, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
26 BELHAVEN AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 16

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
486	0975 0976	Horizontal movement of blockwork retaining wall. Possibly due to undersized footings. Similar wall to the right has not moved probably because its being restrained by a large rock.	-	S
489	0979	Concrete footpath has moved horizontally ~20mm away from house in downhill direction. Likely some minor settlement.	-	R
490	0980	Bottom of concrete slab is showing evidence of spalling. Appears to have been poorly constructed (poorly vibrated) and has insufficient cover.	3	S
491	0981	Rebar under suspended slab deck had no cover whatsoever.	3	S
492	0982	Spalling on underside of suspended slab. Appears to be poorly constructed.	3	S
493	0983		3	S
494	0984	Crack in top of suspended slab. Slab is partially cantilevering. Cantilever appears to be sagging which has caused the crack.	1	R
495	0986	Minor diagonal crack in brickwork. May have been caused by close proximity of large tree.	1	R
496	0987 0988	Diagonal cracks either side of two windows on the western side. Potentially due to close proximity of large tree.	1	R
497	0989 0990		0	R

Legend:

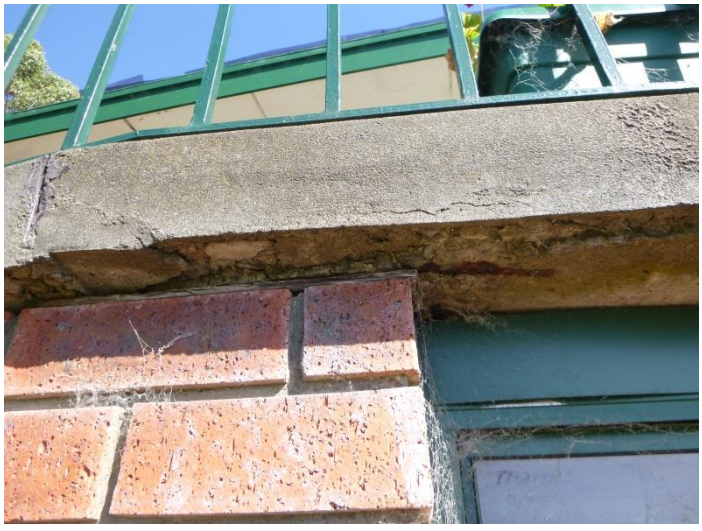
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

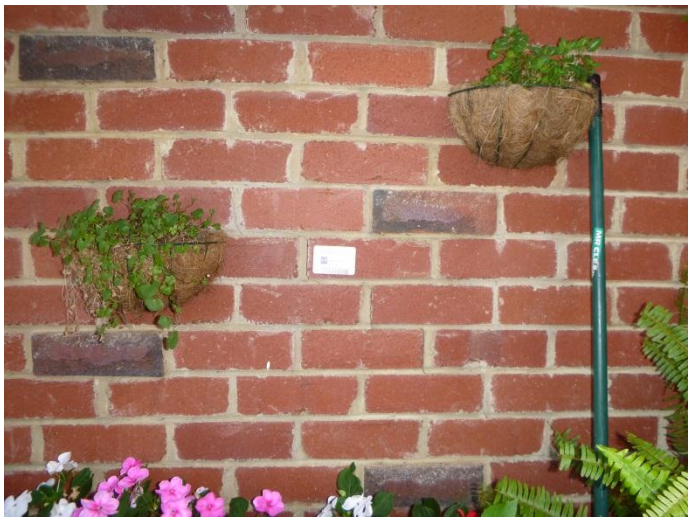
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 485 - Photo 0974	Reference 486 – Photo 0975
Reference 486 – Photo 0976	Reference 487 – Photo 0977

Reference 488 – Photo 0978	Reference 489 – Photo 0979
Reference 490 – Photo 0980	Reference 491 – Photo 0981
	

Reference 492 – Photo 0982	Reference 493 – Photo 0983
Reference 494 – Photo 0984	Reference 495 – Photo 0985

Reference 495 – Photo 0986	Reference 496 – Photo 0987
	
Reference 496 - Photo 0988	Reference 497 – Photo 0989

Reference 497 – Photo 0990	

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PART B – CHANNEL HIGHWAY

Contents

Property Address
100 Channel Highway
135 Channel Highway
139 Channel Highway
141 Channel Highway
149 Channel Highway
153 Channel Highway
155A Channel Highway
155 Channel Highway
157 Channel Highway

1. Property Details

1.1 Inspection Details

Address:	100 Channel Highway, Taroona
Inspection Time and Date:	10:00am, 28 February 2013.

1.2 Property Details

Building:	Precast concrete pannels
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
- No Observed Damage	N/A

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
100 CHANNEL HWY

Figure 17

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
857	1522 1523	Following discussion with MRT only a brief site walkover was completed. The units were all relatively new precast panel construction. None showed any signs of damage whatsoever. There were minor cracks in paintwork between conctrete panels but this it to be expected. The flexible sealant between panels was in good condition.	-	-
858	1524			
859	1525			
860	1526			

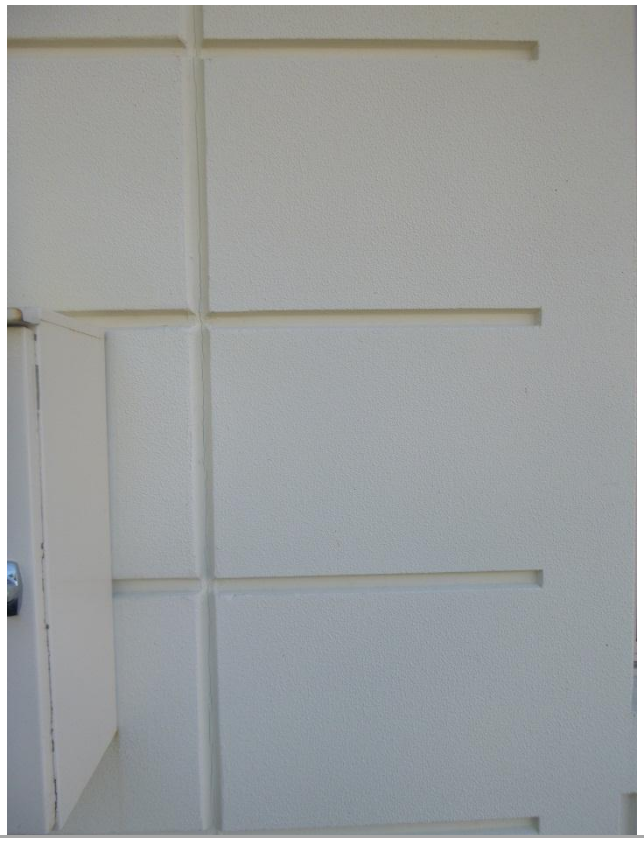
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 857 - Photo 1522	Reference 857 – Photo 1523
Reference 858 – Photo 1524	Reference 859 – Photo 1525
	

Reference 860 – Photo 1526	

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1. Property Details

1.1 Inspection Details

Address:	135 Channel Highway, Taroona
Inspection Time and Date:	2:40pm, 18 February 2013.

1.2 Property Details

Building:	Blockwork
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
0	Negligible	U – Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
135 CHANNEL HWY

Figure 18

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
292	0694	Very minor cracking in timber cladding.	0	U
292	0695	Minor crack in chimney brickwork.	0	U

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

GHD	KINGBOROUGH COUNCIL TAROONA LANDSLIDE RISK ASSESSMENT STAGE 2 135 CHANNEL HWY, TAROONA LIST OF IDENTIFIED ISSUES	JOB NUMBER: 3216698 REVISON: 0 DATE: 18/02/13 SHEET 1 of 1

5. Photographs

Reference 286 - Photo 0688	Reference 287 – Photo 0689
Reference 289 – Photo 0690	**Reference 290 – Photo 0691**

Reference 291 – Photo 0692	Reference 292 – Photo 0693
Reference 292 – Photo 0694	Reference 292 – Photo 0695

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1. Property Details

1.1 Inspection Details

Address:	139 Channel Highway, Taroona
Inspection Time and Date:	9:30am, 28 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
139 CHANNEL HWY

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 19

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
803	1455	Gap between door frame and brickwork. South eastern brick wall appears to have rotated out slightly in downhill direction. Most likely due to settlement.	2	R
804	1456	Concrete driveway uneven and showing up to 60mm of vertical movement. No observable horizontal movement. Appears to be caused by settlement	-	R
805	1457			
806	1458 1459	Crack near eastern corner starting vertical below window and then extending diagonally down to the left. Vertical cracks are uniform ~1.5mm width, horizontal cracks are hairline.	2	R
808	1461	Diagonal crack in north eastern facing brickwork wall. Vertical cracks are ~6mm wide at top, ~3mm wide at bottom. Horizontal cracks ~1mm wide. Likely due to settlement. of north eastern corner.	3	R
809	1462 1463	Blockwork extension at northern corner appears to be dropping and rotating out (to the north). Likely due to settlement of the blockwork wall. The corner of the building which is directly adjacent shows no signs of settlement.	4	R
813	1468	Retaining wall out the back showns little to no movement.	-	-
812	1466 1467	Gap between steps and brickwork on the south western side. Gap is up to ~40mm wide at the top. Stairs appear to be leaning away from house, most likely due to settlement.	-	R

Legend:

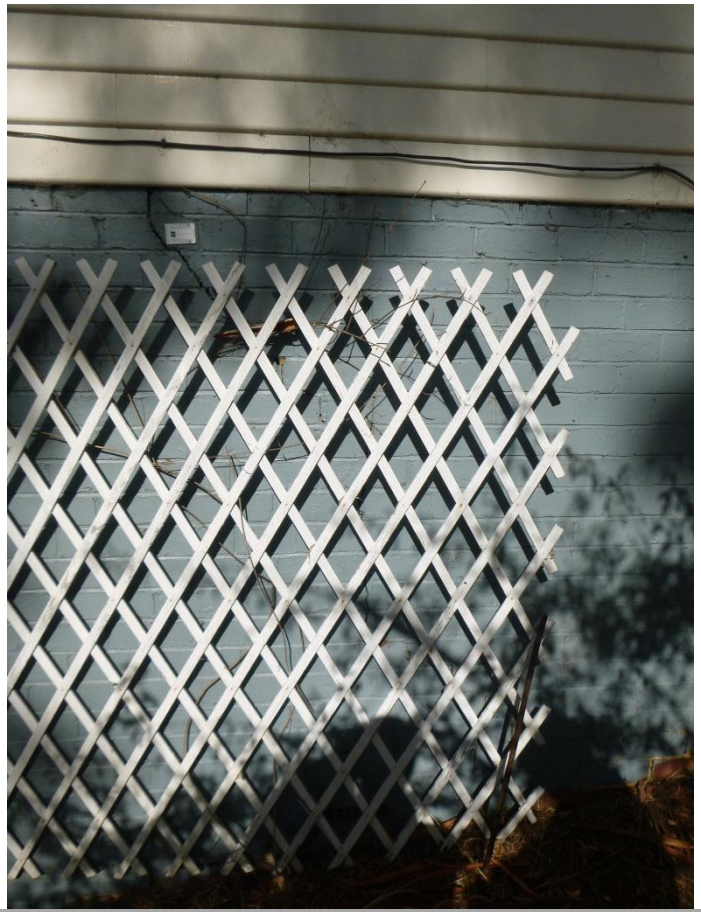
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

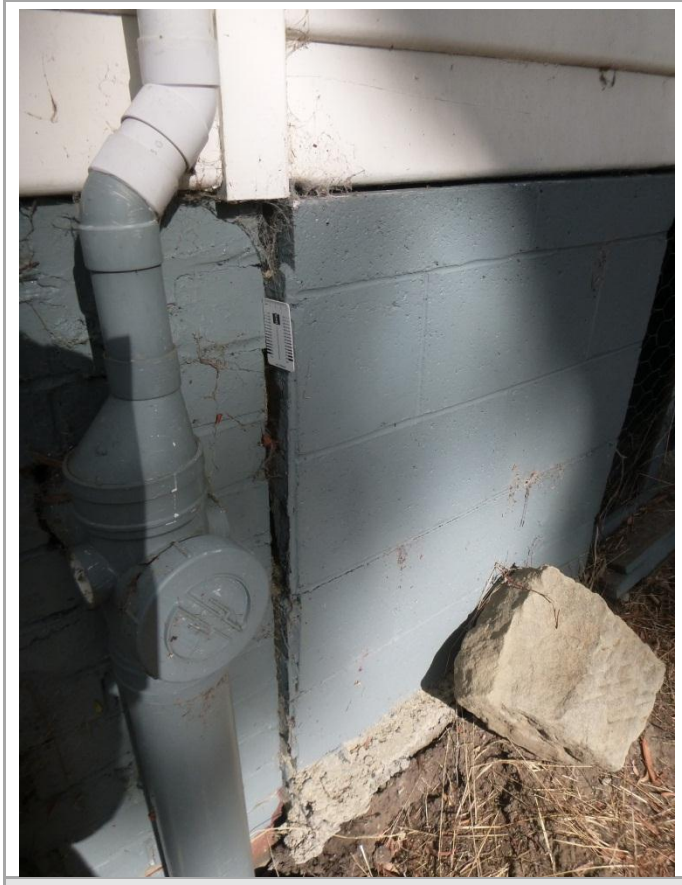
Notes:

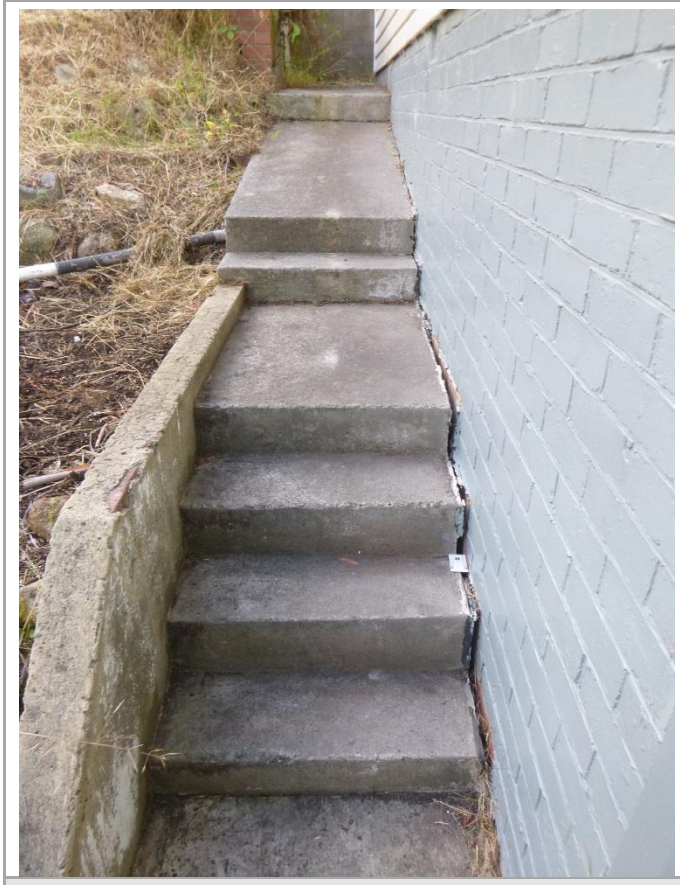
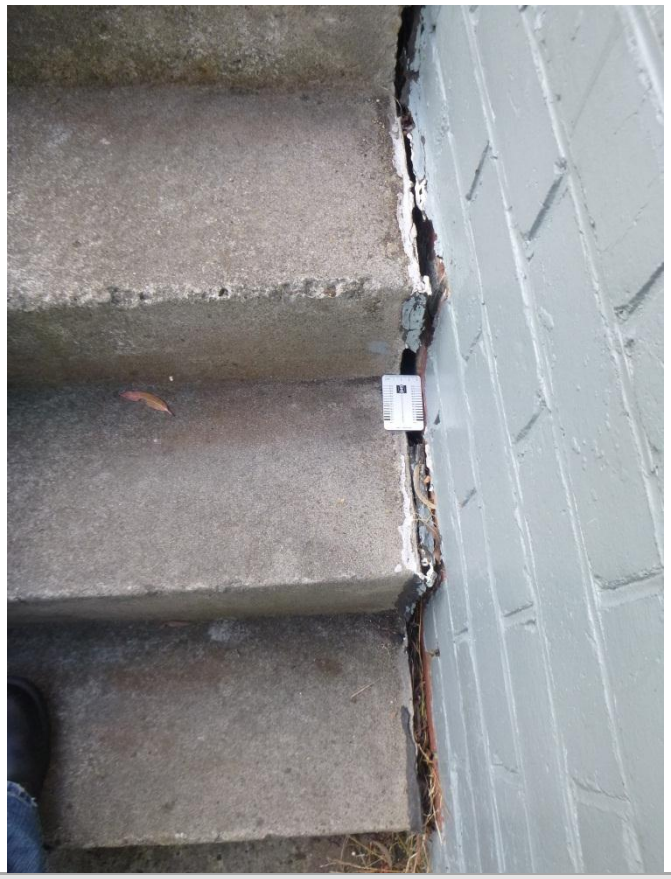
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 802 - Photo 1454	Reference 803 – Photo 1455
Reference 804 – Photo 1456	**Reference 805 – Photo 1457**

Reference 806 – Photo 1458	Reference 806 – Photo 1459
Reference 807 – Photo 1460	Reference 808 – Photo 1461
	

Reference 809 – Photo 1462	Reference 809 – Photo 1463
	
Reference 810 – Photo 1464	Reference 811 – Photo 1465

Reference 812 – Photo 1466	Reference 812 – Photo 1467
	
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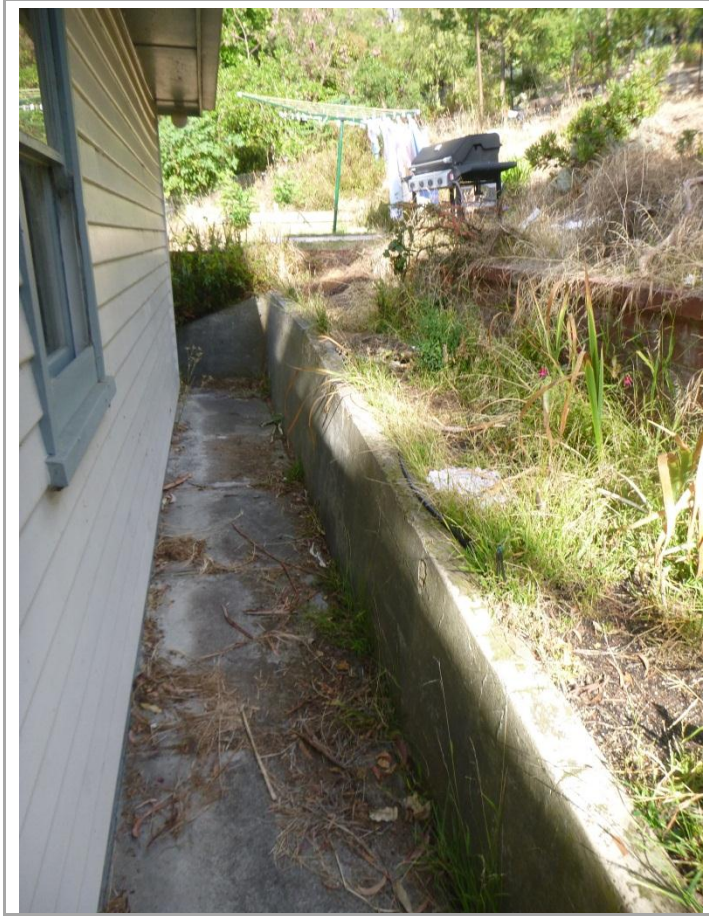	

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1. Property Details

1.1 Inspection Details

Address:	141 Channel Highway, Taroona
Inspection Time and Date:	2:00pm, 12 February 2013.

1.2 Property Details

Building:	Weatherboard with blockwork subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	Low
Site Drainage:	Good
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
141-143 CHANNEL HWY

Figure 20

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
55	0244 0245	Vertical crack in blockwork subfloor below deck. Could posentially be the joint between the original structure and the extension that was added on some time later.	1	S
55	0246 0247	Diagonal crack in blockwork below deck near north eastern corner of building. Orientation of crack suggests damage was caused by settlement of corner but difficult to confirm due to a lack of access.	2	R

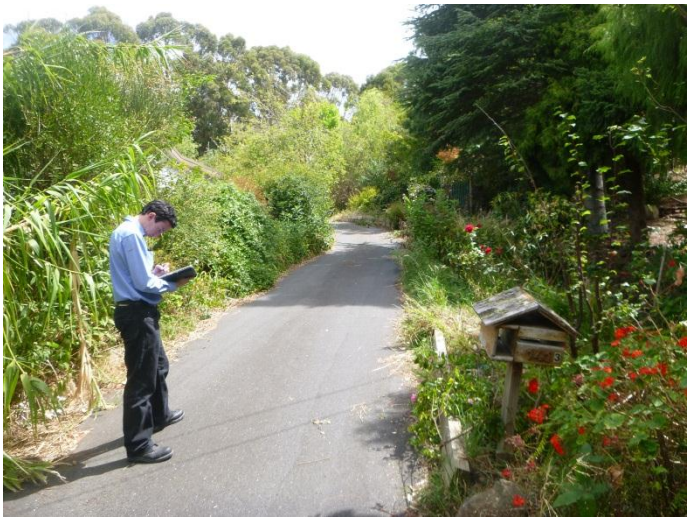
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

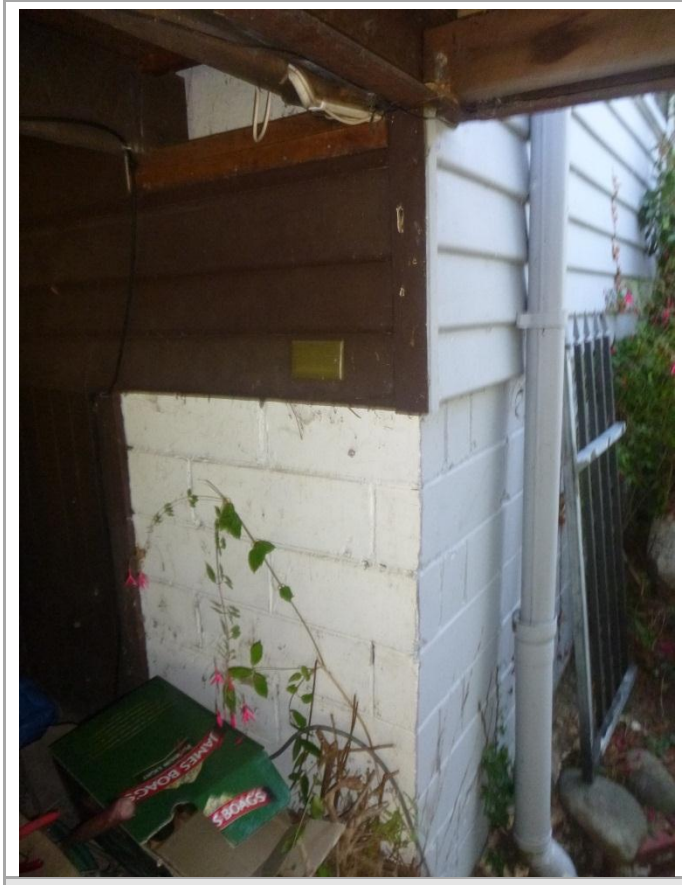
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 49 - Photo 0235	Reference 50 – Photo 0236
	
Reference 50 – Photo 0237	**Reference 51 – Photo 0238**

Reference 51 – Photo 0239	Reference 52 – Photo 0240
Reference 53 – Photo 0241	Reference 54 – Photo 0242

Reference 54 – Photo 0243	Reference 55 – Photo 0244
	
Reference 55 – Photo 0245	Reference 55 – Photo 0246

Reference 55 – Photo 0247	

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1. Property Details

1.1 Inspection Details

Address:	149 Channel Highway, Taroona
Inspection Time and Date:	11:10am, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
3 Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
149 CHANNEL HWY

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 21

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
669	1268	Vertical crack in brickwork at south eastern corner. ~7mm wide at top and hairline at bottom. There are no visible corresponding cracks in the footing which would indicate horizontal movement. Eastern wall appears to have rotated out possibly due to settlement.	3	R
670	1269 1270 1271 1272	Repaired crack in brickwork at two corners near carport on the eastern side. ~10mm of out of plane movement had once occurred however little to no further damage has occurred since repair. Orientation of repairs suggest settlement as likely cause.	1	R
671	1273	Two predominantly vertical cracks on the northern wall that have been repaired and have not reopened. Bricks appear to exhibit a small amount of out of plane movement.	-	-
672	1274	Hairline diagonal cracks in brickwork at north western corner. Likely due to minor settlement of corner.	0	R
673	1275	Vertical crack in concrete retaining wall. Has been repaired in the past & crack has opened up again. Crack is ~15mm wide at top & ~6mm at bottom. Likely caused by settlement.	3	R
675	1277	Gaps top and bottom of doors. At top gaps are wider an the right. At bottom they are wide on the left. The door jambs are also not level. The top of the door frame appears to be racking slightly to the right (south). May have been constructed this way.	-	S
677	1279	Repaired diagonal crack in brickwork which appears to be wider at the bottom but is difficult measure due to repairs. Bricks to the left appear to have dropped likely due to settlement.	-	R
667	1266	Driveway is relitively new and in good condition. Little observable movement.	-	-

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 667 - Photo 1266	Reference 668 – Photo 1267
Reference 669 – Photo 1268	**Reference 670 – Photo 1269**

Reference 670 – Photo 1270	Reference 670 – Photo 1271
Reference 670 – Photo 1272	Reference 671 – Photo 1273

Reference 672 – Photo 1274	Reference 673 – Photo 1275
Reference 674 – Photo 1276	Reference 675 – Photo 1277

Reference 676 – Photo 1278	Reference 677 – Photo 1279

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1. Property Details

1.1 Inspection Details

Address:	153 Channel Highway, Taroona
Inspection Time and Date:	4:00am, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
153 CHANNEL HWY

Figure 22

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LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
708	1316 1317	Diagonal crack below window at south eastern corner has been repaired in the past with flexible sealant. Crack has not yet opened up. Brickwork below crack has moved slightly downhill. Bricks have pushed bottom of window frame out slightly leaving a ~3mm gap.	2	R
709	1318	Crack in concrete front stairs. Likely caused by settlement & tree roots (a root is currently growing through the crack). No observable horizontal movement.	-	O
710	1319 1320 1321	Various significant cracks in concrete driveway indicating settlement of up to 80mm. Through cracks it can be seen that a significant amount of the supporting soil below the slab has been washed away. Resident indicated that she has observed runoff draining past the north eastern corner of the house and underneath the driveway. This is the likely cause of the undermining. Resident also indicated that some of the observable damage to the driveway was caused by an impact of a skip bin.	-	O
714	1325	Small vertical crack in render at top of wall near south eastern corner, ~1mm wide at top changing to hairline ~200mm down. Most likely due to some minor settlement of south eastern corner.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 707 - Photo 1315	Reference 708 – Photo 1316
Reference 708 – Photo 1317	**Reference 709 – Photo 1318**

Reference 710 – Photo 1319	Reference 710 – Photo 1320
Reference 710 – Photo 1321	Reference 711 – Photo 1322

Reference 712 – Photo 1323	Reference 713 – Photo 1324
Reference 714 – Photo 1325	

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1. Property Details

1.1 Inspection Details

Address:	155A Channel Highway, Taroona
Inspection Time and Date:	3:30pm, 18 February 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
155 A CHANNEL HWY

Figure 24

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
296	0699	Diagonal crack from bottom of window to garage lintel. Bricks have been painted making it difficult to measure crack size. Crack is wider at the top. Garage lintel appears to have sagged which may have caused crack.	1	S
297	0700	Minor cracking in pavement out the front of the house. Likely due to settlement.	-	R
299	0703	Vertical crack in retaining wall. Possibly a construction joint. Observable rotational movement likely due to its age.	1	U
299	0704 0705	Horizontal crack in retaining wall. No observable cause.	1	U
299	0706	Vertical crack in retaining wallof uniform ~2mm thickness. Little observable movement so may be a result of shrinkage.	2	S
299	0708 0709	Top of column supporting back porch slab has moved ~40mm. Red wall and column have rotated forward. Blue wall is restrained at the top by porch slab and house which has caused the blue wall to appear to lean backwards slightly. Horizontal gap between blue & red walls. Cause is likely an under designed/constructed retaining wall moving due to lateral earths pressures over an extended period.	1	S
298	0707	Diagonal crack in blockwork perpendicular to retaining wall. Most likely caused by movement of retaining wall. No evidence of blockwork below crack moving.	3	S
300	0710	Diagonal crack in retaining want near southern side. Probably caused by the aforementioned movement of the wall.	2	S

Legend:

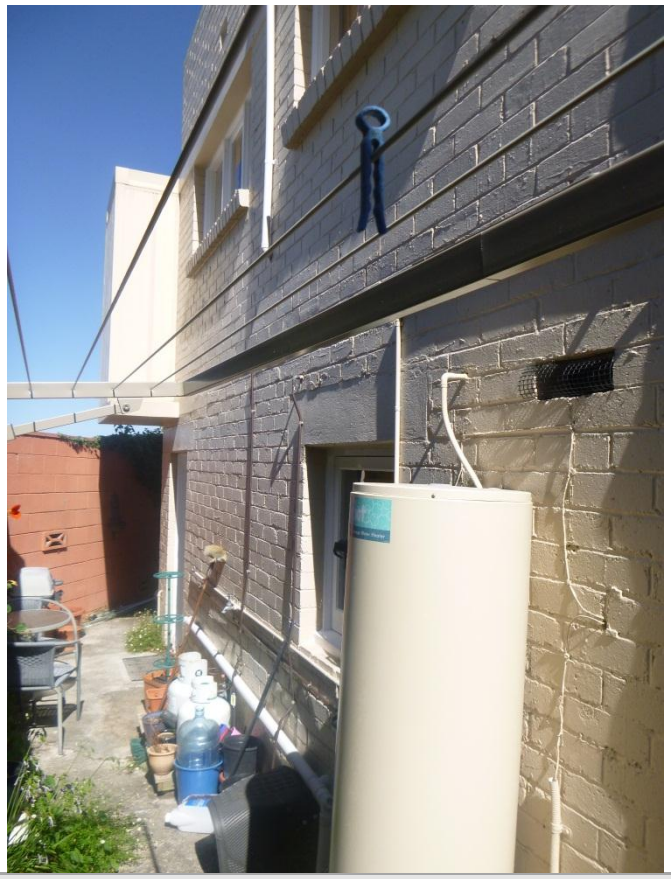
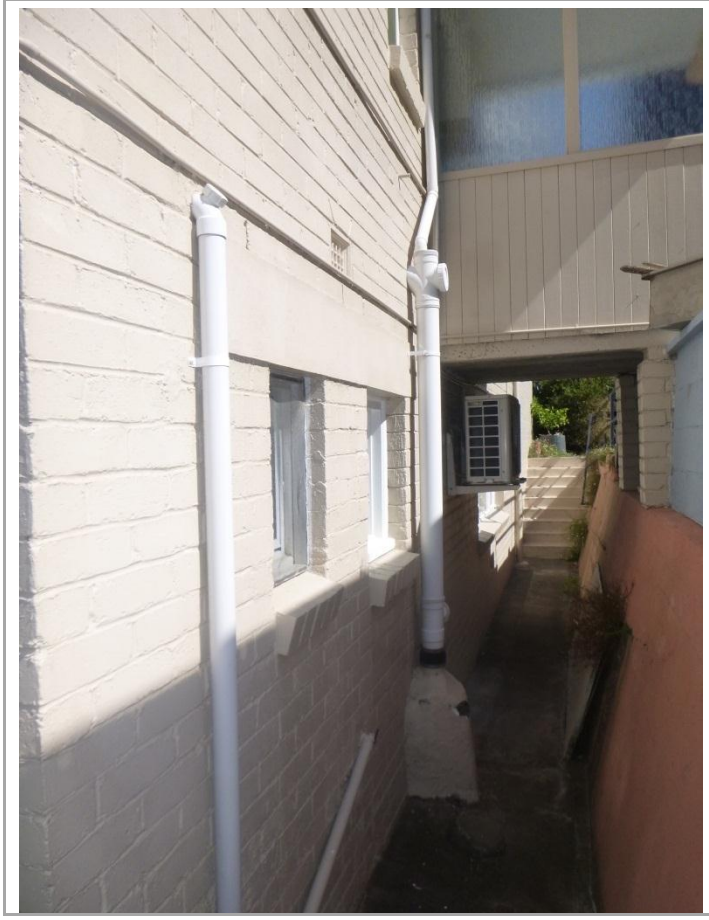
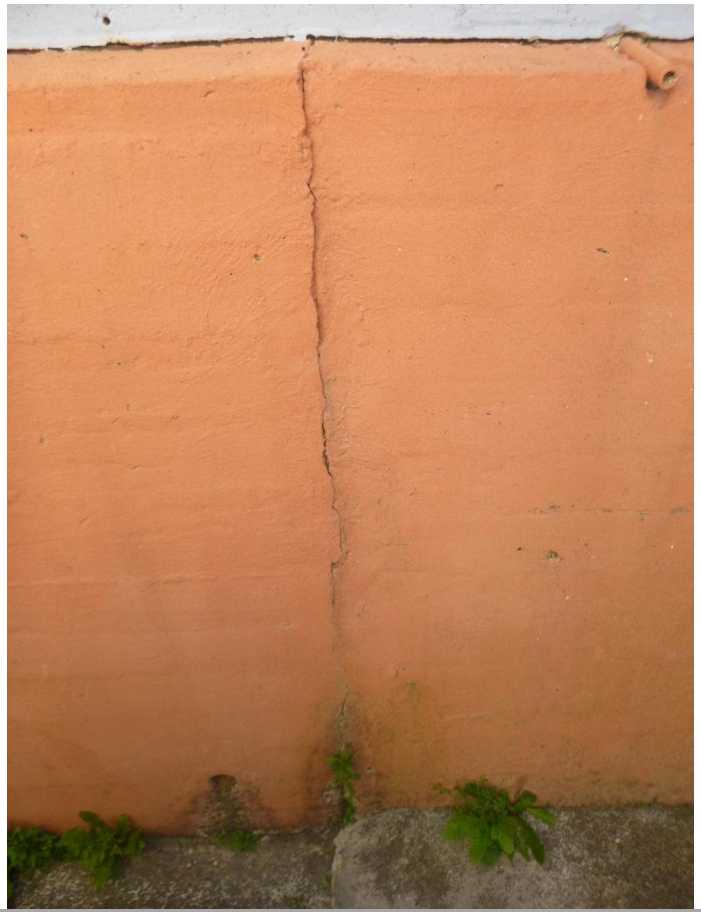
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 293 - Photo 0696	Reference 294 – Photo 0697
Reference 295 – Photo 0698	**Reference 296 – Photo 0699**

Reference 297 – Photo 0700	Reference 298 – Photo 0701
	
Reference 298 – Photo 0702	Reference 299 – Photo 0703
	

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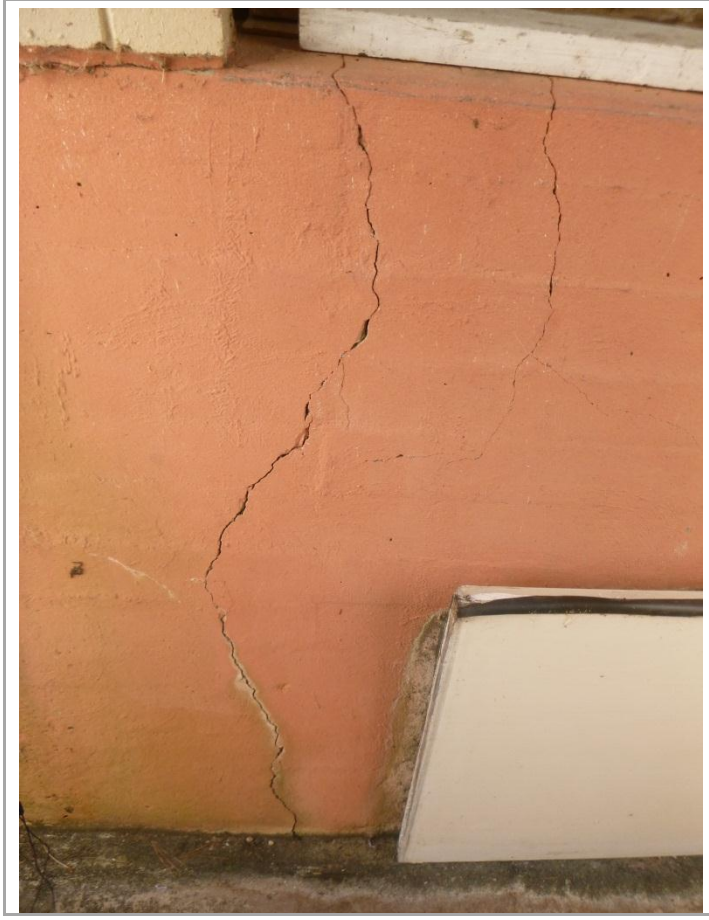
Reference 299 – Photo 0706	Reference 298 – Photo 0707
	

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	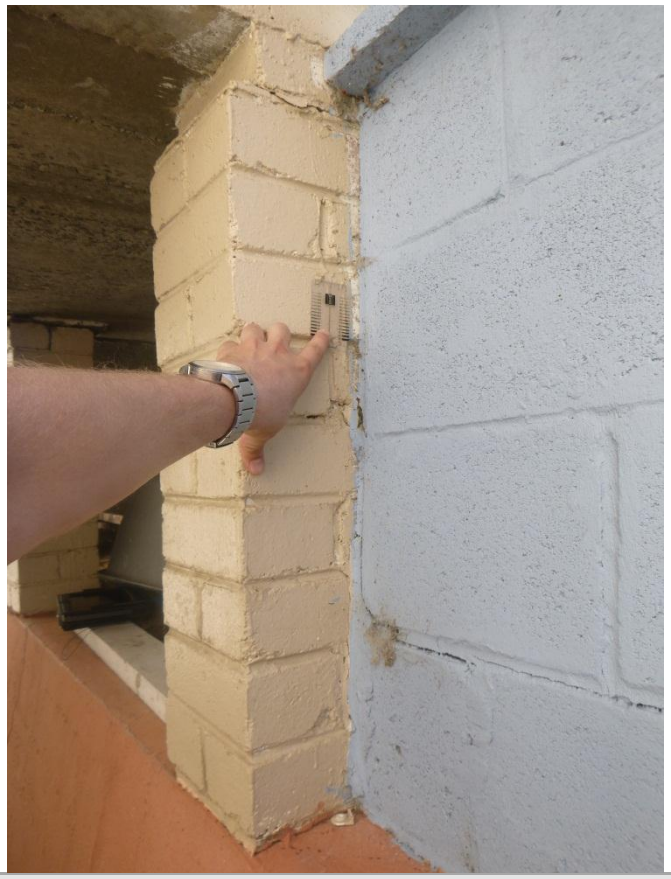
Reference 300 – Photo 0710	

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1. Property Details

1.1 Inspection Details

Address:	155 Channel Highway, Taroona
Inspection Time and Date:	10:00am, 28 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
155 CHANNEL HWY

Figure 23

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
303	0713	Minor horizontal crack in brickwork near top of wall. May be due to thermal movements of the attached balcony slab.	1	S
304	0714 0715 0716 0717	Concrete footpath ~20m long running straight downhill has only minor cracks likely due to shrinkage or minor settlement (there are no crack control joints). Footpaths is moderately old but shows no signs of horizontal movement.	-	R
306	0719	Minor vertical crack in parapet an north side. It is difficult to see from the distance but parapet appears to be concrete or rendered brick. Crack is likely due to shrinkage/thermal contraction as there is no control joints and no observable cracks in the supporting brickwork.	1	S
306	0720	Crack between concrete slab and building wall shows ~6mm vertical movement. The slab appears to have settled. The building shows no evidence of movement.	-	R
308	0722	Small vertical crack above door lintel, wider at the bottom than the top. Probably due to minor lintel sagging.	0	S

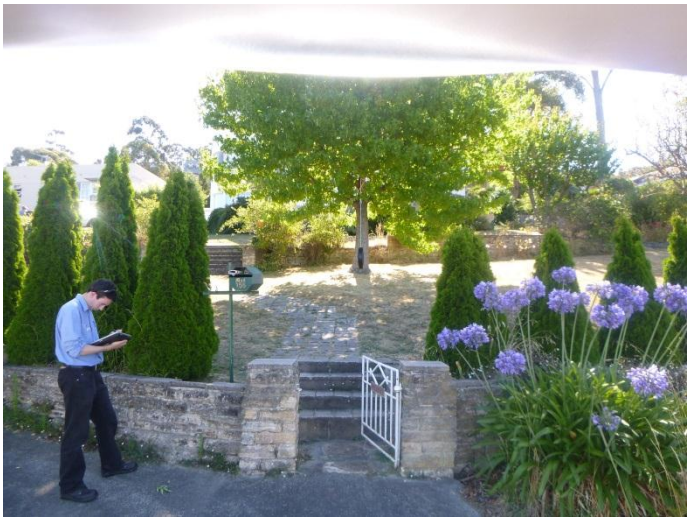
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

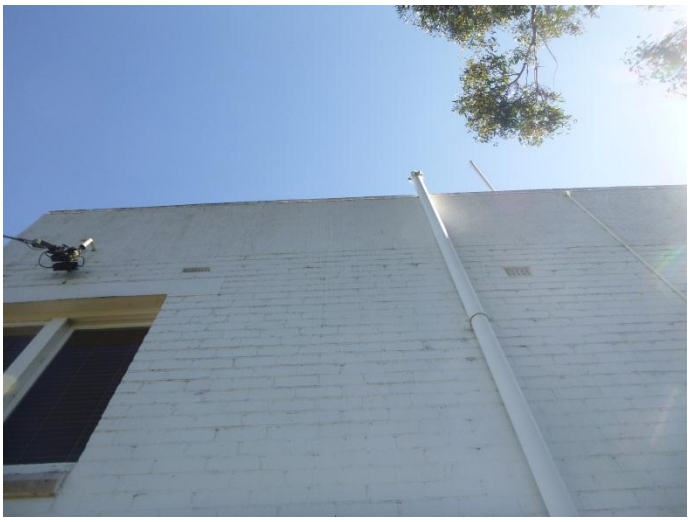
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 301 - Photo 0711	Reference 302 – Photo 0712
	
Reference 303 – Photo 0713	**Reference 304 – Photo 0714**

Reference 304 – Photo 0715	Reference 304 – Photo 0716
Reference 304 – Photo 0717	**Reference 305 – Photo 0718**

Reference 306 – Photo 0719	Reference 306 – Photo 0720
	
Reference 307 – Photo 0721	Reference 308 – Photo 0722

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1. Property Details

1.1 Inspection Details

Address:	157 Channel Highway, Taroona
Inspection Time and Date:	10:45am, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
157 CHANNEL HWY

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 25

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
664	1263	Minor cracks and settlement of concrete stairs on uphill of property.	-	-
665	1264	Small diagonal crack near corner on uphill side. Likely caused by settlement.	1	R
666	1265	Vertical crack at north western corner. Crack appears to be slightly wider at the top. Northern wall appears to angle out slightly at the corner although its difficult to assess as only two courses of of bricks are visible.	2	R
661	1260	Concrete driveway & paths generally in good condition.	-	-

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 661 - Photo 1260	Reference 662 – Photo 1261
Reference 663 – Photo 1262	Reference 664 – Photo 1263

Reference 665 – Photo 1264	Reference 666 – Photo 1265

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PART C – FLINDERS ESPLANADE

Contents

Property Address
100 Flinders Esplanade
103 Flinders Esplanade
104 Flinders Esplanade
106 Flinders Esplanade
108 Flinders Esplanade
109 Flinders Esplanade
110 Flinders Esplanade
111 Flinders Esplanade
112 Flinders Esplanade
113 Flinders Esplanade
116 Flinders Esplanade
118 Flinders Esplanade
122 Flinders Esplanade

1. Property Details

1.1 Inspection Details

Address:	100 Flinders Esplanade, Taroona
Inspection Time and Date:	9:00am, 14 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
100 FLINDERS ESP

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 26

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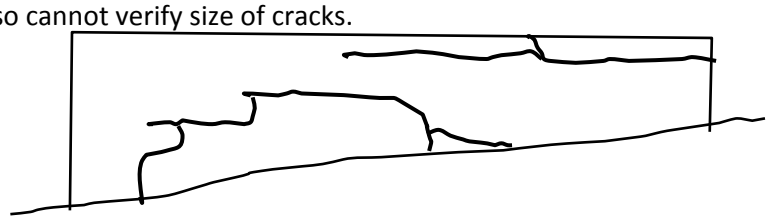
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
135	0437 0438	Diagonal crack at top of wall. ~3mm wide cracks at top changing to hairline 600mm down. Horizontal cracks are all hairline.	2	R
136	0439	Vertical crack in brickwork above lintel. ~1mm at bottom to hairline 300mm up. Possibly caused by minor sagging of lintel	1	S
137	0440 0441 0444	Diagonal crack at corner. ~4mm perpend cracks of uniform width. Hairline horizontal cracks. Bricks above crack have moved horizontally south in relation to those below.	2	R
137	0442 0443	Minor horizontal cracks near top of wall	0	U
138	0445	Vertical crack below corner of window sill. Approx 1mm wide at top and hairline 300mm down	1	R
139	0446	Diagonal crack from top of window to corner of building. ~1mm vertical cracks of uniform width, hairline horizontal. Again a good indication of landslip	1	R
141	0448	Could not gain access to balcony to assess structure in this location	-	-
142	0449	Rendered brick retaining wall supporting front patio area is sloping away from the rest of the house. Most likely settlement. Gap is ~10mm wide at top & hairline at bottom.	3	R
143	0450 0451 0452 0453 0454	Various cracks in pattio rendered brick retaining wall. Only cracks in render are visible so cannot verify size of cracks. 	-	U

Legend:

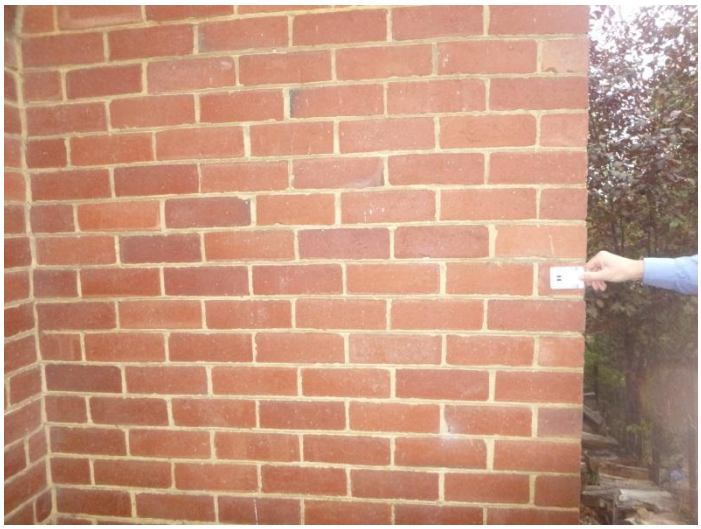
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

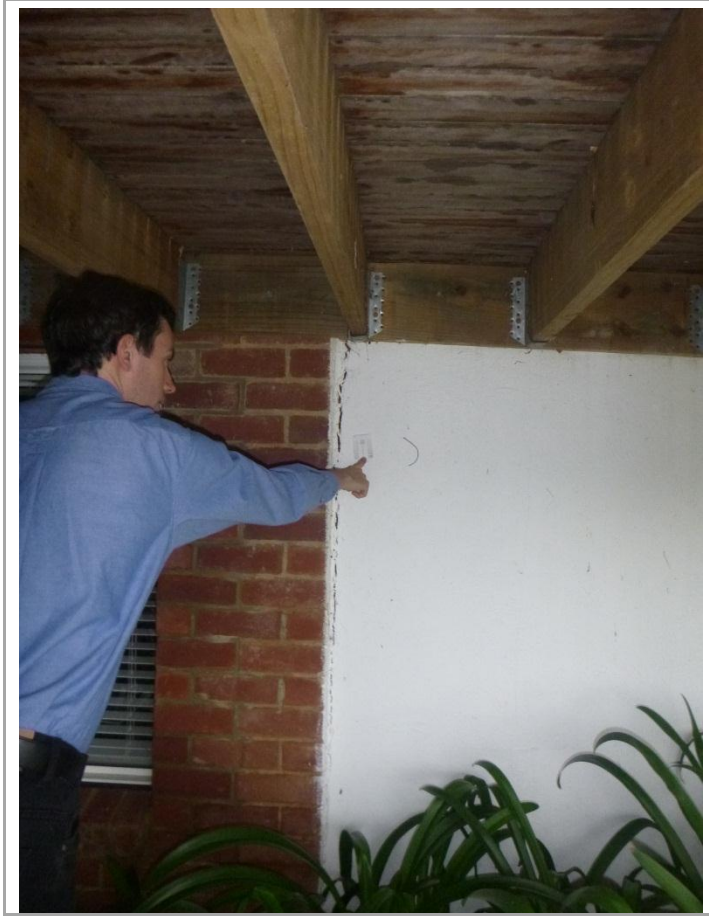
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 133 – Photo 0435	Reference 134 – Photo 0436
Reference 135 – Photo 0437	Reference 135 – Photo 0438

Reference 136 – Photo 0439	Reference 137 – Photo 0440
	
Reference 137 – Photo 0441	Reference 137 – Photo 0442

Reference 137 – Photo 0443	Reference 137 – Photo 0444
Reference 138 – Photo 0445	Reference 139 – Photo 0446

Reference 140 – Photo 0447	Reference 141 – Photo 0448
Reference 142 – Photo 0449	Reference 143 – Photo 0450
	

Reference 143 – Photo 0451

Reference 143 – Photo 0452

Reference 143 – Photo 0453

Reference 143 – Photo 0454

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1. Property Details

1.1 Inspection Details

Address:	103 Flinders Esplanade, Taroona
Inspection Time and Date:	1:30pm, 25 February 2013.

1.2 Property Details

Building:	Brick veneer, weatherboard extension
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
103 FLINDERS ESP

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 27

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
679	1281	Diagonal crack near south eastern corner below window. ~1mm wide at top, hairline at bottom likely caused by some minor settlement.	1	R
680	1282	Minor horizontal crack right of front door. Again, most likely settlement.	1	R
681	1283	Diagonal crack below window ~1mm at window sill, hairline at bottom. North eastern corner may have settled.	1	R
683	1285	Diagonal crack in northern face of north eastern corner above window. Crack is ~3mm wide at top, ~1mm wide near window lintel. Again, north eastern corner appears to have settled.	2	R
685	1287	Concrete path on southern side has settled ~40mm. This may have been caused by excavations in the neighbouring property. Soil has been excavated to a depth of approx 2.5m and is unsupported (slope of unsupported soil is ~60°).	-	O
686	1289	Various cracks in blockwork walls. Corner left of opening may have settled.	1	R
678	1280	Concrete driveway and paths out the front in good condition with only a couple of very minor settlement cracks.	-	-

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 678 - Photo 1280	Reference 679 – Photo 1281
Reference 680 – Photo 1282	**Reference 681 – Photo 1283**

Reference 682 – Photo 1284	Reference 683 – Photo 1285
Reference 684 – Photo 1286	Reference 685 – Photo 1287

Reference 685 – Photo 1288	Reference 686 – Photo 1289

6. Disclaimer

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1. Property Details

1.1 Inspection Details

Address:	104 Flinders Esplanade, Taroona
Inspection Time and Date:	2:30am, 14 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
104 FLINDERS ESP

Figure 28

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
178	0506	Diagonal cracks in wall supporting stairs. Cracks of uniform ~2mm width. A small amount of out of plane movement was observed with the bricks below the crack moving slightly downhill. May be due to settlement.	2	R
180	0508	Diagonal crack above window. ~1mm wide perpend cracks, hairline horizontals.	1	U
181	0509	Small crack between top of door & floor joist. ~1.5mm wide uniform cracks.	2	S
181	0511	Slab near backdoor has dropped near corner and shows evidence of downhill movement of approx 30mm.	-	U
183	0512	Diagonal crack from top of window to top of brickwork. Crack ~2mm wide. Most likely subsidence/settlement.	2	R
184	0513 0514 0515	Horizontal crack in engaged pier ~1.7m above ground level. Crack is 2mm wide at downhill face ranging to hairline near uphill face. Middle of pier maybe bending out downhill (possibly downhill side of footing is settling).	2	R
185	0516	Small diagonal crack localised to the bottom corner of window. ~1.5mm wide perpend cracks & hairline horizontal.	2	U
186	0517 0518	Small ~1mm horizontal crack in brickwork approx 1m long. No clear cause	1	U
183	0512	Very uneven pavement on downhill side of house indicating differential settlement.	-	-
187	0519	Various cracks in window glass near front of the house. Resident says he can hear cracks occur when there is a change in ambient temperature. Could be reactive clays or perhaps a structural issue.	-	U
188	0520 0521			

Legend:

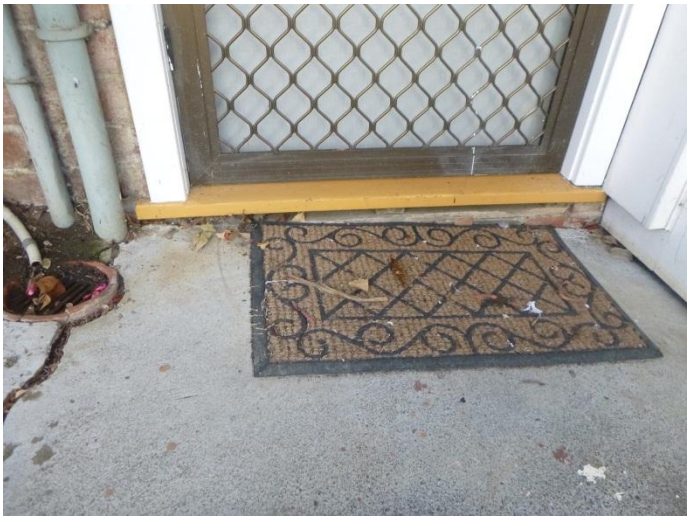
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

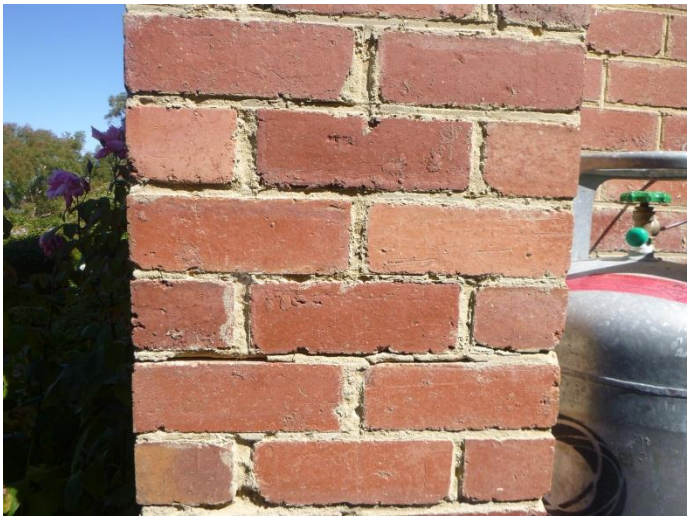
Notes:

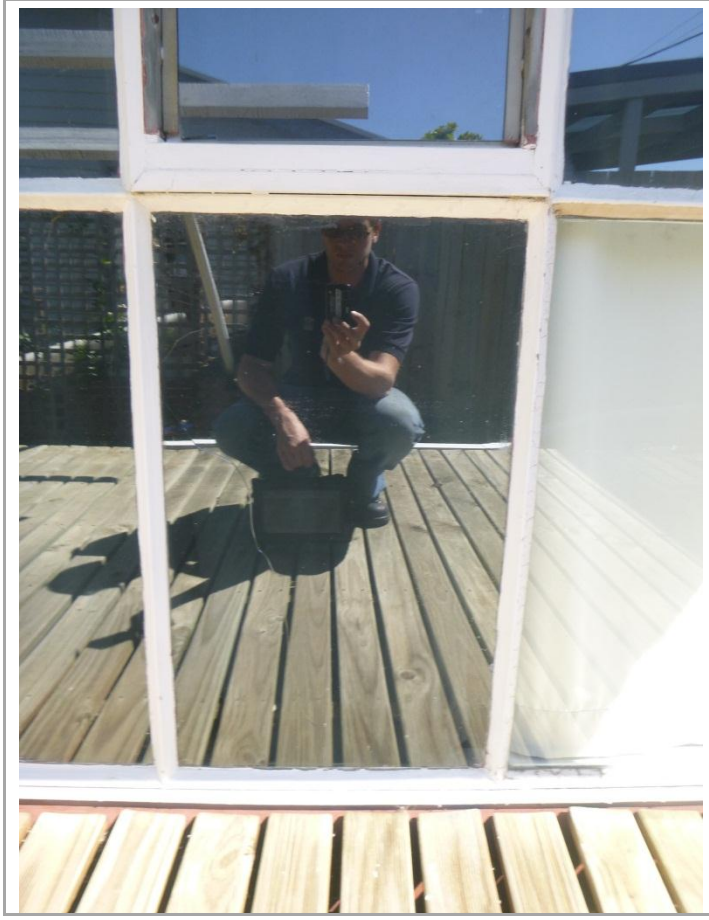
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

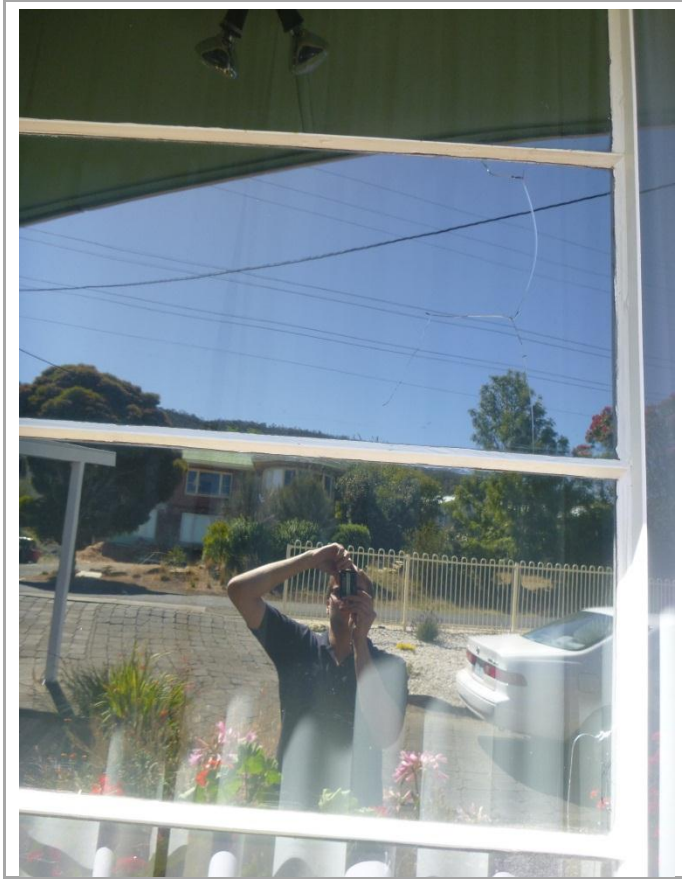
5. Photographs

Reference 177 - Photo 0505	Reference 178 – Photo 0506
Reference 179 – Photo 0507	**Reference 180 – Photo 0508**

Reference 181 – Photo 0509	Reference 182 – Photo 0510
Reference 181 – Photo 0511	**Reference 183 – Photo 0512**
	

Reference 184 – Photo 0513	Reference 184 – Photo 0514
Reference 184 – Photo 0515	Reference 185 – Photo 0516
	

Reference 186 – Photo 0517	Reference 186 – Photo 0518
Reference 187 – Photo 0519	Reference 188 – Photo 0520
	

Reference 188 – Photo 0521	
	

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1. Property Details

1.1 Inspection Details

Address:	106 Flinders Esplanade, Taroona
Inspection Time and Date:	4:30am, 20 February 2013.

1.2 Property Details

Building:	Weatherboard/colourbond with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
106 FLINDERS ESP

Figure 29

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
465	0946	Minor hairline vertical crack in chimney brickwork. Crack is of uniform width and there is no apparent cause.	0	U
467	0948	Various holes in mortar between blockwork. Appears to be some localised weathering of mortar rather than cracks.	-	-
468	0949	Vertical gap between two different types of blockwork sub-floors. The western side appears to be an extension added on at a later time. Vertical gap appears to be wider at the top which may indicate settlement. Horizontal crack near the top appears to show that blocks below the crack have dropped slightly.	2	R
468	0950	Diagonal cracks near south eastern corner which sas been repaired in the past.	2	R
469	0951	Various cracks below deck. Predominantly perpend cracks that have been repointed. Repairs make it difficult to assess cause.	0	U
470	0952 0953		0	U
471	0954		0	U
472	0955	Stairs at the back under deck shows a crack which appears to have been caused by settlement.	-	R
480	0966			
475	0959	Diagonal cracks in blockwork at corner. ~5mm perpend cracks, hairline horizontals. Blockwork below the crack appears too have moved horizontally to the east. Likely result of shrink/swell as damage is locatised.	2	R
476	0960 0961 0962			
477	0963	Vertical cracks uniformly ~1mm wide from top of blockwork to bottom. Hairline horizontal cracks.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

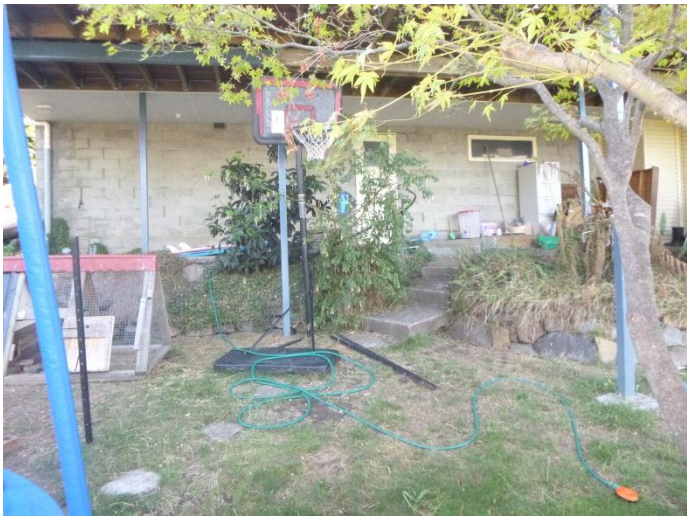
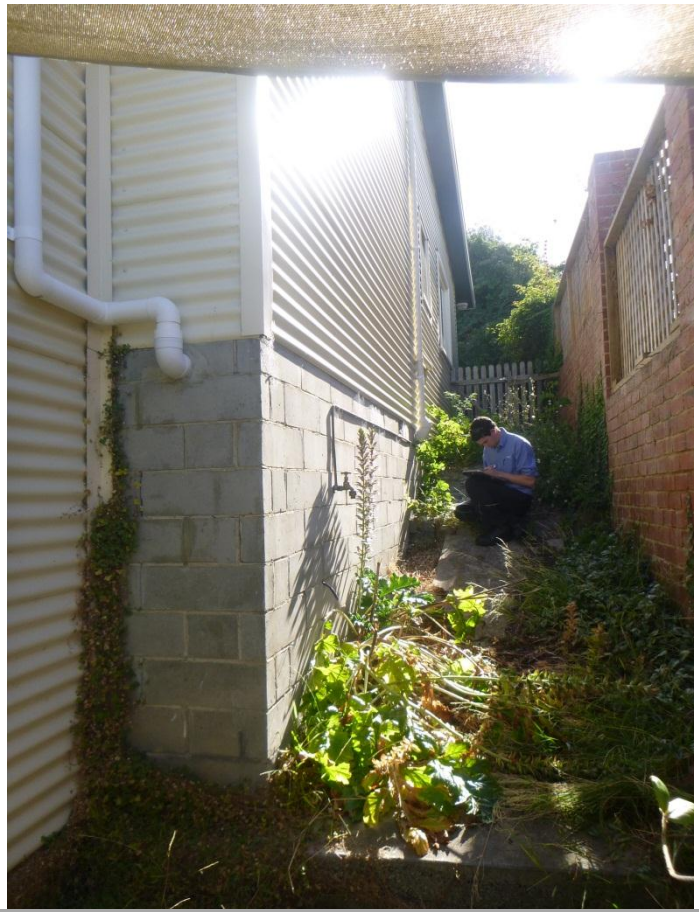
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 463 - Photo 0944	Reference 464 – Photo 0945
Reference 465 – Photo 0946	**Reference 466 – Photo 0947**

Reference 467 – Photo 0948	Reference 468 – Photo 0949
Reference 468 – Photo 0950	Reference 469 – Photo 0951

Reference 470 – Photo 0952	Reference 470 – Photo 0953
Reference 471 – Photo 0954	Reference 472 – Photo 0955

Reference 472 – Photo 0956	Reference 473 – Photo 0957
Reference 474 – Photo 0958	Reference 475 – Photo 0959
	

Reference 476 – Photo 0960

Reference 476 – Photo 0961

Reference 476 – Photo 0962

Reference 477 – Photo 0963

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1. Property Details

1.1 Inspection Details

Address:	108 Flinders Esplanade, Taroona
Inspection Time and Date:	9:55am, 14 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	High
Site Drainage:	Good
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
108 FLINDERS ESP

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 30

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
148	0459	Cracks in natural soil near north eastern corner of building. Soil on downhill side of deck footing has moved horizontally down slope by ~30mm. Most likely downhill creep.	-	-
149	0460		-	-
150	0461		-	-
151	0462 0463	Upper layer of bricks overlap lower bricks by ~15mm near bottom of wall. No evidence of cracks in mortar so this is most likely how it was constructed.	-	-
152	0464	Diagonal crack near corner. ~1mm uniform width perpend cracks which narrow near the corner. ~0.5mm horizontal cracks. Appears to be minor settlement.	1	R

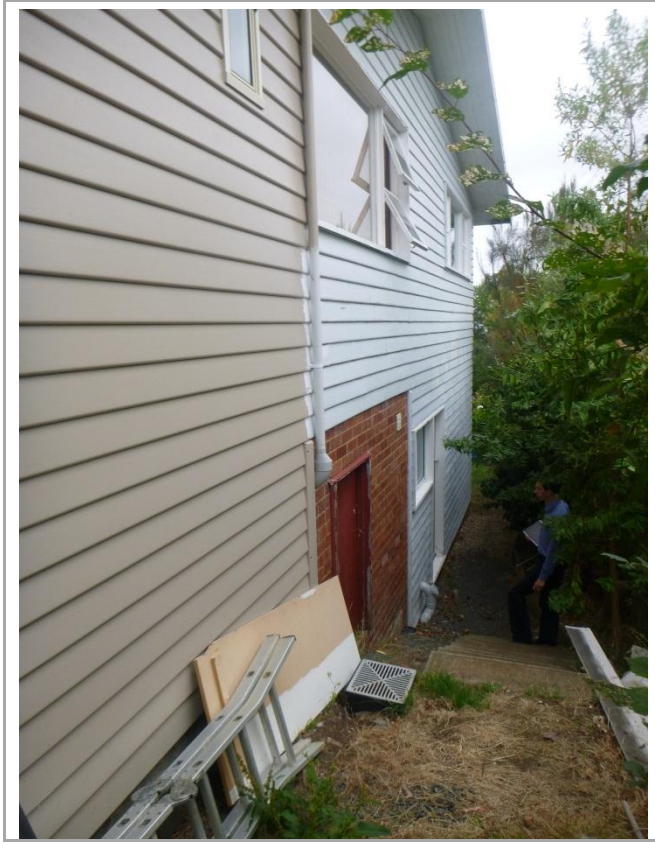
Legend:

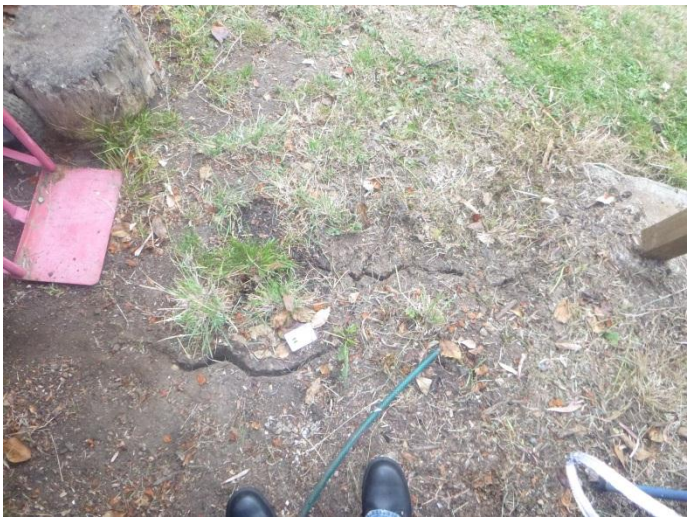
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 144 - Photo 0455	Reference 145 – Photo 0456
Reference 146 – Photo 0457	Reference 147 – Photo 0458
	

Reference 148 – Photo 0459	Reference 149 – Photo 0460
	
Reference 150 – Photo 0461	Reference 151 – Photo 0462

Reference 151 – Photo 0463	Reference 152 – Photo 0464

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1. Property Details

1.1 Inspection Details

Address:	109 Flinders Esplanade, Taroona
Inspection Time and Date:	2:15pm, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
109 FLINDERS ESP

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 31

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
688	1291	Underside of balcony slab has exposed reo. Likely caused by lack of cover and poor vibration during construction. Steel appears to only have minor corrosion indicating slab has likely not lost any strength. Not visible signs of sagging.	3	S
688	1291	Minor crack around corner brick directly underneath suspended slab. Damage appears to only be localised to this one brick.	1	U
689	1292	Minor settlement of front path indicating ~30mm movement.	-	-
691	1294	Minor crack in balcony slab. Crack is very straight indicating that it was likely a construction joint.	1	S
694	1297	Minor settlement of path on the southern side. No apparent horizontal movement.	-	-

Legend:

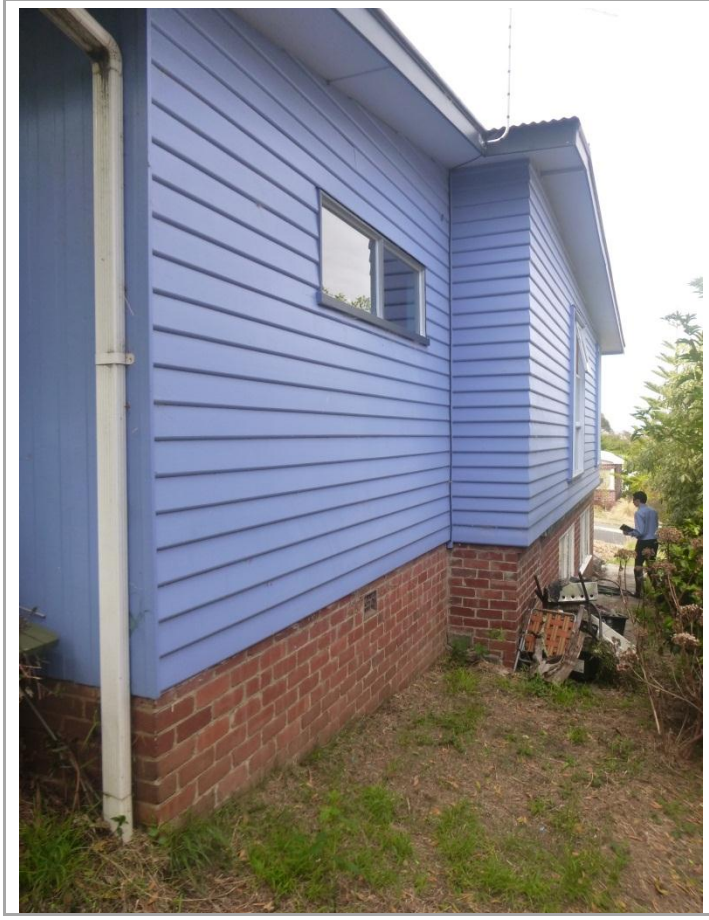
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 687 - Photo 1290	Reference 688 – Photo 1291
Reference 689 – Photo 1292	**Reference 690 – Photo 1293**

Reference 691 – Photo 1294	Reference 692 – Photo 1295
Reference 693 – Photo 1296	Reference 694 – Photo 1297
	

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1. Property Details

1.1 Inspection Details

Address:	110 Flinders Esplanade, Taroona
Inspection Time and Date:	4:20pm, 26 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
110 FLINDERS ESP

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 32

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
785	1433	Asphalt & concrete driveway in good condition and show no sign of movement.	-	-
788	1437 1438	Diagonal cracks in brickwork at south eastern corner. Likely caused by settlement. A timber post is being used to prop the floor, possibly in an effort to counteract the settlement.	3	R
789	1439 1440	Minor diagonal cracks at top of bricksub floor either side of window. Possibly due to the recent modifications to the deck and installation of what appears to be a new lintel.	1	S
792	1443	Small crack in foot concrete path on northern side. Appears to have been caused by some minor settlement. No observable horizontal movement.	-	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

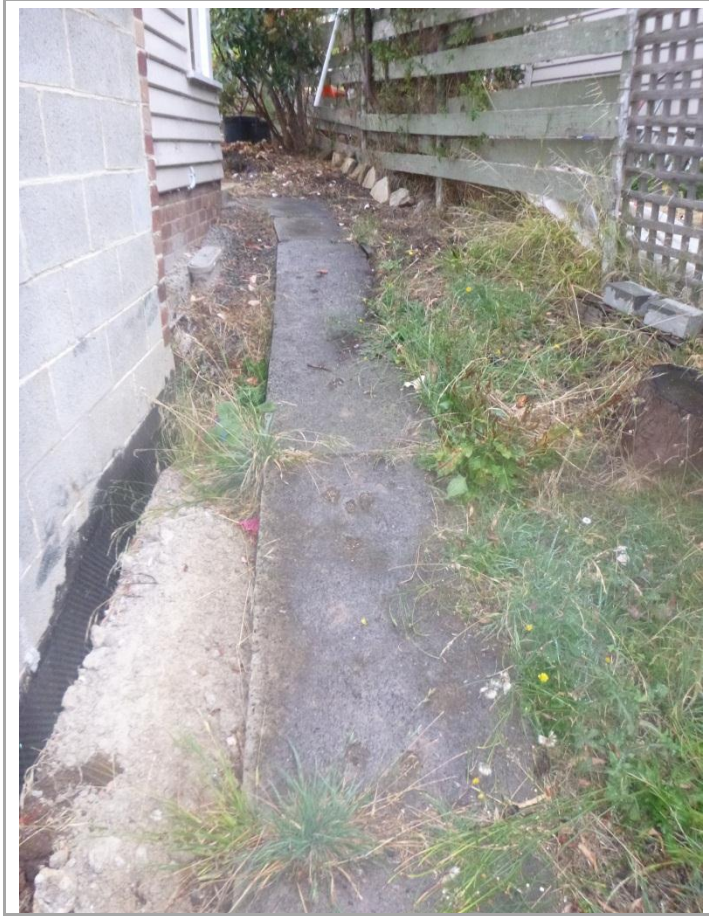
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 785 - Photo 1433	Reference 786 – Photo 1434
Reference 786 – Photo 1435	**Reference 787 – Photo 1436**

Reference 788 – Photo 1437	Reference 788 – Photo 1438
Reference 789 – Photo 1439	Reference 789 – Photo 1440

Reference 790 – Photo 1441	Reference 791 – Photo 1442
Reference 792 – Photo 1443	
	

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1. Property Details

1.1 Inspection Details

Address:	111 Flinders Esplanade, Taroona
Inspection Time and Date:	2:30pm, 25 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
111 FLINDERS ESP

Figure 33

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
696	1299 1300	Horizontal crack below top course of bricks at south eastern corner of house. Bricks below crack have moved horizontally ~10mm to the east. Bricks on the eastern face of corner above garage lintel have been pushed out and are now only ~50% sitting on lintel.	3	U
697	1301	Gap between window frame and brickwork wall an eastern side. Brickwork appears to be leaning slightly out (towards the east)	2	U
697	1302	Diagonal crack below window ~3mm at top, hairline at bottom. Bricks to the left of the crack have moved vertically down most likely due to settlement.	2	R
698	1303	Stone retaining wall in front yard is on a noticeable lean. Was likely under-designed, under-constructed or overloaded. This is to be expected far a residential retaining wall of this type & age.	-	-
699	1304	Horizontal crack at corner below top course of bricks. Bricks below crack have moved horizontally ~5mm to the south. Suspended slab deck appears to be restraining the top course of bricks , limiting movement.	2	R
700	1305	Diagonal crack in brickwork running parallel to concrete stairs. ~2mm wide uniform perpend cracks. Top course of bricks is restrained by concrete and brickwork below has moved.	2	U
756	1306	Small diagonal crack at north eastern corner. Likely due to minor settlement of corner.	1	R
703	1310 1311	Diagonal hairline crack bottom left of window. Likely caused by minor settlement. Vertical hairline crack bottom right of window. Also likely settlement. Horizontal crack below window sill. This is common with windows sills of this type of construction.	1	R
706	1314	Bricks missing and mortar is in poor condition however there appears to be a vertical crack which extends around the corner at the top. Likely caused by minor settlement of corner. The missing bricks may have also reduced the strength of the wall contributed.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

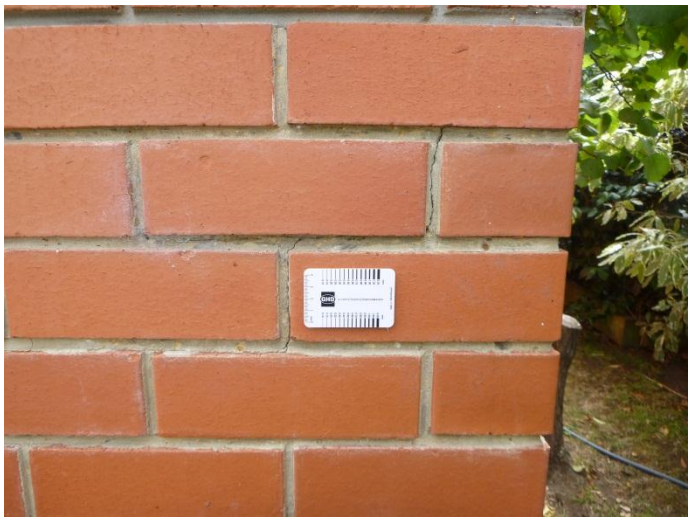
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 695 - Photo 1298	Reference 696 – Photo 1299
Reference 696 – Photo 1300	**Reference 697 – Photo 1301**

Reference 697 – Photo 1302	Reference 698 – Photo 1303
Reference 699 – Photo 1304	Reference 700 – Photo 1305

Reference 701 – Photo 1306	Reference 702 – Photo 1307
	
Reference 702 – Photo 1308	Reference 702 – Photo 1309

Reference 703 – Photo 1310	Reference 703 – Photo 1311
Reference 704 – Photo 1312	Reference 705 – Photo 1313

Reference 706 – Photo 1314	

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1. Property Details

1.1 Inspection Details

Address:	112 Flinders Esplanade, Taroona
Inspection Time and Date:	10:30pm, 14 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
112 FLINDERS ESP

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 34

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LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
156	0471	Vertical crack in blockwork retaining wall. ~2mm wide at top and hairline near bottom. Most likely heaving or subsidence.	-	R
157	0472 0476	Marks on the wall of the building indicate that stairs and pavement have subsided and dropped independent to the house. Gap between cladding ~15mm wide. Screw in cladding is twisted indicating the stairs have dragged the cladding down while the building remained stationary.	-	R
162	0478	Diagonal crack in brick subfloor wall. Horizontal & vertical cracks same width; ~1mm wide at top, hairline at bottom. Corner to the left may have subsided slightly.	1	R
163	0479 0483 0484 0485	Diagonal cracks under deck near brickwork corners below deck. Horizontal cracks are wider than verticals. Corners appears to have subsided slightly.	1	R
164	0480 0481 0482	~2mm wide horizontal crack near bottom of brickwork below deck. Crack is ~6m long.	2	R
164	0484 0485	Vertical crack between newer and old brickwork. Various diagonal cracks in newer brickwork. Horizontal cracks are larger which indicates that newer bricks have settled.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

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2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 152A - Photo 0465	Reference 153 – Photo 0466
Reference 154 – Photo 0467	Reference 154 – Photo 0468

Reference 154 – Photo 0469	Reference 155 – Photo 0470
Reference 156 – Photo 0471	Reference 157 – Photo 0472

Reference 158 – Photo 0473

Reference 159 – Photo 0474

Reference 160 – Photo 0475

Reference 157 – Photo 0476

Reference 161 – Photo 0477	Reference 162 – Photo 0478
Reference 163 – Photo 0479	Reference 164 – Photo 0480

Reference 164 – Photo 0481	Reference 164 – Photo 0482
Reference 164 – Photo 0483	Reference 164 – Photo 0484

Reference 164 – Photo 0485	

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1. Property Details

1.1 Inspection Details

Address:	113 Flinders Esplanade, Taroona
Inspection Time and Date:	11:30am, 14 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

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4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
113 FLINDERS ESP

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 35

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
167	0488	Various small cracks near top of wall. No obvious cause	0	U
167	0489 0490 0491	Vertical cracks at top of wall near corner. Crack breaks through the middle of some bricks. Most likely brick growth as wall around corner is ~9m long near the top with no control joints.	1	S
168	0492 0493 0494	Vertical crack near corner. Horizontal crack approx 2mm wide. Bricks below crack appear too be angling out slightly likely due to settlement.	2	R
169	0495	~1mm vertical crack near bottom at corner. Brickwork at this location appears to have been repaired in the past.	1	R
171	0498	~1mm wide vertical crack near corner. Potentially brick growth.	1	S
172	0499	Vertical crack at corner between brick walls. Crack appears to be larger at the top however conduit is obstructing the view.	1	U
173	0500	Vertical crack in brick retaining wall. Approx 7mm at top, smaller at bottom. Most likely subsidence or heaving.	-	R
174	0501	Horizontal crack in garage wall beside arch, ~3mm on edge to hairline 300mm away. Possibly subsidence.	2	R
175	0502	Diagonal crack with perpend cracks wider than horizontal. Cracks larger at top and hairline ~600mm down. Could have been caused by subsidence of corner as per previous note.	1	R
176	0503 0504	Diagonal ~4mm crack beside arch. Vertical cracks are a uniform 3mm width. Horizontal cracks are a uniform 2mm width. Corner may be settling.	2	R

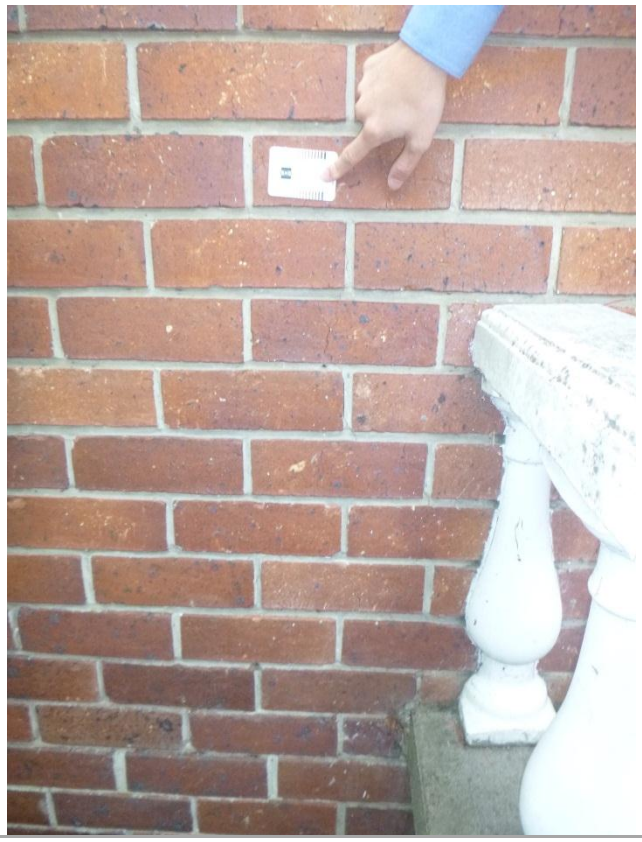
Legend:

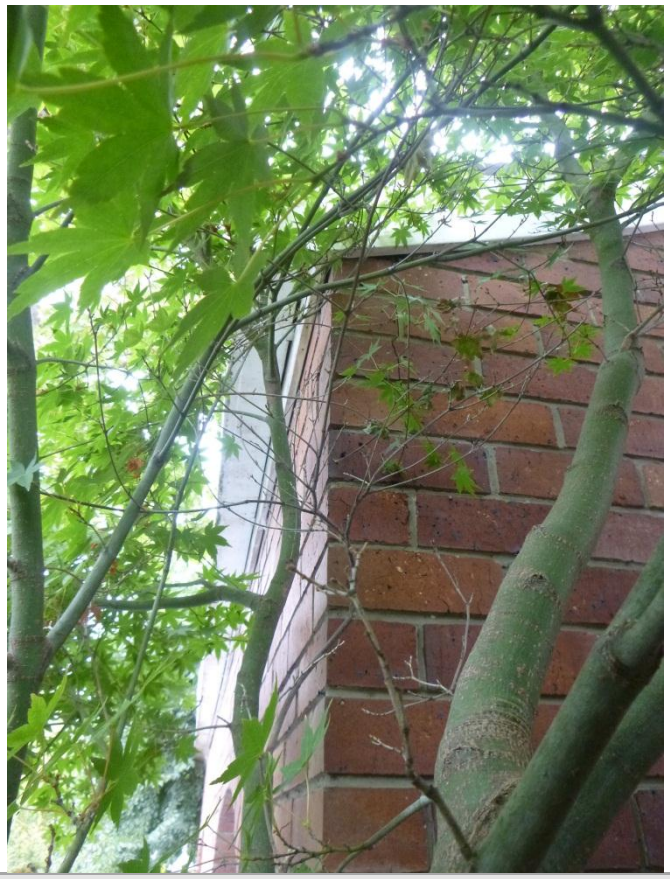
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

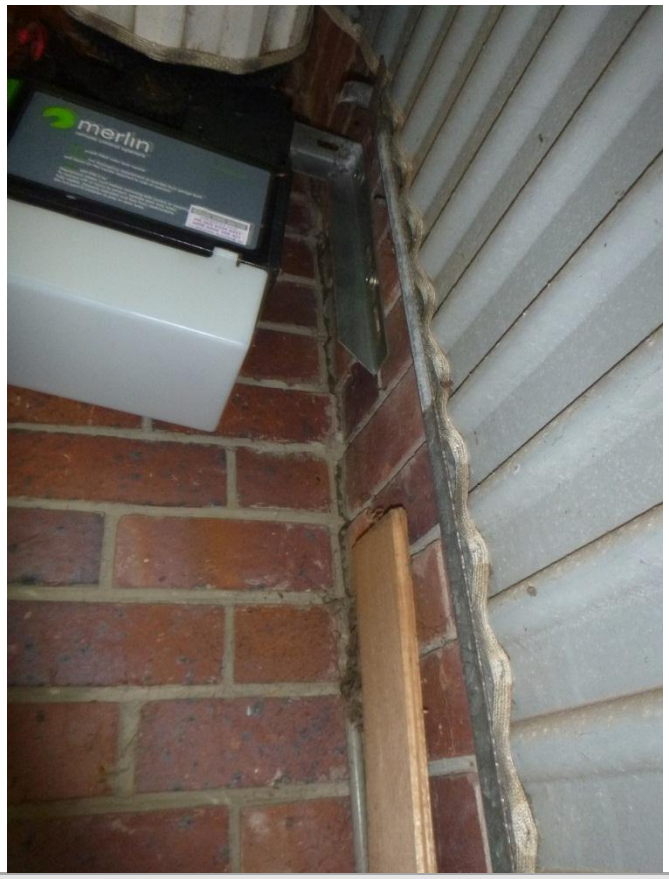
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

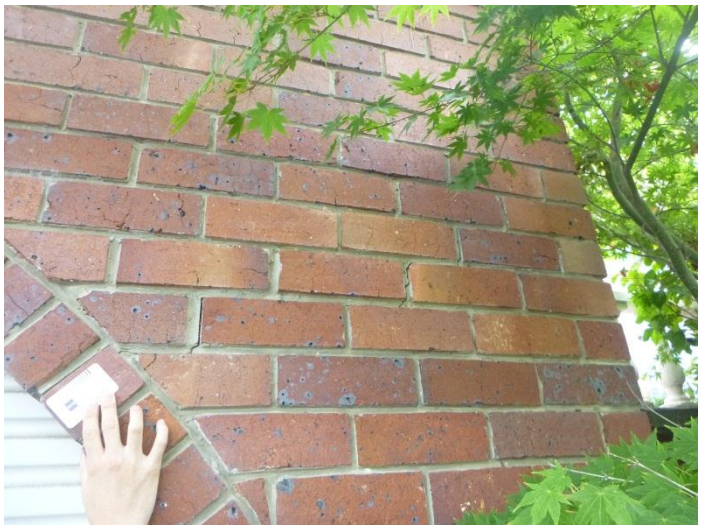
5. Photographs

Reference 165 - Photo 0486	Reference 166 – Photo 0487
Reference 167 – Photo 0488	**Reference 167 – Photo 0489**
	

Reference 167 – Photo 0490	Reference 167 – Photo 0491
	
Reference 168 – Photo 0492	Reference 168 – Photo 0493

Reference 168 – Photo 0494	Reference 169 – Photo 0495
Reference 170 – Photo 0496	Reference 170A – Photo 0497

Reference 171 – Photo 0498	Reference 172 – Photo 0499
	
Reference 173 – Photo 0500	Reference 174 – Photo 0501

Reference 175 – Photo 0502	Reference 176 – Photo 0503
	
Reference 176 – Photo 0504	

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1. Property Details

1.1 Inspection Details

Address:	116 Flinders Esplanade, Taroona
Inspection Time and Date:	3:00pm, 5 April 2013

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and Pads
Roof type:	Timber with corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Moderate
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
116 FLINDERS ESP

Figure 36

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
1030	1772	Diagonal crack on southern wall below window. Crack is ~3mm wide at the top and narrows further down. Possibly caused by heaving. A large tree is located adjacent to the crack.	2	R
1031	1773	Minor vertical crack top left of door. Appears to be part of more recent renovations. Bricks above door are not engaged with wall either side which has formes a plane of weakness.	1	S
1032	1774	Gap between two different sections of brickwork. Gap is of uniform width and was likely constructed this way.	-	-
1034	1776 1777	Concrete footpath at south eastern corner has crack at re-entrant corner. Also signs of minor settlement. Path has been partially undermined.	-	O
1035	1778	Various cracks below window. Vertical crack is ~2mm wide at top and narrows further down. Likely settlement of corner or heaving of wall.	2	R
1037	1781	Timber column supporting deck is unsupported (doesn't reach the ground).	3	S
1036	1779 1780	Diagonal crack in wall below deck. Horizontal cracks are ~2mm wide, verticals are narrower. Bricks left of the crack appear to have settled. Adjacent slab has been undermined which may cause runoff to pool near wall footings.	2	R
1038	1782	Diagonal crack top right of window, ~3mm at top and narrowing further down. Likely due to heaving or settlement.	2	R
1038	1783	Up to 15mm of vertical movement in path on northern side. Most likely caused by settlement.	-	R
1039	1784	Minor diagonal cracks above window either side of corner. May be due to settlement of corner or sagging of lintel.	1	R
1040	1785			
1041	1786	Minor diagonal cracks top left of another window. Again, may be due to settlement of corner or sagging of lintel.	1	R
1041	1787	Minor cracks in driveway. Likely due to settlement and possibly the close proximity of a large tree.	-	R

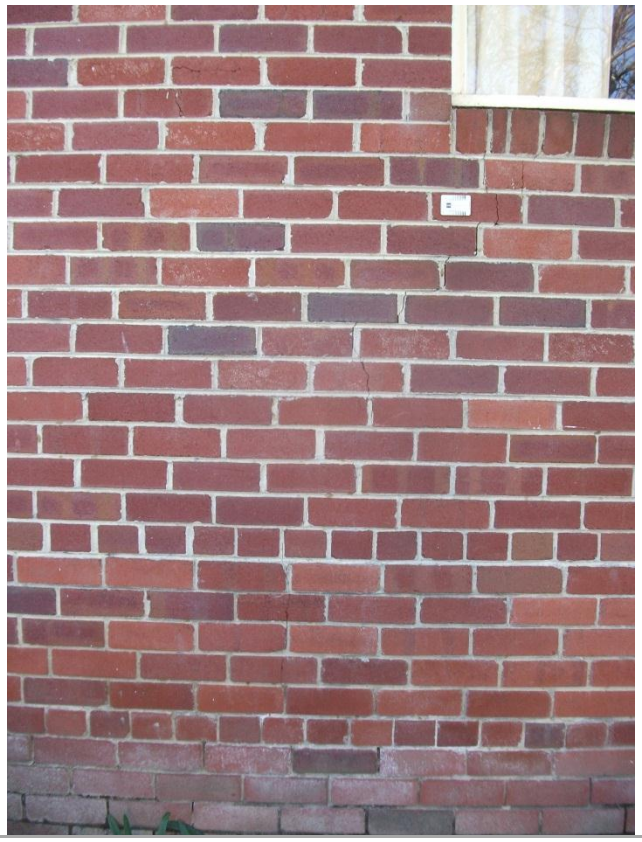
Legend:

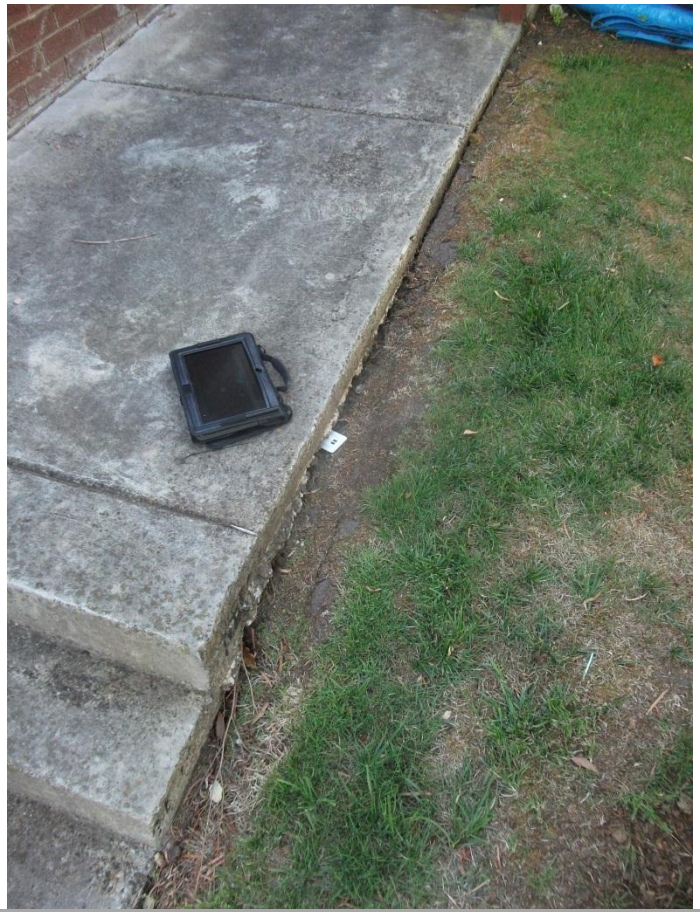
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

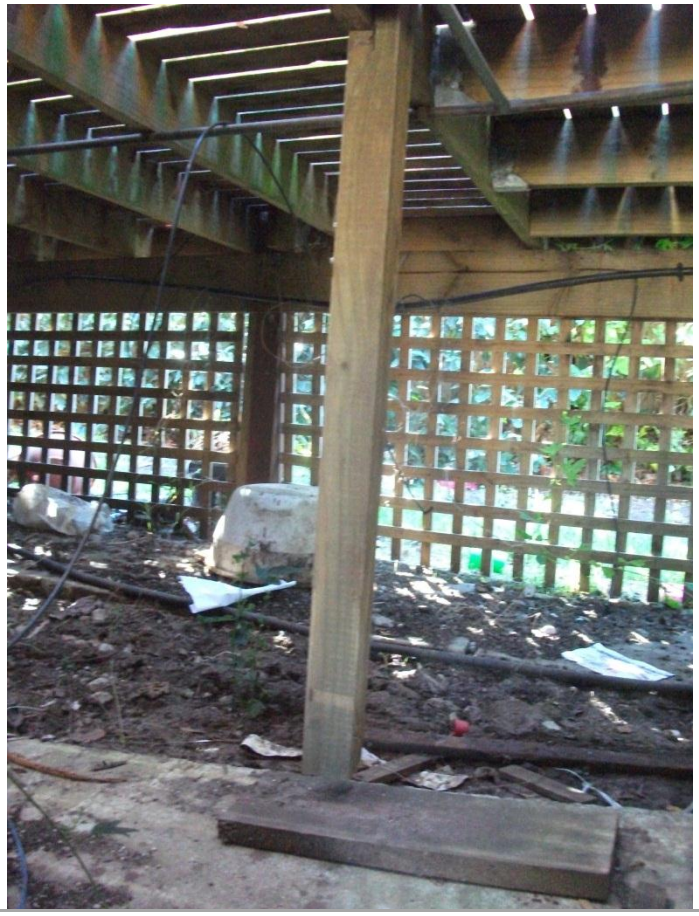
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 1028 – Photo 1770	Reference 1029 – Photo 1771
Reference 1030 – Photo 1772	Reference 1031 – Photo 1773
	

Reference 1032 – Photo 1774	Reference 1033 – Photo 1775
Reference 1034 – Photo 1776	Reference 1034 – Photo 1777
	

Reference 1035 – Photo 1778	Reference 1036 – Photo 1779
Reference 1036 – Photo 1780	Reference 1037 – Photo 1781
	

Reference 1038 – Photo 1782

Reference 1038 – Photo 1783

Reference 1039 – Photo 1784

Reference 1040 – Photo 1785

Reference 1041 – Photo 1786	Reference 1041 – Photo 1787

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1. Property Details

1.1 Inspection Details

Address:	118 Flinders Esplanade, Taroona
Inspection Time and Date:	4:20pm, 14 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
118 FLINDERS ESP

Figure 37

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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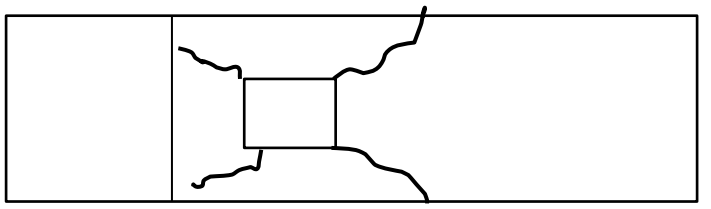
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
197	0532 0533 0534 0535 0536	Diagonal crack at each corner of window. Each crack has hairline horizontal cracks and ~1. 5mm perpend cracks. All cracks are of uniforms width. Some cracks have been repointed. 	2	R
198	0537	Diagonal cracks in corner. Cracks are wider at the top indicating the wall may be leaning out slightly. Crack has been repointed.	2	R
198	0538 0539 0540	Small diagonal crack in corner of uniform ~0.8mm width. Crack has been repointed.	1	R
198	0541	Diagonal crack in corner, wider at top. Indicates that outer corner have settled.	1	R
199	0543 0544 0545 0546	Diagonal crack extending around corner. Bricks below crack appear to have dropped and moved approx ~15mm horizontally relative to the upper bricks. Bottom corner may be rotating outwards due to settlement.	3	R
200	0547 0548 0549 0550	Horizontal cracks extends to north eastern corner of house. Wall below the crack seems to be leaning outward leaving ~6mm crack at some locations.	3	R
200	0551	Ramp to front door rotating out slightly.	-	R
201	0552 0553 0554 0555 0556 0557 0558	Driveway is showing significant horizontal & vertical movement. Very uneven surface and horizontal gaps of 50mm between sections of concrete that were clearly once joined.	-	R
202	0559	Diagonal crack. Perpend cracks vary from ~5mm at the top to ~1mm at the bottom. Horizontal cracks are u uniformly 1mm wide. Most likely due to settlement or heaving.	2	R
203	0560	Diagonal crack showing horizontal movement in both in plane & out of plane directions. Bricks above crack appear to be moving out from the house and to the east.	3	R
204	0561	Vertical cracks near corner. ~1.5mm perpend cracks, hairline horizontal.	2	R
205	0562	Vertical crack near bottom of wall. Crack passes through the middle of multiple bricks. Bricks to the right of crack have moved horizontally out and to the south. In relation to those on the left.	1	U
206	0563 0564	Diagonal crack near corner. Uniform ~1mm width horizontal & vertical cracks.	1	R
207	0565 0566 0567	Diagonal crack in the corner. Corner appears to have moved horizontally to the south west. Crack is wider at the bottom indicating possible heaving or settlement.	2	R
209	0569	Diagonal crack above window, wider at the top.	1	R

Legend:

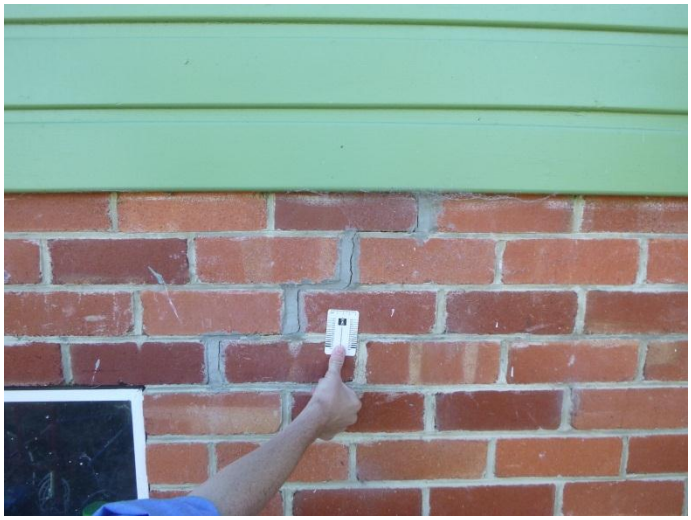
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

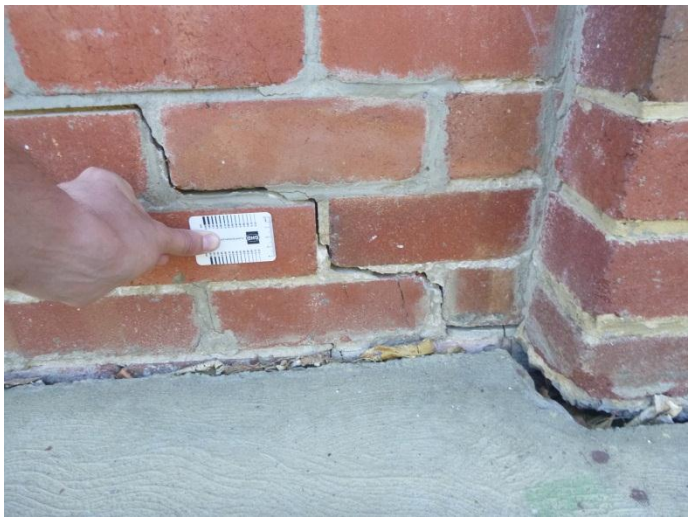
Reference 194 - Photo 0529	Reference 195 – Photo 0530
Reference 196 – Photo 0531	**Reference 197 – Photo 0532**

Reference 197 – Photo 0533	Reference 197 – Photo 0534
Reference 197 – Photo 0535	Reference 197 – Photo 0536
	

Reference 198 – Photo 0537	Reference 198 – Photo 0538
Reference 198 – Photo 0539	Reference 198 – Photo 0540

Reference 198 – Photo 0541	Reference 199 – Photo 0542
Reference 199 – Photo 0543	Reference 199 – Photo 0544

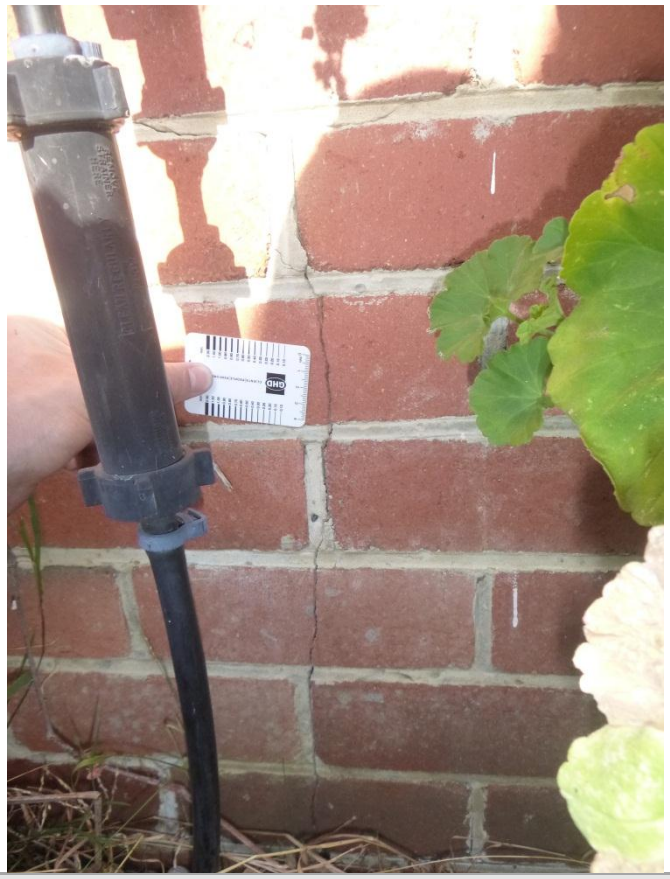
Reference 199 – Photo 0545	Reference 199 – Photo 0546
Reference 200 – Photo 0547	Reference 200 – Photo 0548

Reference 200 – Photo 0549	Reference 200 – Photo 0550
	
Reference 200 – Photo 0551	Reference 201 – Photo 0552

Reference 201 – Photo 0554	Reference 201 – Photo 0555
Reference 201 – Photo 0556	Reference 201 – Photo 0557

Reference 201 – Photo 0558	Reference 202 – Photo 0559
Reference 203 – Photo 0560	Reference 204 – Photo 0561

Reference 205 – Photo 0562



Reference 206 – Photo 0563

Reference 206 – Photo 0564

Reference 207 – Photo 0565

Reference 207 – Photo 0566	Reference 207 – Photo 0567
Reference 208 – Photo 0568	Reference 209 – Photo 0569

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1. Property Details

1.1 Inspection Details

Address:	122 Flinders Esplanade, Taroona
Inspection Time and Date:	3:30pm, 14 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
-	No Observed Damage	N/A

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
122 FLINDERS ESP

Figure 38

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
192	0525 0526 0527	Small gap between stairs at the back door and the rest of the house. Also small cracks in brickwork. Stairs appear to be rotating slightly away from house. Most likely minor settlement of stair footings.	-	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 189 - Photo 0522	Reference 190 – Photo 0523
Reference 191– Photo 0524	**Reference 192 – Photo 0525**

Reference 192 – Photo 0526	Reference 192 – Photo 0527
Reference 193 – Photo 0528	

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PART D – HARROW PLACE

Contents

Property Address
12 Harrow Place
16 Harrow Place
18 Harrow Place

1. Property Details

1.1 Inspection Details

Address:	12 Harrow Place, Taroona
Inspection Time and Date:	10:20am, 6 March 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
12 HARROW PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 40

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
848	1510 1511 1512	Diagonal crack near north western corner. Appears to be some minor settlement. Also small vertical crack in weatherboards likely caused by settlement of corner.	1	R
850	1514	Stone retaining wall is in good condition and shows no signs of rotation or cracking.	-	-
852	1516	Diagonal and horizontal cracks top left of window. Likely caused by subsidence.	1	R
853	1517	Vertical cracks ~4mm wide at base of wall near footing. There are no observable horizontal cracks so likely cause is heaving of corner to the right of the crack or settlement of footing to the left.	2	R
854	1518	Horizontal crack in brickwork near corner. Bricks above crack appear to be overhanging the brick below by ~4mm.	2	U
855	1519	Driveway appears to be in adequate condition. One crack observed near top of driveway but other than that there is little sign of horizontal or vertical movement.	-	-

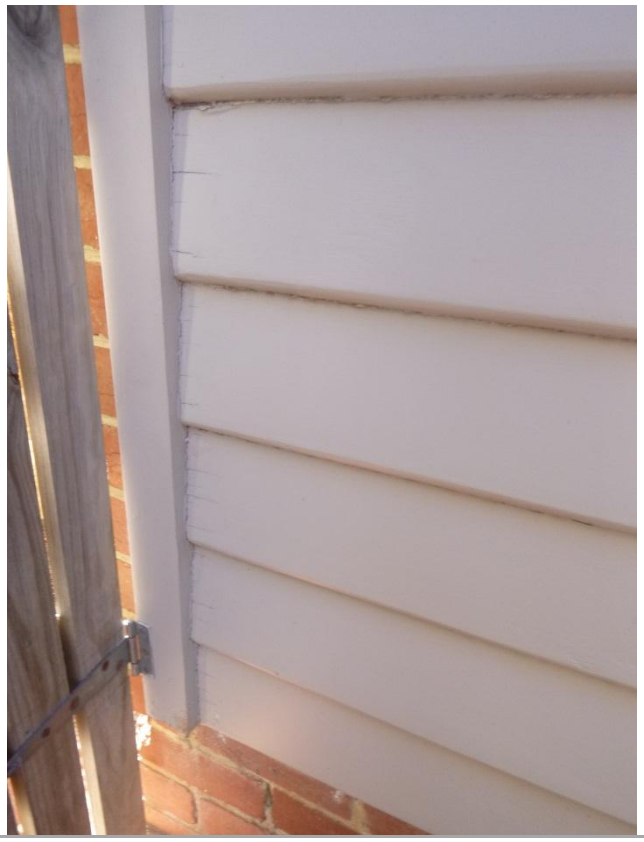
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

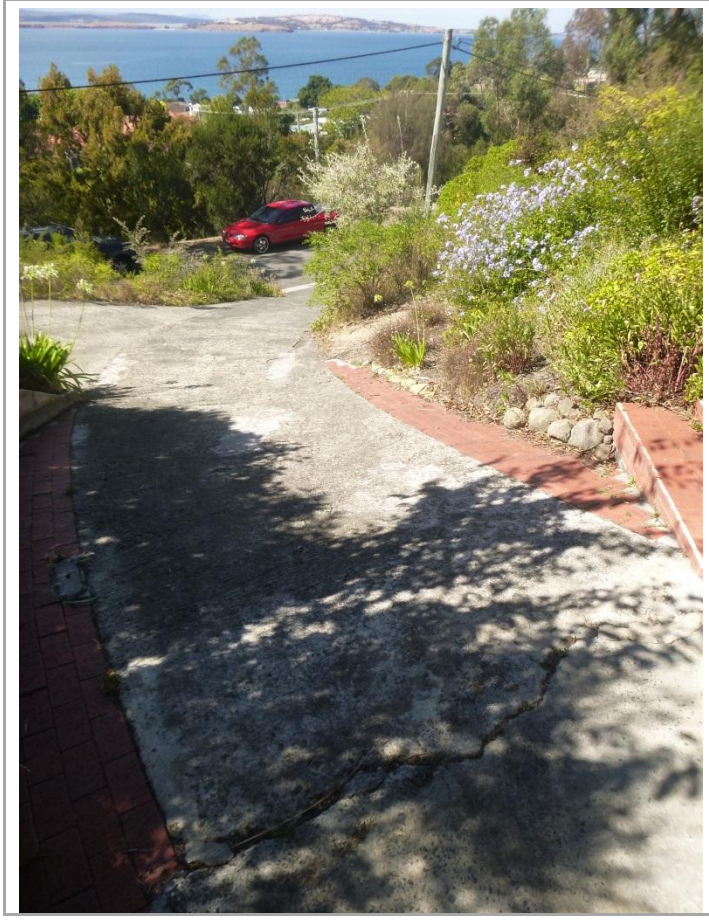
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 847 - Photo 1509	Reference 848 – Photo 1510
Reference 848 – Photo 1511	**Reference 848 – Photo 1512**
	

Reference 849 – Photo 1513	Reference 850 – Photo 1514
Reference 851 – Photo 1515	Reference 852 – Photo 1516

Reference 853 – Photo 1517	Reference 854 – Photo 1518
Reference 855 – Photo 1519	
	

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1. Property Details

1.1 Inspection Details

Address:	16 Harrow Place, Taroona
Inspection Time and Date:	9:10am, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	High
Site Drainage:	Good
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
16 HARROW PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 39

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
644	1231 1232	A small diagonal crack in render near corner has been repaired and has not reopened. Gap between weatherboard at corner. ~3mm at bottom to hairline 200mm up. Rendered brickwork below appears to have pushed corner timber out. Corner of subfloor wall may have settled.	2	R
638	1233	Vertical crack in render larger at top indicating that corner. Also indicates that corner may have settled.	1	R
645	1234 1235	Gaps either side of the front steps. Most likely caused by some minor rotation of the supporting brick retaining wall.	-	-
646	1236 1237	Uneven footpath with various cracks. Little sign of horizontal movement so likely due to settlement.	-	R
647	1238 1239	Horizontal cracks in brickwork at corner. Little horizontal movement. Vertical movement appears to be localised to corner so most likely caused by settlement	2	R
648	1240	Little to no observable horizontal movement of driveway.	-	-
649	1241 1242 1243 1244 1245	Two diagonal cracks extending around corner. Cracks are widest at corner and taper off some distance away. Brick below crack are angling slightly downhill however the base of the wall don't appear to have moved horizontally. Appears to be settlement.	2	R
651	1247 1248 1249	Cracks at top of window on either side. ~10mm diagonal crack below window. Window frame has been forced out of brickwork. Appears to have been caused by settlement of adjacent corner.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

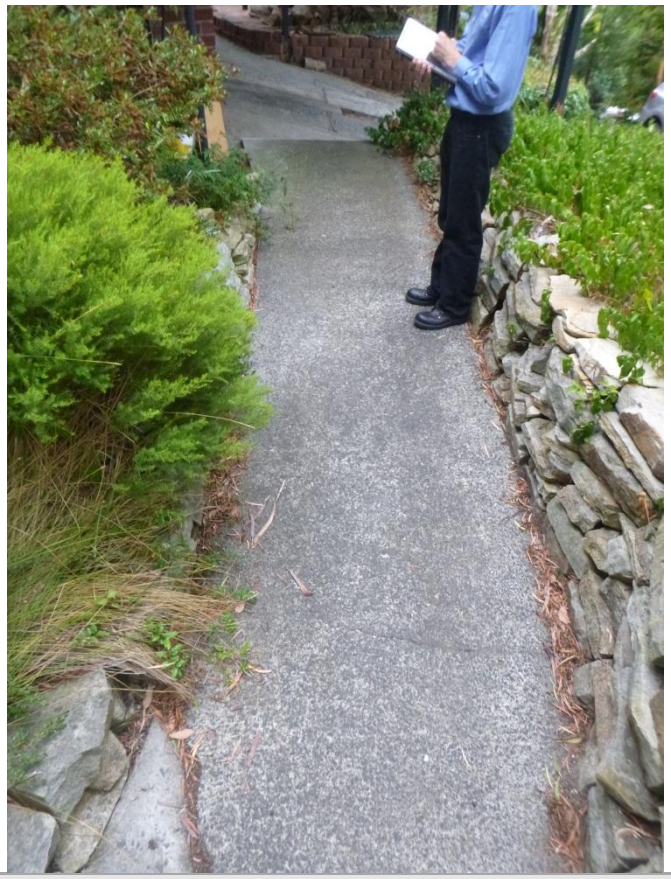
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

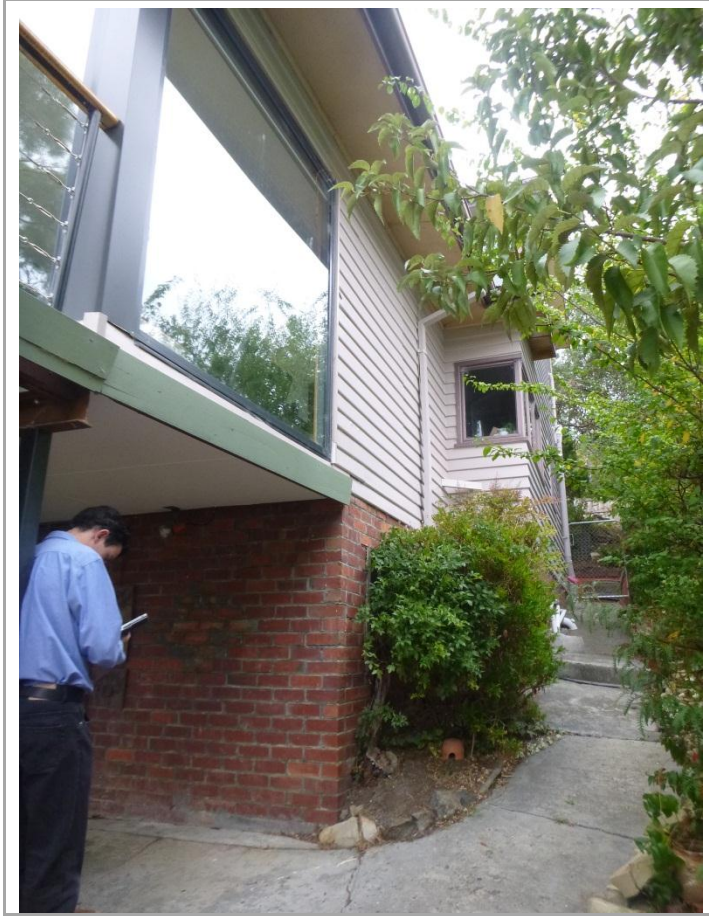
5. Photographs

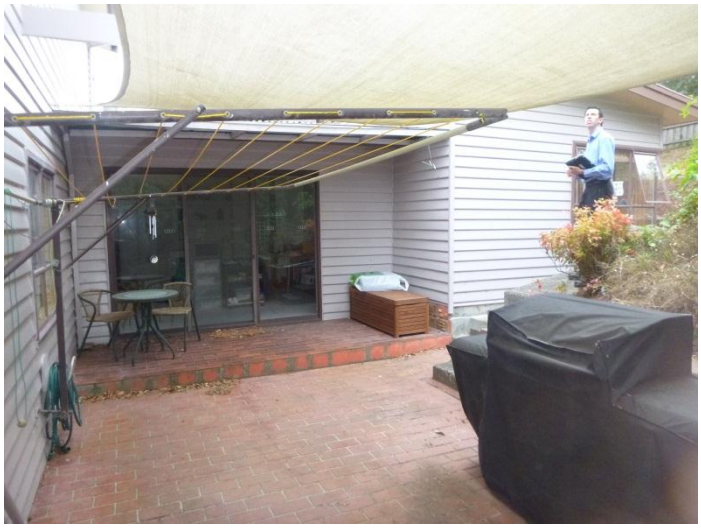
Reference 642 - Photo 1228	Reference 643 – Photo 1229
Reference 643 – Photo 1230	**Reference 644 – Photo 1231**

Reference 644 – Photo 1232	Reference 644 – Photo 1233
Reference 645 – Photo 1234	Reference 645 – Photo 1235

Reference 646 – Photo 1236	Reference 646 – Photo 1237
	
Reference 647 – Photo 1238	Reference 647 – Photo 1239

Reference 648 – Photo 1240	Reference 649 – Photo 1241
Reference 649 – Photo 1242	Reference 649 – Photo 1243

Reference 649 – Photo 1244	Reference 649 – Photo 1245
Reference 650 – Photo 1246	Reference 651 – Photo 1247
	

Reference 651 – Photo 1248	Reference 651 – Photo 1249
Reference 652 – Photo 1250	Reference 653 – Photo 1251
	

Reference 654 – Photo 1252	

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1. Property Details

1.1 Inspection Details

Address:	18 Harrow Place, Taroona
Inspection Time and Date:	10:00am, 25 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
0	Negligible	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
18 HARROW PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 41

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
659	1257	Diagonal crack in brickwork below front deck. Crack has been painted over but appears to be wider at the top than the bottom. Likely due to settlement.	0	R
660	1258 1259	Concrete paths are generally in good condition with cracks only present at control joints. Paths show no evidence of horizontal movement.	-	-

Legend:

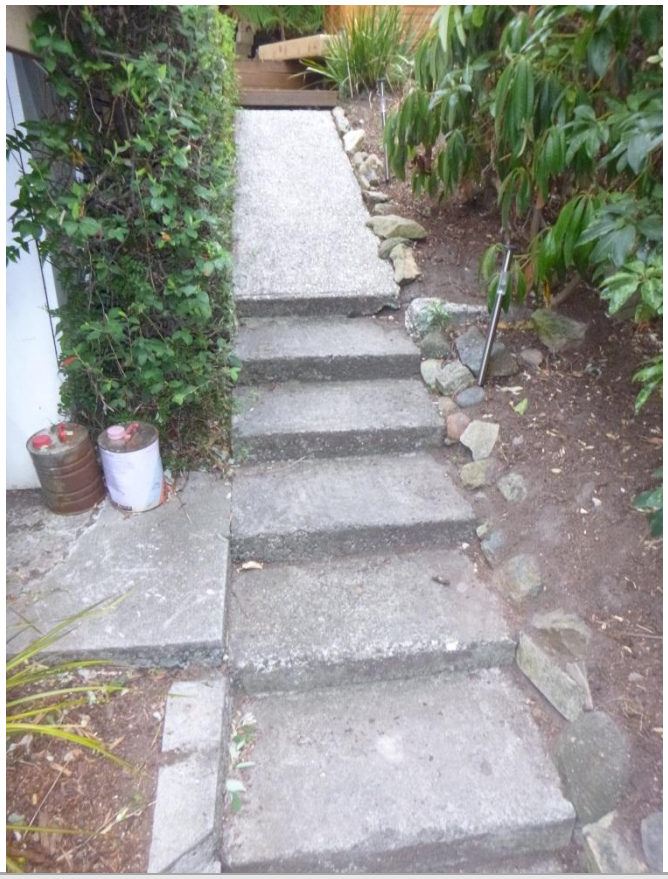
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 655 - Photo 1253	Reference 656 – Photo 1254
Reference 657 – Photo 1255	**Reference 658 – Photo 1256**

Reference 659 – Photo 1257	Reference 660 – Photo 1258
	
Reference 660 – Photo 1259	

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PART E – MEATH AVENUE

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17 Meath Avenue
18 Meath Avenue
21 Meath Avenue
22 Meath Avenue
24 Meath Avenue
25 Meath Avenue
27 Meath Avenue
28 Meath Avenue

1. Property Details

1.1 Inspection Details

Address:	1 Meath Avenue, Taroona
Inspection Time and Date:	9:30am, 13 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single story
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
1 MEATH AV

Figure 42

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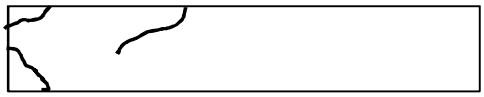
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
68	0290	Crack between existing building and new add-on. ~2mm near top, hairline at head level.	2	U
68	0291 0292	Minor heaving of timber deck may have been caused by roots from adjacent tree.	-	O
68	0293 0294	Footpath angling away from house. Two cracks across width of path. Likely cause by settlement.	-	R
68	0295	Crack between wall and front porch. Crack is ~2mm wide at the top tapering to hairline further down. Consistent with previous statement regarding settlement of the path.	2	R
68	0296	Gap below window is wider on the left that the right. Unable to tell if this was caused by structural movement or if it was constructed this way.	-	-
68	0297 0298 0299	Minor diagonal cracks in rendered brick subfloor wall ~1mm wide. Rendered surface makes it difficult to assess size or cause of cracks. 	1	U
68	0300	Diagonal crack approx ~15mm wide at top and ~3mm at bottom. Horizontal and vertical cracks are approximately the same size. Corner appears to have subsided which may have been exacerbated by the nearby vegetation.	3	R
69	0301 0302	Gaps top and bottom of double doors shows that the frame may be racking to the right (north). The doors may have been constructed this way.	-	-
69	0303 0304	Diagonal crack under deck wider at top and hairline at bottom. Consistent with theory that corner has dropped.	2	R
70	0306 0307	South corner shows evidence of rising damp. Resident indicated that during periods of rainfall water flows out from under the path and out from under house.	-	-
70	0308 0309	Downpipe is angled at bottom showing horizontal movement of approx 30mm. Downpipe may have been constructed this way.	-	-
71	0311 0312	Crack extending around corner of wall. Crack is ~2mm wide at the corner and tapers to hairline ~700mm to the left. This is possible evidence that the corner is subsiding.	2	R
71	0313	Gap has formed top right of door and has been sealed with adhesive tape to prevent leakage. There is little evidence of movement of external structure so is likely movement of the internal frame.	-	S
71	0314	Horizontal crack in render ~1.5mm wide at top left of door. Part of the steel lintel is visable through a hole in the render. Unable to determing if crack extends to brickwork underneath.	-	U
72	0315	Residentindicated that pavers have dropped approx 50mm. May have been caused by water flowing underneath, washing away the fines. May also have been caused by a lack of foundation compaction prior to pavement installation.	-	O

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
72	0316	Small cracks predominantly horizontal and ~1mm wide. No identifiable cause.	1	U
72	0317	Crack between old and new sections of house, ~6mm at top and hairline near middle. Likely some minor movement of internal timber frame.	2	S
73	0318	Vertical crack at corner of building ~7mm at top and hairline at bottom. There didn't appear to be any bricks interlocking the two walls which is the likely cause.	3	S

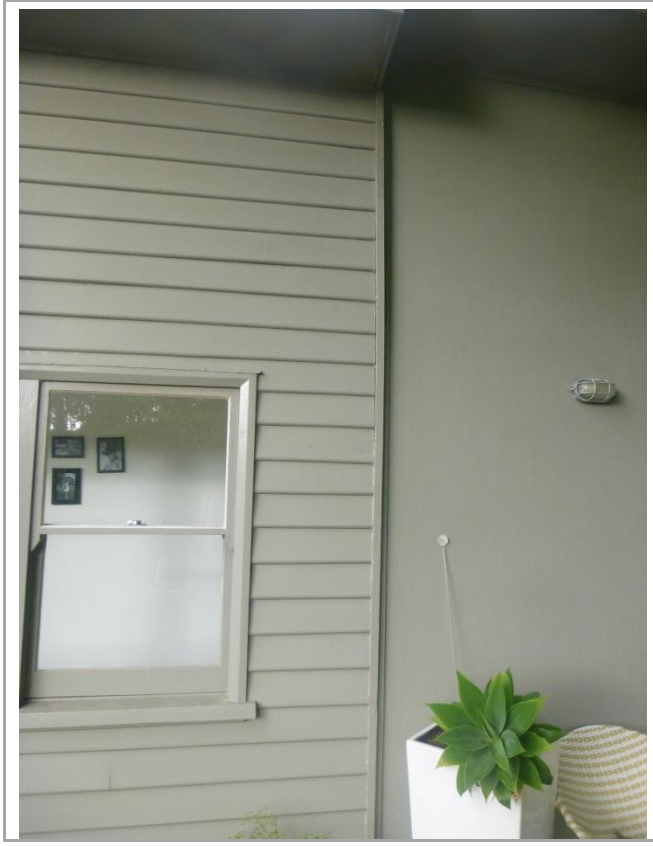
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 066 – Photo 0288	Reference 067 – Photo 0289
Reference 068 – Photo 0290	**Reference 068 – Photo 0291**
	

Reference 068 – Photo 0292

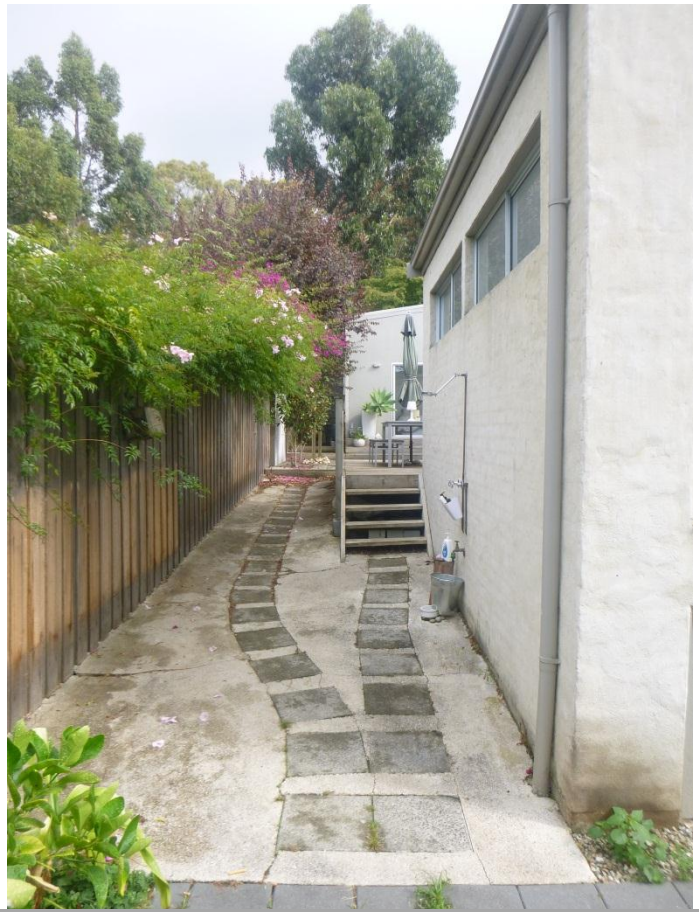
Reference 068 – Photo 0293

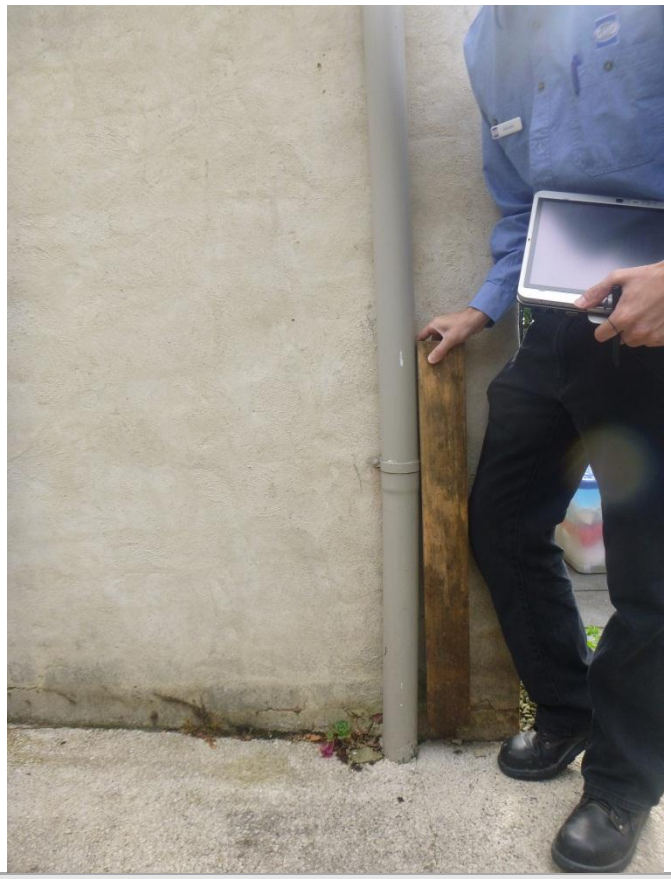
Reference 068 – Photo 0294

Reference 068 – Photo 0295

Reference 068 – Photo 0296	Reference 068A – Photo 0297
Reference 068A – Photo 0298	Reference 068A – Photo 0299

Reference 068A – Photo 0300	Reference 069 – Photo 0301
Reference 069 – Photo 0302	Reference 069 – Photo 0303

Reference 069 – Photo 0304	Reference 069 – Photo 0305
Reference 070 – Photo 0306	Reference 070 - Photo 0307
	

Reference 070 – Photo 0308	Reference 070 – Photo 0309
	
Reference 071 – Photo 0310	Reference 071 – Photo 0311

Reference 071 – Photo 0312	Reference 071 – Photo 0313
Reference 071 – Photo 0314	**Reference 072 – Photo 0315**

Reference 072 – Photo 0316	Reference 072 – Photo 0317
Reference 073 – Photo 0318	Reference 074 – Photo 0319

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1. Property Details

1.1 Inspection Details

Address:	3 Meath Avenue, Taroona
Inspection Time and Date:	1:00pm, 5 April 2013.

1.2 Property Details

Building:	Brick with board cladding
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
3 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 43

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
1009	1746 1747	Driveway appears to be relatively new. Minor crack in slab appears to be caused	-	-
1011	1749	Vertical crack in corner of brickwork. Appears to be an interface betweenoriginal brickworks and a more recent addition. Crack has been repaired with flexible sealant but appears to be wider near the top. likely settlement of older brickworks causing minor rotation to the north.	2	R
1011	1749 1750	Diagonal crack near bottom of brickwork adjacent to corners. Crack is ~2mm wide at north side and narrower at south. Again, northern wall appears to have settled.	2	R
1011	1751	Small diagonal crack at top of corner which appears to have been painted over.	1	R
1012	1752	Diagonal crack below window ~3mm wide at top, tapering further down. As per previous comments, corner to the left may have settled.	2	R
1013	1753	Diagonal crack near corner, bottom left of window. Crack uniform width ~2.5mm wide. Large trees are located nearby so maybe due to cyclic movements of reactions soils.	2	R
1015	1755	~1.5mm gap between cladding at corner.	1	U

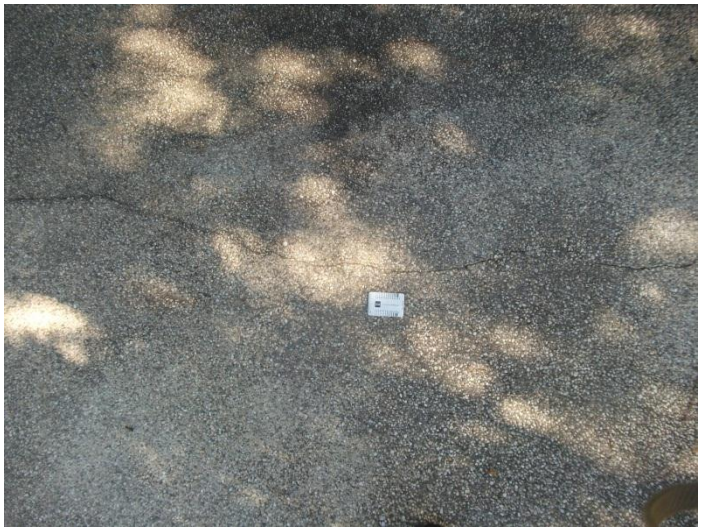
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 1009 – Photo 1746	Reference 1009 – Photo 1747
	
Reference 1010 – Photo 1748	Reference 1011 – Photo 1749

Reference 1011 – Photo 1750	Reference 1011 – Photo 1751
Reference 1012 – Photo 1752	**Reference 1013 – Photo 1753**

Reference 1014 – Photo 1754	Reference 1015 – Photo 1755

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1. Property Details

1.1 Inspection Details

Address:	4 Meath Avenue, Taroona
Inspection Time and Date:	4:00pm, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated Sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
4 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 44

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
536	1053 1054 1055 1056	Carport roof appears to be angling away from the house (to the west).Vertical gap betweens carport wall and house wall larger at the top. Horizontal gap at top of door and top of weather boards are larger at the western side. Wall shows signs of racking.	2	R
537	1057 1521	Brick sub floor wall on the eastern side near the south is on a noticeable angle (top is leaning towards the east) especially towards the middle of the wall. Diagonal crack around corner shows that only the eastern wall has moved.	2	U
538	1058			
541	1061	Similar to previous note brick sub floor wall on the eastern side near the north is on a noticeable angle (top is leaning towards the east). Diagonal crack around corner shows that only the eastern wall has moved.	2	U
856	1520			
542	1063 1064	Gaps between blockwork chimney and timber frame on each side. Gap is larger at the top. A crack is present in the top course of bricks showing horizontal movement. Blocks are angling to the north most likely due to settlement.	3	R
543	1065	Horizontal gap between bottom of timber cladding and brick sub floor on western side. Gap is negligible near end wall and ~30mm near the middle. This wall may also be leaning to the east like the ones on the eastern side of the house. There is little sign of movement on the northern side likely as it's restrained by the northern wall.	3	U

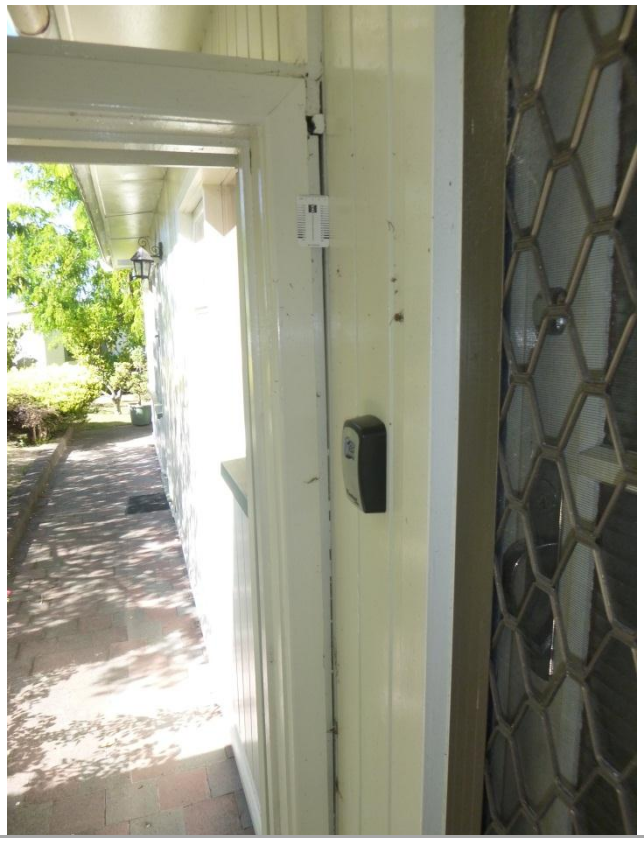
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 534 - Photo 1051	Reference 535 – Photo 1052
Reference 536 – Photo 1053	**Reference 536 – Photo 1054**
	

Reference 536 – Photo 1055	Reference 536 – Photo 1056
Reference 537 – Photo 1057	Reference 538 – Photo 1058

Reference 539 – Photo 1059	Reference 540 – Photo 1060
Reference 541 – Photo 1061	Reference 542 – Photo 1063

Reference 542 – Photo 1064	Reference 543 – Photo 1065
Reference 544 – Photo 1066	Reference 856 – Photo 1520

Reference 537 – Photo 1521	

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1. Property Details

1.1 Inspection Details

Address:	6 Meath Avenue, Taroona
Inspection Time and Date:	4:45pm, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
6 MEATH AV

Figure 45

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
546	1068	Minor cracks is front porch concrete slab. Resident indicated that path was constructed in the 50's from plain concrete (no reinforcement was used). Likely the result of settlement.	2	R
547	1069		3	R
549	1071	Vertical crack near southern corner ~4mm wide at top, hairline at bottom. Around corner is a horizontal crack near the top of the top of the brick sub floor wall. These indicate that corner may have settled.	2	R
550	1072 1073			
552	1075 1076 1077	Crack through carport slab. Likely due to a combination of settlement and shrinkage.	2	R
553	1078	Crack in footpath ~25mm wide. Uneven surface. Most likely due to settlement.	-	-

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

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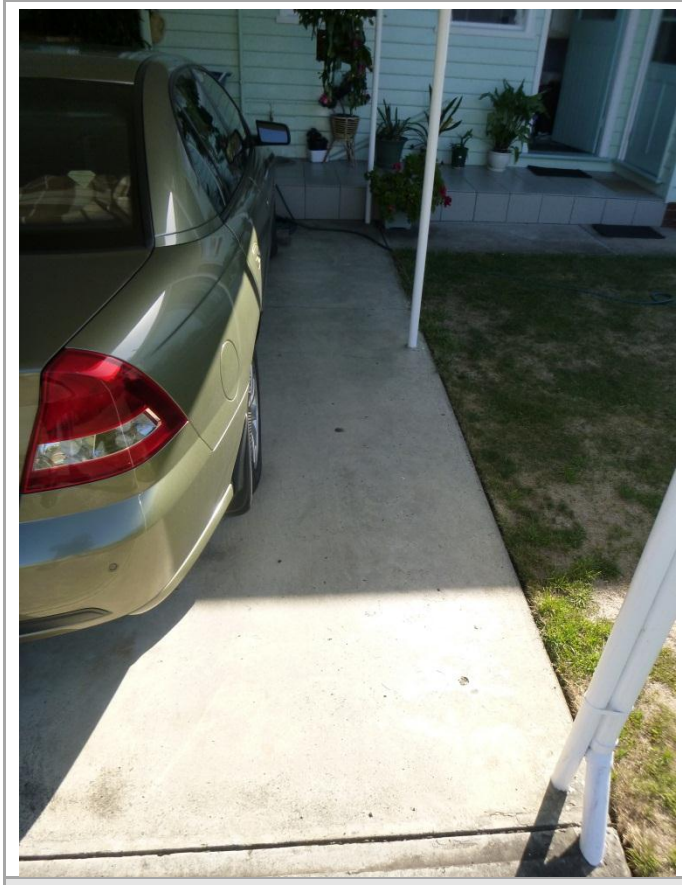
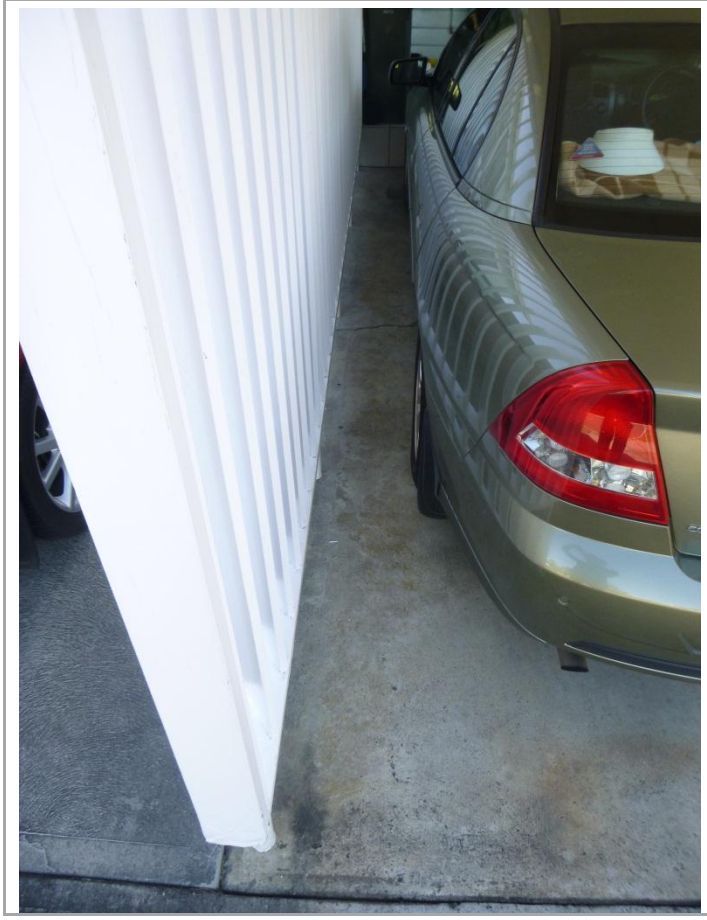
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 545 – Photo 1067	Reference 546 – Photo 1068
Reference 547 – Photo 1069	**Reference 548 – Photo 1070**

Reference 549 – Photo 1071	Reference 550 – Photo 1072
Reference 550 – Photo 1073	Reference 551 – Photo 1074

Reference 552 – Photo 1075	Reference 552 – Photo 1076
	
Reference 552 – Photo 1077	Reference 553 – Photo 1078
	

Reference 554 – Photo 1079	

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1. Property Details

1.1 Inspection Details

Address:	7 Meath Avenue, Taroona
Inspection Time and Date:	1:45pm, 21 February 2013.

1.2 Property Details

Building:	Brick veneer, weatherboard extension second floor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

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Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
7 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 46

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd
2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
511	1010	Vertical crack top left of front door. Crack appears to have been repaired in the past. Seems to indicate a small amount on horizontal movement.	1	U
515	1014	Small vertical ~1mm crack near corner at top of wall down to window lintel.	1	R
516	1015	Diagonal cracks ~1mm wide between top of wall and lintels. Likely settlement of corner.	1	R
517	1016 1017	Diagonal crack from bottom left corner of window to ground on northern wall. Crack ~1.5mm wide at the top & hairline at bottom indicating possible settlement of north western corner.	2	R
518	1018 1019	Evidence of cracks that have been repointed near corner at bottom of wall. Cracks have not opened up and repointing doesn't look particularly new. Most likely some heaving or settlement in the past that has now ceased. Wall is covered with ivy making it difficult to assess.	-	R
519	1020	Timber eves are sagging at north eastern corner. Brickwork below doesn't appear to have moved. Most likely only timber creep of a small localised failure of timber frame.	1	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

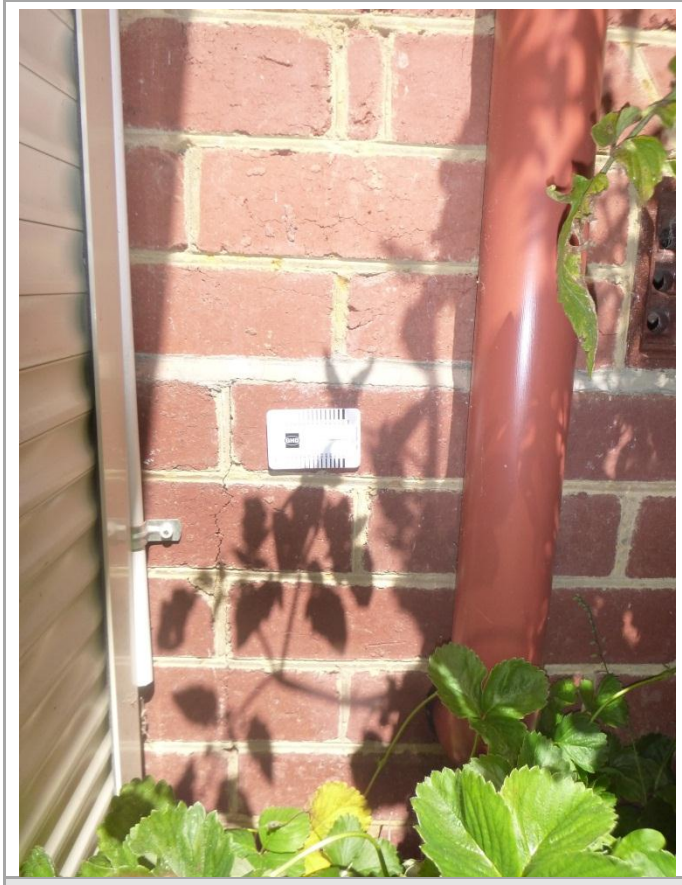
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 510 – Photo 1009	Reference 511 – Photo 1010
Reference 512 – Photo 1011	**Reference 513 – Photo 1012**

Reference 514 – Photo 1013	Reference 515 – Photo 1014
Reference 516 – Photo 1015	Reference 517 – Photo 1016

Reference 517 – Photo 1017	Reference 518 – Photo 1018
	
Reference 518 – Photo 1019	Reference 519 – Photo 1020

6. Disclaimer

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Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1. Property Details

1.1 Inspection Details

Address:	8 Meath Avenue, Taroona
Inspection Time and Date:	2:00pm, 15 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
3 Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
8 MEATH AV

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 47

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
258	0648 0649 0650	Three small cracks in front path not situated at the crack control joints. Appears to be horizontal movement rather than just vertical settlement.	-	U
260	0652	Soil has moved away from walls on one side leaving a gap of ~15mm.	-	-
261	0653	Uniform ~0.7mm vertical crack in wall. Wall has been partially repaired making determination of cause difficult.	1	U
262	0654 0655	Various cracks in garage floor slab. Uneven surface. Most likely due to vertical movement.	3	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 257 - Photo 0647	Reference 258 – Photo 0648
Reference 258 – Photo 0649	**Reference 258 – Photo 0650**

Reference 259 – Photo 0651	Reference 260 – Photo 0652
Reference 261 – Photo 0653	Reference 262 – Photo 0654

Reference 262 – Photo 0655	Reference 263 – Photo 0656

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1. Property Details

1.1 Inspection Details

Address:	10 Meath Avenue, Taroona
Inspection Time and Date:	1:45pm, 13 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated Sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
10 MEATH AV

Figure 48

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
93	0373	Small ~1mm crack in brickwork varying to hairline at ground level. Downpipe draining to ground which may be causing heaving.	1	R
94	0374	Crack in ground approx 50mm wide and 200mm deep.	-	U
95	0375	Two diagonal cracks in brickwork. ~2mm wide at left varying to hairline at right. Possibly evidence of subsidence of bottom left corner of bricks.	2	R
96	0376	Diagonal crack at top approx ~7mm wide. Possible rotation of brickwork but difficult to tell as weatherboard section obstructs view.	3	U
96	0377	Gap between brickwork & weatherboard. ~20mm at bottom, ~5mm at top	3	R
97	0379	Crack in ground approx 30mm wide and 100mm deep	-	U
98	0380	Small ~1mm crack in brickwork and vent varying to hairline at ground level	1	R
99	0381 0382	Diagonal crack is brick near corner. ~10mm wide horizontal cracks, ~3mm wide perpend cracks. Bricks have moved out, pushing weatherboards approx 15mm.	3	R
101	0384	Various cracks in paths and uneven surface. Most likely due to settlement.	-	R
102	0385	Small ~1mm crack in brickwork varying to hairline at ground level. Downpipe draining to ground.	1	R
100	0386 0387	Various cracks in natural soil up to 60mm wide & 300mm deep.	-	R

Legend:

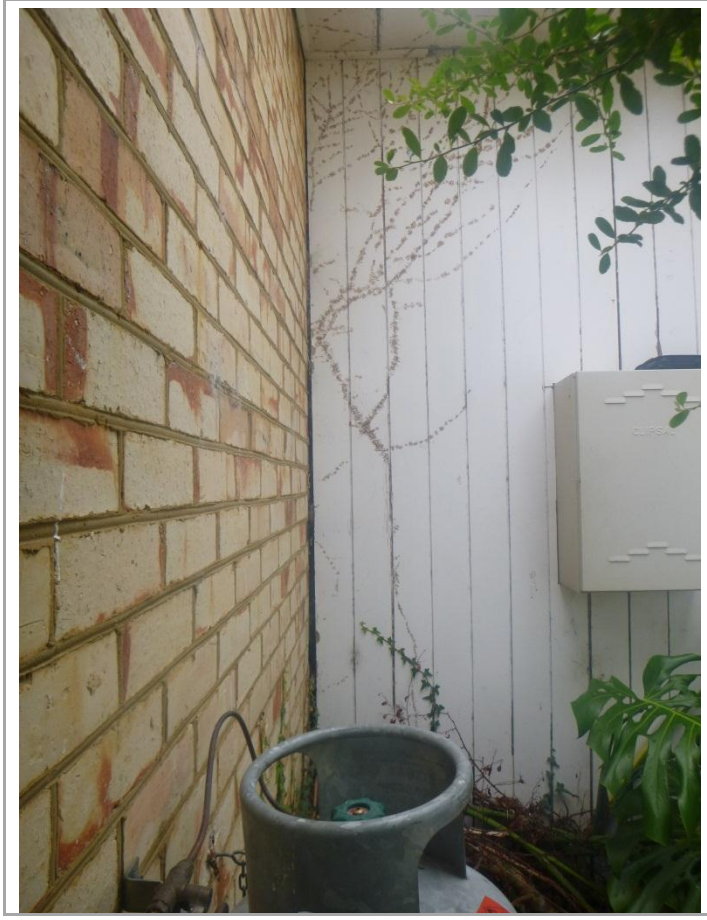
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

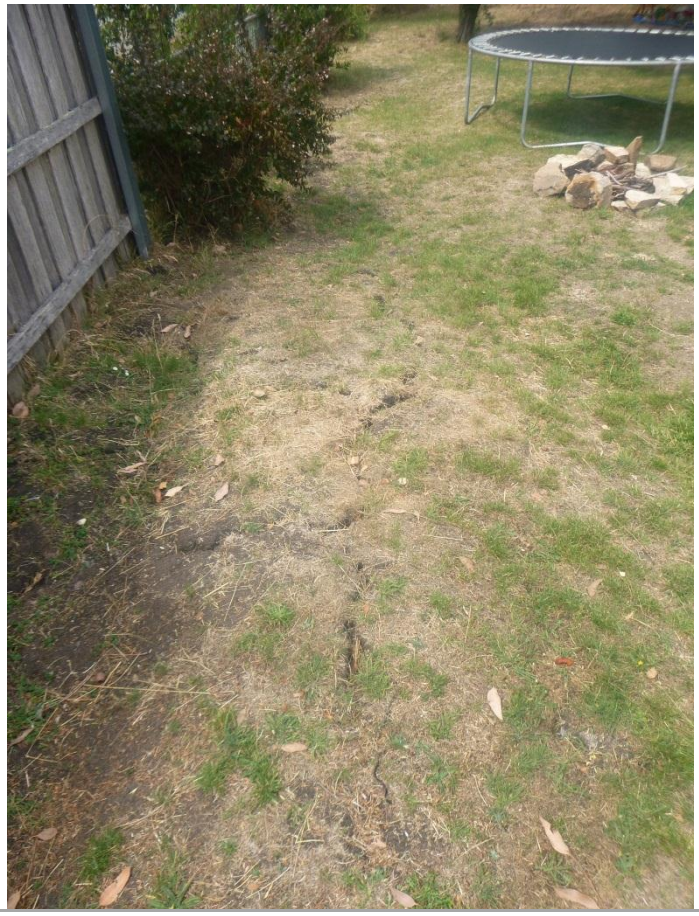
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 91 - Photo 0371	Reference 92 – Photo 0372
Reference 93 – Photo 0373	**Reference 94 – Photo 0374**

Reference 95 – Photo 0375	Reference 96 – Photo 0376
Reference 96 – Photo 0377	**Reference 97 – Photo 0378**
	

Reference 97 – Photo 0379	Reference 98 – Photo 0380
Reference 99 – Photo 0381	Reference 99 – Photo 0382

Reference 100 – Photo 0383	Reference 101 – Photo 0384
Reference 102 – Photo 0385	Reference 100 – Photo 0386
	

Reference 100 – Photo 0387	

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1. Property Details

1.1 Inspection Details

Address:	11 Meath Avenue, Taroona
Inspection Time and Date:	2:40pm, 21 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
11 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 49

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
522	1023	Large cracks in concrete slab at bottom of front stairs. Slab is mostly covered making is difficult to see the extent of the cracks. Cracks are predominantly diagonal and show little horizontal movement. Most likely caused by settlement.	-	R
525	1026	Vertical crack in bricks near top of sub floor wall has been repaired in the past and has not opened up again.	1	U
526	1027 1028 1029 1030 1031	Small section of bricks on the southern side has been added on sometime after construction of the house. A vertical crack ~10mm is located at interface between original and newer brickwork. A horizontal crack ~8mm wide extends around the wall and then diagonally down parallel to the stairs. Diagonal crack is wider at the top. The new section of brick appears to have settled ~4mm. The original bricks in this areas shows little to no signs of movement.	3	R
527	1032	Diagonal crack in brickwork on other side of stairs. Stairs appear to be self supporting but bricks below are settling.	1	R
527	1033 1034 1035	Horizontal cracks at the top of two engaged pier which are ~1mm wide on the eastern side tapering to hairline on the west. Piers appear to be angling out to the east at the top. There is also a corresponding horizontal crack in the brick wall. The floor on the eastern side of the house may have moved horizontally to the east.	1	R
528	1036	Diagonal crack near top of brickwork ~3mm wide at top and hairline near corner. Top bricks are angling out to the east.	2	R
530	1038 1039	Horizontal crack in wall on eastern side ~2mm wide. This wall also appears to be angling towards the east.	2	R
531	1041 1042 1043 1044 1045	Vertical gap between the original and the more recent brickwork. Gap is wider at the top again indicating that the entire extension is sloping to the east. Similar vertical gaps between the original brickwork and the more recent brick piers is showing the same thing. There is also a vertical gap between the newer wall and it's engaged pier.	2	R
528	1046			
532	1047	Vertical crack in original brickwork wider at the top.	1	R
531	1048	Gaps between newer weatherboards and original house also indicates that newer floor has moved to the east.	2	R
533	1050	Cracks in tiles at front porch. Crack also extends around through the concrete stairs and diagonally down through brickwork. Crack is wider at the top indicating settlement as likely cause.	2	R
520	1021	Uneven cracked concrete driveway. Likely caused by settlement and the age of the concrete.	-	R
521	1022		-	R

Legend:

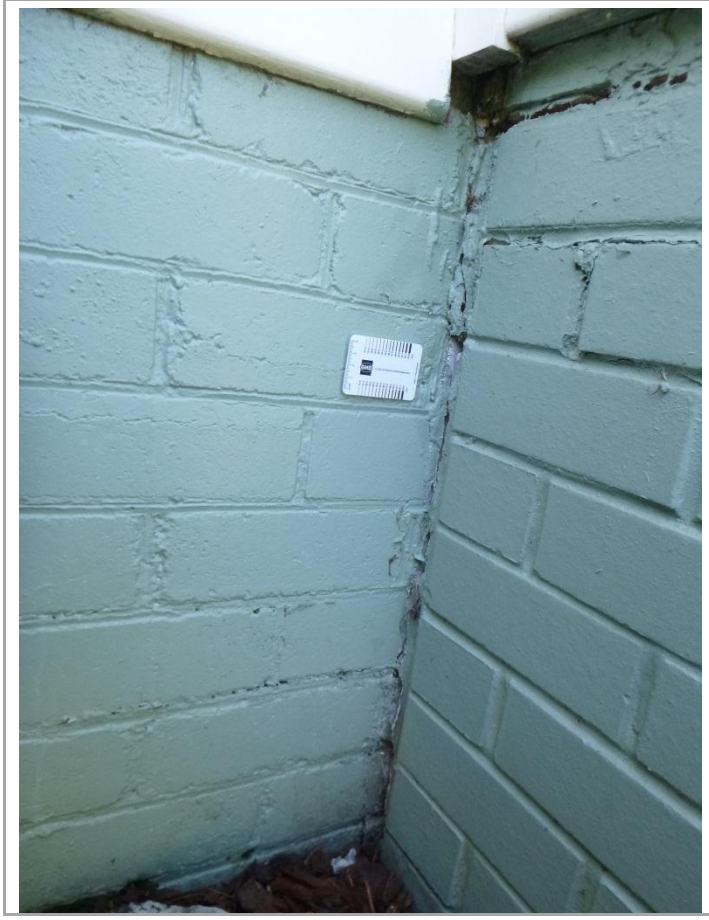
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

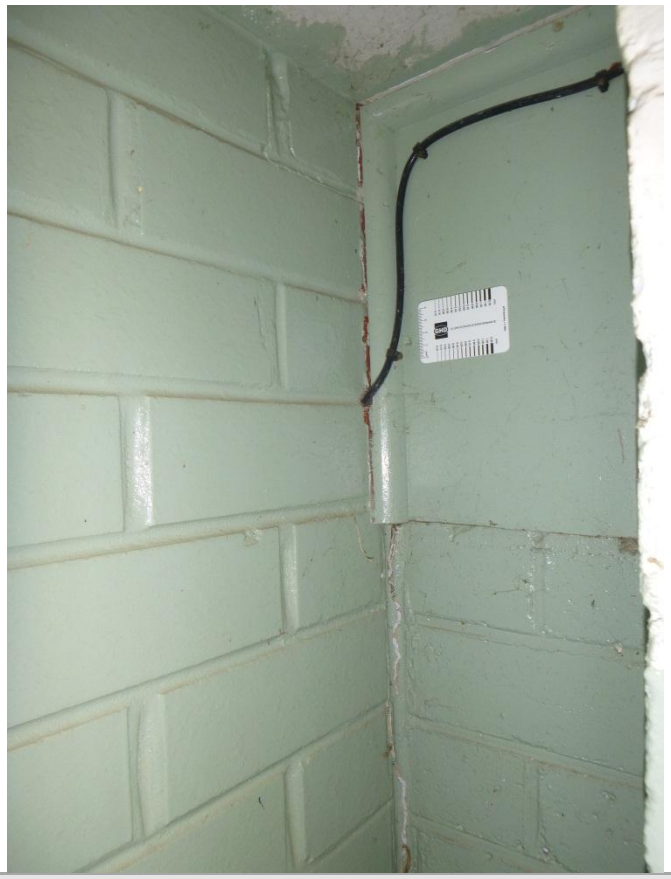
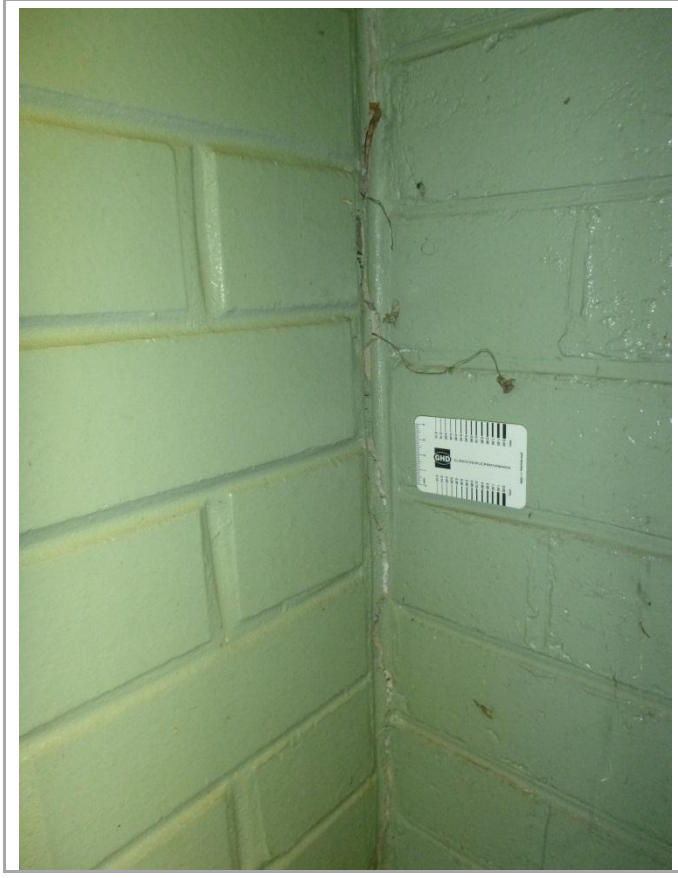
Reference 520 - Photo 1021	Reference 521 – Photo 1022
Reference 522 – Photo 1023	**Reference 523 – Photo 1024**

Reference 524 – Photo 1025	Reference 525 – Photo 1026
Reference 526 – Photo 1027	Reference 526 – Photo 1028
	

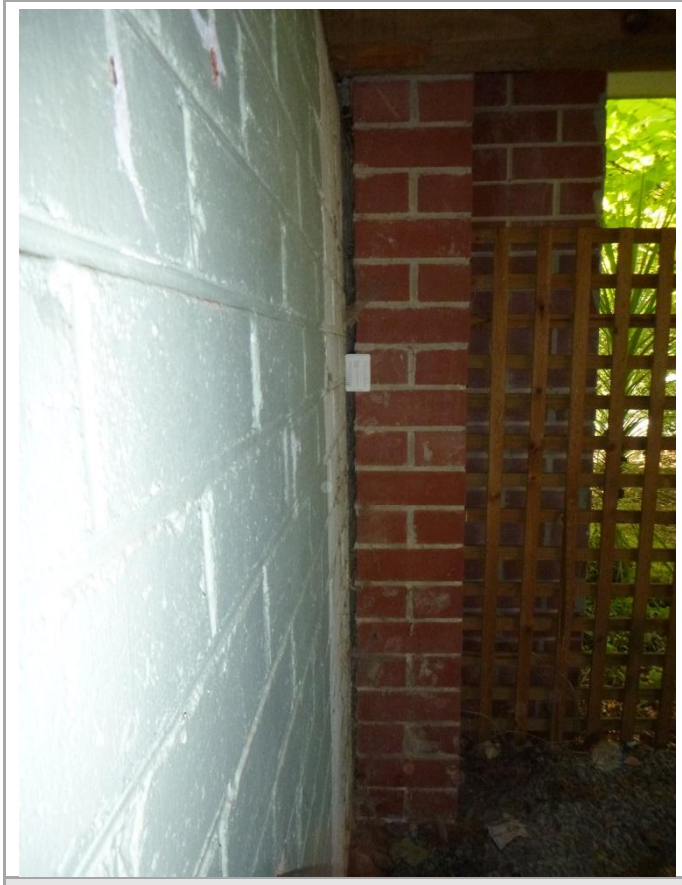
Reference 526 – Photo 1029	Reference 526 – Photo 1030
Reference 526 – Photo 1031	**Reference 527 – Photo 1032**

Reference 527 – Photo 1033	Reference 527 – Photo 1034
Reference 527 – Photo 1035	**Reference 528 – Photo 1036**

Reference 529 – Photo 1037	Reference 530 – Photo 1038
Reference 530 – Photo 1039	Reference 530 – Photo 1040

Reference 531 – Photo 1041	Reference 531 – Photo 1042
	
Reference 531 – Photo 1043	Reference 531 – Photo 1044
	

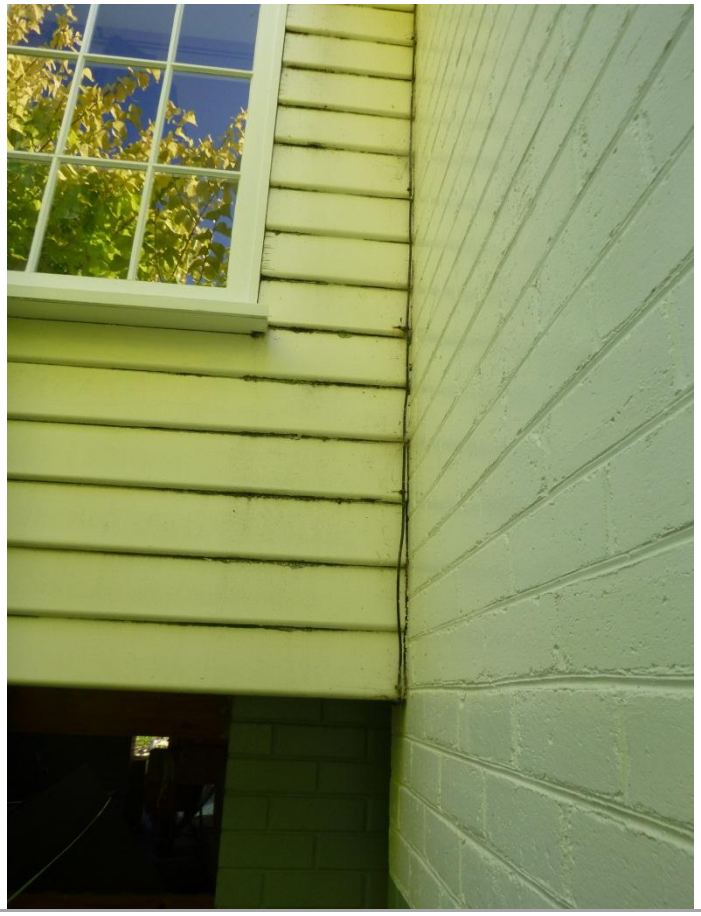
Reference 531 – Photo 1045



Reference 528 – Photo 1046

Reference 532 – Photo 1047

Reference 531 – Photo 1048



Reference 533 – Photo 1050	

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1. Property Details

1.1 Inspection Details

Address:	15 Meath Avenue, Taroona
Inspection Time and Date:	3:30pm, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
15 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 50

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
383	0817	Appears to be >20mm horizontal movement between weatherboards and brick subfloor wall.	4	U
383	818	Northeast corner shows lateral movement in downhill direction. ~4mm vertical crack of uniform width also shown lateral movement downhill.	2	U
382	0816	Various cracks in driveway and signs of vertical movement. Likely due to settlement. There is no crack control joints over 12m length so it may also be partially attributed to shrinkage.	-	R
384	0819 0820	Soil has moved away from driveway. Most of this is likely due to drying of the soil causing contraction.	-	-
386	0822	Entire carport and attached shed is racking towards the north. Gaps between western window and weatherboards clearly showing the racking movement. Walls are noticeable on an angle. Gap above the door also shows racking. Most likely due to a lack of cross-bracing or shearwalls.	3	S
387	0823			
388	0824	Entire western wall of house also appears to be racking slightly to the north. South western corner is noticeably on an angle.	-	S
389	0825	Various vertical cracks in south eastern corner brickwork with ~1.5mm perpend cracks & hairline horizontals. Cracks appear to show minor horizontal movement of southern wall in a southerly direction.	2	R
391	0827	Diagonal cracks in brick at back porch. Horizontal cracks are wider away from the house, vertical cracks are wider at the top. Both of these indicate that north western corner of porch has settled.	2	R
392	0828	Either side of porch (on eastern side) the weatherboards are overhanging the bricks by up to 60mm. This is not the case at either end of the wall. There seems to be little movement of the bricks so the entire timber frame may have moved independantly. The board below the door is on a significant angle which also supports the theory that timber may have moved.	4	U
393	0829			
394	0830			

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

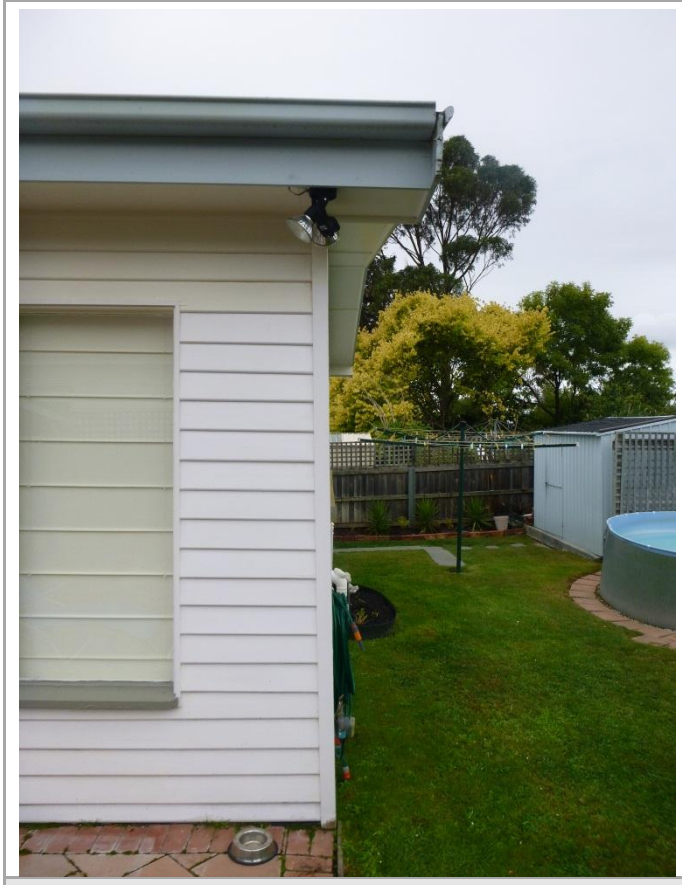
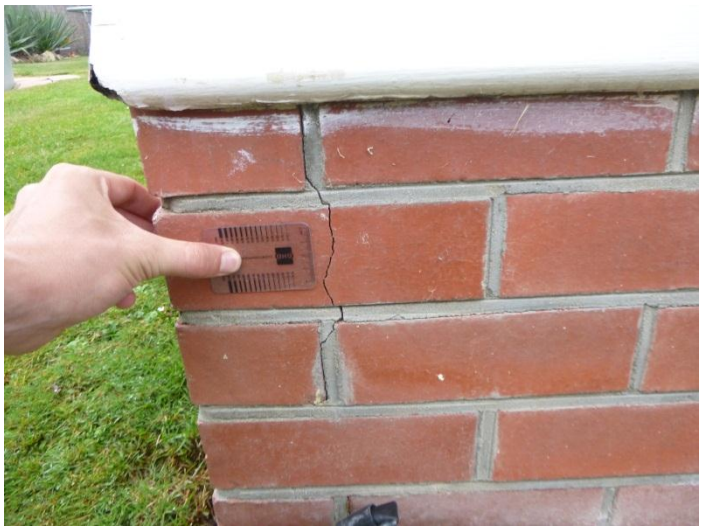
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 382 - Photo 816	Reference 383 – Photo 817
Reference 383 – Photo 818	**Reference 384 – Photo 819**

Reference 384 – Photo 820	Reference 385 – Photo 821
Reference 386 – Photo 822	Reference 387 – Photo 823

Reference 388 – Photo 824	Reference 389 – Photo 825
	
Reference 390 – Photo 826	Reference 391 – Photo 827

Reference 392 – Photo 828	Reference 393 – Photo 829
Reference 394 – Photo 830	

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1. Property Details

1.1 Inspection Details

Address:	17 Meath Avenue, Taroona
Inspection Time and Date:	4:40pm, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
17 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 51

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
395	0831	Longitudinal cracks in asphalt driveway running across the hill. Cracks are predominantly near the edges indicating settlement as likely cause.	-	R
396	0832 0842			
397	0833	Little mortar remaining between bricks in north eastern corner making it difficult to locate cracks.	-	-
398	0835	Vertical crack between sections of house from ground level all the way up to and through eaves. The northern section of the house may be a more recent extension.	1	S
398	0836			
399	0837	Various cracks in paths at the south of the house. Little horizontal movement so likely due to settlement.	-	R
400	0838	Minor crack near corner, narrower near the bottom. Settlement likely cause.	1	R
401	0839	Concrete drain has moved away from the house ~30mm.	-	U
401	0840	Vertical crack between sections of house from ground level all the way up to roof. Corresponds to similar crack on other side of house.	1	S
402	0841	Concrete footing for downpipe exhibiting lateral movement.	-	U

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

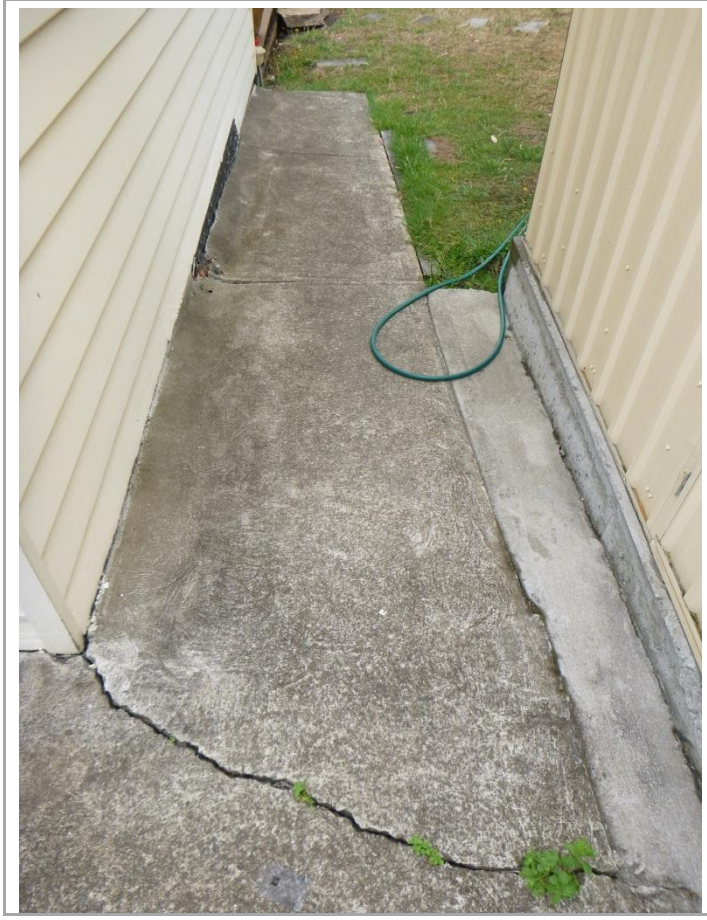
5. Photographs

Reference 395 - Photo 831	Reference 396 – Photo 832
Reference 397 – Photo 833	**Reference 397 – Photo 834**

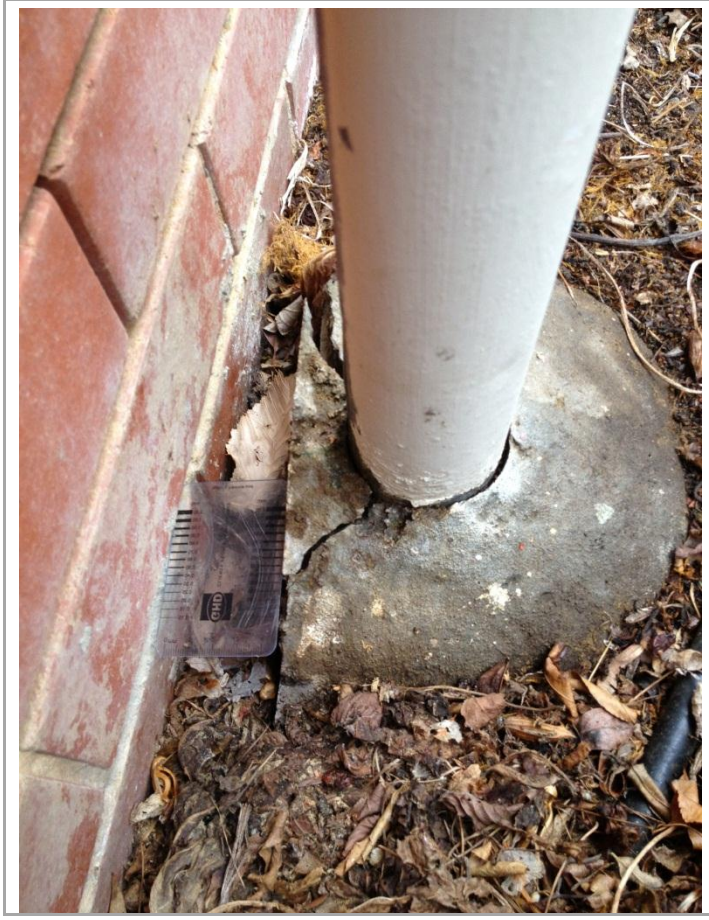
Reference 398 – Photo 835

Reference 398 – Photo 836

Reference 399 – Photo 837



Reference 400 – Photo 838

Reference 401 – Photo 839	Reference 401 – Photo 840
Reference 402 – Photo 841	**Reference 396 – Photo 842**
	

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1. Property Details

1.1 Inspection Details

Address:	18 Meath Avenue, Taroona
Inspection Time and Date:	1:15pm, 19 February 2013.

1.2 Property Details

Building:	Brick veneer, rendered fibre board extension
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
18 MEATH AV

Figure 52

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
355	0781	Diagonal crack near bottom of wall. ~2mm wide perpend cracks, ~1mm wide horizontals.	1	R
355	0782 0783 0784	Diagonal and horizontal crack in bricks to the left of garage door. Bricks below crack have moved horizontally ~7mm to the south east in relation to those below. Possible roatation due to settlement.	3	R
356	0785	Various small cracks in bricks supporting front stairs. Cracks have been painted over and have opened minimally. Difficult to assess cause.	1	U
360	0789 0790	Evidence of diagonal crack extending around corner. Has been painted over so is difficult to assess size. Orientation of crack and small amount of horizontal movement visible indicates most likely due to settlement.	1	R
362	0792	Small diagonal crack between windows. Has been painted over so is difficult to assess size. Crack does not extend below lower window so vertical movement is the likely cause. Could be due to sagging of lower window lintel.	1	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 344 - Photo 780	Reference 355 – Photo 781
Reference 355 – Photo 782	**Reference 355 – Photo 783**

Reference 355 – Photo 784	Reference 356 – Photo 785
Reference 357 – Photo 786	Reference 358 – Photo 787

Reference 359 – Photo 788	Reference 360 – Photo 789
Reference 360 – Photo 790	**Reference 361 – Photo 791**

Reference 362 – Photo 792	

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1. Property Details

1.1 Inspection Details

Address:	21 Meath Avenue, Taroona
Inspection Time and Date:	1:40pm, 5 April 2013.

1.2 Property Details

Building:	Brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Moderate
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

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3. Findings

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
21 MEATH AV

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 54

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
1016	1762	Minor cracks in asphalt driveway. Cracks are located near edges indicating settlement as the likely cause.	-	R
1017	1756	Vertical crack near top of wall that continues down past window and down to the ground. Crack is ~1mm wide at top and hairline near bottom. May be due to heaving of wall. Adjacent area is moderately vegetated.	1	R
1018	1757	Diagonal crack near top of north western corner ~2mm wide at top & narrowing down and to the left. Most likely due to settlement of corner.	2	R
1019	1758	Horizontal crack in brickwork at what appears to be floor level. Crack is ~5mm wide.	2	U
1021	1761			
1020	1759	Diagonal cracks top left of window ~2mm wide.	2	R
1020	1760	Diagonal crack between top right of window and south western corner. Crack is wider near the corner indicating settlement of corner as likely cause.	2	R
1022	1763 1764	Diagonal cracks bottom left & top right of window. Both cracks are widest at the top (~4mm) and hairline near the bottom. Possibly caused by settlement of wall to the right of window.	2	R
1023	1765			
1024	1766	Vertical crack top left of window from top of wall and terminates at top of lintel.	2	U
1026	1768	Footpaths an eastern side is cracked and angled. Appears to have settled.	-	R
1027	1769	Small horizontal crack between windows. Crack is ~1 mm wide on right tapering to hairline on left.	1	R

Legend:

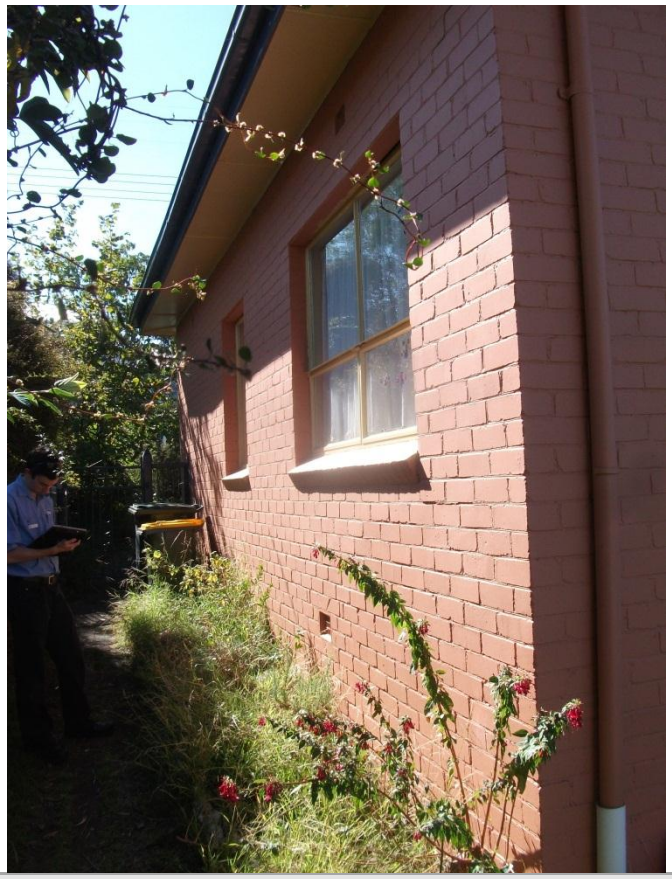
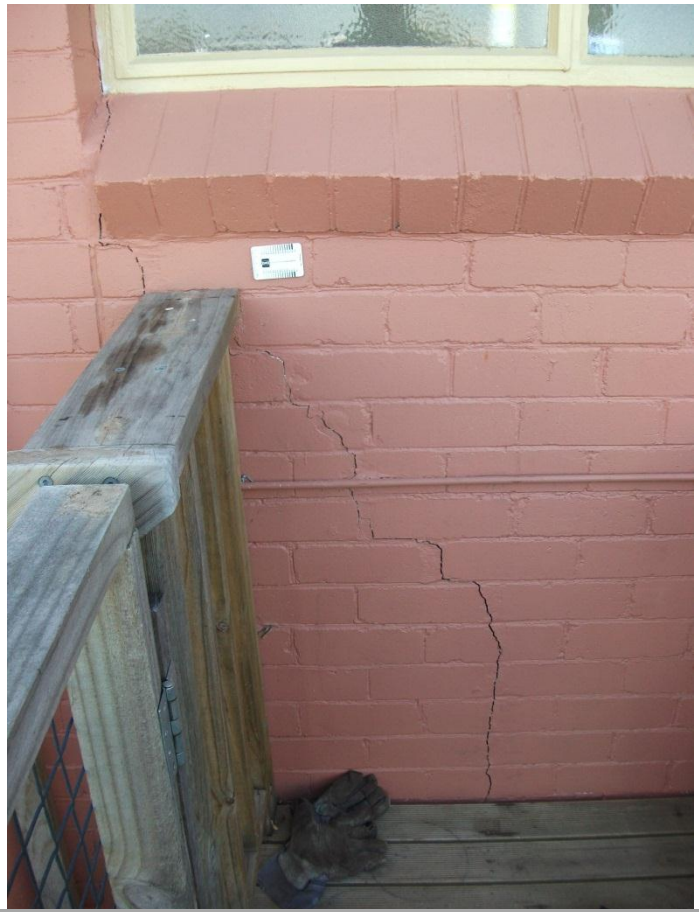
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 1017 – Photo 1756	Reference 1018 – Photo 1757
Reference 1019 – Photo 1758	**Reference 1020 – Photo 1759**

Reference 1020 – Photo 1760	Reference 1021 – Photo 1761
	
Reference 1016 – Photo 1762	Reference 1022 – Photo 1763
	

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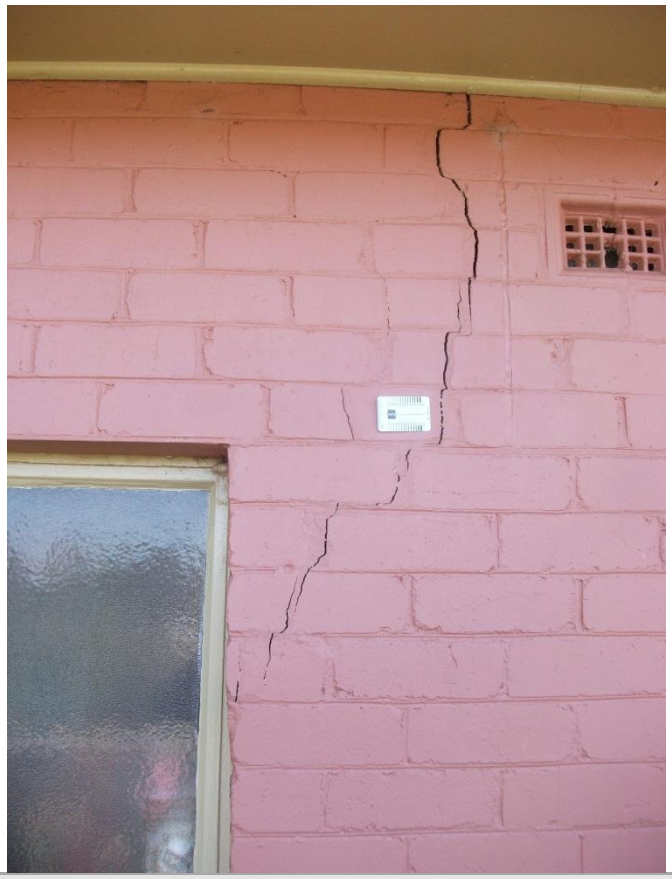
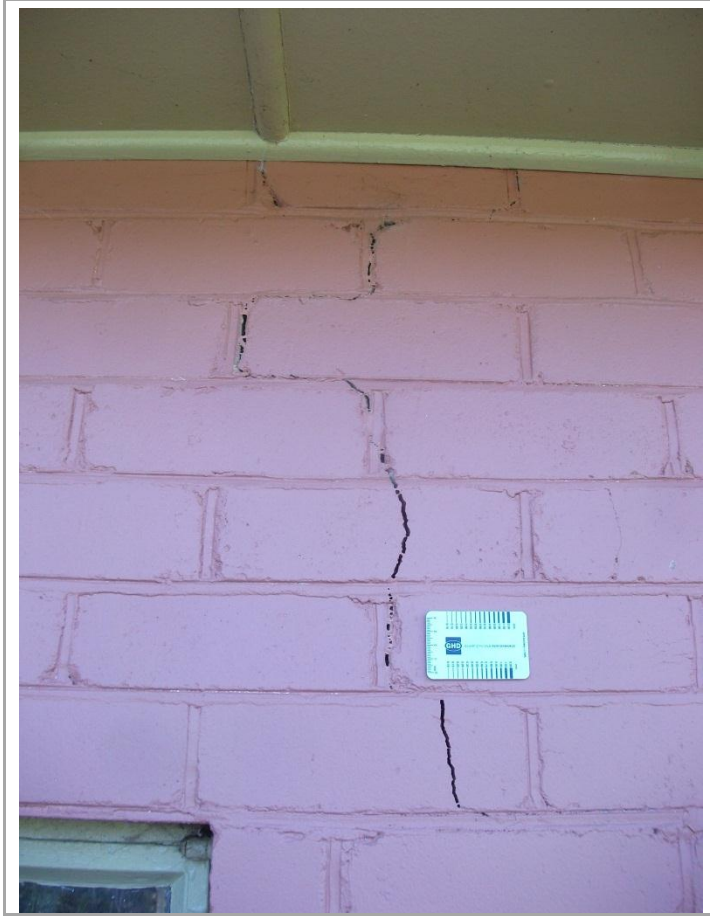
	
Reference 1024 – Photo 1766	**Reference 1025 – Photo 1767**
	

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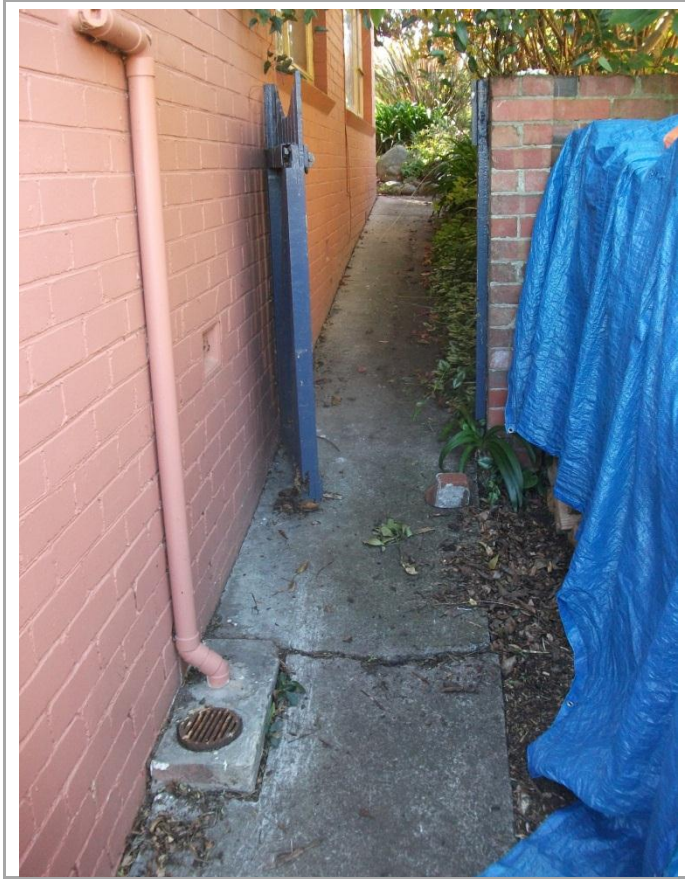	

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1. Property Details

1.1 Inspection Details

Address:	22 Meath Avenue, Taroona
Inspection Time and Date:	1:30pm, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	S - Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
22 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 53

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
368	0798	Mortar missing from around bricks on the north wall. More than one brick is completely loose.	2	S
363	0793	Driveway & paths in good condition with no observable cracks.	-	-
364	0794			

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 363 - Photo 793	Reference 364 – Photo 794
Reference 365 – Photo 795	**Reference 366 – Photo 796**

Reference 367 – Photo 797	Reference 368 – Photo 798

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1. Property Details

1.1 Inspection Details

Address:	24 Meath Avenue, Taroona
Inspection Time and Date:	1:50pm, 19 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
24 MEATH AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 55

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
372	0802	There seems to be a small single room extension on the northern side. A small timber stud subfloor has been built to blend in with the rest of the buildings brick subfloor. Timber is angling in at the bottom likely due to lateral earth pressure from the small amount of retained soil.	2	S
373	0803			
374	0804	Bottom of downpipe on wall is misaligned with the section of pipe going underground. Difficult to tell if it's horizontal movement of if it was constructed this way.	-	U
375	0805 0806	A small extension has been built on the western side consisting of a slab on ground supporting a timber frame. There is a ~0.8mm wide crack through the slab, possibly due to shrinkage as the slab is ~9m long and there is no visible control joints.	1	S
377	0809	Diagonal crack near south eastern corner. ~0.5mm uniform perpend cracks, hairline horizontals.	1	U
381	0813 0814 0815	Various vertical cracks in concrete subfloor walls of smaller structure adjacent to the house.	3	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 369 - Photo 0799	Reference 370 – Photo 0800
Reference 371 – Photo 0801	**Reference 702 – Photo 0802**

Reference 373 – Photo 0803	Reference 374 – Photo 0804
Reference 375 – Photo 0805	**Reference 375 – Photo 0806**

Reference 376 – Photo 0807	Reference 377 – Photo 0808
Reference 377 – Photo 0809	Reference 378 – Photo 0810

Reference 379 – Photo 0811	Reference 380 – Photo 0812
Reference 381– Photo 0813	Reference 381 – Photo 0814

Reference 381 – Photo 0815	

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1. Property Details

1.1 Inspection Details

Address:	25 Meath Avenue, Taroona
Inspection Time and Date:	9:00am, 28 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
25 MEATH AV

Figure 56

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LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
795	1446 1447	Repaired damage in rendered retaining wall out the front. Eastern section of wall appears to have experienced some rotation.	-	-
800	1452	Concrete paths & driveway showing very little cracking. Indication of minor settlement only.	-	R
801	1453		-	R
799	1451	Diagonal crack in brickwork on eastern sub floor wall. Crack has uniform perpend crack of ~1.5mm and hairline horizontals. Crack extends from top to bottom of sub floor wall. Possibly due to minor settlement.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

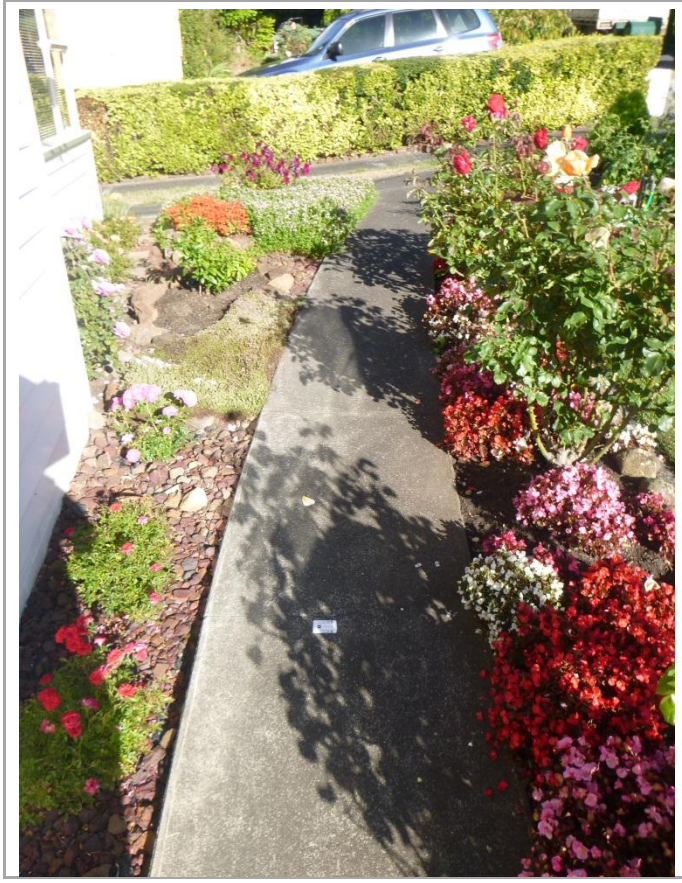
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 793 - Photo 1444	Reference 794 – Photo 1445
Reference 795 – Photo 1446	Reference 795 – Photo 1447

Reference 796 – Photo 1448	Reference 797 – Photo 1449
Reference 798 – Photo 1450	Reference 799 – Photo 1451

Reference 800 – Photo 1452	Reference 801 – Photo 1453
	

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1. Property Details

1.1 Inspection Details

Address:	27 Meath Avenue, Taroona
Inspection Time and Date:	9:00am, 12 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

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Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
27 MEATH AV

Figure 57

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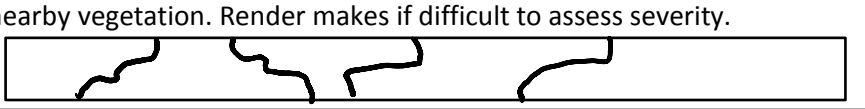
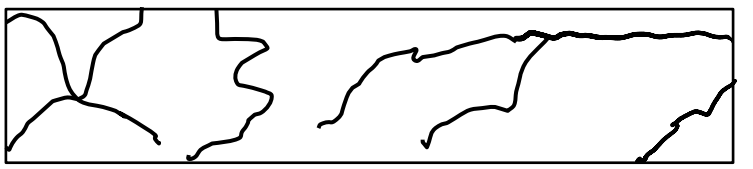
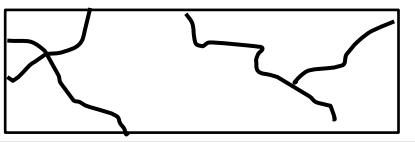
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
2	0142	Cracks in asphalt driveway. All appear to be orientated in the same direction.	-	R
4	0146	Gaps at top and bottom of door. Gaps appear to be caused by a combination of settlement and minor racking of frame.	2	R
5	0147	Various diagonal cracks in northern rendered wall. Likely caused by reactive soils and nearby vegetation. Render makes if difficult to assess severity. 	0	R
6	0148		1	R
7	0149		2	R
8	0150		1	R
9	0151	Vertical gap between chimney & weatherboards. ~10mm at top and zero at bottom. May have been constructed this way.	2	R
10	0152	Horizontal crack in chimney ~0.2mm on outside going to zero near face of wall. Entire wall above floor level may be be racking inwards (to the west).	1	U
13	0156	Vertical hairline crack in render. Appears to be uniform width.	1	U
14	0157 0158 0159	Horizontal crack near bottom of subfloor wall, ~3mm wide at some locations. Appears to be some localised settlement.	2	R
15	0160	Vertical crack in corner between subfloor wall and stairs. ~8mm at top tapering to ~5mm at bottom. Appears to be caused by settlement of stairs.	3	R
16	0161 0162	Diagonal crack in stairs ~6mm wide at bottom and ~2mm wide at top. Stairs appear to be self supporting and rendered brick wall below has settled.	2	R
17	0163 0164	Two diagonal cracks one other side of stairs near ground.	1	R
18	0165 0166 0167 0168 0169	Various diagonal cracks in sourthern subfloor wall. Two diagonal cracks form a cross near the western end. Likely a result of shrink/swell. 	1	R
19	0170 0171 0172 0173	More diagonal cracks in sourthern subfloor wall. Another pair of crossing cracks indicating potential issues with reactive foundations. 	2	R
19	0172 0174	Vertical crack in corner between older building & newer extension. Crack ~4mm wide at bottom tapering to hiarline mid way up weatherboard wall.	1	R
20	0175	Small vertical crack in western subfloor wall. Damage may be localised to the render and bricks below may be undamaged. May be a construction joint in the building (between original building and an extension).	1	U
20	0176	Vertical crack in corner between weatherboard walls. Crack is ~10mm wide at the bottom tapering to hairline ~2m up. Appears to be a joint between original structure and an extension.	3	R

Legend:

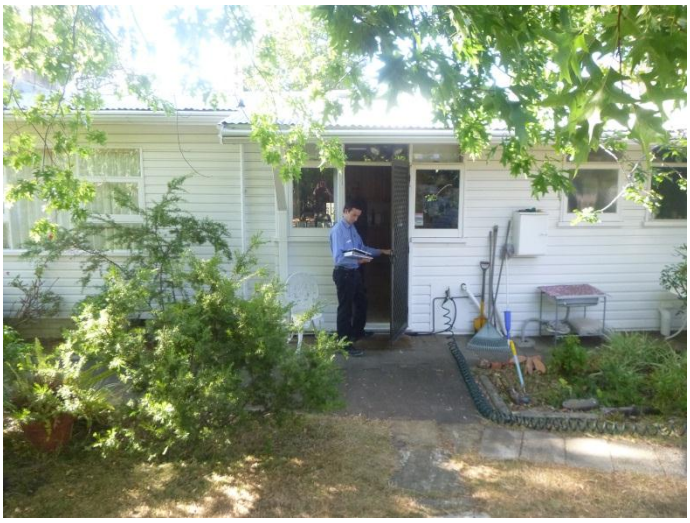
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

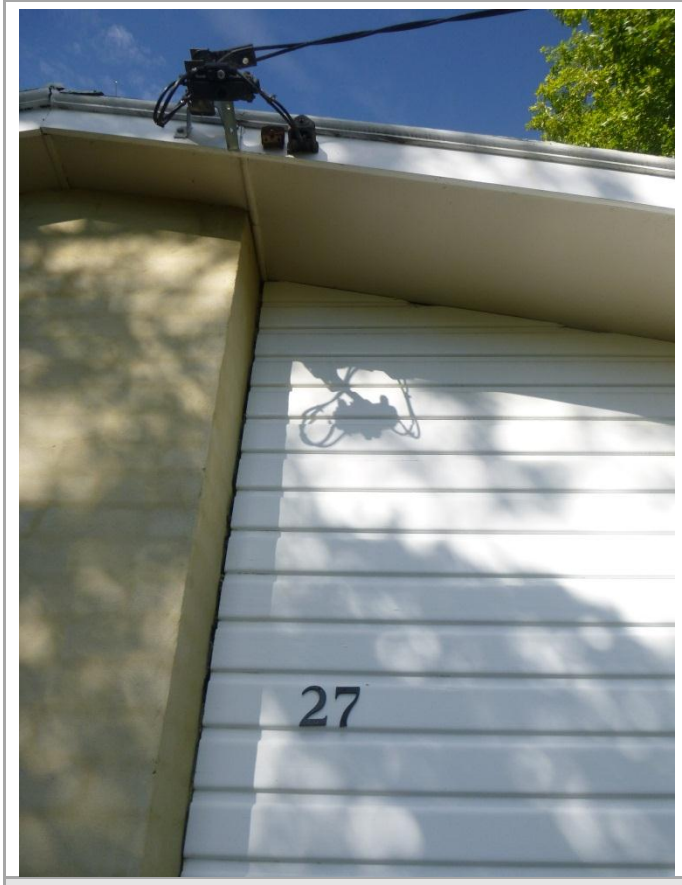
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

GHD	KINGBOROUGH COUNCIL TAROONA LANDSLIDE RISK ASSESSMENT STAGE 2 27 MEATH AVE, TAROONA LIST OF IDENTIFIED ISSUES	JOB NUMBER: 3216698 REVISON: 0 DATE: 12/03/13 SHEET 1 of 1

5. Photographs

Reference 1 - Photo 0141	Reference 2 – Photo 0142
Reference 3 – Photo0143	**Reference 4 – Photo 0146**
	

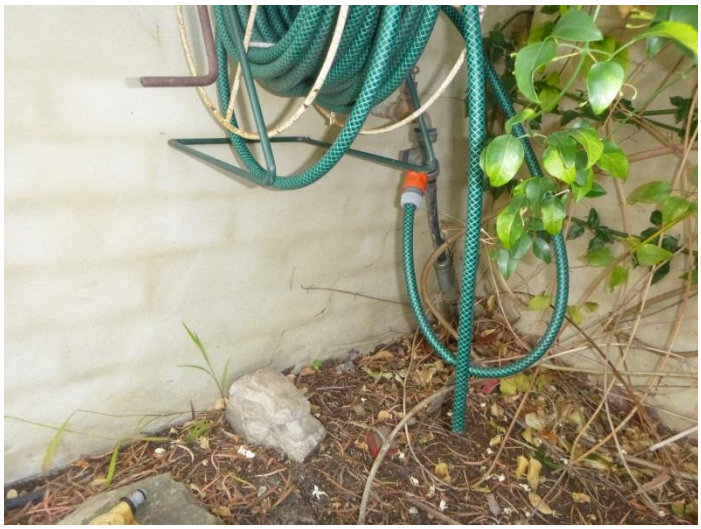
Reference 5 – Photo 0147	Reference 6 – Photo 0148
Reference 7 – Photo 0149	Reference 8 – Photo 0150

Reference 9 – Photo 0151	Reference 10 – Photo 0152
	
Reference 11 – Photo 0153	Reference 12 – Photo 0154

Reference 13 – Photo 0156	Reference 14 – Photo 0157
Reference 14 – Photo 0158	Reference 14 – Photo 0159

Reference 15 – Photo 0160	Reference 16 – Photo 0161
Reference 16 – Photo 0162	Reference 17 – Photo 0163

Reference 17 – Photo 0164	Reference 18 – Photo 0165
Reference 18 – Photo 0166	Reference 18 – Photo 0167

Reference 18 – Photo 0168	Reference 18 – Photo 0169
	
Reference 19 – Photo 0170	Reference 19 – Photo 0171

Reference 19 – Photo 0172

Reference 19 – Photo 0173

Reference 19 – Photo 0174

Reference 20 – Photo 0175

Reference 020 – Photo 0176	

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1. Property Details

1.1 Inspection Details

Address:	28 Meath Avenue, Taroona
Inspection Time and Date:	2:30pm, 15 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single Storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	~50% of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
28 MEATH AV

Figure 58

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
266	0659	Two vertical cracks on south side of veranda wall, ~0.5mm & ~1mm. Top of south corner of veranda has displaced ~30mm horizontally in the south-easterly direction.	2	R
267	0660	One vertical crack on east side of veranda wall, ~2.5mm. Crack is wider at the top.	2	R
267	0661	East side of veranda wall is bowing out in the middle up to 30mm.	-	U
268	0662 0663 0664	Front steps have moved ~3mm away from the wall and have dropped vertically ~10mm.	-	R
269	0665	Localised brick damage at corner. Possibly bearing failure.	1	S
270	0666	Vertical crack at bottom of wall left of garage door ~0.6mm wide.	1	R
271	0667	Vertical crack at bottom of wall right of garage door ~1mm wide.	1	S
272	0668	Various hairline cracks near corner of wall.	0	U
272	0669	Concrete path beside house has moved ~20mm downhill.	-	R
273	0670	Vertical crack near top of wall ~2mm at top & hairline 1m down. Resident noted that house was 'lifted' a few years ago inan attempt to fix some issues. Crack may have been caused by this repair or perhaps shrink/swell.	2	R
274	0671	Diagonal crack extending around corner of uniform 1mm width. Corner appears to be subsiding.	1	R
275	0672			
275	0674	Minor diagonal crack at top of north eastern corner.	0	U
277	0675	Vertical crack below window. Uniform 1mm width horizontal & vertical, again may be due to differential movement of north easthern corner.	1	R
278	0676 0677	Horizontal crack below window. Layer of bricks above window have bulged out by approx 10mm.	-	U
278	0677	Crack through brick at bottom right of window. Bricks in this location have been repointed making it difficult to locate cracks. Potentially due to brick growth.	-	S
279	0678 0679 0687	Diagonal crack extending around corner. 1mm wide perpend cracks, hairline horizontals. Bricks above crack appear to have moved in a south easterly direction in relation to those bricks below.	1	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

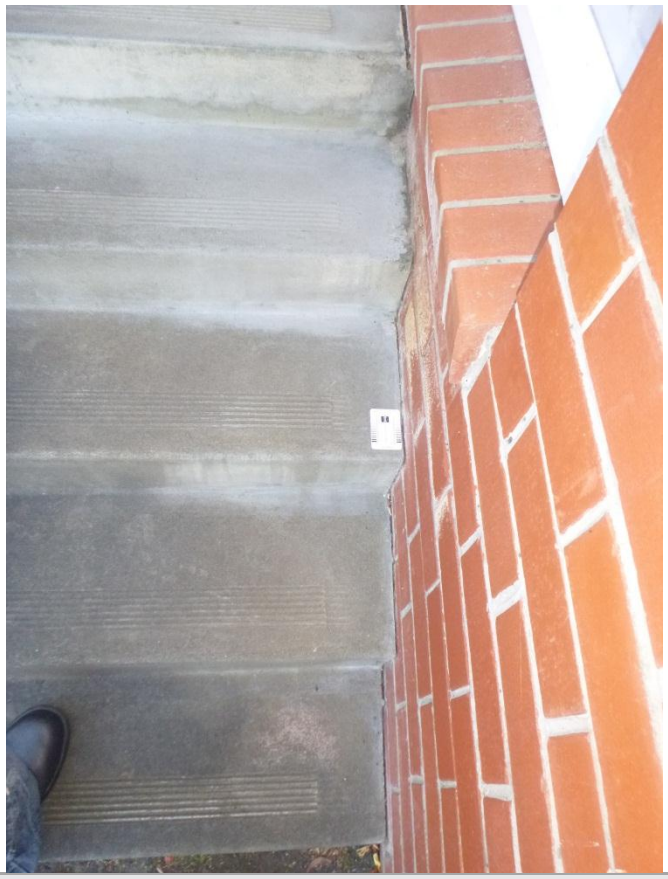
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 264 - Photo 0657	Reference 265 - Photo 0658
Reference 266 - Photo 0659	**Reference 267 - Photo 0660**

Reference 267 - Photo 0661

Reference 268 - Photo 0662

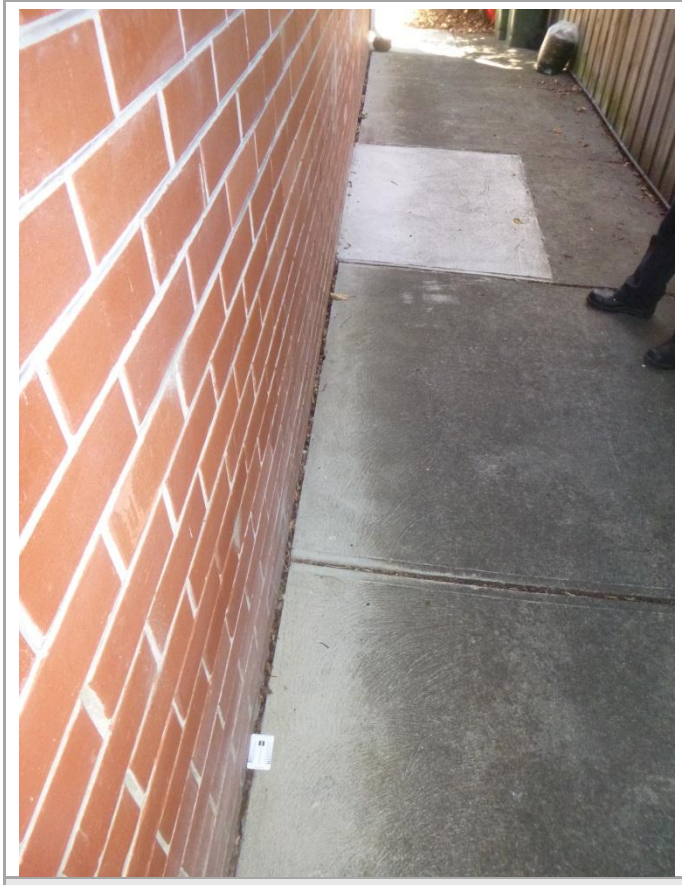


Reference 268 - Photo 0663

Reference 268 - Photo 0664

Reference 269 - Photo 0665	Reference 270 - Photo 0666
Reference 271 - Photo 0667	Reference 272 - Photo 0668

Reference 272 - Photo 0669



Reference 273 - Photo 0670

Reference 274 - Photo 0671

Reference 275 - Photo 0672

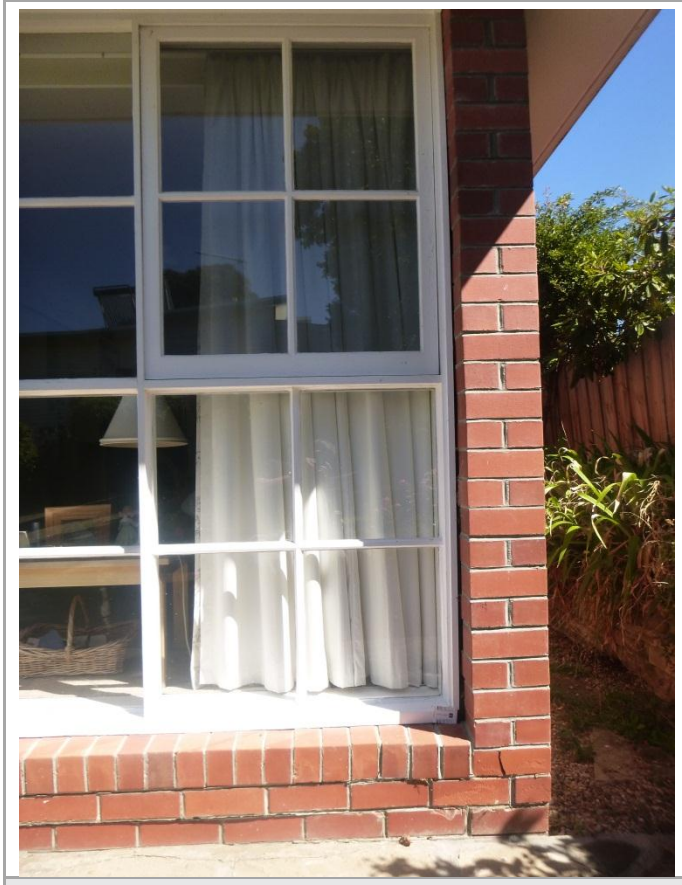
Reference 276 - Photo 0673

Reference 275 - Photo 0675

Reference 277 - Photo 0675

Reference 278 - Photo 0676

Reference 278 - Photo 0677



Reference 279 - Photo 0678

Reference 279 - Photo 0679

Reference 279 - Photo 0687

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PART F – MELINGA PLACE

Contents

Property Address
1 Melinga Place
4 Melinga Place
6 Melinga Place

1. Property Details

1.1 Inspection Details

Address:	1 Melinga Place, Taroona
Inspection Time and Date:	11:30am, 22 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Split Level
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
1 MELINGA PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 59

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
572	1116 1117	Two small diagonal cracks in south eastern corner brick veneer most likely due to minor settlement. Internal blockwork has not moved.	1	R
573	1118 1119	~1mm crack in suspended slab balcony. Also a corresponding diagonal crack in the brickwork. Crack may be due to shrinking as there are no control Joints.	1	S
574	1120	Diagonal crack between windows. Uniform ~1mm wide perpend cracks, hairline horizontals.	1	R
575	1121	Perpend cracks of uniform width above door lintel.	1	U
575	1122	Diagonal crack top right of door. ~6mm uniform perpend cracks, hairline horizontals. Corner may have settled. Resident indicated that there have been many drainage issues on the northern side.	3	R
576	1123 1124 1125 1126 1127	Various cracks in brickwork supporting balcony mainly covered by a creeper.	3	R
577	1128 1129	Hairline diagonal crack from bottom left of window to ground. Again potentially settlement of corner.	0	R
577	1130	Predominantly vertical cracks below window.	1	R
578	1131 1132 1133	Predominantly vertical cracks near middle of northern wall, ~3mm wide at bottom, hairline ~2m up. Most likely due to settlement.	2	R
579	1134	Diagonal crack near north western corner below window. Crack is ~4mm wide at the top and hairline at bottom most likely caused by settlement of corner.	2	R
582	1137 1138	Diagonal cracks around corner, again indicating settlement of corner.	1	R
583	1139 1140	Crossing diagonal cracks in middle of western wall which doesn't reach the top or bottom. Likely due to cyclic vertical movement.	1	R
584	1141	Diagonal crack below window which is ~1mm wide at top & hairline at bottom. Most likely due to heaving.	1	R
585	1142 1143 1144 1145	Diagonal cracks either side of top and bottom left of window.	1	R
586	1146 1147	Vertical crack bottom right of window near south western corner.	1	R
587	1148	Diagonal cracks on other face of corner. Perpend cracks are uniform ~2mm, horizontals are hairline. Settlment of corner likely cause.	2	R
588	1149	Diagonal crack below window, wider at the top which indicates heaving.	1	R
588	1150	Small diagonal crack below window ~1mm wide in the middle and hairline top and bottom. No apparent cause.	2	U

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 571 - Photo 1115	Reference 572 – Photo 1116
Reference 572 – Photo 1117	**Reference 573 – Photo 1118**

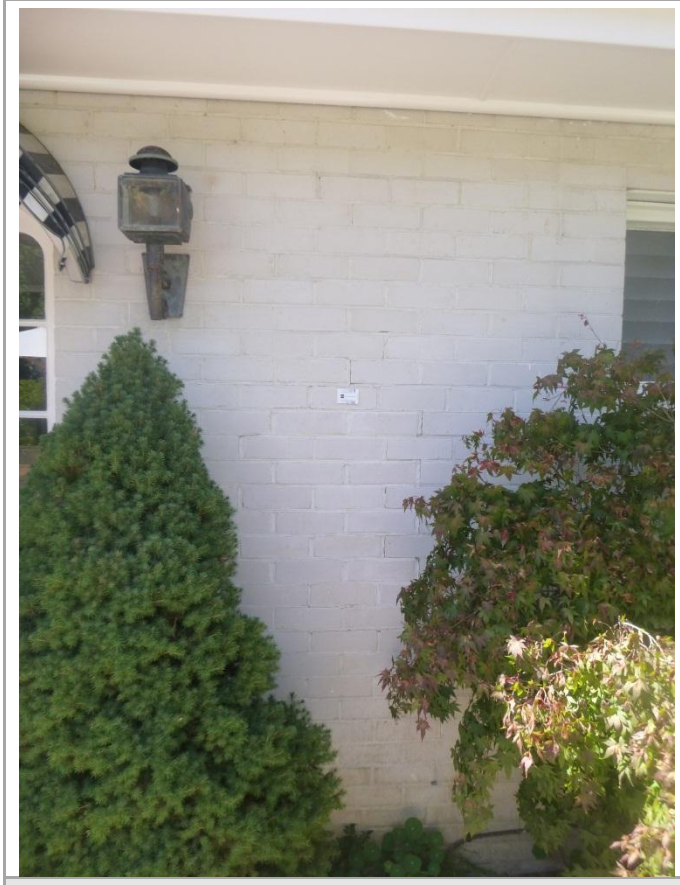
Reference 573 – Photo 1119	Reference 574 – Photo 1120
Reference 575 – Photo 1121	Reference 575 – Photo 1122

Reference 576 – Photo 1123	Reference 576 – Photo 1124
Reference 576 – Photo 1125	Reference 576 – Photo 1126

Reference 576 – Photo 1127	Reference 577 – Photo 1128
Reference 577 – Photo 1129	Reference 577 – Photo1130

Reference 578 – Photo 1131	Reference 578 – Photo 1132
Reference 578 – Photo 1133	Reference 579 – Photo 1134

Reference 580 – Photo 1135	Reference 581 – Photo 1136
Reference 582 – Photo 1137	Reference 582 – Photo 1138

Reference 583 – Photo 1139	Reference 583 – Photo 1140
	
Reference 584 – Photo 1141	Reference 585 – Photo 1142

Reference 585 – Photo 1143	Reference 585 – Photo 1144
Reference 585 – Photo 1145	Reference 586 – Photo 1146

Reference 586 – Photo 1147	Reference 587 – Photo 1148
Reference 588 – Photo 1149	Reference 588 – Photo 1150

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1. Property Details

1.1 Inspection Details

Address:	4 Melinga Place, Taroona
Inspection Time and Date:	9:00am, 22 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Steep
Amount of vegetation:	Moderate
Site Drainage:	Good
Pavement surrounds:	100%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3	Moderate	U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
4 MELINGA PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 60

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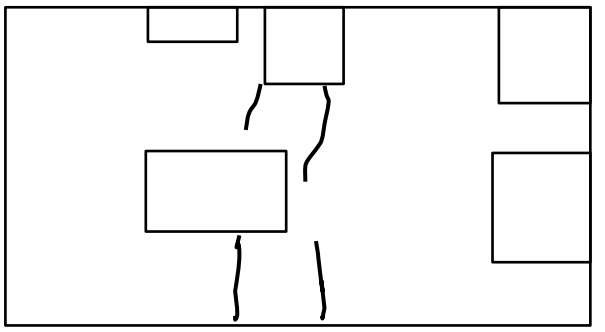
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
556	1081	Wall beside the garage has vertical cracks wider at the top and terminates ~1.5m off the ground. The wall may be rotating towards the east, potentially due to settlement.	1	R
557	1082	Vertical crack near north eastern corner of house. Crack is wider at the top.	2	R
559	1084 1085	Hairline vertical cracks on both faces of corner. Possibly due to minor settlement.	1	R
559	1086 1087	Concrete path and rendered concrete stairs on northern side has settled ~40mm one side and is now sloping towards house.	-	-
560	1088 1089			
560	1113	Slab at top of stairs is no longer sitting on soil foundation. Foundation appears to have washed away.	-	-
561	1090	Diagonal crack in blockwork near north western corner. May have been caused by minor sagging of the supporting slab (the one mentioned above that is no longer sitting on a foundation)	1	U
561	1091 1092	Diagonal crack in retaining wall which is larger at the top & hairline near bottom. Wall appears to be angling back to the west. Crack aligns with a crack in slab. Both appear to be evidence of vertical movements.	1	R
562	1093 1094 1095	Retaining walls in this area have rotated slightly and are leaning to the east. This is to be expected for residential retaining walls of this age. Retaining walls have surprisingly few cracks considering they only appear to be unreinforced brick.	-	-
564	1097 1114	Cracks in blockwork wall. Wall appears to he angling to the west. Likely due to settlement or heaving.	1	R
565	1098 1101	Windows on western side near southern corner appear to be angling in with repect to the brickwork. The internal timber frame may be angling to the east or the brickwork may be angling to the west.	2	U
566	1099			
567	1100			
567	1102	Vertical crack above lintel wider at bottom than top. Most likely caused by sagging of lintel.	1	S
569	1104	Small vertical crack above lintel on southern side wider at bottom than top. Most likely caused by sagging of lintel.	1	S
569	1105 1106 1107 1108	Various vertical cracks in southern wall. All appear to be wider at the top. 	3	U
569	1112	Gap between window frame near top of wall and brickwork. Window frame has moved independently to brickwork but is difficult to see due to its height above ground.	2	U
570	1109 1110	Diagonal cracks below window, wider at top than bottom. Possibly due to vertical movements caused by nearby tree.	2	R

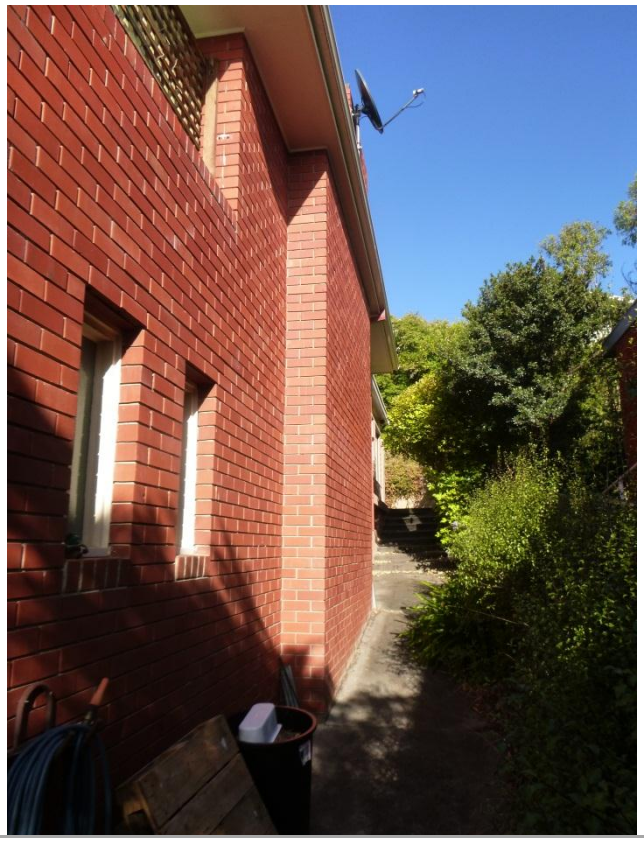
Legend:

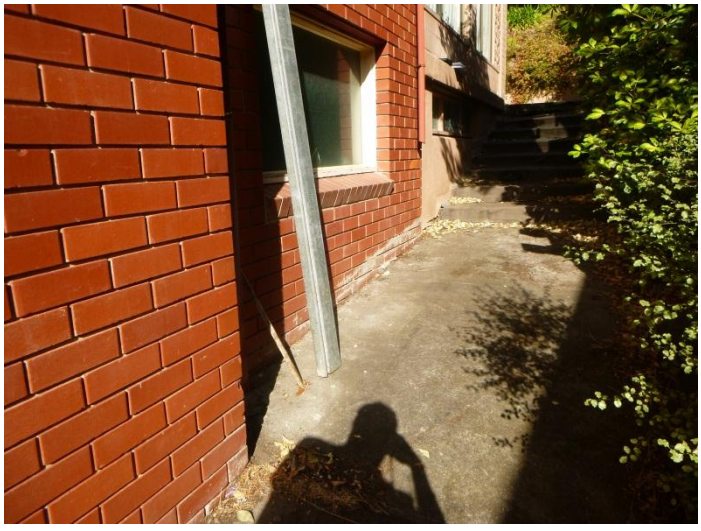
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

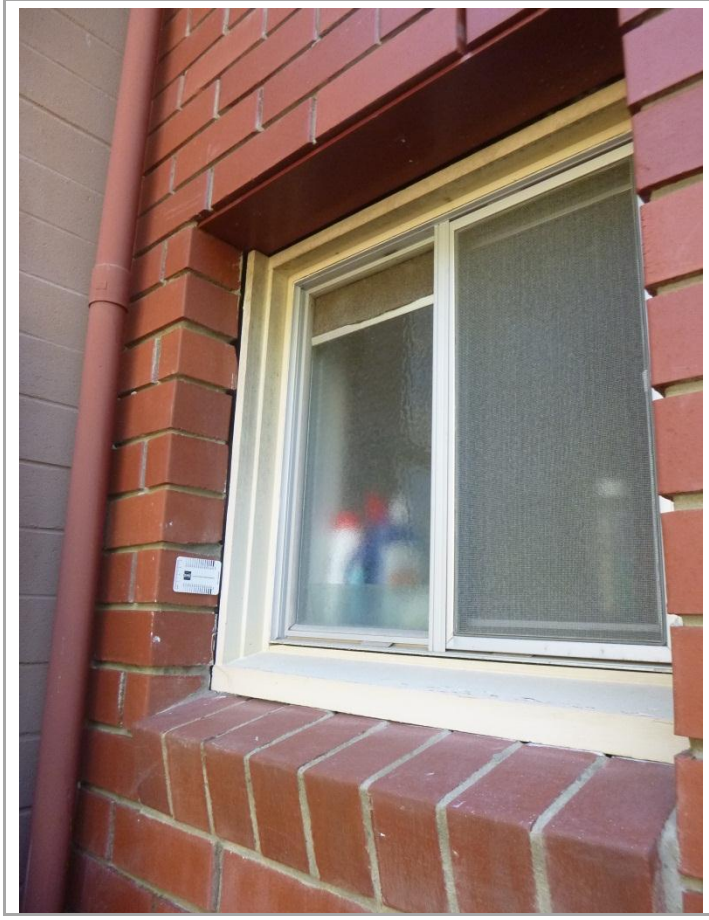
5. Photographs

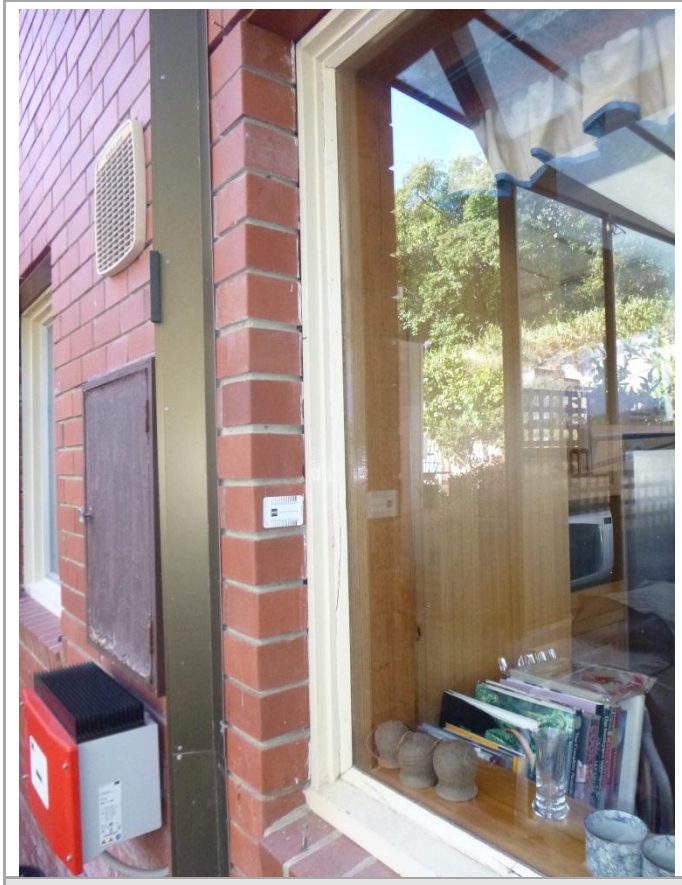
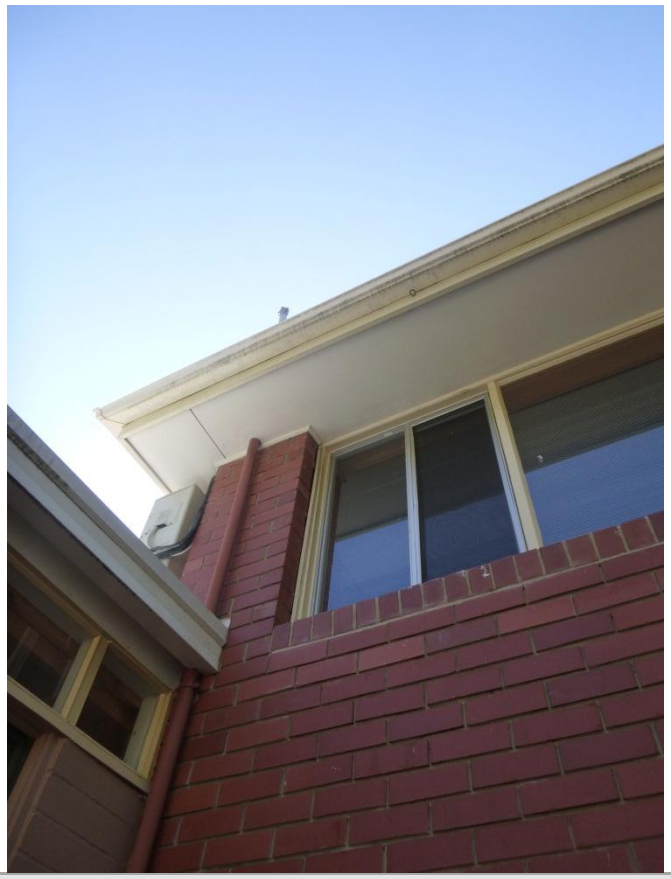
Reference 555 - Photo 1080	Reference 556 – Photo 1081
Reference 557 – Photo 1082	**Reference 558 – Photo 1083**
	

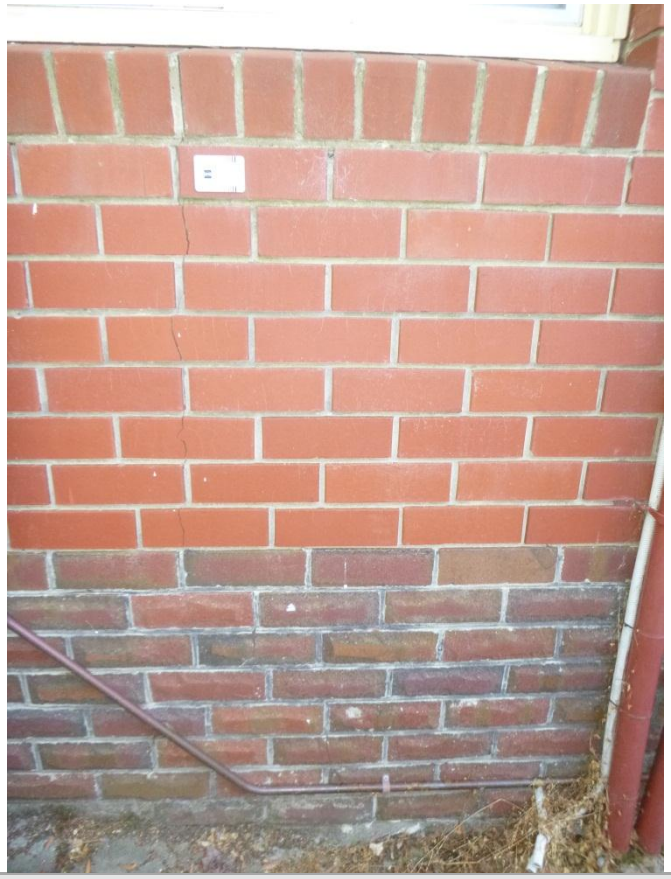
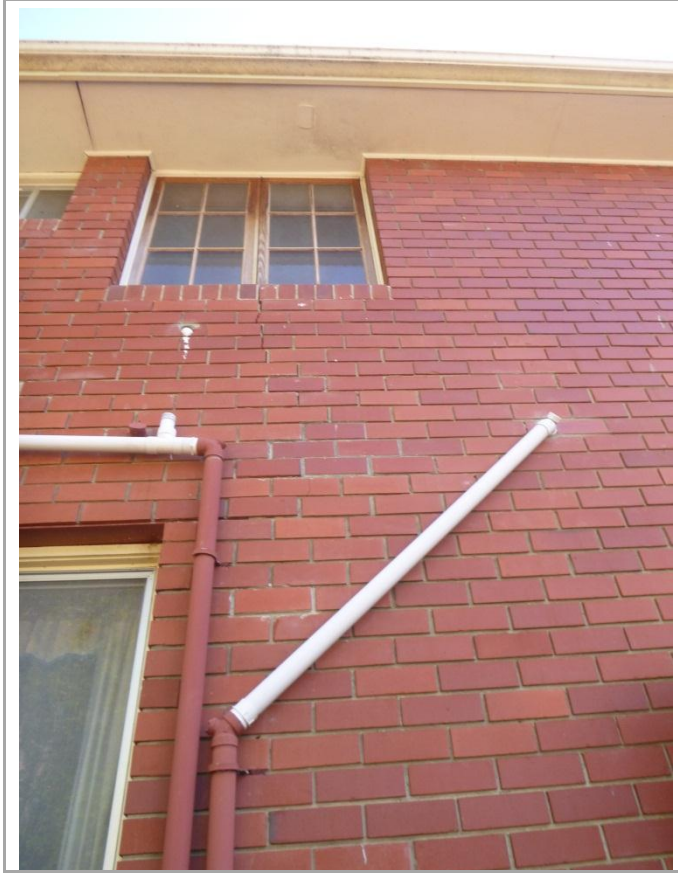
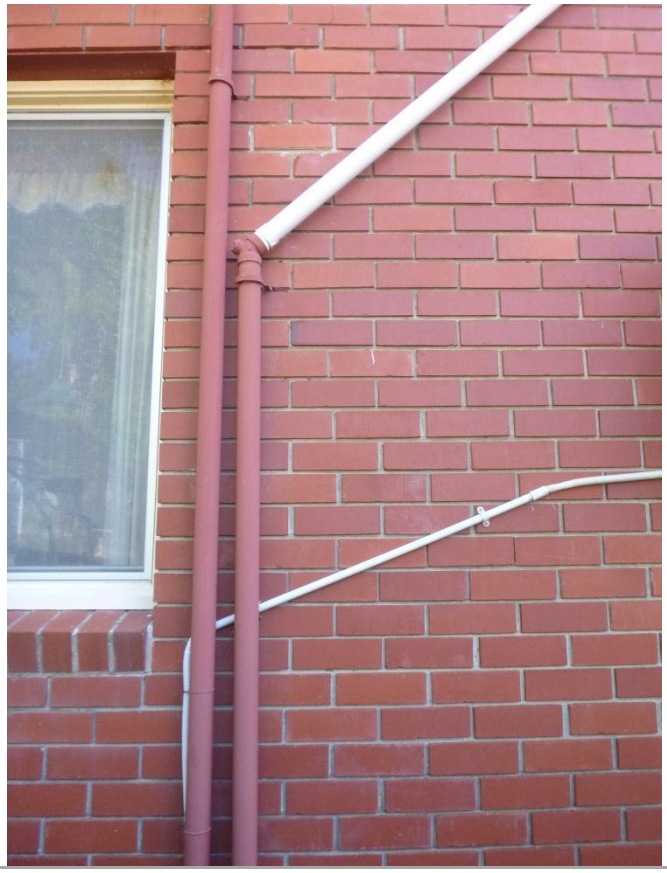
Reference 559 – Photo 1084	Reference 559 – Photo 1085
Reference 559 – Photo 1086	Reference 559 – Photo 1087
	

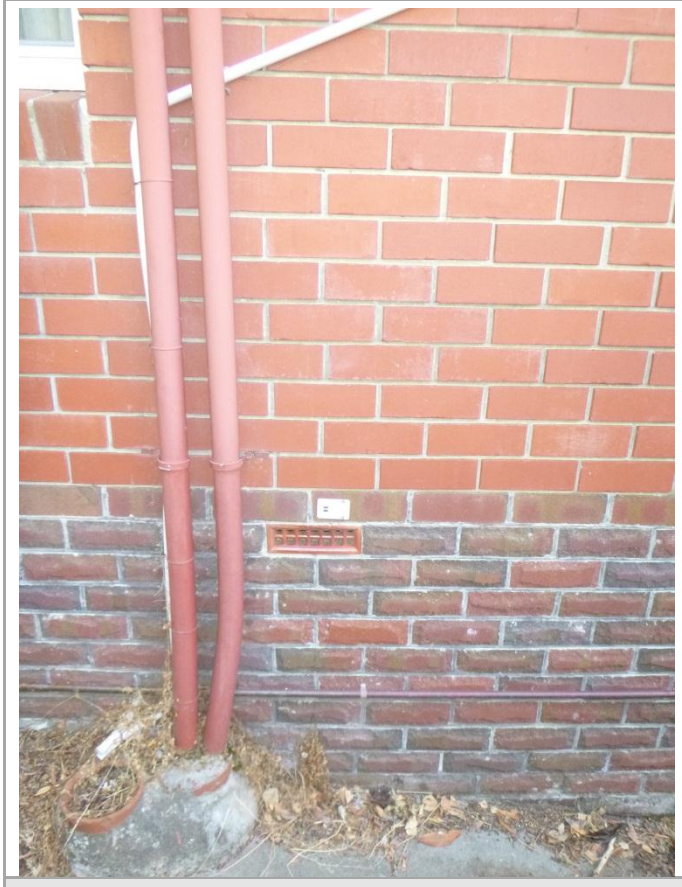
Reference 560 – Photo 1088	Reference 560 – Photo 1089
Reference 561 – Photo 1090	Reference 561 – Photo 1091

Reference 561 – Photo 1092	Reference 562 – Photo 1093
Reference 562 – Photo 1094	Reference 562 – Photo 1095

Reference 563 – Photo 1096	Reference 564 – Photo 1097
Reference 565 – Photo 1098	Reference 566 – Photo 1099
	

Reference 567 – Photo 1100	Reference 565 – Photo 1101
	
Reference 567 – Photo 1102	Reference 568 – Photo 1103

Reference 569 – Photo 1104	Reference 569 – Photo 1105
	
Reference 569 – Photo 1106	Reference 569 – Photo 1107
	

Reference 569 – Photo 1108	Reference 570 – Photo 1109
	
Reference 570 – Photo 1110	Reference 569 – Photo 1112

Reference 560 – Photo 1113	Reference 564 – Photo 1114

6. Disclaimer

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GHD otherwise disclaims responsibility to any person other than Kingborough Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

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The opinions, conclusions and any recommendations in this report are based on information obtained from the on-site assessments. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.
Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1. Property Details

1.1 Inspection Details

Address:	6 Melinga Place, Taroona
Inspection Time and Date:	4:00pm, 15 February 2013.

1.2 Property Details

Building:	Rendered finish
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Steep
Amount of vegetation:	Low
Site Drainage:	Good
Pavement surrounds:	75%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
- No Observed Damage	N/A

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
6 MELINGA PL

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 61

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2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
-		House was renovated 18 months ago and only at small portion of the original structure was retained. No evidence of any damage to the house. A few original sandstone retaining walls were present at the rear of the property (uphill side) which showed no evidence of overturning or cracking.	-	-
282	0683	A few of the original footpaths remained which showed evidence of settlement/subsidence.	-	R
283	0684			
285	0686	Water tank was on a noticeable lean towards the north. Resident explained that tank was founded on clay so subsidence/settlement is the likely cause.	-	R

Legend:

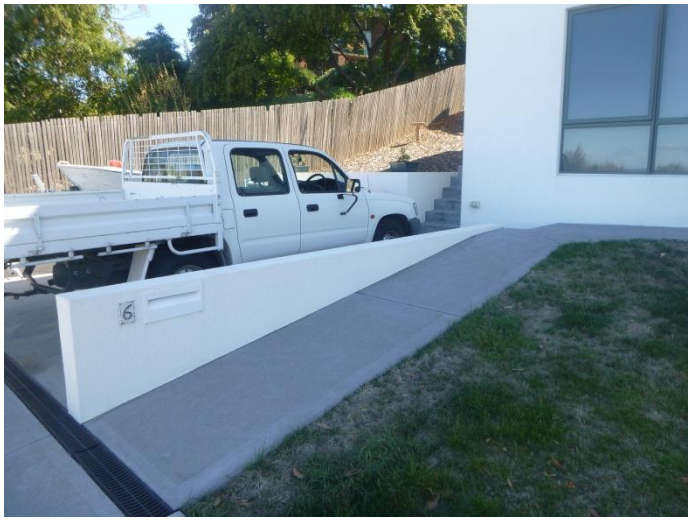
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

GHD	KINGBOROUGH COUNCIL TAROONA LANDSLIDE RISK ASSESSMENT STAGE 2 6 MELINGA PL, TAROONA LIST OF IDENTIFIED ISSUES	JOB NUMBER: 3216698 REVISON: 0 DATE: 15/02/13 SHEET 1 of 1

5. Photographs

Reference 280 - Photo 0680	Reference 280 – Photo 0681
	
Reference 281 – Photo 0682	Reference 282 – Photo 0683

Reference 283 – Photo 0684	Reference 284 – Photo 0685
Reference 285 – Photo 0686	

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PART G – NORWOOD AVENUE

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Property Address
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20 Norwood Avenue
22 Norwood Avenue
23 Norwood Avenue
27 Norwood Avenue
29 Norwood Avenue
36A Norwood Avenue
36B Norwood Avenue
38 Norwood Avenue
39 Norwood Avenue

1. Property Details

1.1 Inspection Details

Address:	1 Norwood Avenue, Taroona
Inspection Time and Date:	10:20am, 20 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
1 NORWOOD

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 62

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
411	0857	Small vertical crack in render and brickwork at interface between front porch and wall of the house. Crack is wider at the top and hairline ~1m off the ground. Likely due to settlement of stairs.	1	R
412	0858	~20mm differential settlement between front path and ramp.	-	R
414	0860 0861	Diagonal crack at top of wall near south western corner. Crack is ~1mm wide at top tapering to hairline further down. Another diagonal hairline crack is located at the bottom right of the adjacent window. These 2 cracks indicate minor settlement of corner	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 410 - Photo 0856	Reference 411 – Photo 0857
Reference 412 – Photo 0858	**Reference 413 – Photo 0859**

Reference 414 – Photo 0860	Reference 414 – Photo 0861
Reference 415 – Photo 0862	Reference 416 – Photo 0863

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1. Property Details

1.1 Inspection Details

Address:	2 Norwood Avenue, Taroona
Inspection Time and Date:	10:45am, 20 February 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
2 NORWOOD AV

Figure 63

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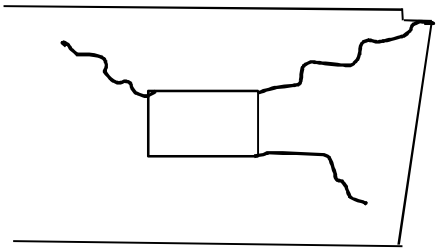
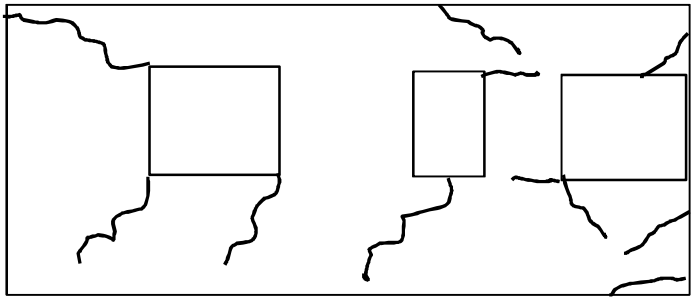
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
418	0865	2 windows on the western wall show gaps between frame & brickwork on the left. No cracks in brickwork at these location indicating independent movement of timber frame.	2	U
419	0866		2	U
420	0867 0868 0869 0870	Multiple cracks around window. Crack at the top left has ~3mm wide horizontal cracks tapering to hairline ~1m away. Vertical cracks are hairline throughout. Crack bottom right has ~3mm wide horizontal cracks tapering to hairline ~1m away. Vertical cracks are hairline throughout. Crack top right of window has been repainted but still shows significant horizontal movement. Bricks below crack appear to have moved in a south westerly direction and are now protruding ~15mm out from the bricks above the crack. The corner of the house appears to have settled and is angling out is a south westerly direction. 	3	R
421	0871	The other face of the south western corner shows a similar repointed crack which supports the argument of settlement and rotation out of the corner.	3	R
423	0873 0874	2 small diagonal cracks below window. Cracks are only hairline but show evidence of being repaired in the past.	1	R
423	0875	Diagonal crack below window ~10mm wide at top and hairline at bottom. Crack has been repaired so actual damage may be worse than it appears.	3	R
423	0877 0885	Horizontal cracks top and bottom between windows. Top crack is wider at the left & bottom is wider at the right. Vertical gap between window frame and brickwork is wider at the bottom. These cracks indicate that bricks below window have moved to the east most likely due to settlement of south eastern corner.	2	R
423	0876 0878 0880 0883	3 diagonal cracks at south eastern corner also indicate that corner has settled. 	2	R

Legend:

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Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

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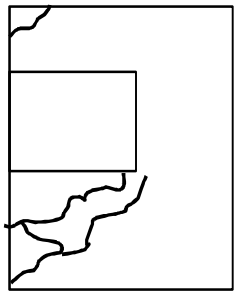
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
424	0879 0881 0882 0884	More diagonal cracks in the eastern facing wall near south corner. Cracks don't appear to extend to ground at any locations which indicates landslip is not the likely cause. 	2	R
425	0886	Large diagonal crack in blockwork wall top left of garage door ~16mm wide perpend cracks and hairline horizontals. Also minor horizontal crack to the left which has been repaired with flexible sealant. Crack appears wider to the right.	4	R
426	0887 0888	Diagonal crack to the right of garage door. Appears to be of uniform width. Little to no movement of slab or blocks at bottom of wall which indicates settlement of the eastern corner. Driveway is in good condition except is showing evidence of settlement near the eastern corner of the blockwork wall which also supports previous observation.	2	R
427	0889 0890 0891 0892	Diagonal crack at top left corner of northern garage wall. Blocks below crack show some lateral movementis the downhill direction. Vertical gup between window fane and blockwork to the left of widow. Also a vertical crack through blockwork which extends to ground level. Unable to see eastern wall of garage so it's difficult to determine cause. Could be either settlement or landslip.	2	U
428	0893 0894	Predominantly horizontal crack near corner that has been repaired and has not opened back up again. Bricks below crack have moved downhill by ~15mm. Crack extends around corner and horizontally to the ground.	-	U
428	0895	Gap between brickwork and back porch slab. Gap is narrower at the bottom indicating settlement of northern edge of porch slab as likely cause. There is also a gap between other edge of porch slab and bottom of weatherboard wall. Gap is wider at the north end which supports argument that northern edge is settling.	-	R
429	0896			
432	0899	Vertical crack in cladding at top left of door. There appears to be a noticeable sag in the cladding. May be caused by settlement of slab footing or possibly failure of part of the internal wall framing system ie. the lintel	2	U
433	0900 0901	Diagonal crack top left of window that has been repaired in the past but has opened up again. Diagonal crack below window extending down to the ground. Crack is hairline near ground and wider near the top indicating settlement as likely cause.	1	R
434	0902 0903 0904 0905	Cracks in brick doorway around side gate. 30mm crack between east side of lintel and house which has been repaired. Small diagonal cracks on western side of lintel. Wall on the western side supporting lintel appears to be leaning away from the house. Most likely caused by settlement of western end.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

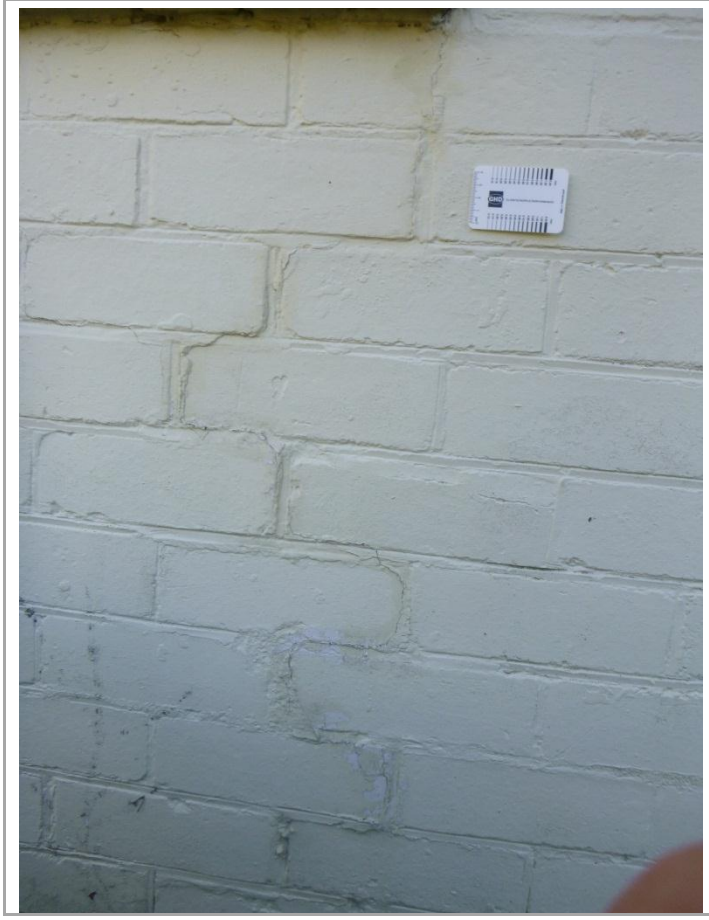
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 417 - Photo 0864	Reference 418 – Photo 0865
Reference 419 – Photo 0866	**Reference 420 – Photo 0867**

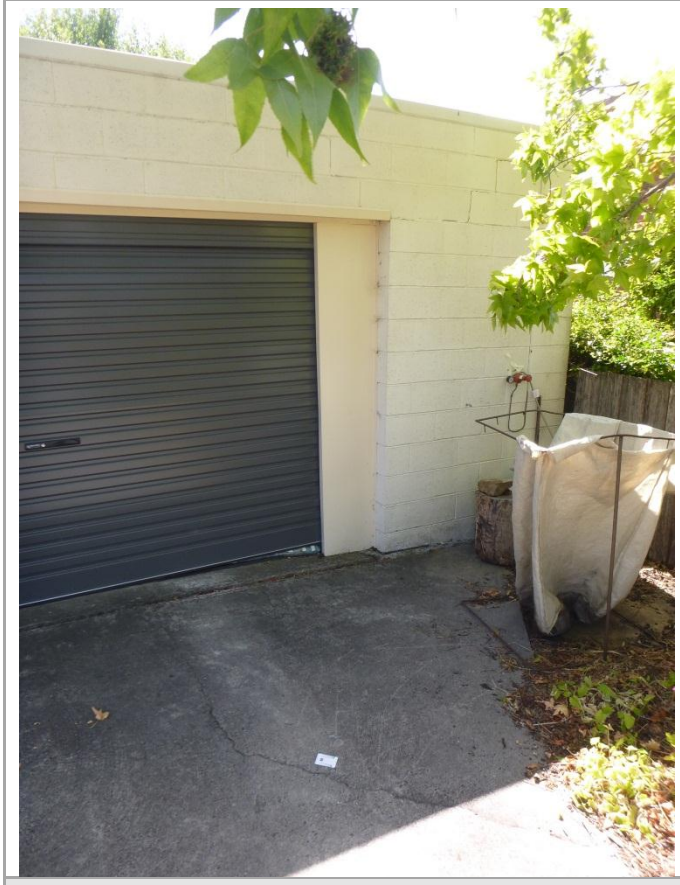
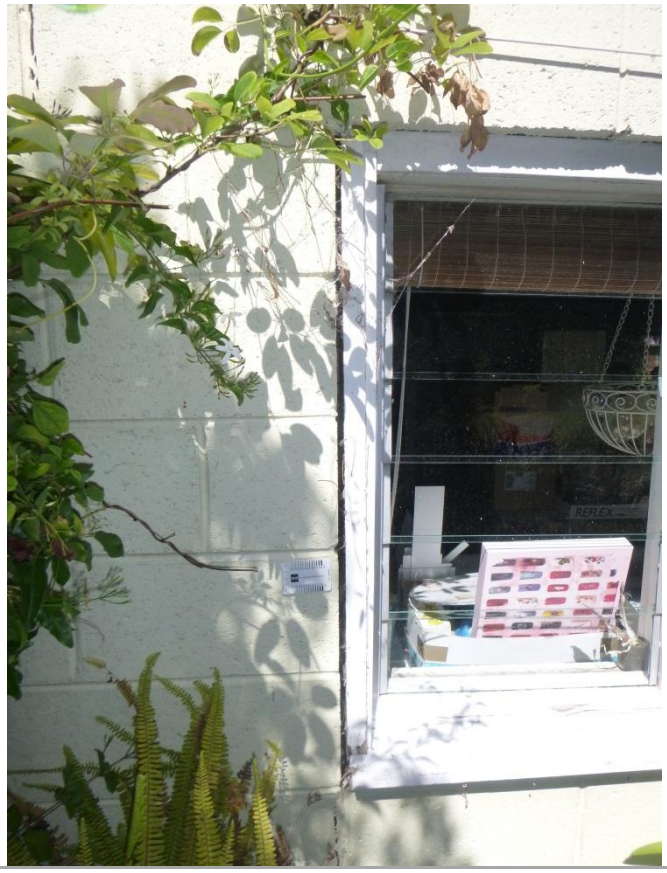
Reference 420 – Photo 0868	Reference 420 – Photo 0869
Reference 420 – Photo 0870	Reference 421 – Photo 0871

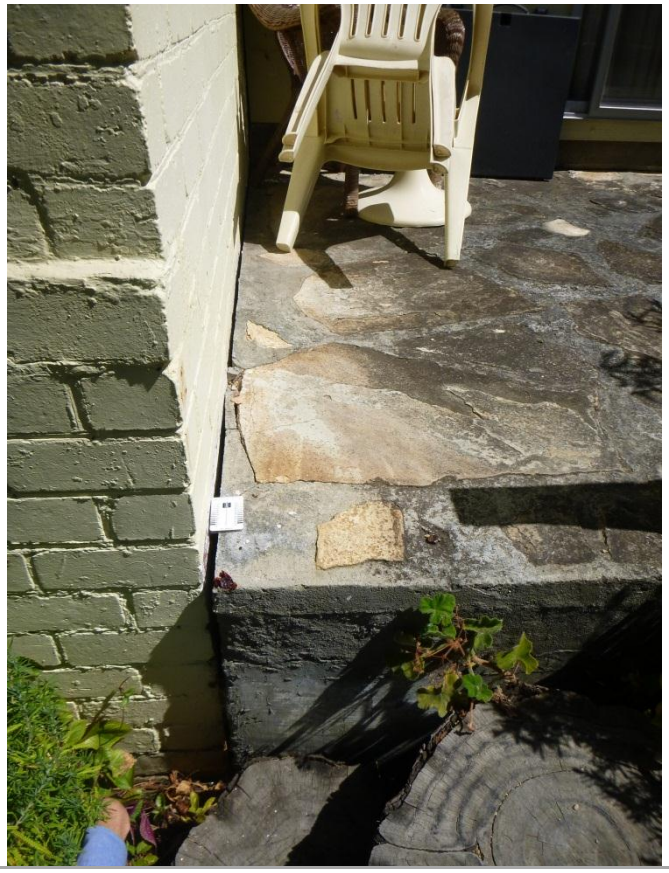
Reference 422 – Photo 0872	Reference 423 – Photo 0873
Reference 423 – Photo 0874	Reference 423 – Photo 0875
	

Reference 423 – Photo 0876	Reference 423 – Photo 0877
Reference 423 – Photo 0878	Reference 424 – Photo 0879

Reference 423 – Photo 0880	Reference 424 – Photo 0881
Reference 424 – Photo 0882	Reference 423 – Photo 0883

Reference 424 – Photo 0884	Reference 423 – Photo 0885
Reference 425 – Photo 0886	Reference 426 – Photo 0887

Reference 426 – Photo 0888	Reference 427 – Photo 0889
	
Reference 427 – Photo 0890	Reference 427 – Photo 0891
	

Reference 427 – Photo 0892	Reference 428 – Photo 0893
Reference 428 – Photo 0894	Reference 428 – Photo 0895
	

Reference 429 – Photo 0896	Reference 430 – Photo 0897
Reference 431 – Photo 0898	Reference 432 – Photo 0899

Reference 433 – Photo 0900	Reference 433 – Photo 0901
Reference 434 – Photo 0902	Reference 434 – Photo 0903

Reference 434 – Photo 0904	Reference 434 – Photo 0905

6. Disclaimer

This report has been prepared by GHD for Kingborough Council and may only be used and relied on by Kingborough Council for the purpose agreed between GHD and the Kingborough Council as set out in the original agreement between the two parties.

GHD otherwise disclaims responsibility to any person other than Kingborough Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. GHD disclaims liability arising from any of the opinions, conclusions or recommendations being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from the on-site assessments. Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.
Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1. Property Details

1.1 Inspection Details

Address:	3 Norwood Avenue, Taroona
Inspection Time and Date:	11:45am, 5 April 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	U – Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
3 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 64

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd
2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
987	1721 1722	Diagonal crack left of front door which has been repaired and has not reopened. In the past bricks above crack have moved in in a southerly direction by ~15mm.	3	U
987	1722	Small vertical crack top right of door ~1mm wide.	1	U
988	1723	Diagonal crack bottom left of window down to slab. Appears to be ~3 mm wide but is difficult to tell.	2	R
989	1724	Minor crack in concrete ramp. Crack appears to start at re-entrant corner. Few crack control joints are present. Likely due to shrinkage and/or minor settlement.	-	R
990	1725	Diagonal crack top left of window ~4 mm wide.	2	R
991	1726	Repaired diagonal crack below window. Crack has not reopened.	-	R
992	1727	Footpath on the western side in generally good condition. Is showing signs of ~10mm of settlement near concrete step.	-	R
993	1728			
994	1730			
997	1733			
993	1729	Lintel above door has sagged ~5mm. Appears to be some repaired damage to brickwork above.	-	S
995	1731	Small vertical crack top right of door ~1mm wide.	1	U
996	1732	~Vertical crack in corner ~2mm wide at top & hairline ~1m down. Crack is interface between original building and extension. Likely due to some minor differential settlement.	2	R
998	1734	Settlement of footpath on southern side. Paint appears to indicate path has dropped up to 80mm.	-	R
999	1735			
1000	1736			
1002	1738	Vertical crack in corner at interface between original building and extension similar to other side. Crack is ~ 4 mm wide at top and hairline ~1.5m down. Again likely due to differential settlement.	2	R
1004	1741	Gap between top of brickwork and underside of eves, ~4mm wide. Some of the top course of bricks appear to have moved horizontally in (to the north) by ~4mm.	2	U
1003	1739 1740	Damage at corner of timber deck. Gap between intersecting bearers due to minor rotation. Decking boards in this area have deteriorated, likely due to weather exposure.	-	O
1005	1742	A single brick has been pushed in ~3mm (to the west). A hole has been drilled partway though the brick. The movement was likely caused by the drilling work.	2	O
1006	1743	Small vertical crack top left of window ~1mm wide.	1	U
1007	1744	~2mm wide crack between concrete ramp and supporting wall on the eastern side. Crack runs full length of ramp.	2	R
1008	1745	Driveway is uneven with various cracks. Appears to have settled.	-	R

Legend:

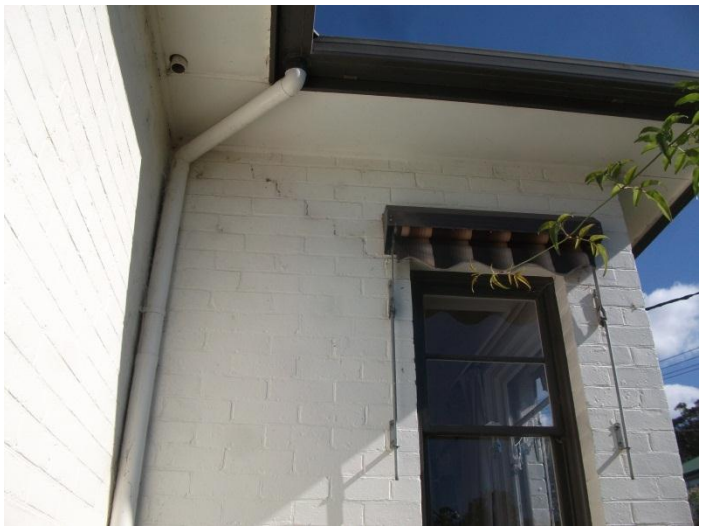
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

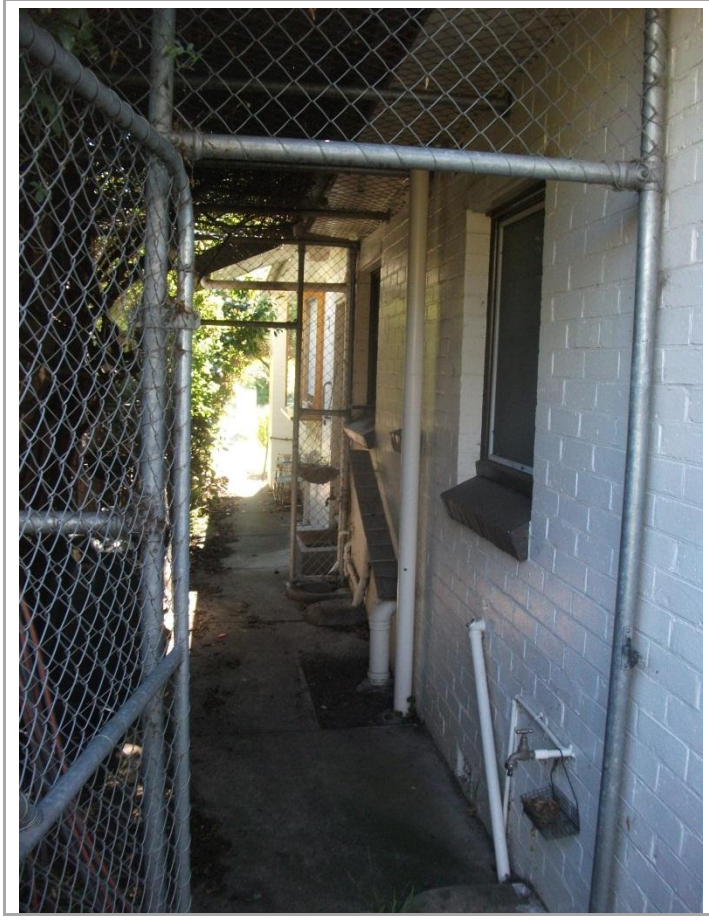
Reference 986 - Photo 1120	Reference 987 – Photo 1721
Reference 987 – Photo 1722	**Reference 988 – Photo 1723**

Reference 989 – Photo 1724	Reference 990 – Photo 1725
	
Reference 991 – Photo 1726	Reference 992 – Photo 1727

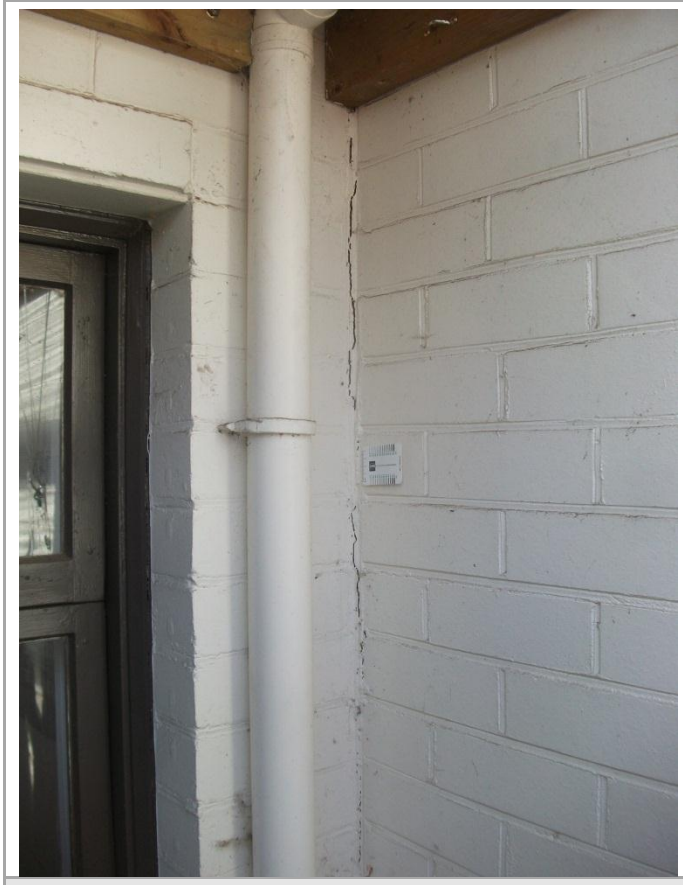
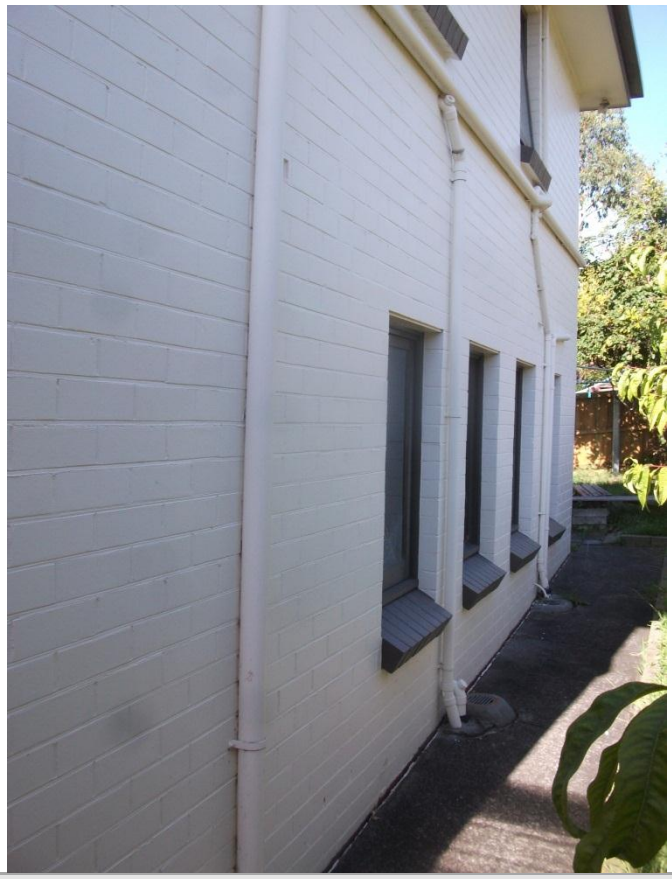
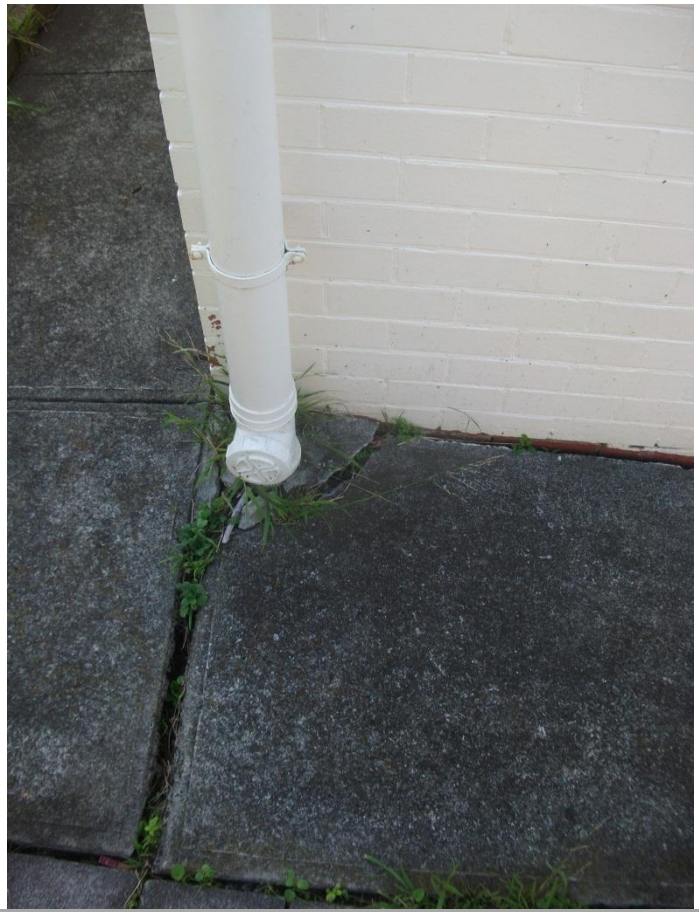
Reference 993 – Photo 1728

Reference 993 – Photo 1729

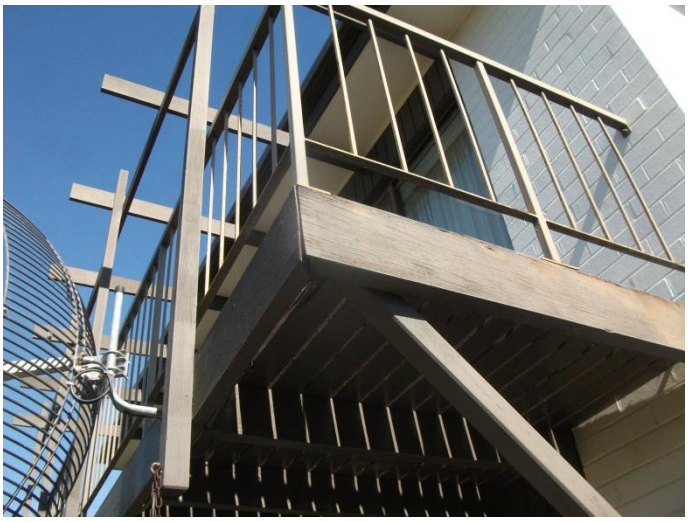
Reference 994 – Photo 1730



Reference 995 – Photo 1731

Reference 996 – Photo 1732	Reference 997 – Photo 1733
	
Reference 998 – Photo 1734	Reference 999 – Photo 1735
	

Reference 1000 – Photo 1736	Reference 1001 – Photo 1737
Reference 1002 – Photo 1738	Reference 1003 – Photo 1739

Reference 1003 – Photo 1740	Reference 1004 – Photo 1741
	
Reference 1005 – Photo 1742	Reference 1006 – Photo 1743

Reference 1007 – Photo 1744	Reference 1008 – Photo 1745

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1. Property Details

1.1 Inspection Details

Address:	4 Norwood Avenue, Taroona
Inspection Time and Date:	3:00pm, 12 February 2013.

1.2 Property Details

Building:	Double Brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
4 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 65

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2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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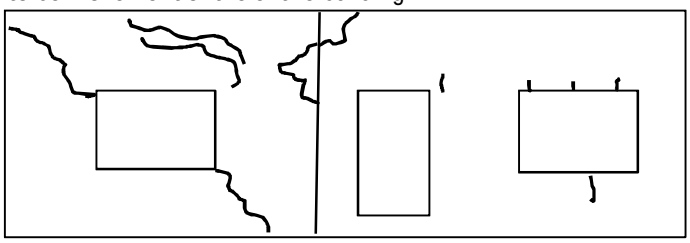
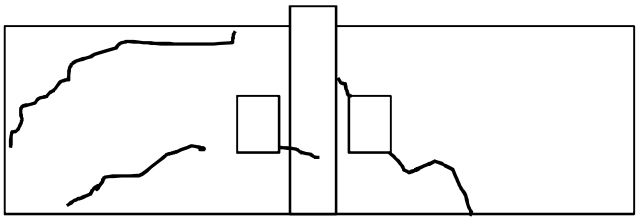
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
57	0250	~5mm vertical crack in concrete bond beam right of front door. Crack is of uniform width and doesn't appear to propergate up or down into the attached brickwork. Likely a shrinkage crack.	2	S
57	0251	Small vertical cracks in bond beam above window. Cracks appear to be larger at the bottom and may be causes by long term creep of concrete.	1	S
57	0252	Small vertical crack below window narrowing to hairline ~300mm down. No apparent cause.	1	
58	0253	Diagonal crack bottom right of window, ~5mm wide perpend cracks and ~1mm horizontals.	3	
58	0254 0255 0256	Various vertical & horizontal cracks in southern wall west of the front door. Appears to be movement of the entire building. 	3	
59	0259 0261 0262 0263	Crack starting as hairline vertical extending diagonally up. Perpend crack approx 2mm wide, horizontal cracks hairline. Bricks on this wall have been repointed at least once before. The larger mass of the chimney may have caused differential vertical settlement at the centre of the wall. 	3	R
59	0259 0260 0268	Diagonal crack near bottom of wall ~2mm uniform width. Bricks above crack have moved horzitonally ~10mm to the east in relation to those below.	3	R
59	0264	Horizontal crack bottom left of window, ~3mm wide. Potentially due to settlement of the wall below.	2	R
60	0265 0266	Diagonal crack bottom right of window. Crack starts as ~5mm wide at window corner and narrows to ~4mm before transitioning to a vertical crack down to the ground. Vertical part of crack shears through the middle of multiple bricks. Again may be caused by differential settlement due to chimney.	2	R
60	0267	~5mm vertical crack through bond beam top left of window and continuing up diagonally through brickwork.	2	R
62	0270	Another ~2mm vertical crack in losalised to the bond beam.	2	S

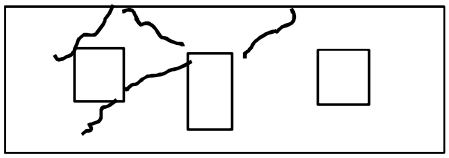
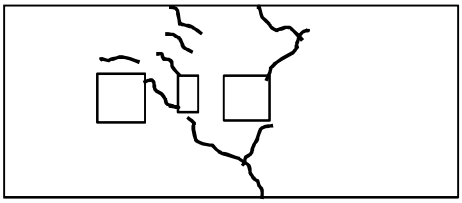
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
62	0271 0274	Diagonal cracks left of door have been repointed. Bricks above the crack have pushed out (to the north) in relation to those below by ~4mm. There also appear to be some repaired damaged to the bond beam spanning over back porch. 	2	R
62	0272 0273	Diagonal crack below window was repointed in the past but has reopended to ~1mm.	1	R
63	0275	Diagonal crack right of door ~2mm at bond beam tapering to hairline ~300mm up and to the right.	2	R
63	0276 0277	Top right corner of wall is angling inwards by ~50mm. Top of wall may have been pulled in a south easterly direction by the roof framing.	3	O
65	0283	Horizontal crack in lintel ~1mm wide. Crack is wider in the middle indicating sagging as the potential cause.	1	S
65	0279 0284 0285	Large diagonal cracks up to ~50mm wide at the top of the wall tapering to ~30mm at top of window. Most likely evidence of evidence of heaving/settlement. Crack also extends down past the window and down to ground level. 	4	R
65	0280 0281	Various diagonal cracks between and above windows. Cracks are up to ~4mm wide.	2	R
62	0286 0287	Vertical crack between concrete steps and brick wall ~4mm wide at top and ~1mm at bottom. Likely settlement of stairs.	2	R
749	1382 1383 1384 1385 1386	Significant gaps in eastern blockwork wall of garage structure (only visible from 6 Norwood Av). Gap appears to have been a control joint that has opened up and is now ~80mm wide at top & ~40mm wide at bottom. The section of wall on the northern side appears to be have rotated out (towards the east). There is also a gap between the front of the footing and the soil which may have caused the observed roatation. The gap between sections of the wall was most likely caused by differential settlement.	4	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 56 - Photo 0249	Reference 57 – Photo 0250
Reference 57 – Photo 0251	**Reference 57 – Photo 0252**

Reference 58 – Photo 0253

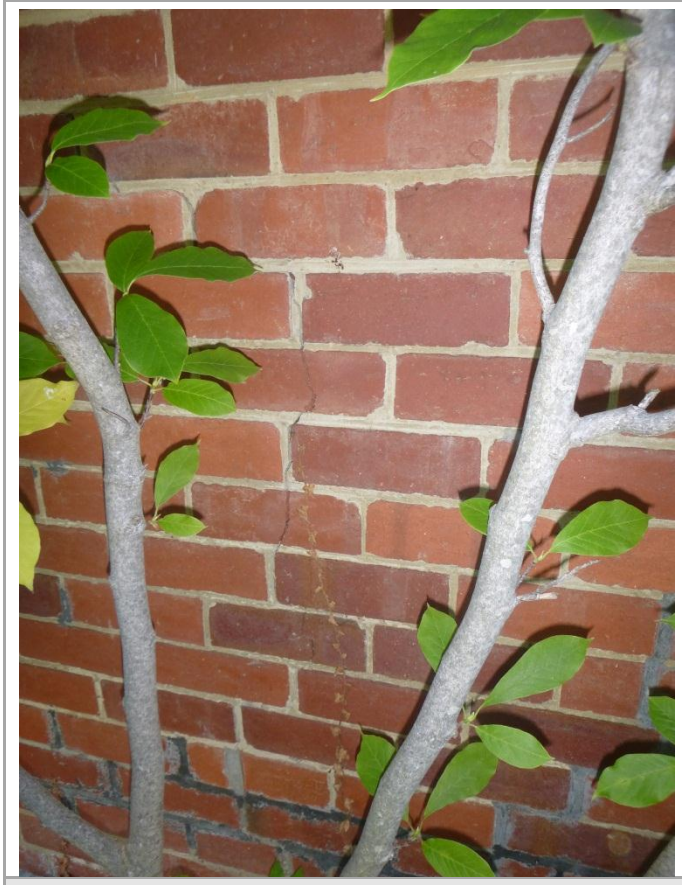
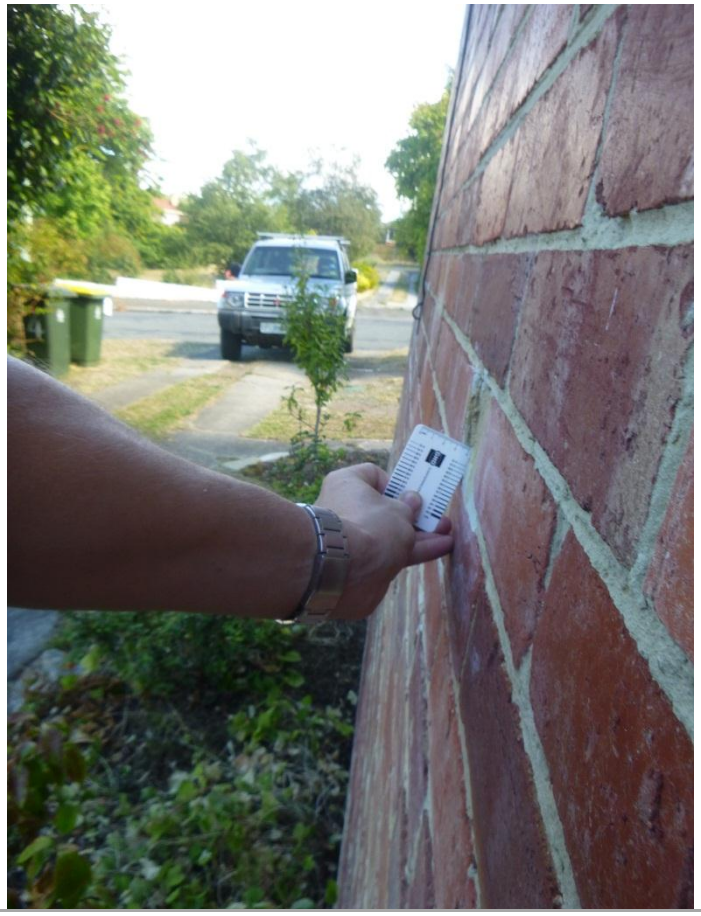
Reference 58 – Photo 0254

Reference 58 – Photo 0255

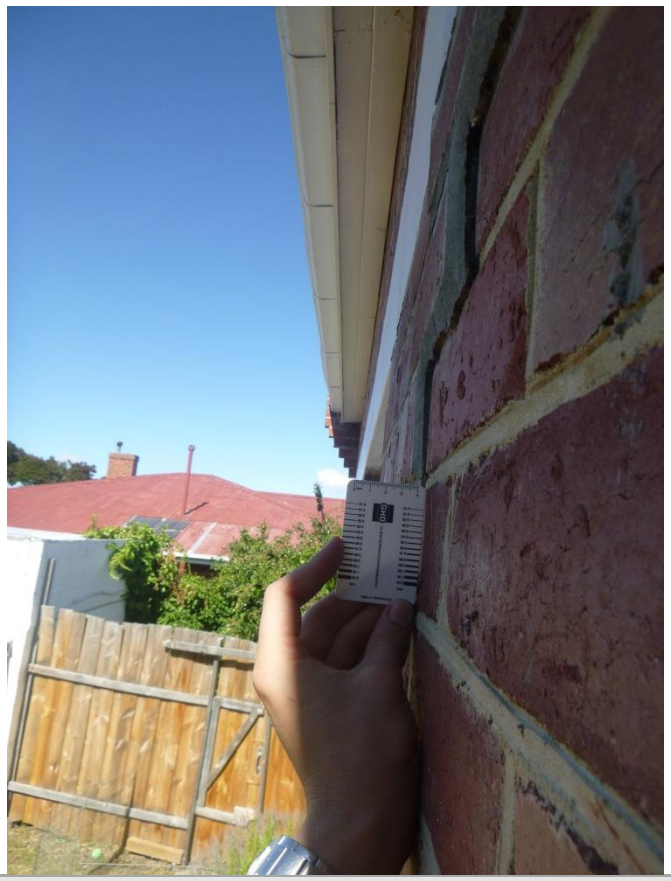
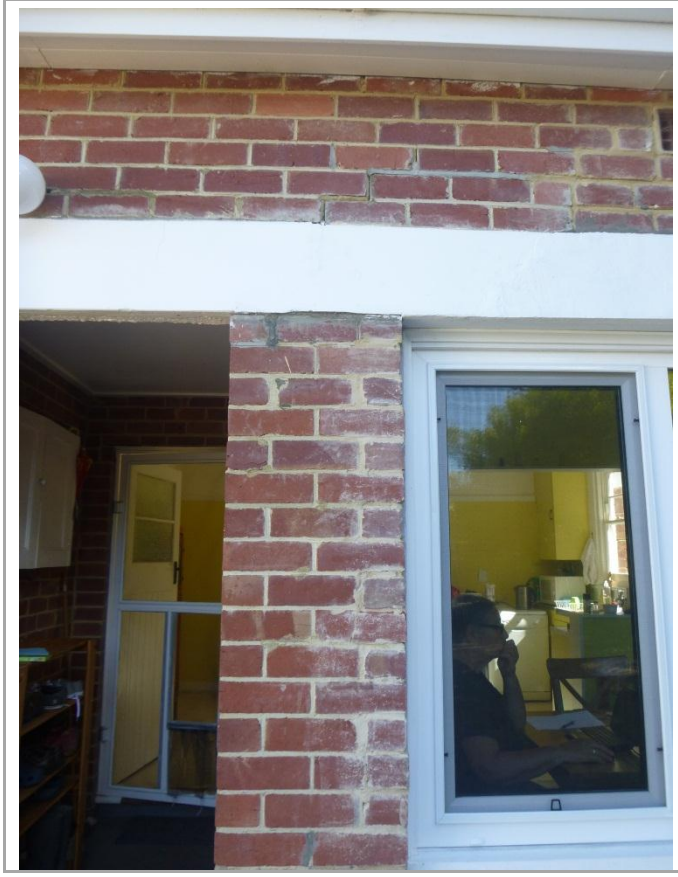
Reference 58 – Photo 0256

Reference 58 – Photo 0257	Reference 58 – Photo 0258
Reference 59 – Photo 0259	Reference 59 – Photo 0260

Reference 59 – Photo 0261	Reference 59 – Photo 0262
Reference 59 – Photo 0263	Reference 59 – Photo 0264

Reference 60 – Photo 0265	Reference 60 – Photo 0266
	
Reference 60 – Photo 0267	Reference 59 – Photo 0268
	

Reference 61 – Photo 0269	Reference 62 – Photo 0270
Reference 62 – Photo 0271	**Reference 62 – Photo 0272**

Reference 62 – Photo 0273	Reference 62 – Photo 0274
	
Reference 63 – Photo 0275	Reference 63 – Photo 0276
	

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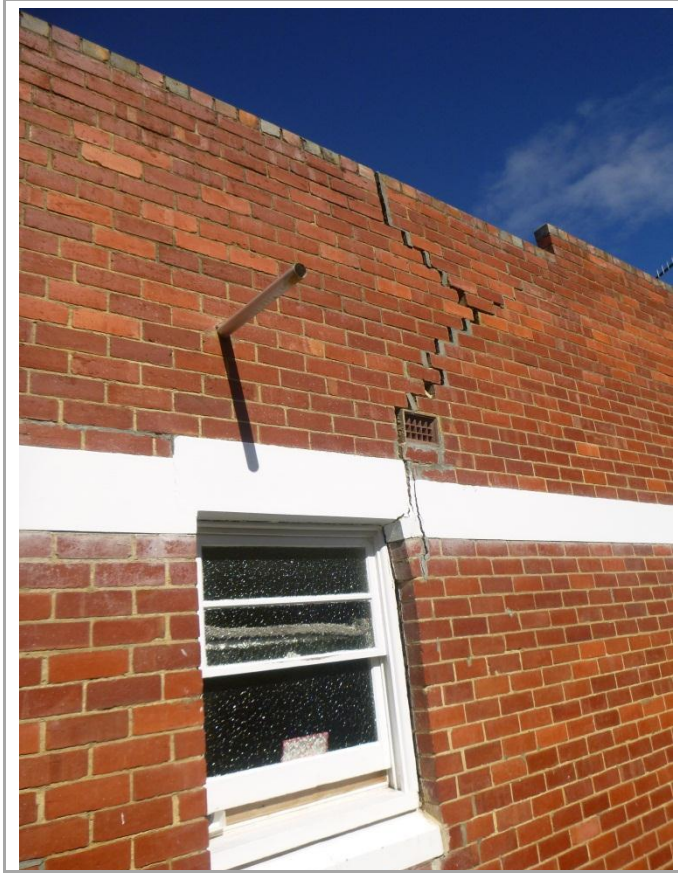
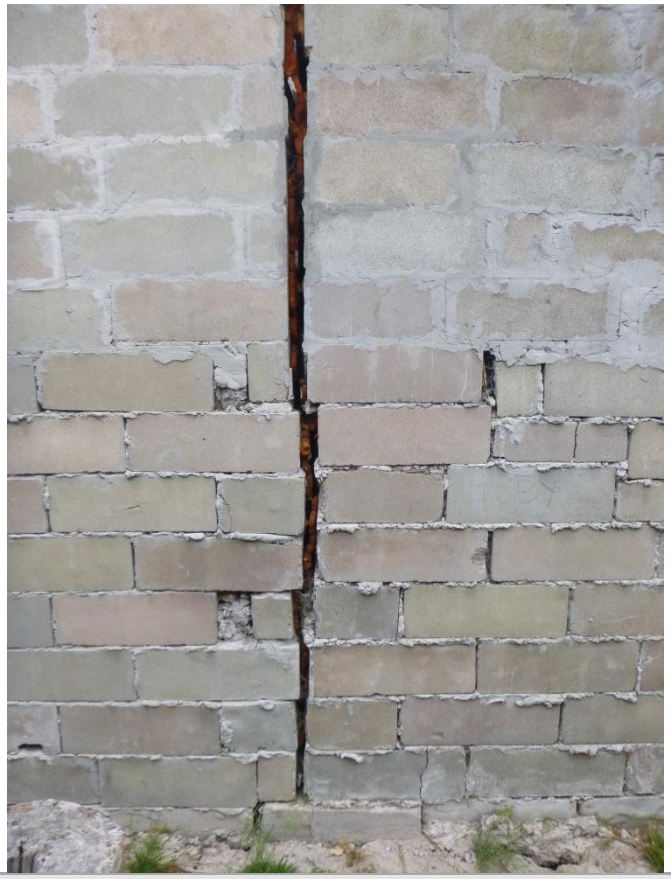
Reference 65 – Photo 0279	Reference 65 – Photo 0280
	

Reference 65 – Photo 0281	Reference 65 – Photo 0282
Reference 65 – Photo 0283	Reference 65 – Photo 0284

Reference 65 – Photo 0285	Reference 62 – Photo 0286
Reference 62 – Photo 0287	Reference 749 – Photo 1382

Reference 749 – Photo 1383	Reference 749 – Photo 1384
	
Reference 749 – Photo 1385	Reference 749 – Photo 1386

6. Disclaimer

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1. Property Details

1.1 Inspection Details

Address:	6 Norwood Avenue, Taroona
Inspection Time and Date:	10:15am, 26 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
6 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 66

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2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
730	1345	Vertical crack at top left of door ~1.5mm at top, ~0.5mm at top of door. Corner to left may have settled.	2	R
730	1346	Vertical crack in corner ~4mm wide at top, ~2mm wide at door lintel.	2	R
731	1347 1348	Concrete driveway has minor crack. Likely caused by shrinkage as there are no crack control joints.	-	S
732	1349 1350 1351 1352	Vertical crack in brickwork next to front steps ~4mm uniform width. Stairs and directly adjacent brickwork appear to have settled and rotated slightly in a southerly direction.	2	R
732	1354 1355 1356	Crack in brickwork at corner above front porch stairs. Crack is larger near the corner again indicating settlement.	1	R
732	1357	Vertical & diagonal cracks in southern wall. Vertical crack ~2mm wide at bottom changing to hairline ~400mm up. Diagonal crack uniform ~1mm vertical & horizontal cracks. Large tree nearby which may be contributing to the subsidence.	2	R
733	1358	Diagonal crack passing around south eastern corner. Appears to be caused by minor settlement of the southern wall.	2	R
734	1359	Vertical crack above window lintel, crack is largerat the bottom. Most likely caused by sagging of the lintel.	2	S
735	1360 1361	Vertical crack above window lintel, crack is largerat the bottom. Most likely caused by sagging of the lintel.	1	S
735	1631	Small vertical crack below window ~1mm wide under sill and varying to hairline ~500mm below. Indicates heaving or settlement.	1	R
736	1362	Vertical crack above window lintel up to top of wall. This wall appears to have been renovated recently with new bricks below window level and the original bricks were reused above. The crack appears to be at the interface between the original and renovated sections of wall.	1	S
737	1363			
738	1364			
739	1365			
740	1366			
741	1367 1368	Brickwork supporting porch slab at back door appears to have settled causing vertical crack in corner and horizontal crack where the concrete slab joins the brickwork.	2	R
742	1369 1370	Large crack in concrete step suggesting significant settlement.	-	-
743	1371	Vertical gap between blockwork extension and original house. On eastern side gap is ~30mm wide at top and hairline at bottom. On western side it is ~50 m at top, ~20mm at bottom. Also 2 cracks above door. All likely due to settlement of blockwok extension.	4	R
744	1372 1373			
746	1375 1376	2 vertical cracks below window ~1.5mm wide. Diagonal crack top right of window, up to ~2mm wide. Likely due to settlement of corner.	2	R
747	1378	Diagonal crack bottom left of window ~3mm wide below window sill varying to hairline at corner.	2	R
747	1379	Crack to the left of window ~10mm perpends cracks, hairline horizontals Diagonal crack below window ~1.5mm uniform width.	3	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
747	1380	Diagonal crack above window near vent, ~5mm wide horizontal cracks and hairline verticals. Bricks left of crack appear to have dropped. This and the two items above all indicate settlement as the likely cause.	2	R
748	1381	Diagonal crack top left of window. Crack is covered with a creeper making it difficult to assess. Crack is wider at window corner and tapers to hairline ~500mm away. Most likely settlement.	2	R

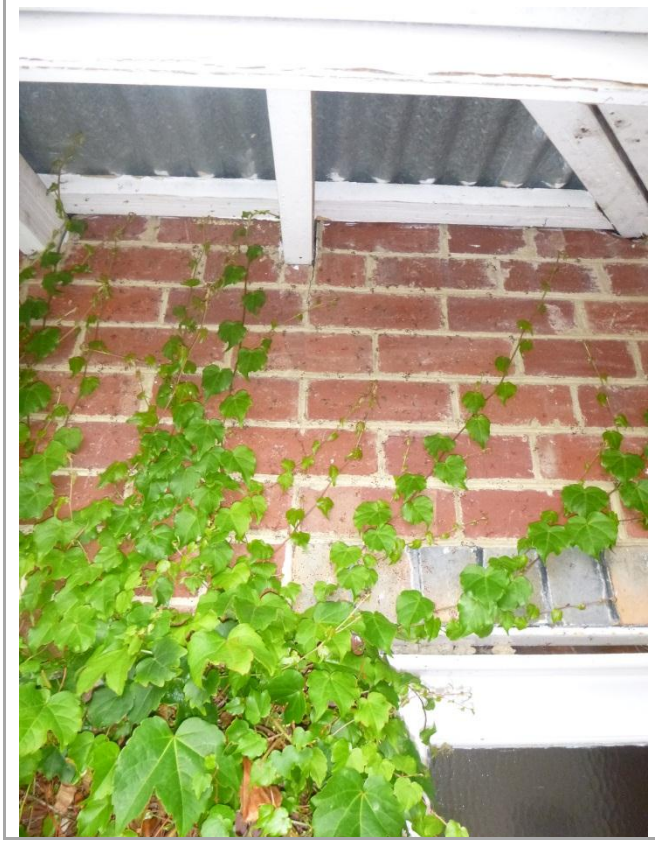
Legend:

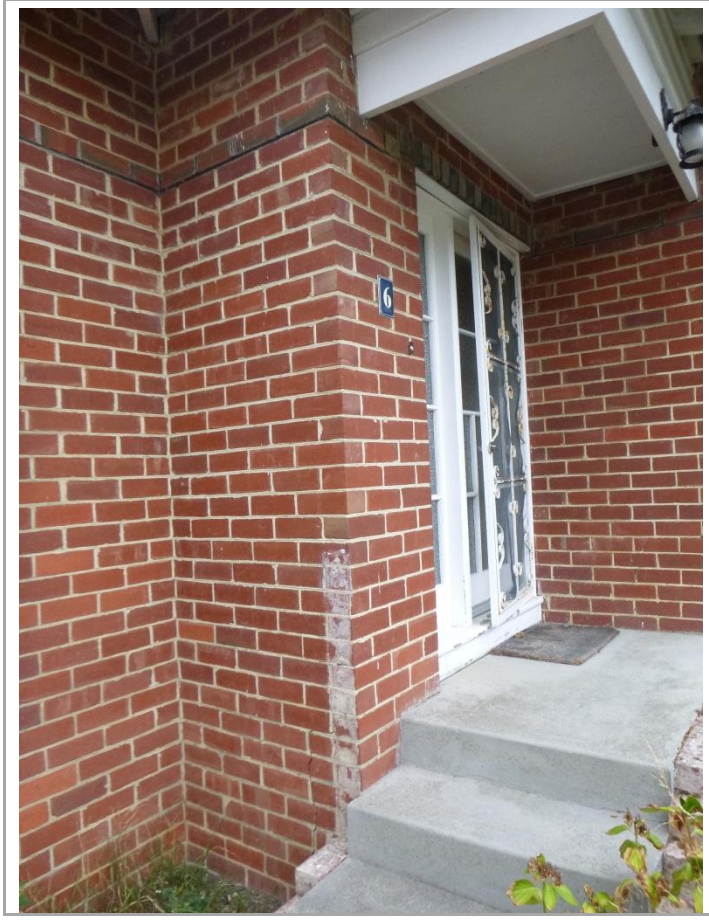
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 729 - Photo 1343	Reference 729 – Photo 1344
Reference 730 – Photo 1345	Reference 730 – Photo 1346
	

Reference 731 – Photo 1347	Reference 731 – Photo 1348
Reference 732 – Photo 1349	Reference 732 – Photo 1350
	

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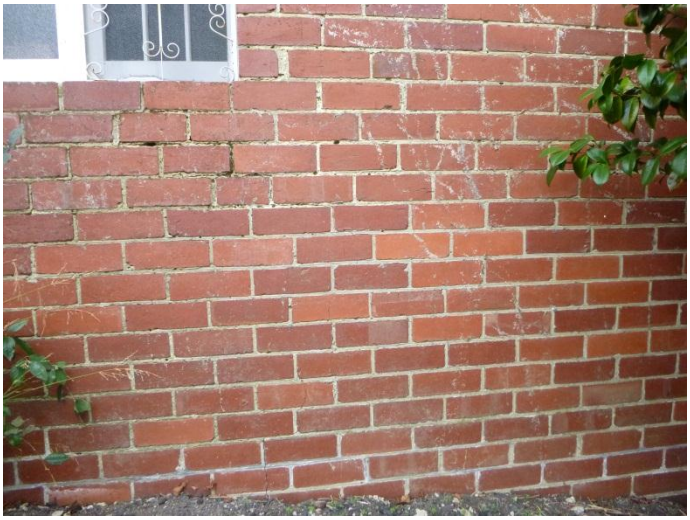
Reference 732 – Photo 1353	Reference 732 – Photo 1354

Reference 732 – Photo 1355

Reference 732 – Photo 1356

Reference 732 – Photo 1357



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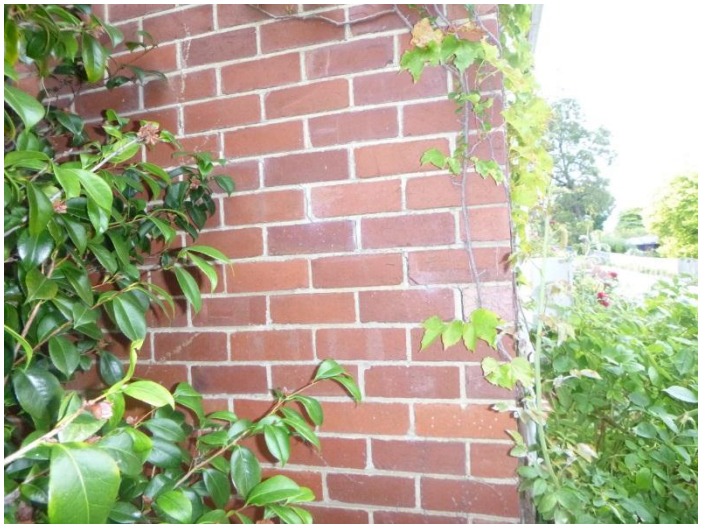

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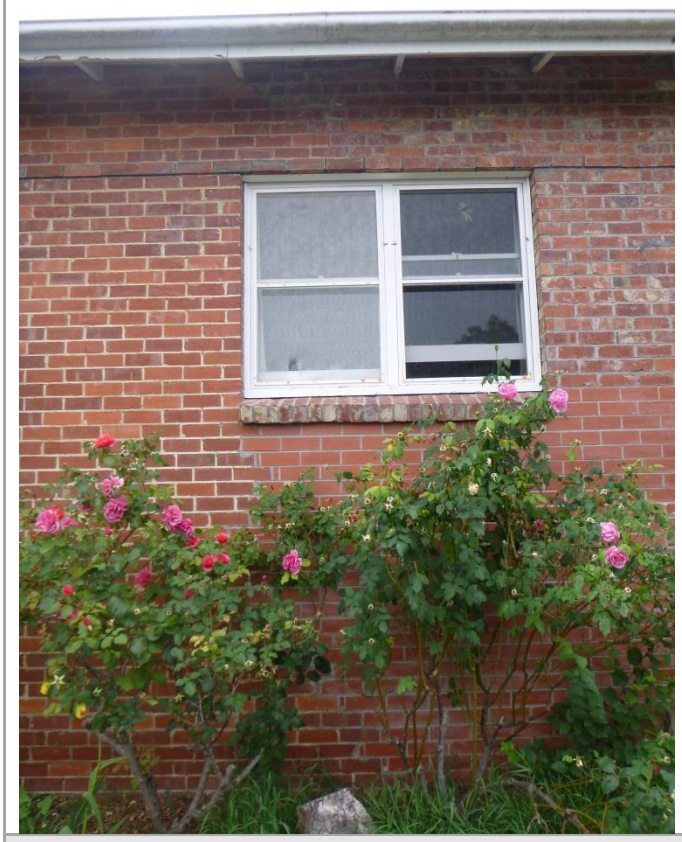
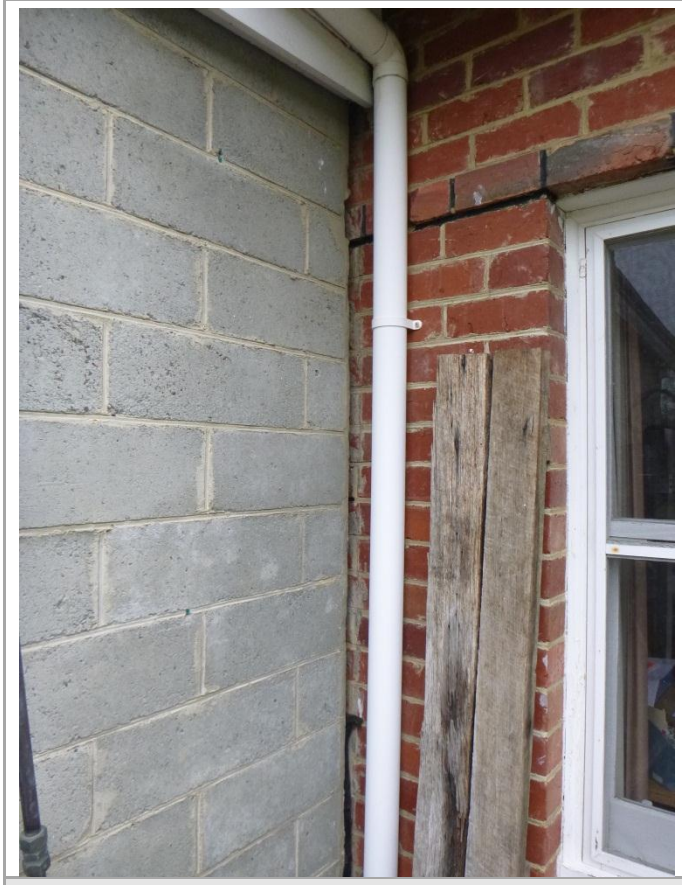
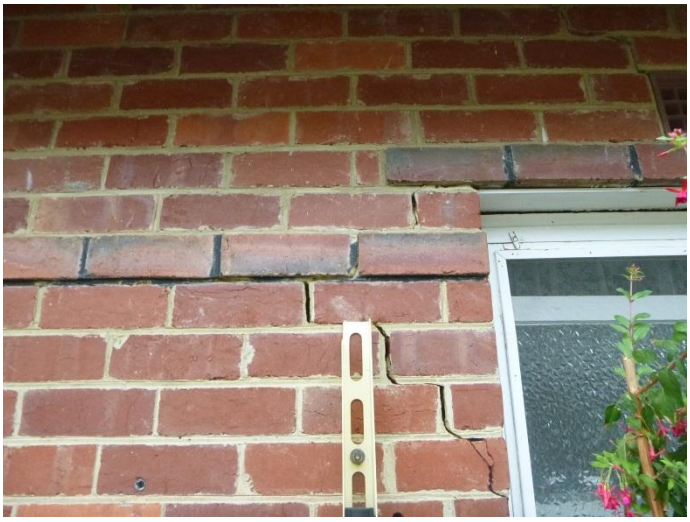
Reference 735 – Photo 1361	Reference 736 – Photo 1362

Reference 737 – Photo 1363	Reference 738 – Photo 1364
	
Reference 739 – Photo 1365	Reference 740 – Photo 1366

Reference 741 – Photo 1367	Reference 741 – Photo 1368
Reference 742 – Photo 1369	Reference 742 – Photo 1370

Reference 743 – Photo 1371	Reference 744 – Photo 1372
	
Reference 744 – Photo 1373	Reference 745 – Photo 1374

Reference 746 – Photo 1375	Reference 746 – Photo 1376
Reference 746 – Photo 1377	Reference 747 – Photo 1378

Reference 747 – Photo 1379	Reference 747 – Photo 1380
	
Reference 748 – Photo 1381	

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1. Property Details

1.1 Inspection Details

Address:	7 Norwood Avenue, Taroona
Inspection Time and Date:	9:00am, 26 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
2 Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
7 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 67

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
717	1328	Diagonal crack in brickwork and rendered wall belove window has been repaired with flexible sealant. Crack has not opened up again.	-	-
717	1329	~1mm crack in rendered wall supporting concrete stairs. Crack runs parallel to concrete stair slab which indicates minor settlement of the supporting brickwork. Was likely caused by reactive foundations and the large nearby tree.	1	R
717	1330 1331	Stairs appear to have rotated outwards (to the north), likely due to settlement of outer stair footing as per previous note.	2	R
718	1332	Repaired diagonal crack below window which has not reopened. Bricks below crack have show some slight out of plane movement (to the north). Unable to determine cause as crack has been repaired but orientation of repair indicated settlement.	-	R
719	1333	Repaired vertical crack near base of wall has reopened to ~1mm width. Brickwork to the right of the crack has moved horizontally out of plane to the south and has dropped vertically slightly. Difficult to assess cause due to repairs but most likely settlement.	1	R
720	1334	Vertical crack in concrete bond beam above corner of window. Crack is approximately of ~1.5mm uniform width. Crack doesn't appear to extend down into brick wall so may be caused by skrinkage of the concrete.	2	S
721	1335	Another vertical crack in bond beam above corner of window. Crack is ~1mm wide and is again potentially due to concrete shrinkage.	1	S
724	1338	Downhill side of asphalt driveway near the garage appears to have settled and dragged the downpipe with it. Bottom of downpipe is now not connected to horizontal pipe in ground.	-	-
725	1339	Repaired diagonal cracks near south eastern corner. Cracks have not reopened making it difficult to determine cause.	-	U
726	1340	Repaired vertical crack in bond beam above deck. Crack appears to have opened up slightly.	1	S
727	1341	Various predominantly vertical cracks in chimney brickwork ~1mm wide. Cracks don't extend to ground indicating settlement as likely cause.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

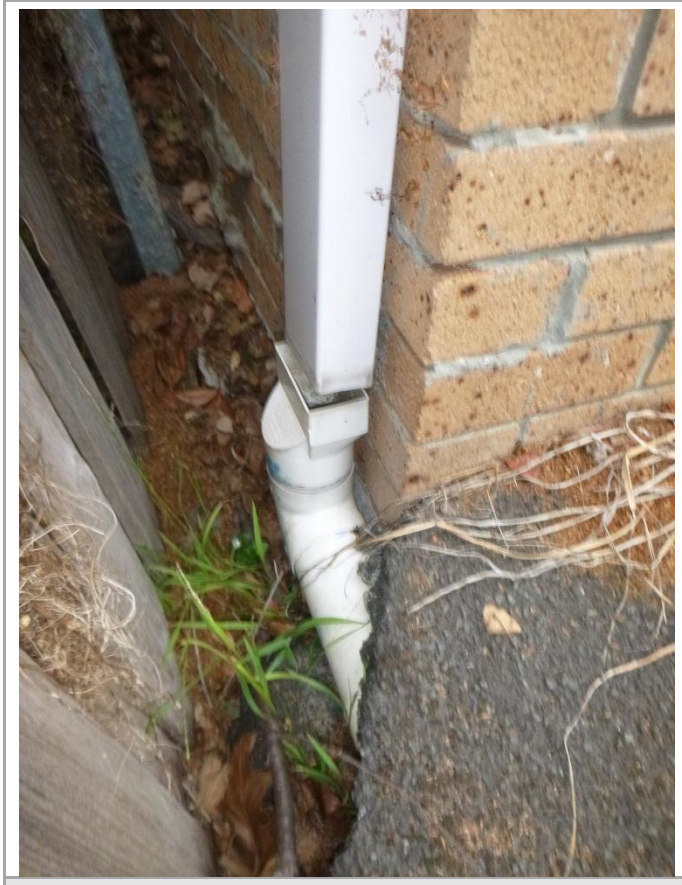
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 715 - Photo 1326	Reference 716 – Photo 1327
Reference 717 – Photo 1328	Reference 717 – Photo 1329

Reference 717 – Photo 1330	Reference 717 – Photo 1331
Reference 718 – Photo 1332	Reference 719 – Photo 1333

Reference 720 – Photo 1334	Reference 721 – Photo 1335
Reference 722 – Photo 1336	Reference 723 – Photo 1337

Reference 724 – Photo 1338	Reference 725 – Photo 1339
	
Reference 726 – Photo 1340	Reference 727 – Photo 1341

Reference 728 – Photo 1342	

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1. Property Details

1.1 Inspection Details

Address:	8 Norwood Avenue, Taroona
Inspection Time and Date:	1:30pm, 26 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
8 NORWOOD AV

Job Number 32-16698
Revision 0
Date 10 May 2013

Figure 68

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
752	1389	Diagonal crack in blockwork subfloor. Cracks are only minor and there appears to be no clear cause.	1	U
753	1390	Diagonal crack near corner. Appears to be heaving of corner of settlement of wall.	0	R
754	1391	Diagonal crack in blockwork near front porch. ~4mm wide perpend cracks & hairline horizontals. Bricks below crack appear to have moved horizontally to the right (north) in relation to those below. Possible caused by repeated cyclic movements due to reactive foundations. Numerous trees in the vacitiy may also contribute to movement.	2	R
754	1392	At western end of porch the concrete slab is hanging over the supporting blockwork by ~10mm. Again the blockwork at this location appears to have moved horizontally to the north.	3	R
755	1393	Edge of front porch concrete slab appears to be breaking out at column location. May be caused by water ingress and possible spalling although there were no visible rust stains.	2	S
749	1396	Gap between front porch slab & blockwork. The blockwork supporting the slab appears to have settled.	2	R
756	1395 1397			
756	1394	Horizontal crack at interface between slab and blockwork. Vertical crack in blockwork most likely caused by the aforementioned settlement of the supporting blockwork.	1	R
757	1398	Diagonal crack in blockwork at south eastern corner. Crack is ~4mm wide at bottom of corner varying to hairline ~2.5m away to the left. Around the corner is a diagonal crack in the footing. These were likely caused by settlement of the corner.	2	R
758	1399 1400			
759	1401	Diagonal crack in blockwork at carport. Crack is ~8mm wide at the top and hairline at the bottom. Again, appears to be caused by settlement.	3	R
761	1403 1404	Diagonal crack around north eastern corner. Appears to be caused by settlement.	2	R
762	1405	Various cracks is soil around north eastern corner. Cracks are up to 40mm wide and 300m deep.	-	-
763	1406 1407	Vertical cracks at corner of uniform ~2mm width.	2	U
764	1408	Diagonal crack ~3mm wide at bottom and hairline ~1m up. Appears to be settlement related.	2	R
764	1409	Predominantly horizontal crack near back steps. Crack is ~20mm wide at north and hairline at south. Blockwork below crack appears to have settled. Blockwork above crack now appears to be supported by concrete slab.	4	R
765	1410	Concrete back porch appears to have moved horizontally ~30mm to the south.	-	U
766	1411	Small cracks inconcrete slab out the back. Most likely caused by a lack of control joints and minor settlement.	-	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 750 – Photo 1387	Reference 751 – Photo 1388
Reference 752 – Photo 1389	Reference 753 – Photo 1390

Reference 754 – Photo 1391	Reference 754 – Photo 1392
Reference 755 – Photo 1393	Reference 756 – Photo 1394

Reference 756 – Photo 1395	Reference 756 – Photo 1396
Reference 756 – Photo 1397	Reference 757 – Photo 1398

Reference 758 – Photo 1399	Reference 758 – Photo 1400
Reference 759 – Photo 1401	Reference 760 – Photo 1402

Reference 761 – Photo 1403	Reference 761 – Photo 1404
Reference 762 – Photo 1405	Reference 763 – Photo 1406

Reference 763 – Photo 1407	Reference 764 – Photo 1408
Reference 764 – Photo 1409	Reference 765 – Photo 1410

Reference 766 – Photo 1411	Reference 767 – Photo 1412

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1. Property Details

1.1 Inspection Details

Address:	12 Norwood Avenue, Taroona
Inspection Time and Date:	12:15pm, 15 February 2013.

1.2 Property Details

Building:	Weatherboard with rendered brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
12-14 NORWOOD AV

Figure 69

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
248	0632 0633	Two vertical cracks in render. Unable to see size or arrangement of cracks underneath so difficult to determine cause.	-	U
252	0634	Diagonal & vertical crack in render left of garage door. Unable to see size or arrangement of cracks underneath so difficult to determine cause.	-	U
250	0636	Various cracks is concrete strip beside house. No crack control joints are present so are most likely shrinkage cracks.	0	S
252	0638			
251	0637	Vertical crack below window. Render is partially detached in some locations. Appears to be a small amount of out of plane movement (wall to the left of the crack has moved out in relation to the right). Difficult to determine cause.	-	U
254	0640 0641 0642 0643	Columns under deck have horizontal cracks near the top. Cracks are ~1mm wide on outer face ranging to hairline near the back. The top of the column and the supported beam appear to have rotated.	1	R
255	0644	Vertical crack at back of the house, wider at the top indicating heaving or settlement. Unable to see size or arrangement of cracks underneath render so difficult to determine cause.	-	U
256	0645 0646	Garage floor has uneven surface indicating differential vertical movement. Corner left of garage door shows vertical crack on the inside which is wider at the top indicating rotation rather than horizontal movement.	1	R

Legend:

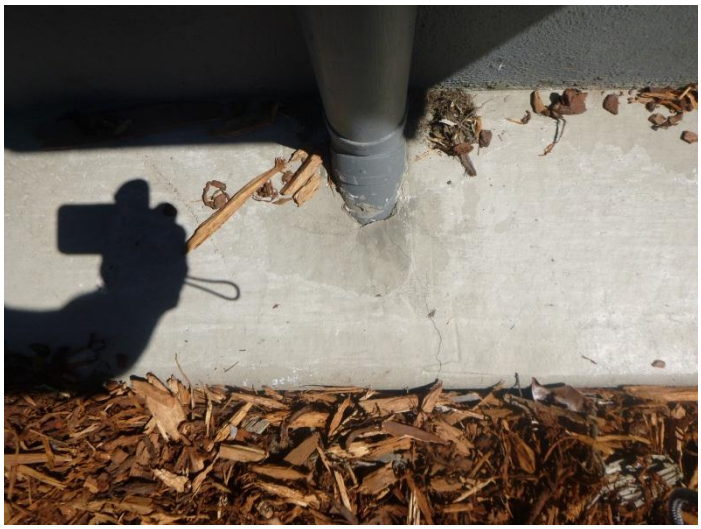
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

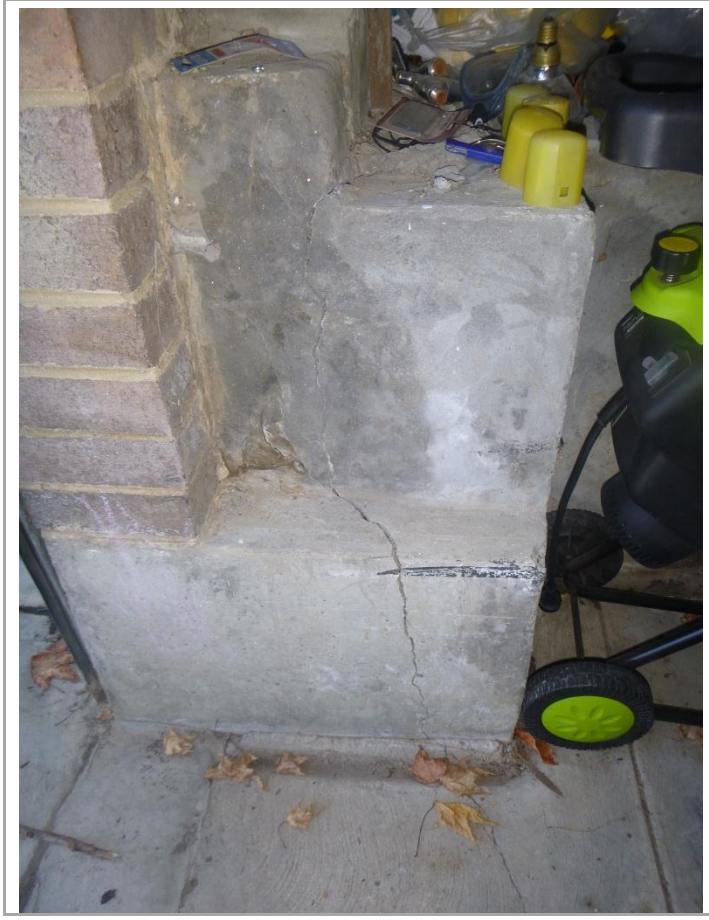
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 247 - Photo 0631	Reference 248 – Photo 0632
Reference 248 – Photo 0633	**Reference 249 – Photo 0634**

Reference 250 – Photo 0635	Reference 250 – Photo 0636
	
Reference 251 – Photo 0637	Reference 252 – Photo 0638

Reference 253 – Photo 0639	Reference 254 – Photo 0640
Reference 254 – Photo 0641	**Reference 254 – Photo 0642**

Reference 254 – Photo 0643	Reference 255 – Photo 0644
Reference256 – Photo 0645	Reference 256 – Photo 0646
	

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1. Property Details

1.1 Inspection Details

Address:	13 Norwood Avenue, Taroona
Inspection Time and Date:	9:00am, 20 February 2013.

1.2 Property Details

Building:	Weatherboard and brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat (<5%)
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
13 NORWOOD AV

Figure 70

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
404	0846 0847	Diagonal crack in north east corner. ~1mm wide at top and hairline near bottom. Most likely due to settlement.	1	R
405	0848 0849	Various cracks in asphalt footpath our the front of the house. Cracks are approx 30mm. One section was resealed recently and the same cracks have opened up again. Resident indicated that cracks reduce in size during winter.	-	R
408	0853 0854	Diagonal crack below window on south eastern corner of house. ~2mm wide at top, hairline at bottom. Smaller diagonal crack at the top of window, wider at top than bottom. Corner appears to have settled.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

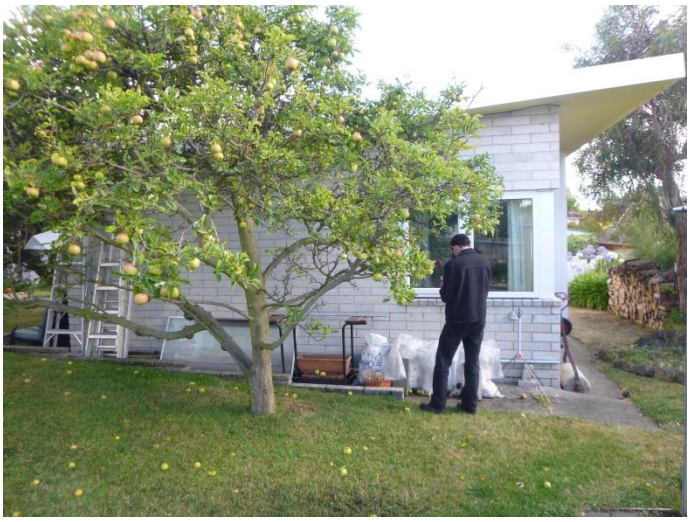
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 403 - Photo 0843	Reference 404 – Photo 0844
Reference 404 – Photo 0846	**Reference 404 – Photo 0847**

Reference 405 – Photo 0848	Reference 405 – Photo 0849
Reference 406 – Photo 0850	Reference 407 – Photo 0851

Reference 408 – Photo 0852	Reference 408 – Photo 0853
	
Reference 408 – Photo 0854	**Reference 409 – Photo 0855**

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1. Property Details

1.1 Inspection Details

Address:	15 Norwood Avenue, Taroona
Inspection Time and Date:	2:20pm, 20 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
15 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 71

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
436	0908	Diagonal crack below window on either side, ~0.5mm at top, hairline at bottom.	1	R
437	0910		1	R
436	0907	Vertical cracks at top of window at each side of lintel. This appears to be a common issue at this house and may be caused by shrinkage or thermal movements of the concrete lintels.	1	S
437	0909		0	S
438	0911 0912 0914	More vertical cracks either side of lintels above front door and sliding door to the right.	0	S
439	0913		0	S
440	0915	Another small crack top left of window next to lintel.	0	S
446	0916	Diagonal crack below windowsill, possibly due to heaving.	0	R
441	0917	Another small crack top left of window next to lintel.	1	S
442	0918	Vertical hairline crack running full height of wall.	1	U
443	0919 0920	Various cracks in soil in backyard. Up to 60mm wide & 200mm deep.	-	-
445	0923	Another small crack top left of door next to lintel.	0	S
446	0924 0926	Diagonal crack passing around corner. Crack on the south side is wider at the top and bricks above oracle appear to angle out at the top.	2	R
447	0927	Vertical crack from top to bottom of wall. This is clearly a joint between two different structures. It looks like it's in the process of being repaired.	2	S
448	0928	Small vertical crack in blockwork wall near corner behine lattice. There appears to be an old lintel at the top of the crack which indicates there was previously a door at this location which has been filled in. The vertical crack is most likely the joint between the existing door and the infill blocks.	1	S
450	0930	Small vertical cracks above lintel. Very localised so possibly just due to lintel.	0	S
451	0931	Small diagonal crack top corner near door.	1	U
452	0932	Small vertical crack below window.	1	R
454	0933	Diagonal cross crack below window. Hairline near bottom, wider at the top. Most likely due to shrink/swell.	1	R
454	0935	Small vertical cracks either side of lintel.	0	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

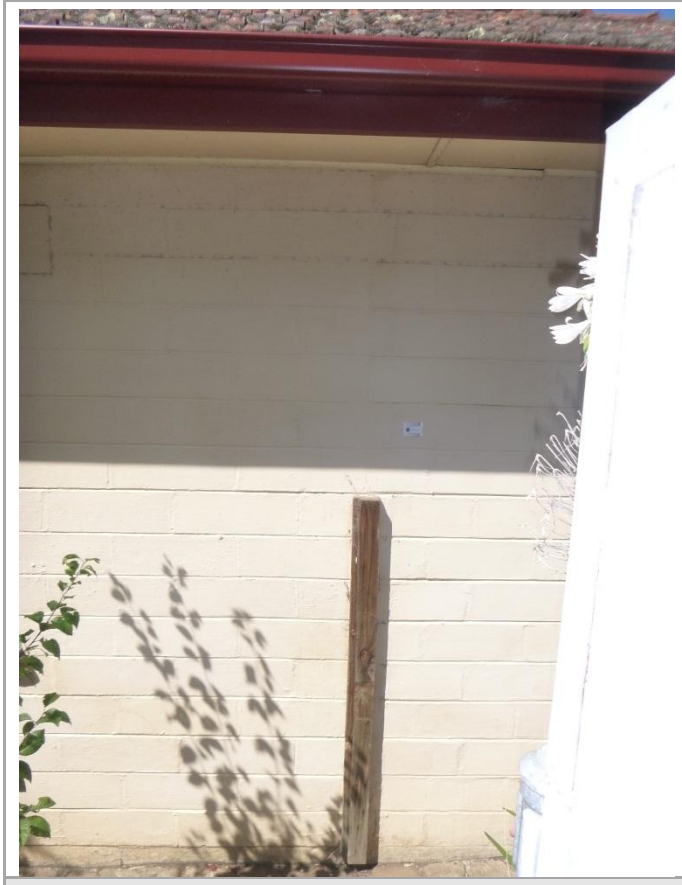
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 435 - Photo 0906	Reference 436 – Photo 0907
Reference 436 – Photo 0908	**Reference 437 – Photo 0909**

Reference 437 – Photo 0910	Reference 438 – Photo 0911
Reference 438 – Photo 0912	Reference 439 – Photo 0913

Reference 439 – Photo 0914	Reference 440 – Photo 0915
Reference 440 – Photo 0916	Reference 441 – Photo 0917

Reference 442 – Photo 0918	Reference 443 – Photo 0919
	
Reference 443 – Photo 0920	Reference 444 – Photo 0921

Reference 444 – Photo 0922	Reference 445 – Photo 0923
Reference 446 – Photo 0924	Reference 446 – Photo 0926

Reference 447 – Photo 0927	Reference 448 – Photo 0928
Reference 449 – Photo 0929	Reference 450 – Photo 0930

Reference 451 – Photo 0931	Reference 452 – Photo 0932
Reference 454 – Photo 0933	Reference 455 – Photo 0934

Reference 454 – Photo 0935	

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1. Property Details

1.1 Inspection Details

Address:	17 Norwood Avenue, Taroona
Inspection Time and Date:	3:30pm, 20 February 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

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The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
17 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 72

N:\AU\Hobart\Projects\32\16698\GIS\Maps\3216698_02_PropertyReport_Rev0.mxd
2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
458	0938	Vertical crack near corner of wall extending diagonally up to bottom corner of window. May have been caused by brick growth (thermal expansion) as wall is ~8m long, north facing and restrained at the other end by stairs. The vertical crack is one layer of bricks in from the edge and has sheared straight through multiple bricks.	1	S
461	0941	Hairline vertical crack at lintel top right of window.	0	U
462	0943	Horizontal crack above lintel to downstairs window. Lintel appears corroded and may have expanded causing the crack.	1	S

Legend:

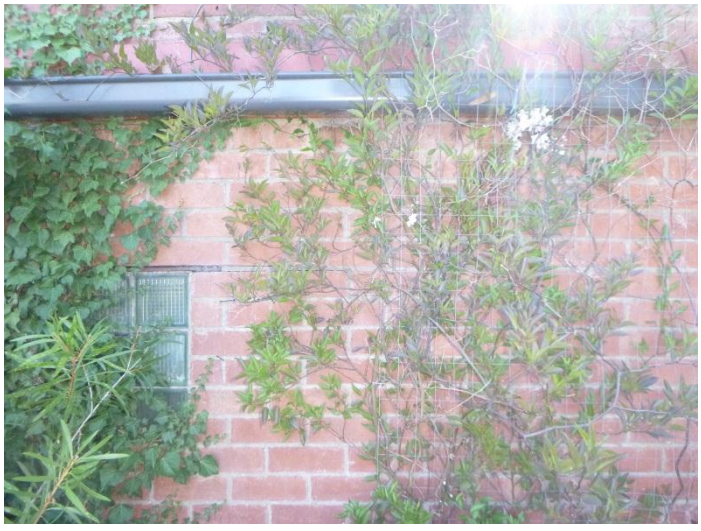
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 456 - Photo 0936	Reference 457 – Photo 0937
Reference 458 – Photo 0938	**Reference 459 – Photo 0939**

Reference 460 – Photo 0940	Reference 461 – Photo 0941
Reference 461A – Photo 0942	Reference 462 – Photo 0943
	

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1. Property Details

1.1 Inspection Details

Address:	18 Norwood Avenue, Taroona
Inspection Time and Date:	11:10am, 15 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
4 Severe	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
18 NORWOOD AV

Figure 73

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
237	0612 0613	Vertical crack above corner of window, wider at the top.	1	R
237	0614	Horizontal crack below window sill ~1mm wide.	1	U
238	0615	Horizontal crack below window sill ~0.8mm wide.	1	U
239	0616 0617 0618	100mm thick suspended slab balcony is showing significant sagging (~30mm over 3300mm). Cracks are observable on the underside of the slab and penetrate through ~80% of its thickness. Cracks also present around the south eastern support column and may be in danger of punching through. The resident has been notified of the danger.	4	S
240	0619	Various vertical cracks in retaining wall in front yard.	-	-
241	0620		-	-
243	0622 0627	Diagonal crack at top corner of wall. Vertical cracks are wider than horizontal. Bricks above crack appear to have moved to the right in relation to those below.	3	R
243	0623 0624	Corner of small suspended slab at back door is cracked leaving exposes reinforcement. Underside of slab shows evidence of spalling near edge.	-	S
243	0625 0626	Back stairs are moving away from the house. Plants are growing in the gap which may be causing or intensifying the movement.	-	R
244	0628	Diagonal crack above door, ~1mm wide perpend cracks. Also evidence of repointing.	1	R
245	0629	Minor horizontal crack bottom left of window.	1	R
246	0630	Cracks in small block wall supporting gate. Wooden wedge is being used in an attempt to keep level. Outer side of wall is subsiding/settling.	-	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

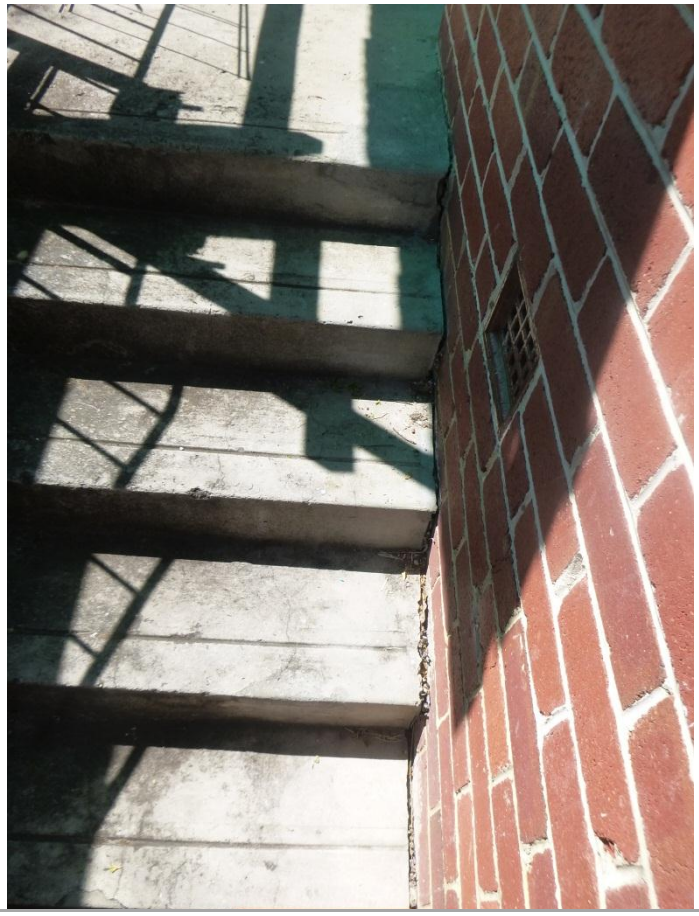
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 236 - Photo 0611	Reference 237 – Photo 0612
Reference 237 – Photo 0613	**Reference 237 - Photo**

Reference 238 – Photo 0614	Reference 239 – Photo 0615
Reference 239 – Photo 0617	**Reference 239 – Photo 0618**

Reference 240 – Photo 0619	Reference 241 – Photo 0620
Reference 242 – Photo 0621	Reference 243 – Photo 0622

Reference 243 – Photo 0623	Reference 243 – Photo 0624
Reference 243 – Photo 0625	Reference 243 – Photo 0626
	

Reference 243 – Photo 0627	Reference 244 – Photo 0628
Reference 245 – Photo 0629	Reference 246 – Photo 0630

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1. Property Details

1.1 Inspection Details

Address:	20 Norwood Avenue, Taroona
Inspection Time and Date:	10:10am, 15 February 2013.

1.2 Property Details

Building:	Blockwork
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
3 Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
20 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 75

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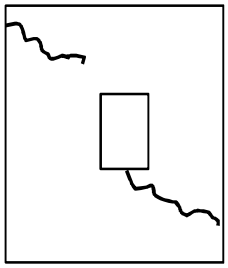
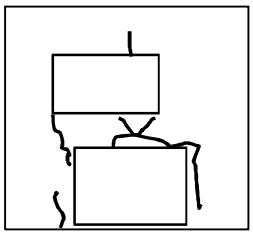
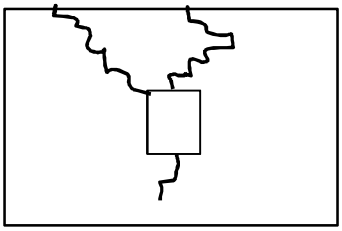
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
227	0592 0593	Diagonal crack at top of wall near corner. Also diagonal crack lower down below window sill. Crack gets narrower towards the bottom. Corner of house may be settling. 	1	R
228	0594	Vertical crack above window which is ~6mm at the bottom changing to hairline ~0.8m up.	3	R
228	0595 0596	Various cracks predominantly vertical and 2mm wide changing to hairline near ground level. Possible evidence of settlement. 	2	R
229	0597 0598	Various cracks in naturals soil, approx 30mm wide and 300mm deep soil. Has moved away from bricks in the downhill direction approx 40mm.	-	-
231	0600 0601 0602 0603	Vertical cracks ~0.5mm wide at window corners.	1	R
232	0604	Gap between door jamb and wall ~12mm at top, 2mm at bottom. Possibly due to settlement of corner of blockwork.	3	R
232	0604 0605	Crack in blockwork top right of door. 2mm perpend cracks. Horizontal crack is hairline at left, changing to ~2mm at corner on right. Horizontal crack extends around corner for approx. 3 m. Wall may be rotating out at the top.	2	R
233	0606			
234	0607	Diagonal cracks above window. Perpend cracks are larger than horizontal and of uniform width.	2	R
234	0608	Predominantly vertical crack below the window, wider at top than bottom. Possibly settlement of corner. 	2	R

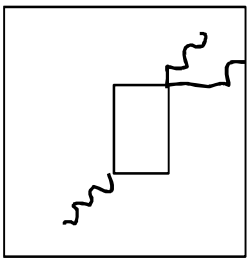
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
235	0609 0610	Diagonal cracks bottom left & top right of window. Cracks are larger at the top. Front corner of house may be leaning out. 	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

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5. Photographs

Reference 225 - Photo 0590	Reference 226 – Photo 0591
Reference 227 – Photo 0592	**Reference 227 – Photo 0593**

Reference 228 – Photo 0594	Reference 228 – Photo 0595
Reference 228 – Photo 0596	**Reference 229 – Photo 0597**

Reference 229 – Photo 0598	Reference 230 – Photo 0599
Reference 231 – Photo 0600	Reference 231 – Photo 0601

Reference 231 – Photo 0602	Reference 231 – Photo 0603
Reference 232 – Photo 0604	Reference 232 – Photo 0605

Reference 233 – Photo 0606	Reference 234 – Photo 0607
Reference 234 – Photo 0608	Reference 235 – Photo 0609

Reference 235 – Photo 0610	

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1. Property Details

1.1 Inspection Details

Address:	22 Norwood Avenue, Taroona
Inspection Time and Date:	9:15am, 15 February 2013.

1.2 Property Details

Building:	Brick veneer with weatherboard extension
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
22 NORWOOD AV

Figure 76

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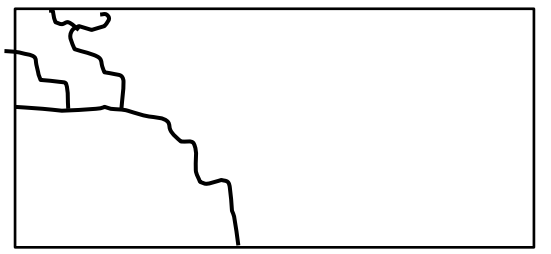
Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
211	0571	Horizontal crack in brickwork above meterbox. Vertical cracks in same location. Cracks most likely caused by a lack of lintel leading to vertical sag.	1	S
213	0573	Cracks in natural soil. Approx 30mm wide & 50mm deep. Soil is also receeding away from the concrete driveway and moving ~10mm downhill.	-	-
214	0574		-	-
215	0575		-	-
216	0576 0577 0578		-	-
219	0581 0582	Cracks in natural soil. Approx 30mm wide & 50mm deep.	-	-
221	0584	Mortar has been repaired with a flexible sealant and painted making it difficult to identify cracks.	-	U
222	0585	Vertical crack above garage window. Diagonal crack top left of window tapering to hairline ~300mm down and left. North eastern corner maybe settling.	1	R
223	0586 0587	Various diagonal cracks in garage will near corner. Bricks below the crack have moved ~3mm down and to the south. Cracks are predominantly of uniform width. Supporting slab is showing evidence that the corner in question is settling. 	2	R
224	0588 0589		3	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
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GHD	KINGBOROUGH COUNCIL TAROONA LANDSLIDE RISK ASSESSMENT STAGE 2 22 NORWOOD AVE, TAROONA LIST OF IDENTIFIED ISSUES	JOB NUMBER: 3216698 REVISON: 0 DATE: 15/02/13 SHEET 1 of 1

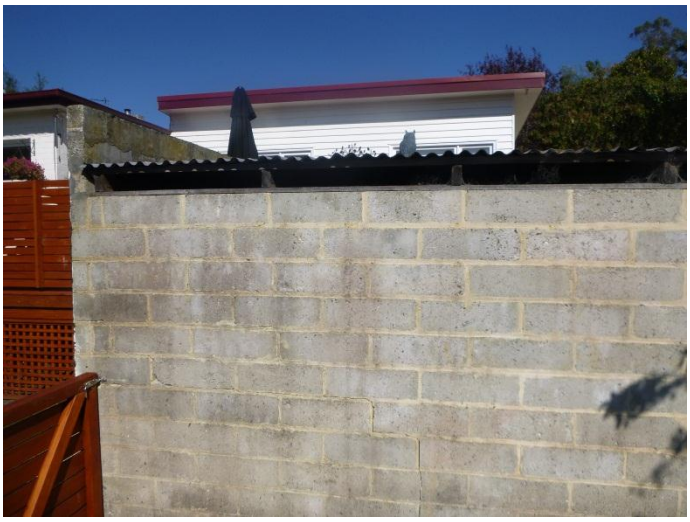
5. Photographs

Reference 210 - Photo 0570	Reference 211 – Photo 0571
Reference 212 – Photo 0572	Reference 213 – Photo 0573

Reference 214 – Photo 0574	Reference 215 – Photo 0575
Reference 216 – Photo 0576	Reference 216 – Photo 0577

Reference 216 – Photo 0578	Reference 217 – Photo 0579
Reference 218 – Photo 0580	Reference 219 – Photo 0581

Reference 219 – Photo 0582	Reference 220 – Photo 0583
Reference 221 – Photo 0584	Reference 222 – Photo 0585

Reference 223 – Photo 0586	Reference 223 – Photo 0587
	
Reference 224 – Photo 0588	Reference 224 – Photo 0589

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1. Property Details

1.1 Inspection Details

Address:	23 Norwood Avenue, Taroona
Inspection Time and Date:	3:00pm, 26 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
19-23 NORWOOD AV

Figure 74

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
771	1415	Small diagonal crack at top of brick pier most likely due to settlement.	1	R
773	1417	Diagonal crack at top of wall from vent down approx 300mm. Crack has been repointed in the past making it difficult to determine extent. Most likely caused by some minor settlement/heaving.	1	R
774	1418	Minor cracks & vertical movement in concrete driveway on southern side.	-	R
776	1420	Small diagonal crack bottom left of window. Likely just due to some minor settlement.	1	R

Legend:

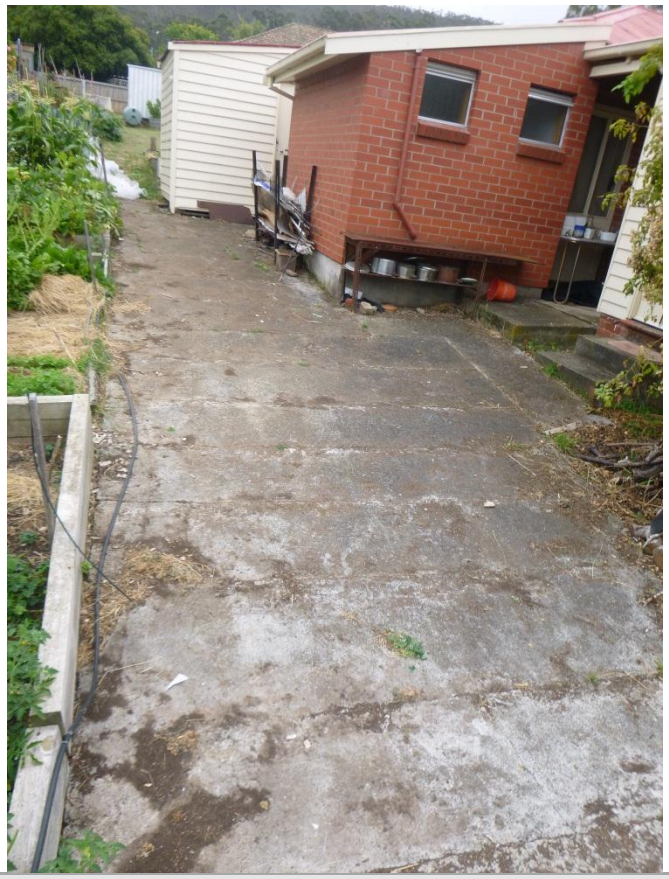
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 769 – Photo 1413	Reference 770 – Photo 1414
Reference 771 – Photo 1415	**Reference 772 – Photo 1416**

Reference 773 – Photo 1417	Reference 774 – Photo 1418
	
Reference 775 – Photo 1419	**Reference 776 – Photo 1420**

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1. Property Details

1.1 Inspection Details

Address:	27 Norwood Avenue, Taroona
Inspection Time and Date:	3:30pm, 26 February 2013.

1.2 Property Details

Building:	Weatherboard with brick subfloor
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
27 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 77

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
779	1423 1425	Various cracks in concrete paths and steps on eastern side. Uneven surface indicating differential settlement as the cause. Path also appears to have moved horizontally in an eastern direction.	-	R
779	1424	Gap of up to 50mm between path & soil on eastern side. Likely due to drying and shrinkage of soil.	-	-
781	1427	Uneven concrete pavement on western side of house likely due to the age of the concrete and some minor settlement.	-	R
782	1428			
784	1430 1431 1432	Cracks in brick subfloor. Bricks are angling downhill in a south easterly direction. Damage is only localised to this corner so is likely settlement.	3	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 777 - Photo 1421	Reference 778 – Photo 1422
Reference 779 – Photo 1423	**Reference 779 – Photo 1424**

Reference 779 – Photo 1425

Reference 780 – Photo 1426

Reference 781 – Photo 1427

Reference 782 – Photo 1428

Reference 783 – Photo 1429

Reference 784 – Photo 1430

Reference 784 – Photo 1431

Reference 784 – Photo 1432

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1. Property Details

1.1 Inspection Details

Address:	29 Norwood Avenue, Taroona
Inspection Time and Date:	2:00pm, 22 February 2013.

1.2 Property Details

Building:	Brick veneer
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	100%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

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Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
29 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 78

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
591	1153 1154 1155	Small cracks in the underside of the balcony slab at mid span. Cracks are only minor and should not impact the strength of the slab. Little to no viable rust stains or sag.	0	S
592	1156 1157 1158	Small cracks in concrete path propagating out from base of columns. Likely caused by lack of trimmer bars around penetrations and minor settlement.	1	S
593	1159 1160 1161	Various minor cracks in driveway slab most likely caused by settlement	-	-
594	1162	Diagonal crack bottom right of window extending down to ground. Crack is larger at the top. Southern wall may be rotating out slightly probably due to settlement.	1	R
597	1165	Small vertical crack above lintel most likely due to minor sag.	1	S
595	1163	Footpaths on west and south sides are in excellent condition with no evidence of landslip or settlement	-	-
596	1164			
598	1166			

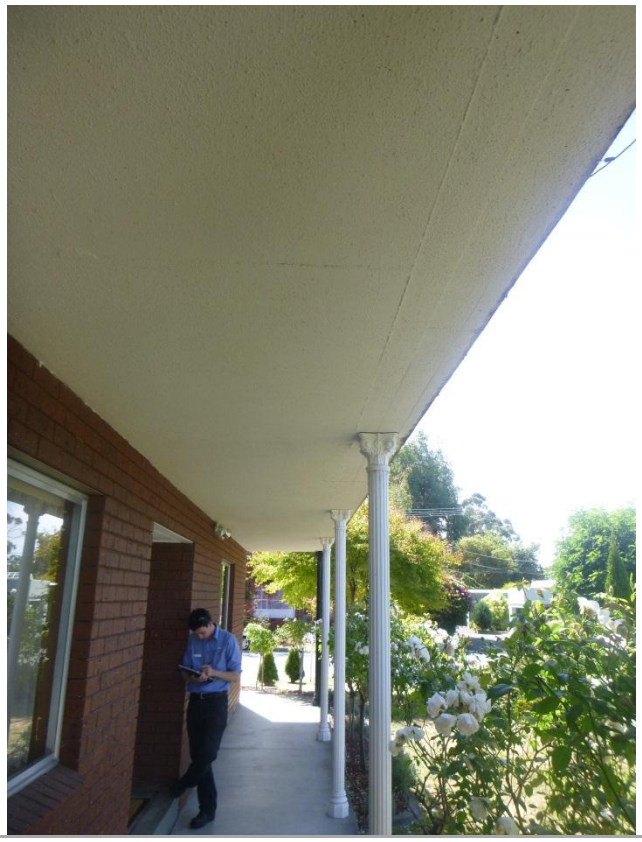
Legend:

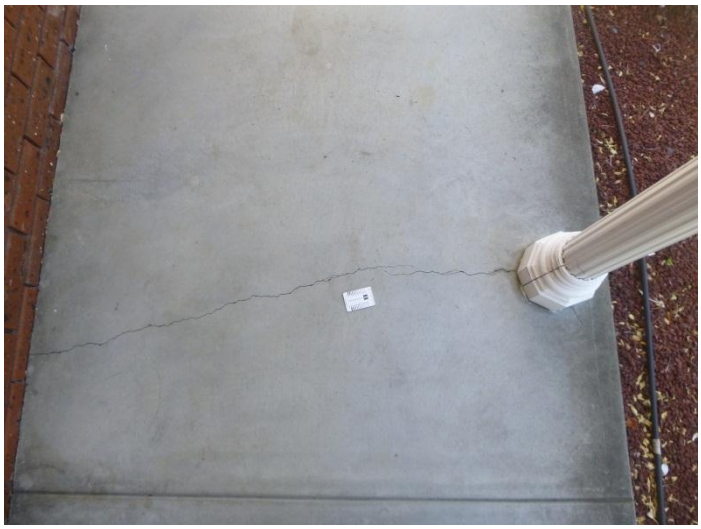
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

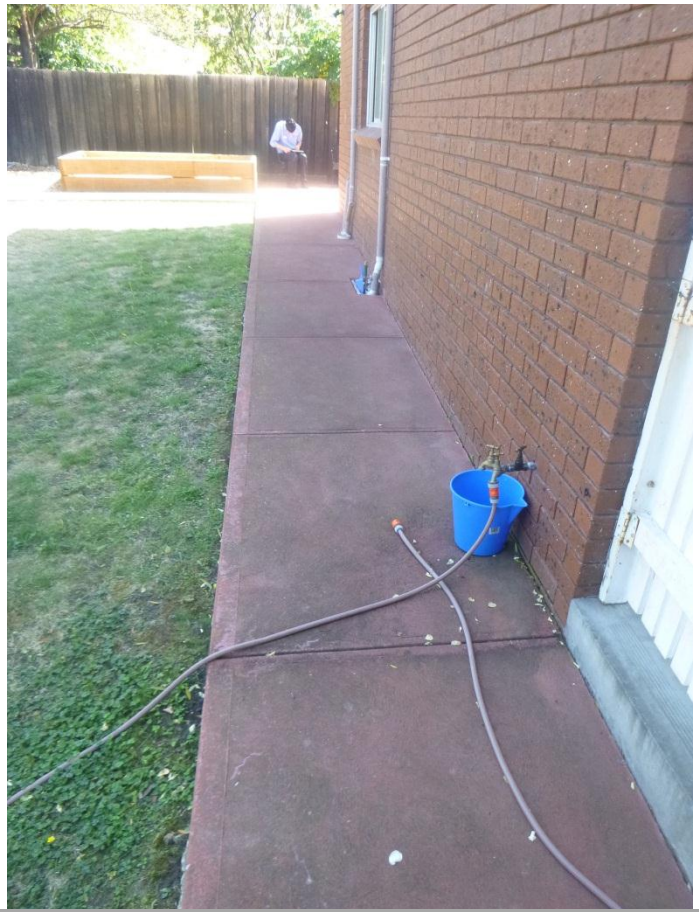
1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 589 - Photo 1151	Reference 590 – Photo 1152
Reference 591 – Photo 1153	**Reference 591 – Photo 1154**
	

Reference 591 – Photo 1155	Reference 592 – Photo 1156
	
Reference 592 – Photo 1157	Reference 592 – Photo 1158

Reference 593 – Photo 1159	Reference 593 – Photo 1160
Reference 593 – Photo 1161	Reference 594 – Photo 1162

Reference 595 – Photo 1163	Reference 596 – Photo 1164
Reference 597 – Photo 1165	Reference 598 – Photo 1166
	

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1. Property Details

1.1 Inspection Details

Address:	36A Norwood Avenue, Taroona
Inspection Time and Date:	2:40pm, 22 February 2013.

1.2 Property Details

Building:	Rendered finish
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
1	Very Slight	S – Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
36 A NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 79

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
602	1170	Minor cracks in garage slab. Most likely due to settlement by may be partially due to shrinkage as there are no control joints.	1	S
603	1171 1172	There are various areas on all walls where flexible sealant has filled gaps. Most of these appear to be articulation joints however some appear to have been repaired damage. Cracks have not opened up again.	-	-
604	1173			
605	1174			
606	1175			

Legend:

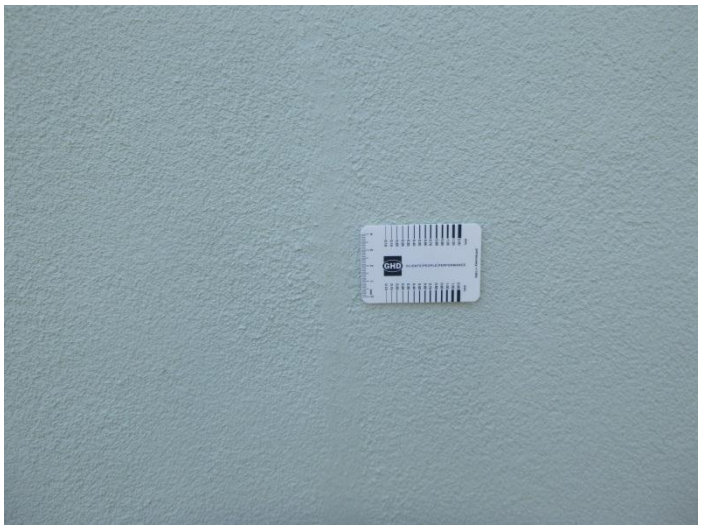
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 599 - Photo 1167	Reference 600 – Photo 1168
Reference 601 – Photo 1169	**Reference 602 – Photo 1170**

Reference 603 – Photo 1171	Reference 603 – Photo 1172
	
Reference 604 – Photo 1173	Reference 605 – Photo 1174

Reference 606 – Photo 1175	

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1. Property Details

1.1 Inspection Details

Address:	36B Norwood Avenue, Taroona
Inspection Time and Date:	3:00pm, 21 February 2013.

1.2 Property Details

Building:	Rendered finish
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

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Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
36 B NORWOOD AV

Figure 80

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
610	1180	Very minor crack in rendered blockwork wall at south eastern corner. Around the corner are various cracks in the cladding. These indicate that the corner may have experienced some minor settlement.	0	R
612	1182		1	R
612	1183	Concrete footing on eastern side appears to have settled, leaving a horizontal gap ~10mm wide. Wall above now appears to be partially unsupported and a vertical crack has formed in cladding which is wider at the bottom.	3	R
613	1186 1187	Path on northern side has settled leaving gap between bottom of wall of ~10mm	-	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 607 - Photo 1176	Reference 607 – Photo 1177
Reference 608 – Photo 1178	Reference 609 – Photo 1179

Reference 610 – Photo 1180

Reference 611 – Photo 1181

Reference 612 – Photo 1182

Reference 612 – Photo 1183

Reference 613 – Photo 1184	Reference 614 – Photo 1185
Reference 614 – Photo 1186	Reference 614 – Photo 1187

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1. Property Details

1.1 Inspection Details

Address:	38 Norwood Avenue, Taroona
Inspection Time and Date:	3:30pm, 22 February 2013.

1.2 Property Details

Building:	Rendered finish
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
38 NORWOOD AV

Figure 81

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
616	1190	Repaired damage at south western corner of house. Likely caused by localised settlement. There has been little to no further damage since repairs.	-	R
618	1192	Minor crack bottom left of window. Likely caused by minor settlement.	0	R
619	1193	Minor horizontal crack near south eastern corner. Wall is rendered making it difficult to assess cause. Possibly just a construction joint.	1	U
620	1194	Horizontal crack in wall below deck. Possibly minor settlement. Wall above crack doesn't appear to be affecting.	2	R
623	1197	Diagonal crack near eastern corner. Possibly caused by vertical movement initiated by large trees in close proximity.	1	R
623	1198	Horizontal crack in northern wall. Possibly a construction joint at the underside of the floor slab.	1	S
624	1199	Horizontal crack near north western corner. Possibly due to settlement.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 614 - Photo 1188	Reference 615 – Photo 1189
Reference 616 – Photo 1190	**Reference 617 – Photo 1191**

Reference 618 – Photo 1192	Reference 619 – Photo 1193
Reference 620 – Photo 1194	Reference 621 – Photo 1195

Reference 622 – Photo 1196	Reference 623 – Photo 1197
Reference 623 – Photo 1198	Reference 624 – Photo 1199

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1. Property Details

1.1 Inspection Details

Address:	39 Norwood Avenue, Taroona
Inspection Time and Date:	4:15pm, 22 February 2013.

1.2 Property Details

Building:	Rendered finish
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	High
Site Drainage:	Poor
Pavement surrounds:	100%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
39 NORWOOD AV

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 82

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
627	1203 1204	Crack in corner beside front stairs. Appears to have been caused by heaving of corner of front porch. The house and concrete stairs do not appear to have moved.	3	R
628	1205	Repaired diagonal crack is visible near south western corner. Crack was likely originally caused by settlement but has not yet reopened.	-	R
629	1206	Minor cracks in garage slab. Possibly due to settlement and a lack of crack control joints.	1	R
632	1210 1211	Diagonal cracks on either side of downpipe. Crack is ~0.5mm wide at top and hairline at bottom. Possible due to heaving or settlement. There are multiple large trees nearby.	0	R
633	1212 1213 1214	Gap betweens concrete stairs and walls either side. Stairs have most likely settled.	-	R
634	1215 1216	Diagonal cracks in eastern wall supporting suspended slab deck. Cracks are exhibiting no lateral movement and are most likely due to settlement.	1	R
635	1217	Horizontal cracks near top bottom of northern wall supporting suspended slab deck. No apparent cause.	1	U
636	1218		0	U
637	1219 1220	Two cracks in window sill each corresponding to a crack in the suspended slab.	1	R
638	1221 1222 1223 1224	The western crack in the slab also corresponds to a vertical crack in the supporting wall that is ~2mm wide at top & hairline ~200mm down.	1	R
639	1225	Crack in footpath on northern side. Likely caused by tree roots.	-	-
640	1226	Retaining walls supporting deck near front porch are leaning out. Possibly caused by being under-designed or overloaded.	-	-
641	1227			

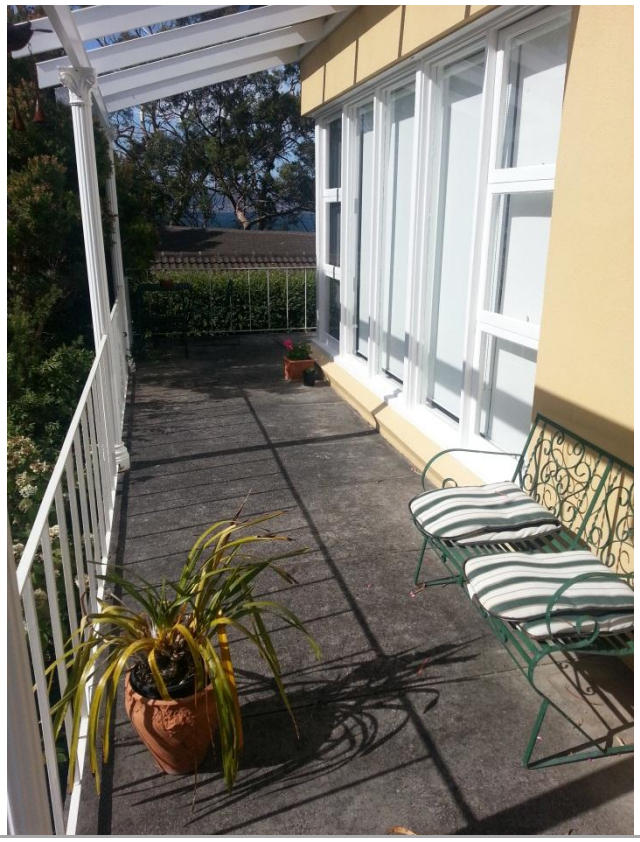
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 625 - Photo 1200	Reference 626 – Photo 1201
Reference 627 – Photo 1202	**Reference 627 – Photo 1203**
	

Reference 627 – Photo 1204	Reference 628 – Photo 1205
Reference 629 – Photo 1206	Reference 630 – Photo 1207

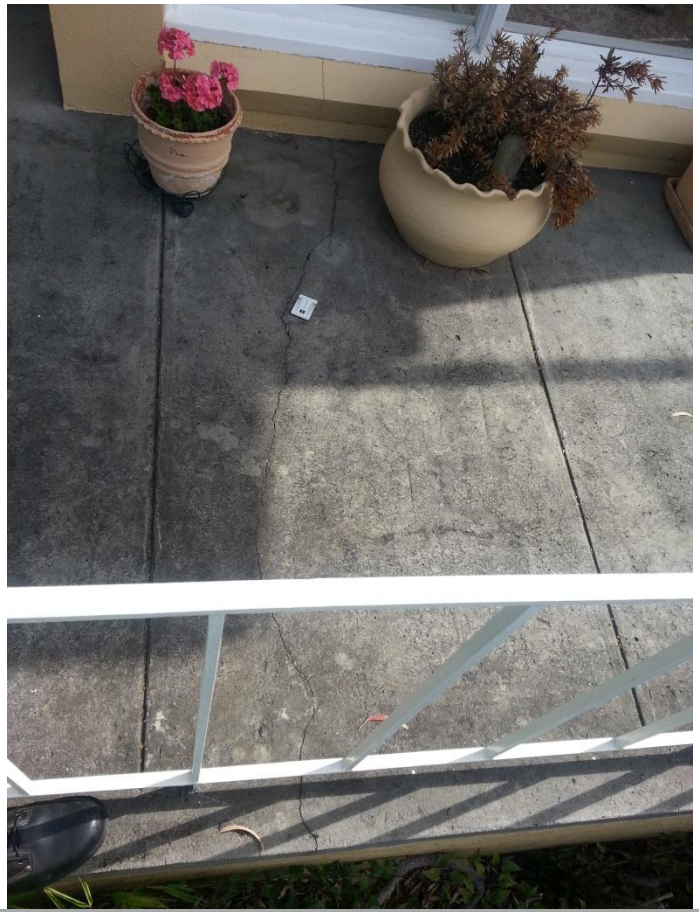
Reference 631 – Photo 1208	Reference 631 – Photo 1209
Reference 632 – Photo 1210	Reference 632 – Photo 1211

Reference 633 – Photo 1212

Reference 633 – Photo 1213

Reference 633 – Photo 1214

Reference 634 – Photo 1215

Reference 634 – Photo 1216	Reference 635 – Photo 1217
Reference 636 – Photo 1218	Reference 637 – Photo 1219
	

Reference 637 – Photo 1220	Reference 638 – Photo 1221
Reference 638 – Photo 1222	Reference 638 – Photo 1223

Reference 638 – Photo 1224	Reference 639 – Photo 1225
Reference 640 – Photo 1226	Reference 641 – Photo 1227

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PART H – TAROONA HIGH SCHOOL

Contents

Property Address
A Block, Taroona High School
B Block, Taroona High School
C Block, Taroona High School
Science Block, Taroona High School
Gym, Taroona High School

1. Property Details

1.1 Inspection Details

Address:	A Block, Taroona High School
Inspection Time and Date:	9:15am, 1 March 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

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3. Findings

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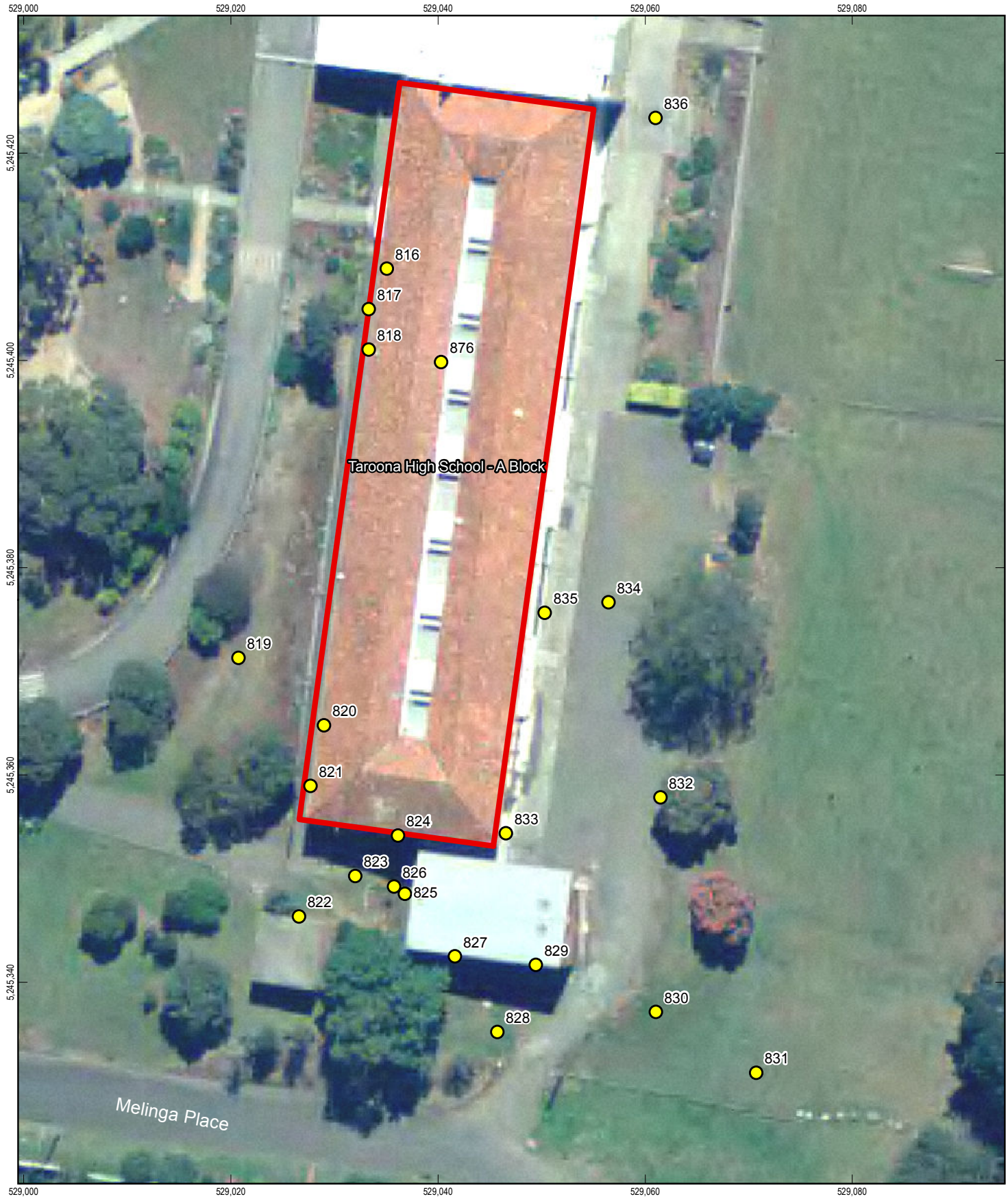
The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues



LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4
0 2.5 5 10
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona High School - A Block

Figure 83

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
816	1670	Vertical crack below window. ~2.5mm uniform verticals, hairline horizontals.	2	R
816	1471 1671	Diagonal crack below window and above vent. Uniform crack of ~1mm width.	1	R
817	1472 1672	Diagonal crack below window ~2mm wide at sill varying to hairline ~400mm down. Appears to be due to heaving or settlement.	2	R
818	1473	Vertical crack below window near bike rack. ~1mm at bottom, hairline ~400mm up. This crack and the three listed above are all in close proximity to a large tree.	1	R
819	1474			
820	1475	Vertical crack between concrete column and wall. Difficult to tell if column or wall has moved.	2	U
821	1476	Vertical crack in brickwork wall ~1.5mm wide at bottom varying to hairline ~1.5 up.	2	R
823	1478	Diagonal crack in brickwork supporting concrete slab. Wall to the left of the crack appears to have settled.	2	R
823	1479	Horizontal cracks in brickwork supporting concrete slab. Bottom course of bricks have dropped up to 12mm in some locations.	3	R
824	1480	Numerous vertical cracks in concrete bond beam above windows. Cracks appear wider at the bottom, most likely due to minor sagging and possibly shrinkage.	1	S
825	1481	Vertical crack below window. ~0.7mm wide at sill varying to hairline ~1m down. Likely due to heaving or settlement. A large tree is located nearby.	1	R
826	1482	Vertical crack at corner of concrete retaining wall indicating some minor rotational movement of east facing wall. This is to be expected for a wall of this age.	-	-
827	1483	Concrete path on southern side indicates ~60mm of vertical settlement. Large tree is adjacent.	-	R
829	1485	Numerous vertical cracks in bond beam above windows. Cracks appear wider at the bottom, most likely due to minor sagging and possibly shrinkage.	1	S
830	1486	Numerous cracks in soil between school and water. Cracks are up to 60mm wide & 300mm deep. Most likely due to drying shrinkage.	-	-
831	1487			
833	1491	Localised vertical crack below window ~3mm wide. There appears to have been more diagonal cracks below that have since been repaired.	2	U
834	1492	Five ~0.5mm cracks through floor slab. Likely due to shrinkage & minor settlement.	1	R
835	1493			
836	1494	Concrete pavement on eastern side is generally in good condition. No signs of horizontal movement and only minor settlement.	-	-
876	1552 1553	Cracks in underside of first floor slab inside building adjacent to library. Cracks in the slab have been repaired and don't appear to have reopened.	-	S

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
876	1554 1555	There are also cracks in the wall supporting the slab mentioned above. A vertical section of the wall appears to have been cut and removed to the right of the door. The wall now appear to be cantilevering over the doorway which would explain the presence of the cracks. This may have also caused the damage in the supported slab above.	2	S
876	1551	Other side of the wall shows a crack in the plaster which corresponds to the seciton of wall that has been removed. This supports the theory above.	2	S

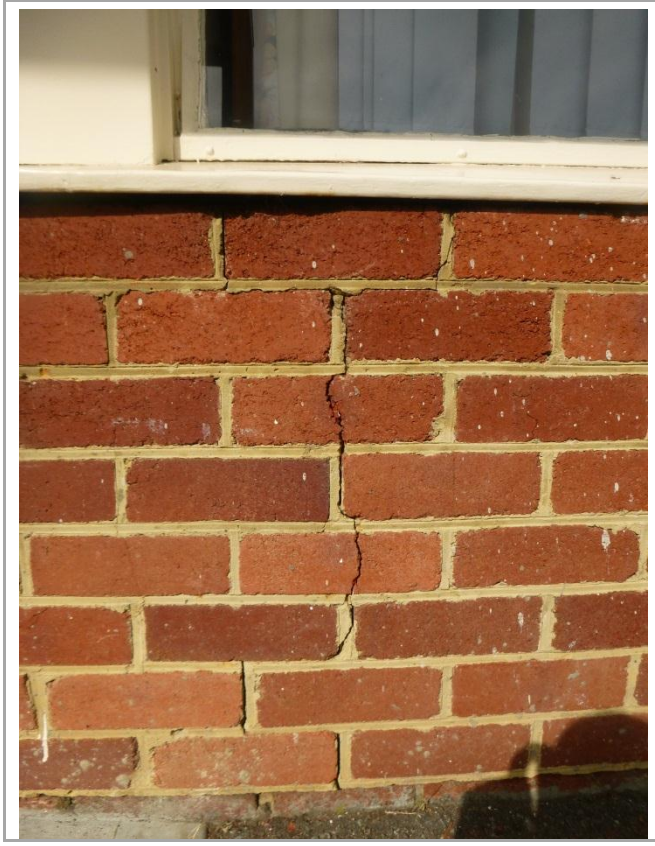
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 814 - Photo 1469	Reference 815 – Photo 1470
Reference 816 – Photo 1670	**Reference 816 – Photo 1471**
	

Reference 816 – Photo 1671

Reference 817 – Photo 1472

Reference 817 – Photo 1672

Reference 818 – Photo 1473

Reference 819 – Photo 1474	Reference 820 – Photo 1475
Reference 821 – Photo 1476	Reference 822 – Photo 1477

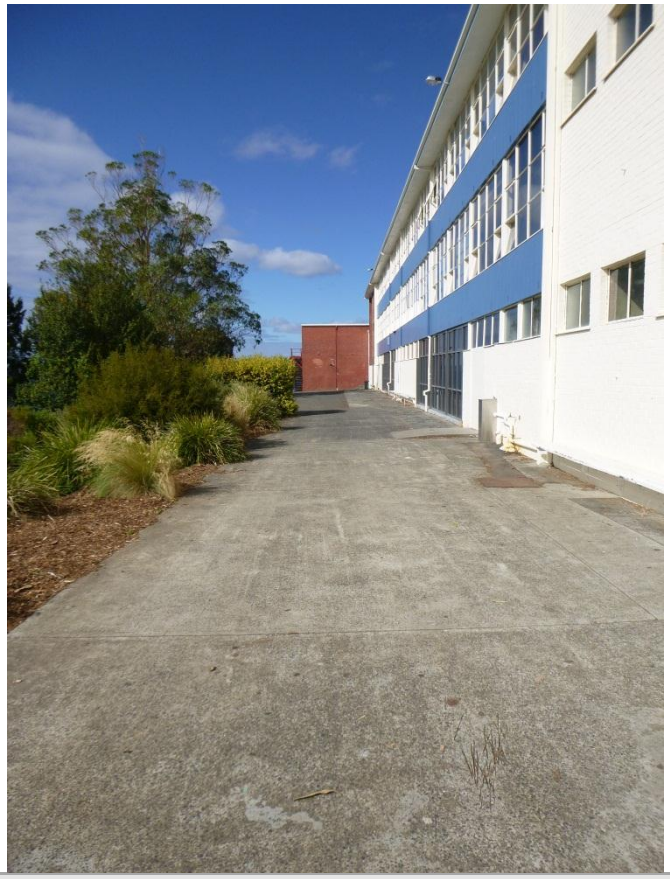
Reference 823 – Photo 1478	Reference 823 – Photo 1479
Reference 824 – Photo 1480	Reference 825 – Photo 1481

Reference 826 – Photo 1482	Reference 827 – Photo 1483
Reference 828 – Photo 1484	Reference 829 – Photo 1485

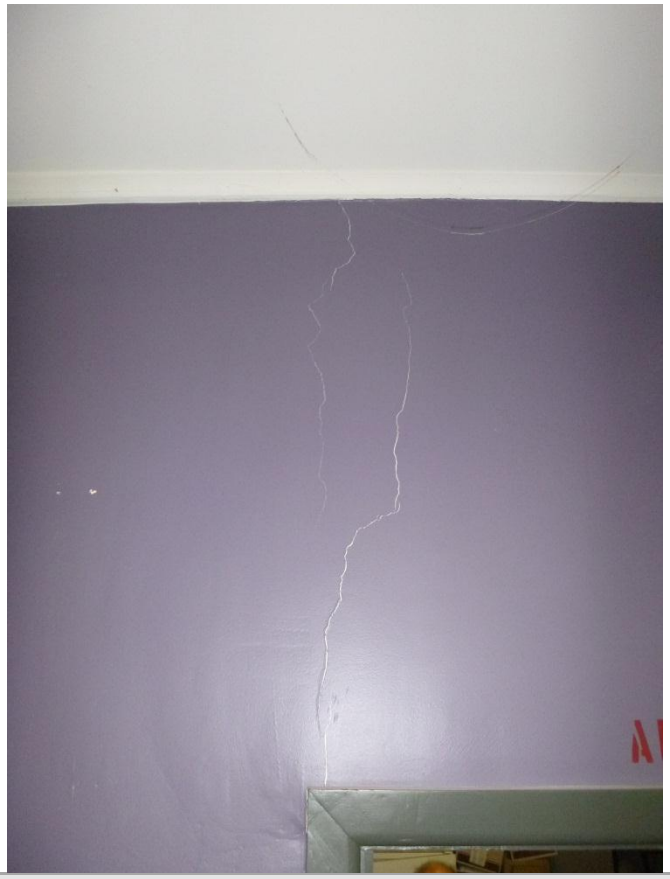
Reference 830 – Photo 1486	Reference 831 – Photo 1487
Reference 832 – Photo 1488	Reference 832 – Photo 1489

Reference 832 – Photo 1490	Reference 833 – Photo 1491
Reference 834 – Photo 1492	Reference 835 – Photo 1493

Reference 836 – Photo 1494

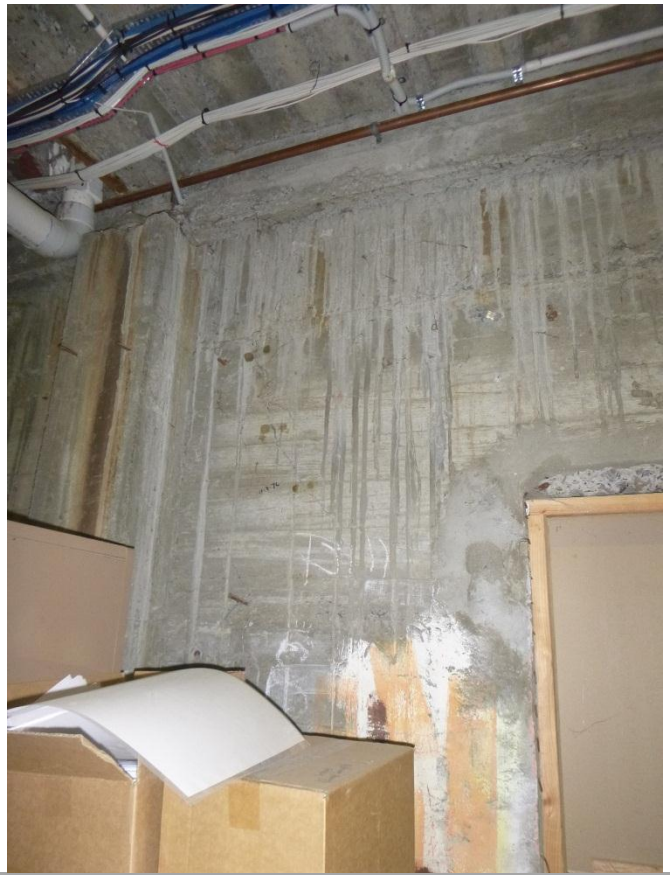


Reference 876 – Photo 1551



Reference 876 – Photo 1552

Reference 876 – Photo 1553

Reference 876 – Photo 1554	Reference 876 – Photo 1555
	

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1. Property Details

1.1 Inspection Details

Address:	B Block, Taroona High School
Inspection Time and Date:	10:30am, 1 March 2013.

1.2 Property Details

Building:	Double Brick
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	O – Other (see description of item)

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona High School - B Block

Figure 84

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
839	1497	Small diagonal crack below window. ~0.5mm uniform width.	1	U
840	1498	~30mm of settlement in gutter. Can see through gap that concrete path has been undermined.	-	O
841	1499 1500	Five ~0.5mm cracks through floor slab. Likely due to shrinkage & minor settlement.	1	R
844	1503 1504 1505	Large crack in concrete retaining wall up to ~15mm wide at the top. Section of wall south of crack of appears to have rotated out slightly. The section of the wall that is exhibiting the most movement is the higher section of wall which indicates that the wall in this area may have been underdesigned or overloaded. The crack is narrower at the ground indicating that differential settlement may also be a contributing factor. Crack in wall also corresponds to a crack in the adjoining concrete path at the base of the wall. There appears to be a small amount of horizontal movement.	3	O
845	1506 1507	Smaller crack in concrete retaining wall up to ~8mm wide at the top and narrower at the bottom. Crack in wall also corresponds to a crack in the adjoining concrete path at the base of the wall. Again, appearst to be settlement and possible shrinkage.	3	O
846	1508	Vertical crack between brickwork wall and glazing wall. Difficult to tell which wall has moved.	2	U

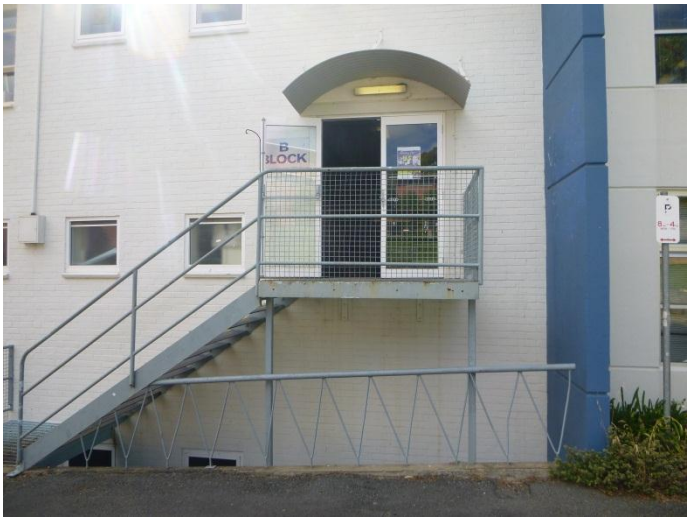
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 837 - Photo 1495	Reference 838 – Photo 1496
	
Reference 839 – Photo 1497	**Reference 840 – Photo 1498**

Reference 841 – Photo 1499	Reference 841 – Photo 1500
Reference 842 – Photo 1501	Reference 843 – Photo 1502

Reference 844 – Photo 1503	Reference 844 – Photo 1504
Reference 844 – Photo 1505	Reference 845 – Photo 1506

Reference 845 – Photo 1507	Reference 846 – Photo 1508

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1. Property Details

1.1 Inspection Details

Address:	C Block, Taroona High School
Inspection Time and Date:	1:40pm, 25 February 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Tile
Degree of articulation:	Poor
Slope of terrain:	Moderate
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

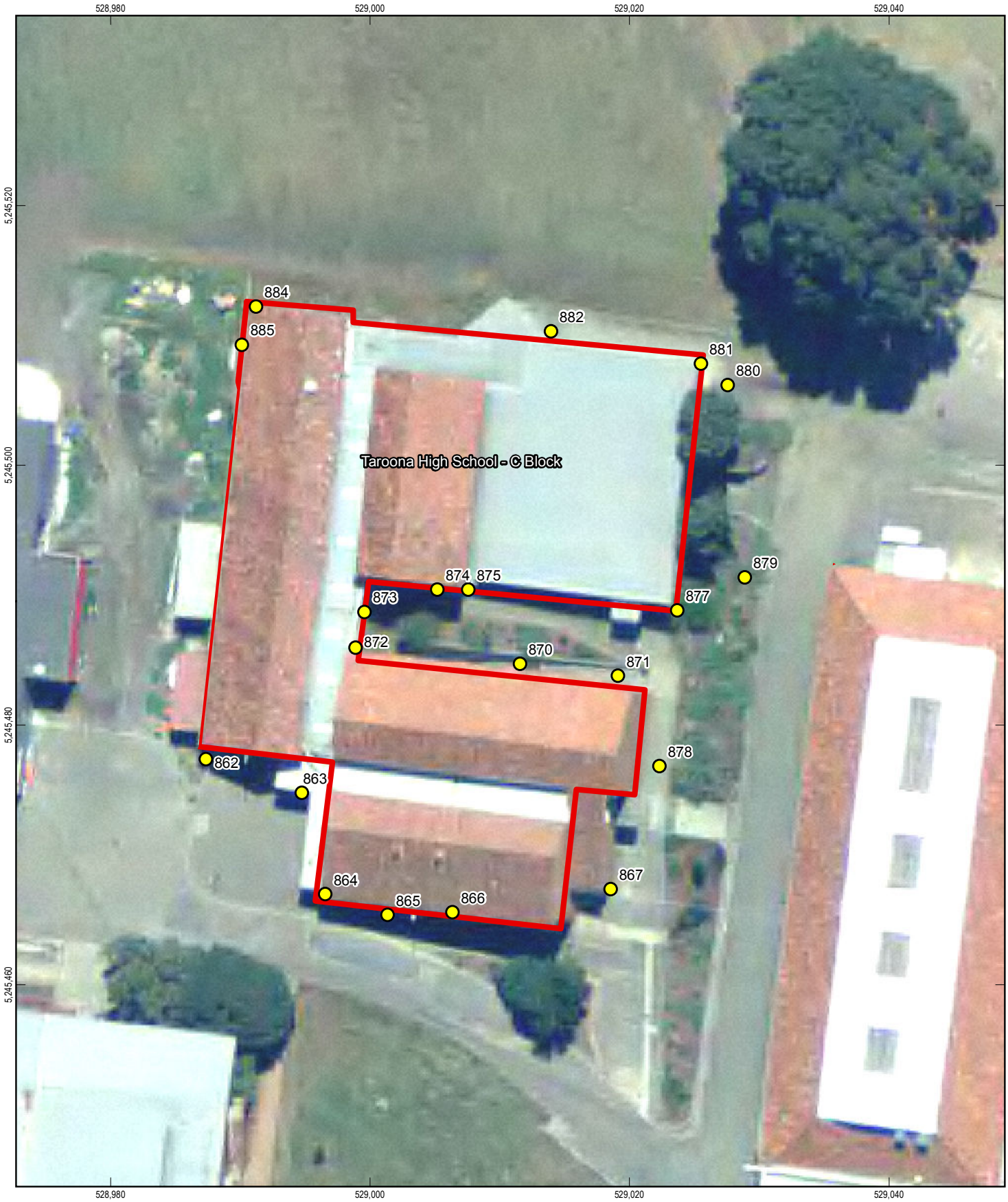
3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
3 Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues



LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
Taroona High School - C Block

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 85

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
862	1528 1529	Cracks around bottom of wall at south western corner ~1mm wide.	1	U
863	1530 1531	Diagonal crack above door lintel ~6mm wide vertical cracks, hairline horizontals. Also gap between door frame and brick wall ~6mm wide at top varying to hairline ~1.5mm down.	2	R
863	1532	Horizontal crack near bottom of wall extending up diagonally near corner. Bricks at corner appear to have settled.	2	R
864	1533 1534	Vertical crack near corner straight through multiple bricks. ~0.5mm at top & hairline ~1.5m down. Around corner is a small diagonal crack near base of wall. Appears to be caused by settlement.	1	R
865	1535	Diagonal crack below window ~2mm vertical cracks, ~3mm horizontals. Bricks to the right of the crack appear to house dropped ~3mm.	2	R
865	1536	Diagonal crack below the crack mentioned above. ~3mm vertical cracks, hairline horizontals. Horizontal crack extends to the adjacent window which shows the bricks below the crack have moved ~7mm to the right (west) in relation to those above. Bricks may have been pushed by minor rotation of the attached retaining wall.	2	O
865	1537	Minor diagonal crack between windows. Brick in the vacinity appear to have been repaied in the past.	1	U
866	1539	Minor vertical crack in middle of wall below vent.	1	U
867	1540 1541	Minor vertical cracks near corner. ~0.5mm wide at bottom passing around corner and varying to hairline ~1.5m up.	1	R
870	1545 1546	Vertical crack in concrete retaining wall ~1.5m wide. Crack corresponds to a crack in the attached concrete paths. There doesn't appear to be any differential movement either side of the crack. Could potentially be due to shrinkage	1	S
871	1547	Smaller vertical crack in concrete retaining wall ~1.5m wide. Crack corresponds to a crack in the attached concrete paths. There doesn't appear to be any differential movement either side of the crack. Could potentially be due to shrinkage	1	S
872	1548	Horizontal crack below window sill ~7mm wide. This is typical for window sill of this type.	3	S
872	1549	Gap between original and newer brickwork. Newer brickworks appears to have moved ~10mm to the north.	3	R
873	1550	Horizontal crack right of door ~3mm wide at right, tapering to to hairline ~1m away. Possible caused by settlement of concrete stairs attached to lower brickwork.	2	R
874	1556	Corner of concrete pavement near stairs appears to have settled and has since been partially repaired.	-	-
875	1557	Gap between sections of building brickwork ~2mm wide at top, hairline at bottom. Likely due to rotation caused by settlement of eastern wall.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
877	1558	Evidence of settlement and horizontal movement of concrete path. Supporting soil is an unsupported soil embankment which is likely moving due to down hill creep and causing the issues.	-	O
878	1559			
879	1560	Diagonal crack at top of corner of building. Unable to get close enough to measure or assess.	-	U
880	1561 1562 1563 1564	Path near north eastern corner appears to have settled ~100mm. Handrail has damaged brickwork where it is attached to the wall.	1	R
881	1565	Vertical crack near north eastern corner, ~2mm wide at bottom, moving around corner and tapering to hairline ~1.5m up. Potentially due to brick growth as building is poorly articulated.	2	S
882	1566 1567	Concrete stairs on north side appear to have settled and caused gaps to open up between it and the wall.	-	R
883	1569 1570	Various cracks in soil up to 50mm wide and 200mm deep. Likely due to drying and shrinkage of the soil.	-	-
884	1571		-	-
884	1572	Diagonal crack above window ~10mm wide vertical cracks, hairline horizontals. Bricks above crack appear to have moved horizontally west (out of plane). Likely due to settlement.	3	R
885	1573	Vertical crack bottom left corner of window. Bricks left of crack appear to rotated clockwise when looking at plan view.	2	R

Legend:

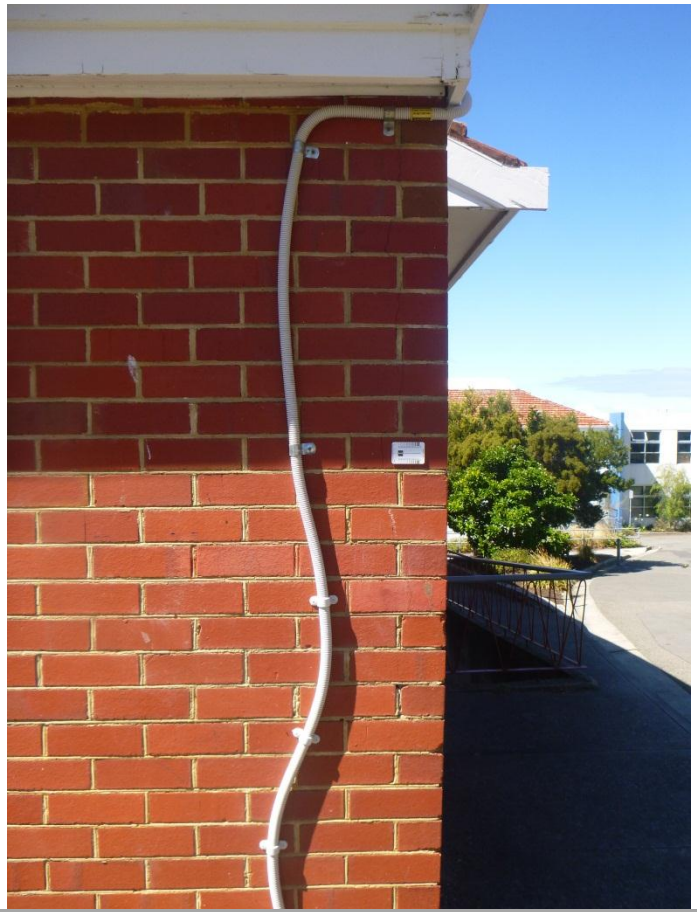
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 861 - Photo 1527	Reference 862 – Photo 1528
Reference 862 – Photo 1529	**Reference 863 – Photo 1530**

Reference 863 – Photo 1531	Reference 863 – Photo 1532
Reference 864 – Photo 1533	Reference 864 – Photo 1534
	

Reference 865 – Photo 1535

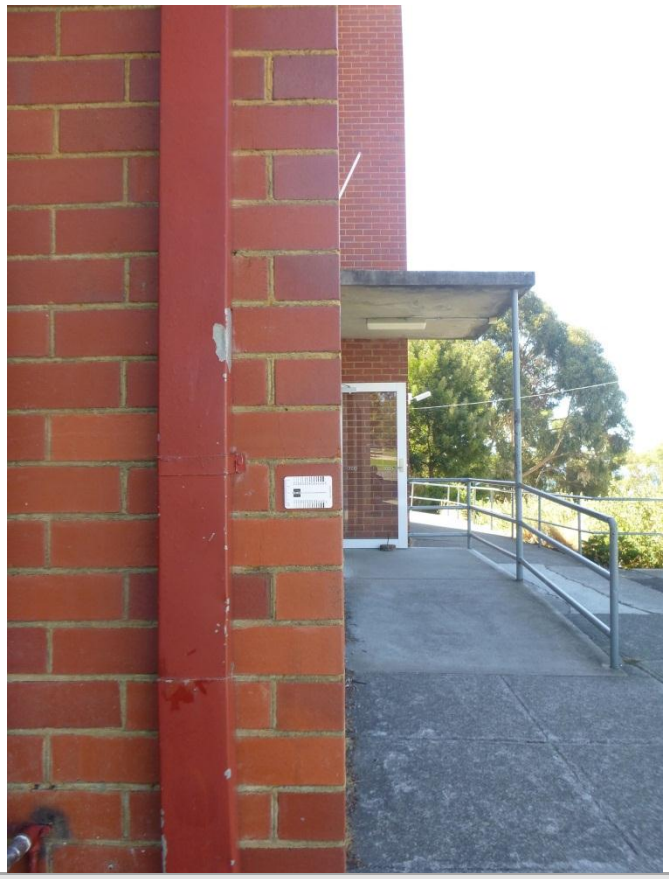
Reference 865 – Photo 1536

Reference 865 – Photo 1537

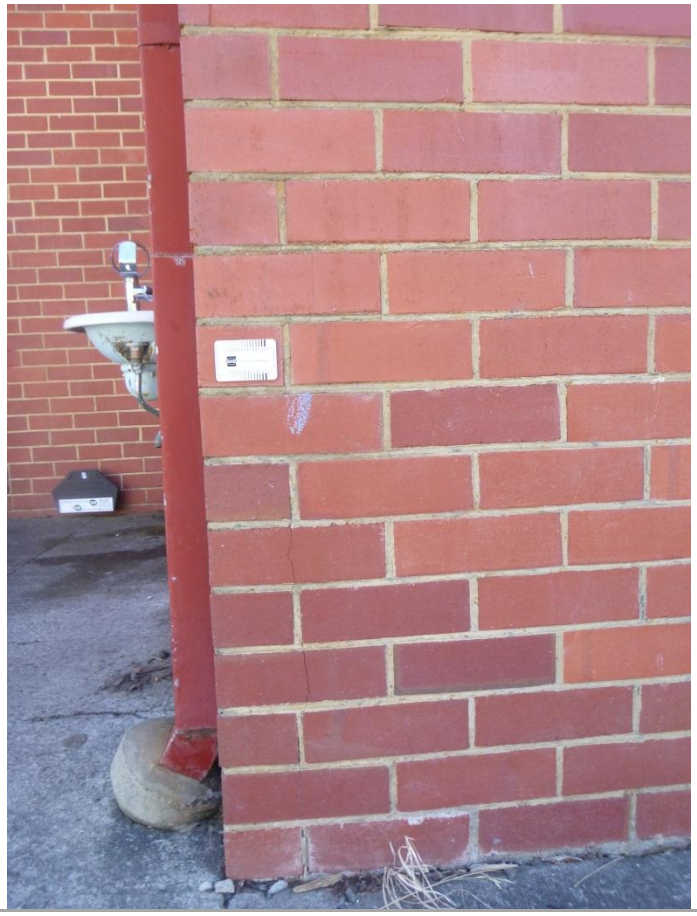
Reference 865 – Photo 1538

Reference 866 – Photo 1539

Reference 867 – Photo 1540

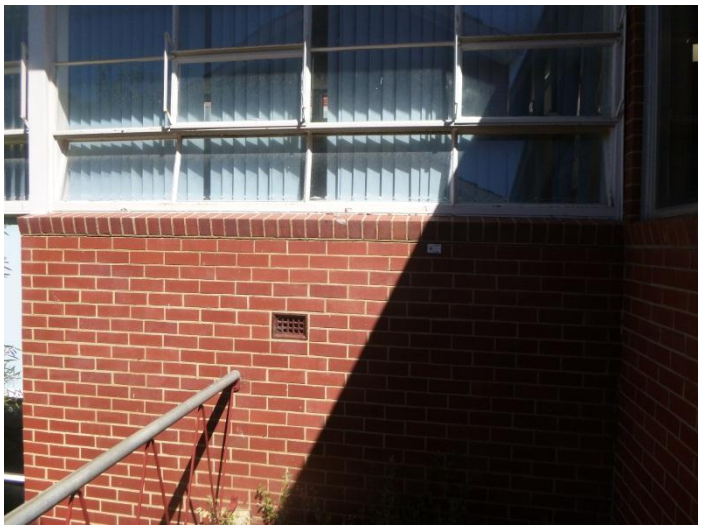
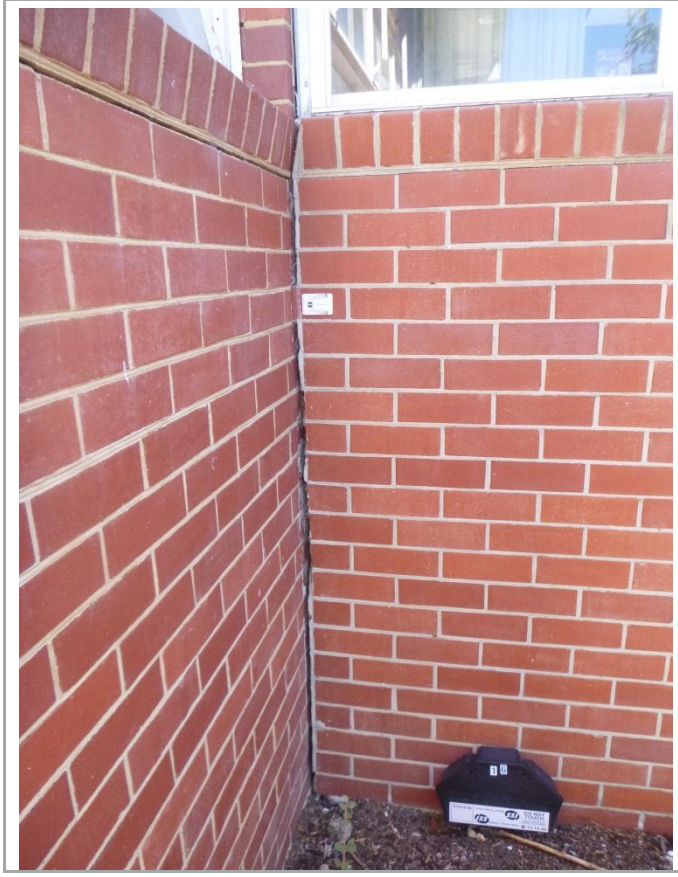


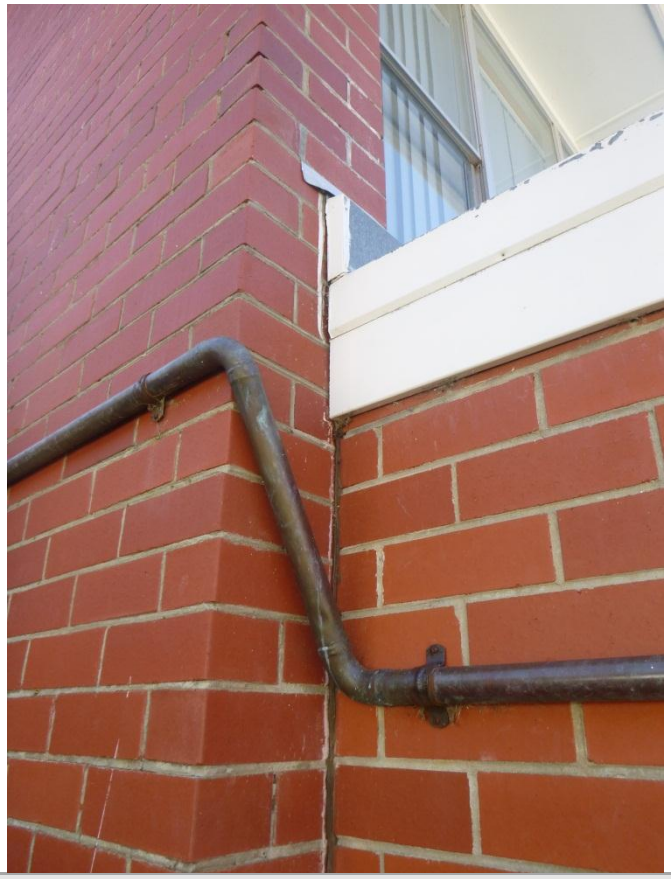
Reference 867 – Photo 1541

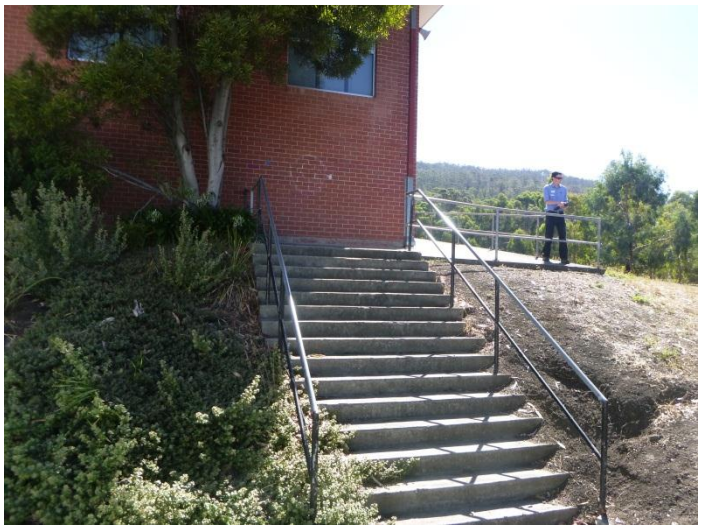


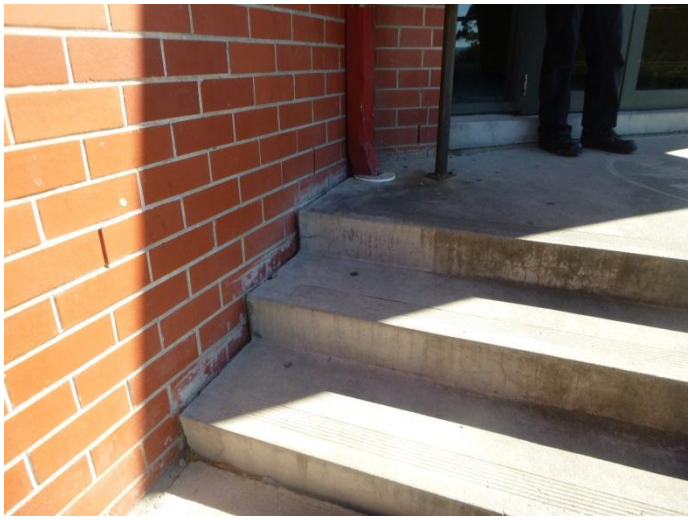
Reference 868 – Photo 1542

Reference 868 – Photo 1543	Reference 869 – Photo 1544
Reference 870 – Photo 1545	Reference 870 – Photo 1546

Reference 871 – Photo 1547	Reference 872 – Photo 1548
	
Reference 872 – Photo 1549	Reference 873 – Photo 1550
	

Reference 874 – Photo 1556	Reference 875 – Photo 1557
	
Reference 877 – Photo 1558	Reference 878 – Photo 1559

Reference 879 – Photo 1560	Reference 880 – Photo 1561
	
Reference 880 – Photo 1562	Reference 880 – Photo 1563

Reference 880 – Photo 1564	Reference 881 – Photo 1565
Reference 882 – Photo 1566	Reference 882 – Photo 1567
	

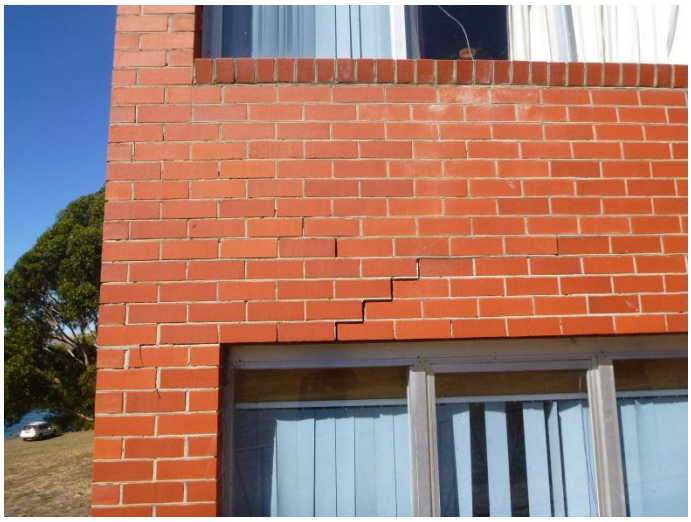
Reference 883 – Photo 1568

Reference 883 – Photo 1569

Reference 883 – Photo 1570

Reference 884 – Photo 1571

Reference 884 – Photo 1572



Reference 885 – Photo 1573

Reference 886 – Photo 1574

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1. Property Details

1.1 Inspection Details

Address:	Science Block, Taroona High School
Inspection Time and Date:	3:40pm, 1 March 2013.

1.2 Property Details

Building:	Various cladding, steel frame structure with blockwork subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Photo Locations:
Taroona High School - Science Block

Job Number	32-16698
Revision	0
Date	10 May 2013

Figure 86

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
887	1575	Building is relatively new and in good condition.	-	-
890	1578	Diagonal crack near corner of blockwork wall ~2mm wide at top tapering to hairline ~1m down. Most likely due to settlement of eastern blockwork wall.	2	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 887 - Photo 1575	Reference 888 – Photo 1576
Reference 889 – Photo 1577	**Reference 890 – Photo 1578**

Reference 891 – Photo 1579	

6. Disclaimer

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1. Property Details

1.1 Inspection Details

Address:	Gym, Taroona High School
Inspection Time and Date:	4:10pm, 1 March 2013.

1.2 Property Details

Building:	Double brick
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	O – Other (see item description) S - Structural

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona High School - Gym

Figure 87

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
893	1581 1582	Vertical crack at south western corner of building. Crack is ~6mm wide at bottom, passes around corner and tapers to hairline ~1m up. An old bolt is still embedded in wall and appears to be bent. It looks as if there used to have been a handrail in this location that was subjected to some kind of impact which caused the cracks in the brickwork.	3	O
895	1584	Vertical crack in end of brick wall besides concrete stairs. Crack is ~4mm wide. Appears to be caused by settlement of stairs.	2	R
896	1585	Vertical crack below window ~1.5mm wide at top, hairline ~1.5 m down. Likely caused by same minor settlement or heaving.	2	R
897	1586 1587 1588	Vertical crack at north eastern corner ~1.5mm wide extending the full height of the wall. Crack swaps from face to force of comer. Most likely due to brick growth as building is poorly articulated. Only the outer lay of bricks are affected and this is the north facing wall.	2	S
897	1586	Diagonal crack extending from corner up to the right and then horizontally to door lintel. ~4mm wide vertical cracks, hairline horizontals. Near door lintel bricks above crack appear to have bulged out (to the north) in relation to those below. Seems to be a combination of both the wall above moving out and the wall below moving in.	2	R
898	1589 1590			
899	1591	Localised vertical crack to the left of door. ~1mm wide and 400mm high.	1	U
901	1593 1594	Vertical crack at north western corner ~6mm wide at the batons, swapping sides and tapering to hairline ~1m up. Potentiall due to brick growth.	3	S
902	1595	Diagonal crack in brickwork from corrugated steel sheet wall to corner of building. Vertical cracks ~3mm wide, horizontals ~1mm.	2	R
903	1596 1597	Crack extends around corner to edge of wall. This crack is vertical and is ~1mm wide at bottoms tapering to hairline ~1.2m up.		
904	1598	Crack also extends around to the eastern facing side of the wall and is vertical near the bottom before extending diagonally up. Vertical cracks are ~2mm wide, horizontal cracks are hairline.		

Legend:

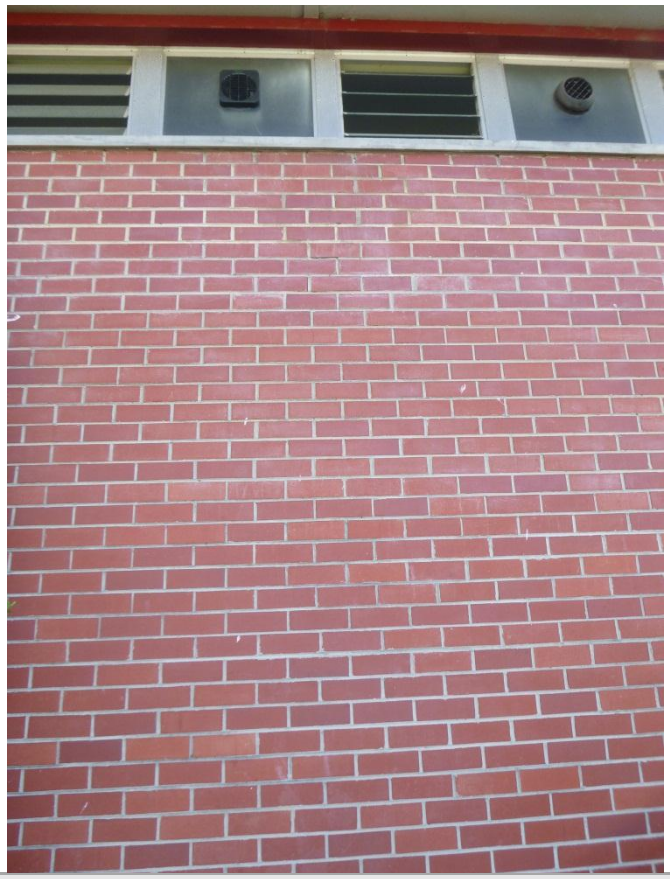
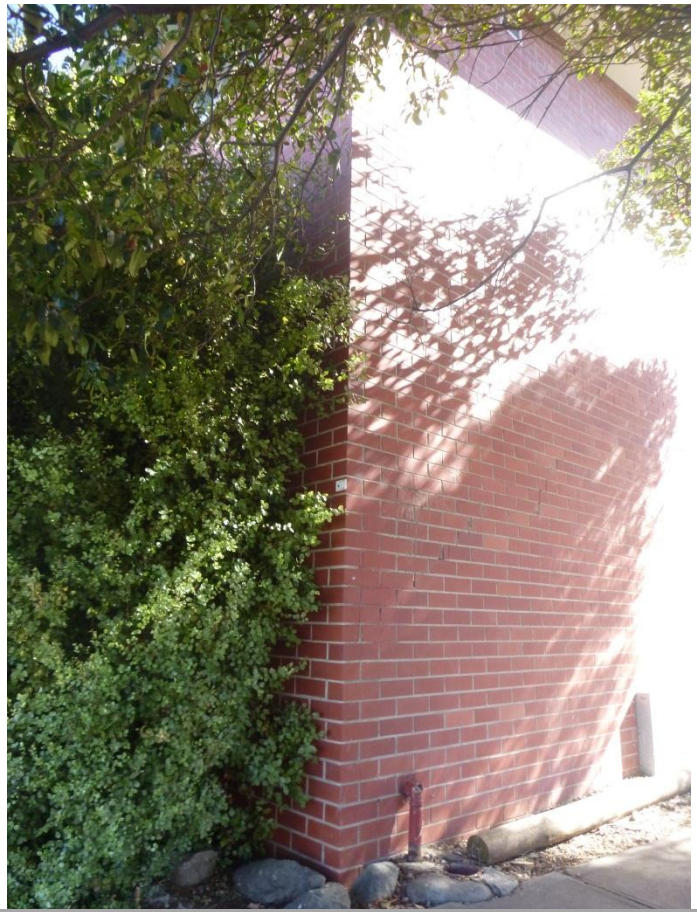
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

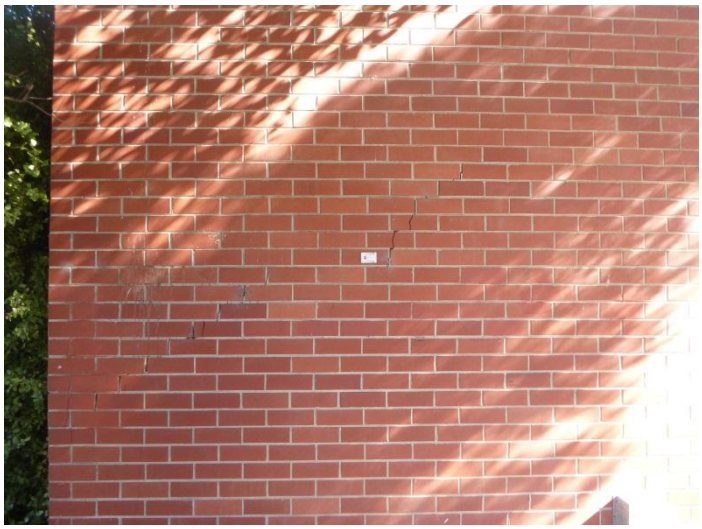
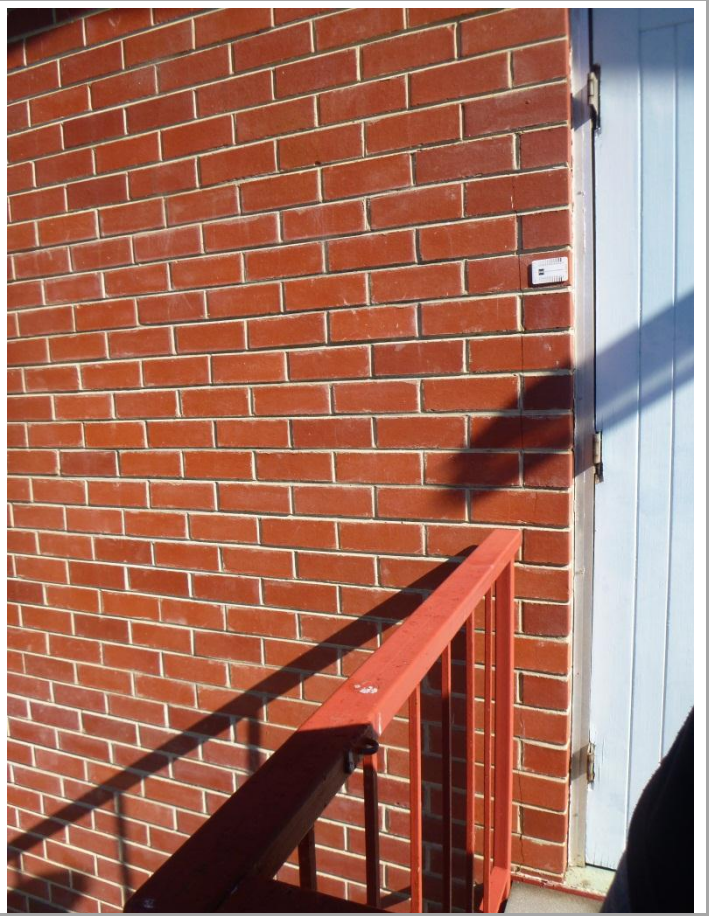
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 892 - Photo 1580	Reference 893 – Photo 1581
Reference 893 – Photo 1582	**Reference 894 – Photo 1583**

Reference 895 – Photo 1584	Reference 896 – Photo 1585
	
Reference 897 – Photo 1586	Reference 897 – Photo 1587
	

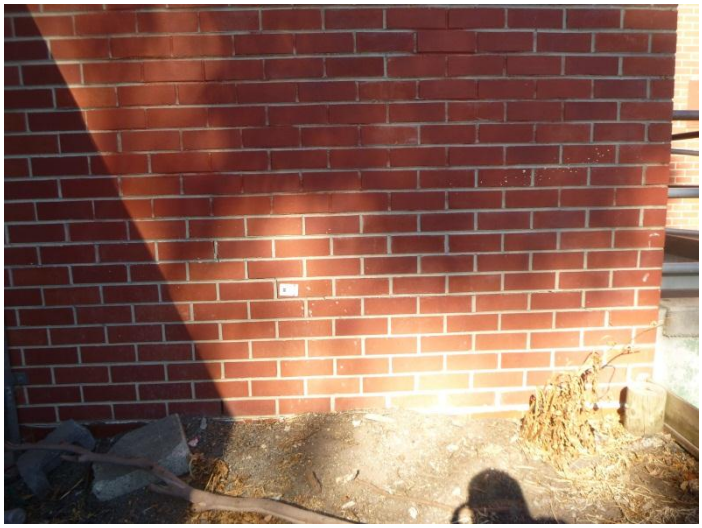
Reference 897 – Photo 1588	Reference 898 – Photo 1589
	
Reference 898 – Photo 1590	Reference 899 – Photo 1591
	

Reference 900 – Photo 1592

Reference 901 – Photo 1593

Reference 901 – Photo 1594

Reference 902 – Photo 1595



Reference 903 – Photo 1596	Reference 903 – Photo 1597
Reference 904 – Photo 1598	

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PART I – TAROONA PRIMARY SCHOOL

Contents

Property Address
Early Childhood Building, Taroona Primary School
Kindergarten, Taroona Primary School
GP Hall, Taroona Primary School
Admin/Music/Library Building, Taroona Primary School
Middle Block, Taroona Primary School
Terrapin 1, Taroona Primary School
Basketball Court, Taroona Primary School

1. Property Details

1.1 Inspection Details

Address:	Early Childhood, Taroona Primary School
Inspection Time and Date:	1:00pm, 8 March 2013.

1.2 Property Details

Building:	Corrugated sheeting clad steel frame
Number of levels:	Split Level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	25%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
-	No Observed Damage	N/A

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - Early Childhood

Figure 88

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
906	1600	Building appears to be relatively new and in good condition. No issues were identified.	-	-
907	1601			
908	1602			

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 906 - Photo 1600	Reference 907 – Photo 1601
Reference 908 – Photo 1602	

6. Disclaimer

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1. Property Details

1.1 Inspection Details

Address:	Kindergarten, Taroona Primary School
Inspection Time and Date:	1:15pm, 8 March 2013.

1.2 Property Details

Building:	Double Brick
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Moderate
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
3 Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - Kindergarten

Figure 90

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
910	1604	Control joint in south eastern corner. ~10mm wider at the top than the bottom. Southern wall appears to have rotated out slightly.	3	R
911	1605	Minor crack above door lintel ~2mm wide and has been painted over. Crack does not appear to have reopened.	2	U
912	1606 1608	Two minor cracks in concrete slab. May be caused by minor settlement.	1	R
912	1607	Edge of concrete breaking out slightly where handrail stanchions were cast in. Appears to be caused by rusting and spalling of handrail stanchion.	3	S
914	1610			
915	1611	Cracks in concrete supporting embankment. Appears to be due to settlement.	-	R
916	1612	Gap in control joint of uniform width. May be caused by deterioration and shrinkage of sealant rather than movement of brickwork.	2	S

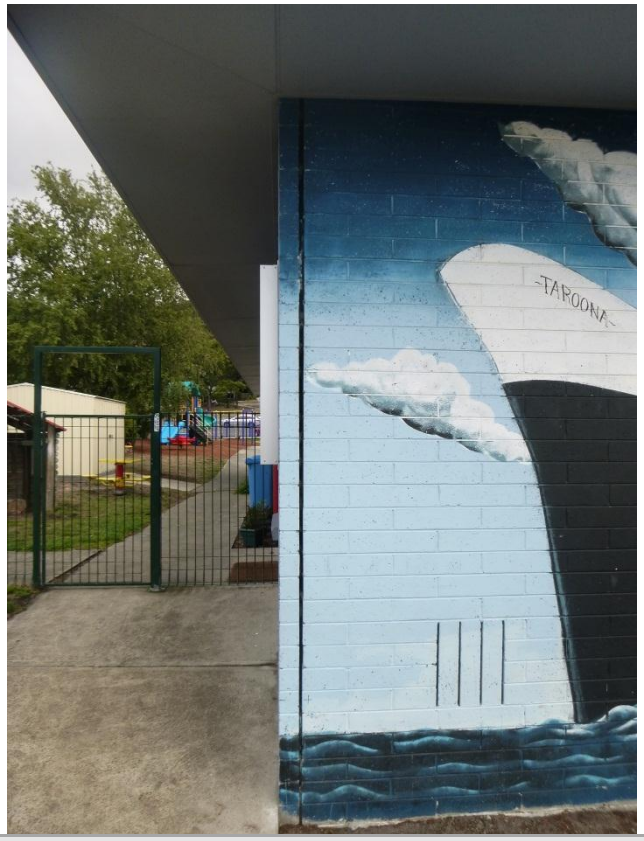
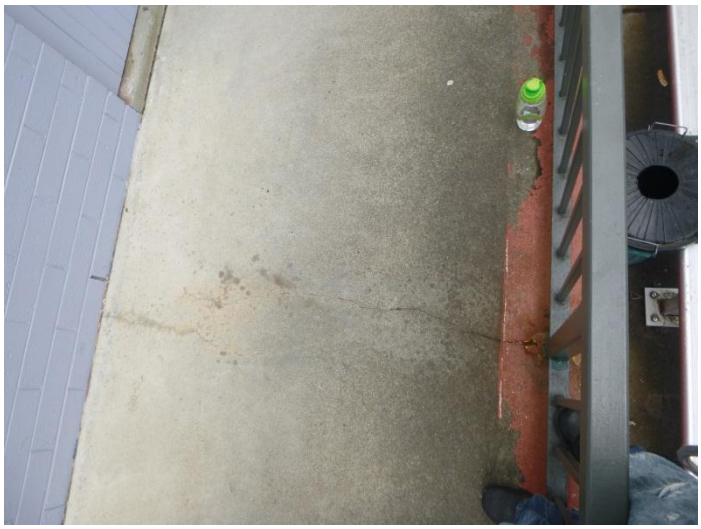
Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

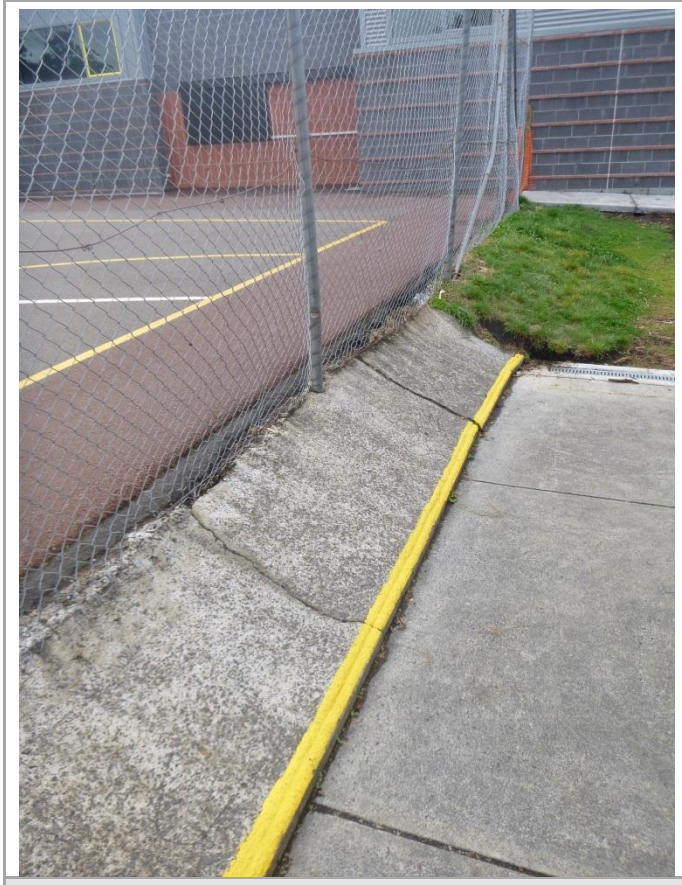
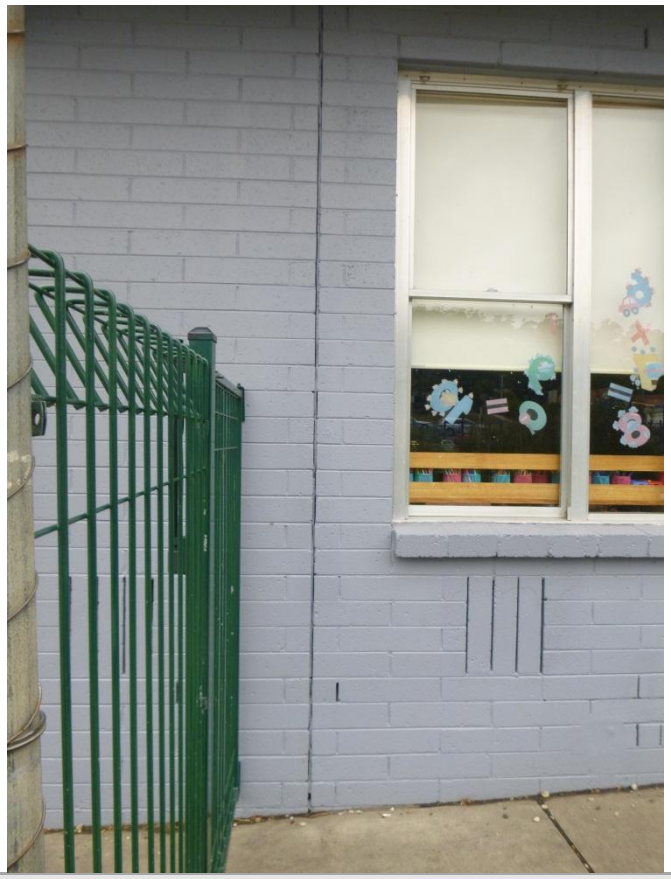
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 909 - Photo 1603	Reference 910 – Photo 1604
	
Reference 911 – Photo 1605	**Reference 912 – Photo 1606**
	

Reference 912 – Photo 1607	Reference 912 – Photo 1608
Reference 913 – Photo 1609	Reference 914 – Photo 1610

Reference 915 – Photo 1611	Reference 916 – Photo 1612
	
Reference 917 – Photo 1613	Reference 918 – Photo 1614

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1. Property Details

1.1 Inspection Details

Address:	GP Hall, Taroona Primary School
Inspection Time and Date:	1:40pm, 8 March 2013.

1.2 Property Details

Building:	Blockwork
Number of levels:	Double storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

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Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - GP Hall

Figure 91

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
920	1616 1617	Diagonal crack out south western corner of building. Crack is diagonal and up to ~1.5mm wide on southern face. Crack on western face is ~0.5mm wide and runs vertically top to bottom of blockwork wall ~150mm from edge.	2	R
922	1619	Two vertical cracks in red blockwork below window ~1.5mm wide. Bricks between cracks are loose and can be easily moved by hand. Blocks are not interlocking which has formed planes of weakness between the bricks. Cracks may have formed by som very minor settlement or heaving.	2	R
923	1620 1621	Hairline crack bottom left of window. Has been repointed in the past. Crack continues down to ground where crack has not been repaired. Crack is ~3mm wide. Difficult to tell due to repairs but orientation of crack indicates it may have been caused by settlement.	3	R
923	1622	Crack in top right corner of window pane. Doesn't appear to be caused by an impact. There may be some movement of the frame.	-	U
924	1623	Diagonal crack bottom right of window ~0.5mm wide.	1	U
925	1624 1625	Diagonal crack below window ~3mm wide at top, narrowing near the bottom. Evidence of a crack to the right that has been repointed.	2	R
925	1626	Diagonal crack left of door. Has been repointed but is now hairline.	1	R
925	1626	Hairline diagonal crack behind handrails.	1	R
927	1628	Diagonal crack ~1mm wide propagating from a penetration for steel fin plate connections.	1	S
928	1629	Various hairline cracks in western wall.	1	U
929	1630			

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

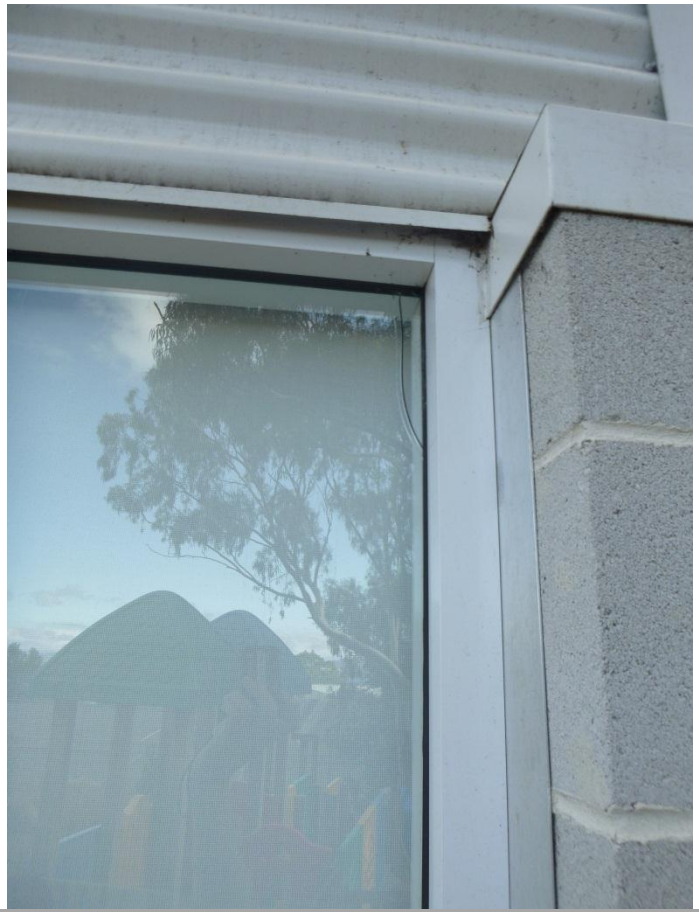
Reference 919 - Photo 1615	Reference 920 – Photo 1616
Reference 920 – Photo 1617	**Reference 921 – Photo 1618**

Reference 922 – Photo 1619

Reference 923 – Photo 1620

Reference 923 – Photo 1621

Reference 923 – Photo 1622

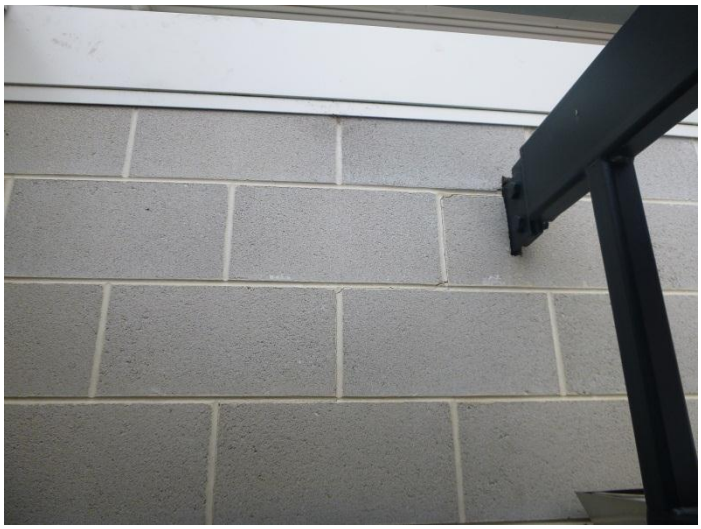


Reference 924– Photo 1623

Reference 925 – Photo 1624

Reference 925 – Photo 1625

Reference 925 – Photo 1626

Reference 926 – Photo 1627	Reference 927 – Photo 1628
	
Reference 928 – Photo 1629	Reference 929 – Photo 1630

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1. Property Details

1.1 Inspection Details

Address:	Admin/Music/Library Building, Taroona Primary School
Inspection Time and Date:	2:20pm, 8 March 2013.

1.2 Property Details

Building:	Brick veneer and weatherboard with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	Poor and N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	All sides of building

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
2	Slight	R – Reactive Foundations U - Undetermined

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number	32-16698
Revision	0
Date	10 May 2013

Photo Locations:
Taroona Primary School - Admin/Music/Library

Figure 92

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
931	1632 1633	Cracks top and bottom of north eastern corner. Bricks have pushed weatherboards out ~4mm.	2	R
932	1634 1635	Various cracks in render. Difficult to assess size or cause of cracks.	2	U

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 905 - Photo 1599	Reference 930 – Photo 1631
Reference 931 – Photo 1632	Reference 931 – Photo 1633

Reference 932 – Photo 1634	Reference 932 – Photo 1635
Reference 933 – Photo 1636	Reference 934 – Photo 1637

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1. Property Details

1.1 Inspection Details

Address:	Middle Block, Taroona Primary School
Inspection Time and Date:	2:45pm, 8 March 2013.

1.2 Property Details

Building:	Corrugated sheeting and weatherboard with brick subfloor
Number of levels:	Split level
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	Moderate
Site Drainage:	Poor
Pavement surrounds:	50%

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
4	Severe	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - Middle Block

Figure 93

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
937	1640	Diagonal crack at south eastern corner. ~1mm wide. Appeats to indicate heaving of corner or settlement of eastern wall.	1	R
938	1641	Diagonal crack in bricksubfloor wall below vent. ~1.5mm wide at top, hairline ~1m below and to the right.	2	R
939	1642 1643	Gap between brick wall and concrete wall. Gap is ~4mm wide at bottom and ~30mm at top. Vertical gap between weatherboards ~5mm wide. Footings for northern concrete columns may have settled causing the observed rotation.	4	R
940	1644 1645	Stair brickwork has moved away from building. Gap is ~25mm wide at top & ~20mm wide at bottom. Footing has also moved. Concrete slab & stairs appear to be tied to main wall & have not moved.	4	R
942	1647	Concrete pavement has settlemed leaving a gap ~40mm between it and the building.	-	R

Legend:

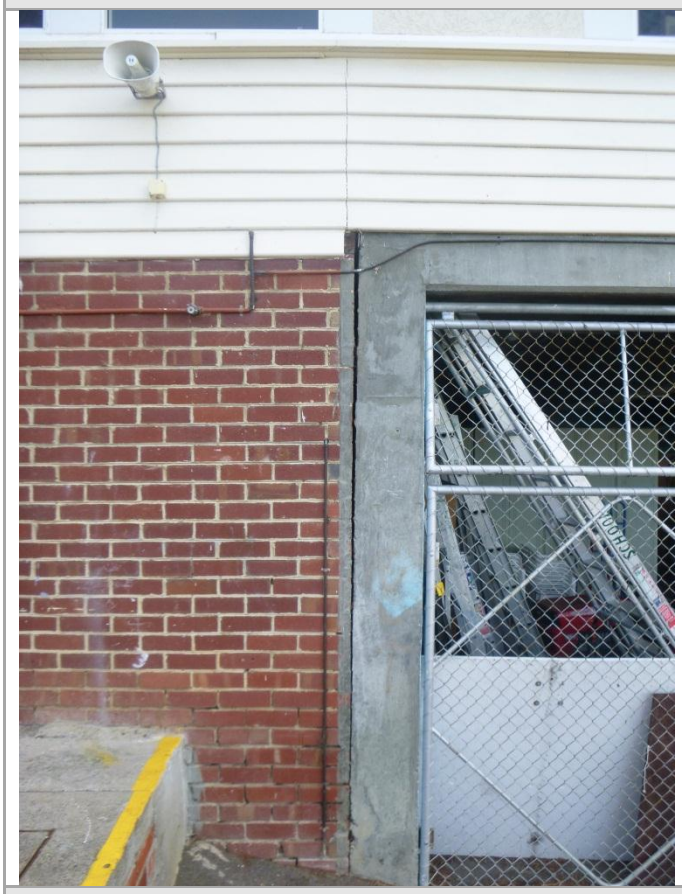
Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

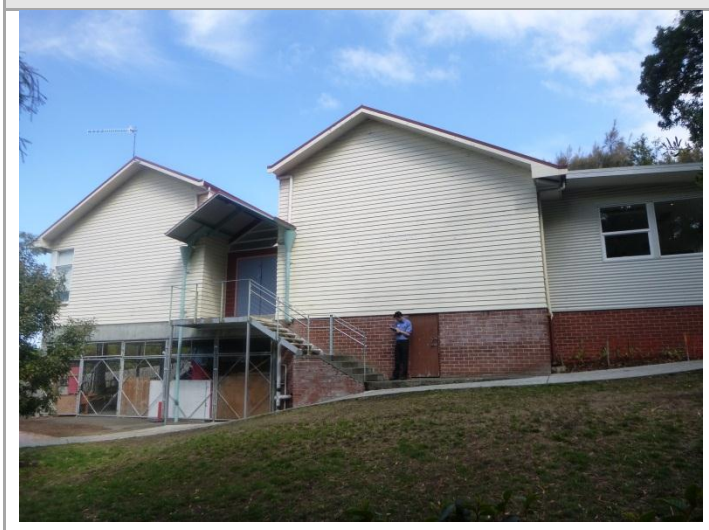
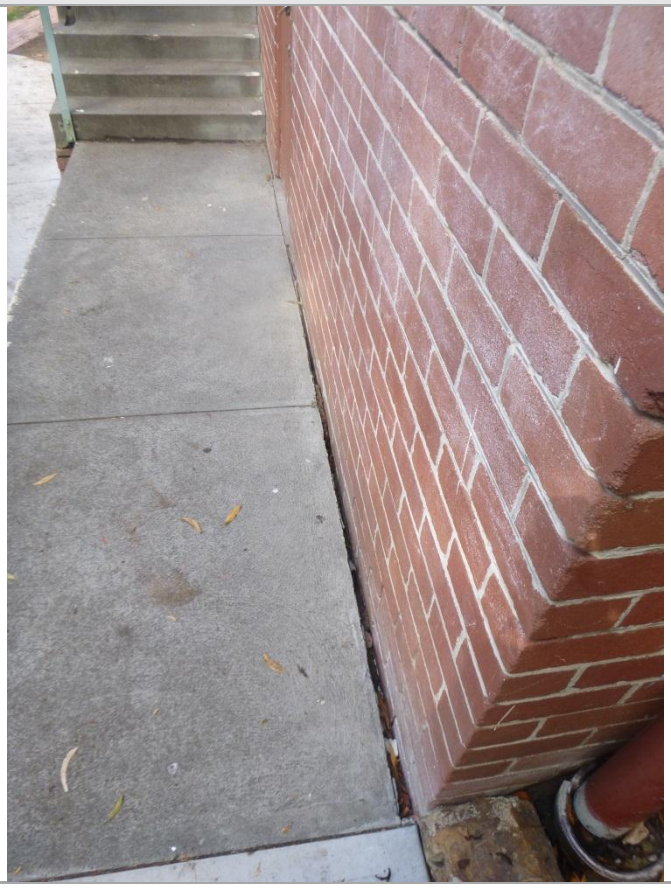
Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 935 - Photo 1638	Reference 936 – Photo1639
Reference 937 – Photo 1640	**Reference 938 – Photo 1641**

Reference 939 – Photo1642	Reference 939 – Photo 1643
	
Reference 940 – Photo 1644	Reference 940 – Photo 1645

Reference 941 - Photo	Reference 942 - Photo
	

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1. Property Details

1.1 Inspection Details

Address:	Terrapin 1, Taroona Primary School
Inspection Time and Date:	3:15pm, 8 March 2013.

1.2 Property Details

Building:	Fibre board cladding with brick subfloor
Number of levels:	Single storey
Footing type:	Strips and pads
Roof type:	Corrugated sheeting
Degree of articulation:	N/A
Slope of terrain:	Flat
Amount of vegetation:	Low
Site Drainage:	Poor
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

An area of land in the vicinity of the Taroona Primary and High Schools has a history of hillside creep. The Taroona Landslide Risk Assessment and Mitigation Project is a joint initiative between the Kingborough Council, Mineral Resources Tasmania and the State Emergency Service with funding from the Federal Government. GHD has been engaged by Kingborough Council to complete external inspections of a number of damaged buildings in the area and attempt to attribute the cause of the distress in these buildings.

2.2 Scope of Assessment

This external condition assessment survey has been undertaken to ascertain the indicative condition of the house. The survey covers only a visual assessment of the exterior of the building and any other accessible areas of the property. It does not represent a full comprehensive structural assessment or detailed condition survey.

Issues highlighted in this report provide a general impression of the condition at the time of the survey and the observations may differ during other times of the year or under differing weather conditions.

3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category		Probable cause(s)
3	Moderate	R – Reactive Foundations

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - Terrapin 1

Figure 94

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LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
944	1649	Vertical crack in brick subfloor wall ~2mm wide below vent. Possibly cause by settlement of wall.	2	R
945	1650	Vertical crack in brick subfloor wall adjacent to pipe. ~2mm wide at bottom, hairline at top. Appears to be settlement.	2	R
947	1652	Down pipe near north eastern corner is not vertical. Bottom of pipe may have moved horizontally away from wall, however may also have been constructed this way.	-	-
949	1654	2 diagonal cracks in northern sub floor wall each ~8mm wide at top,~1mm at the bottom. Indicates potential settlement of centre of wall.	3	R
950	1655			
951	1656	Diagonal crack in western subfloor wall, ~0.8mm wide.	1	R

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

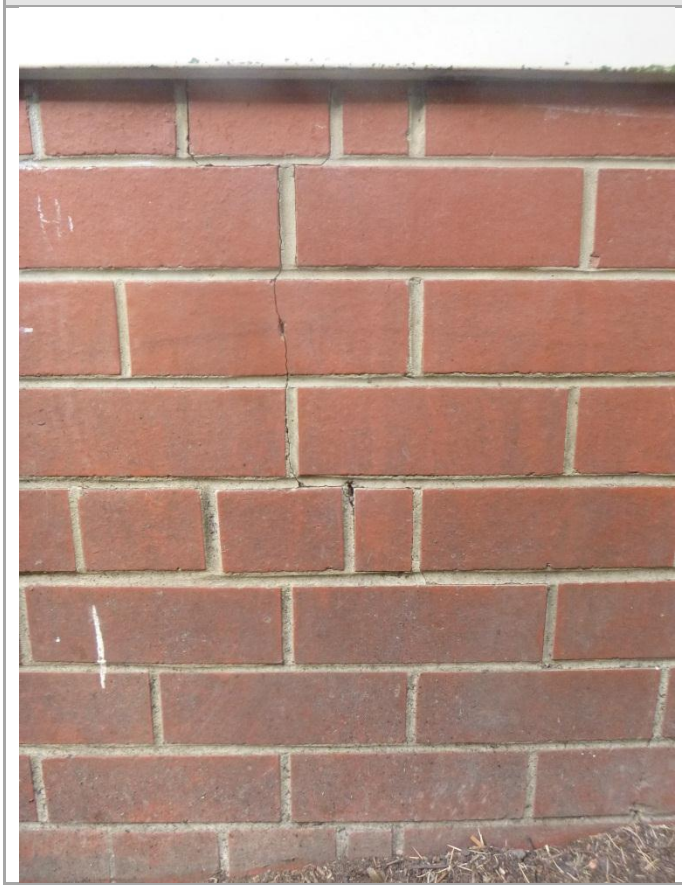
Reference 943 - Photo 1648	Reference 944 – Photo 1649
Reference 945 – Photo 1650	**Reference 946 – Photo 1651**

Reference 947 – Photo 1652

Reference 948 – Photo 1653

Reference 949 – Photo 1654

Reference 950 – Photo 1655

Reference 951 – Photo 1656	Reference 952 – Photo 1657
	

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1. Property Details

1.1 Inspection Details

Address:	Basketball Court, Taroona Primary School
Inspection Time and Date:	3:30pm, 8 March 2013.

1.2 Property Details

Building:	N/A
Number of levels:	N/A
Footing type:	N/A
Roof type:	N/A
Degree of articulation:	N/A
Slope of terrain:	Moderate
Amount of vegetation:	High
Site Drainage:	Moderate
Pavement surrounds:	None

2. Project Details and Scope

2.1 Background

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2.2 Scope of Assessment

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3. Findings

Observed property damage was documented and is presented in the following sections of this report. Each identified issue was assigned a damage category in accordance with table C1 and C2 of AS2870-2011 “Residential Slabs and Footings” and a probable cause was estimated.

The overall damage rating for the property is shown below which is based on the worst observed damage item. An indication of the probable cause of damage is also provided.

Overall property damage category	Probable cause(s)
- Rating not applicable	O – Other (see item description)

4. Site Plan and List of Identified Issues

LEGEND

- Field Survey Photo Location (Reference Number)
- Surveyed Building/Property Boundary

Paper Size A4

0 2.5 5 10

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Kingborough Council
Taroona Landslide Risk Assessment Stages 2 & 3

Job Number 32-16698
Revision 0
Date 10 May 2013

Photo Locations:
Taroona Primary School - Basketball Court

Figure 89

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Data source: KCC, Cadastre, 2012; MRT, Aerial Imagery, 2013; GHD, Locations, 2013. Created by: jtoregan, updated by jpulford

LIST OF IDENTIFIED ISSUES

Ref No.	Photo No.	Description	Damage Category	Probable Cause
953	1658 1659 1660 1661	Various cracks in basketball court asphalt at north western corner up to 30mm wide. Adjacent to the area of the court with the cracks is a large unsupported embankment down to the oval. Cracks in asphalt are orientated perpendicular to the downhill direction of the embankment. At the time of the inspection surface of the embankment was moist topsoil. Downhill creep is the most likely cause of cracks in asphalt.	-	O
954	1662			
955	1663			
956	1664	No observed cracks in asphalt at north eastern corner. The embankment supporting the court at this location has been reinforced with asphalt. This may be why the asphalt at this end of the court has not cracked.	-	-
956	1665	Cracks in soil at top of embankment upsupported part of embankment on the eastern side. Likely tension cracks due to downhill creep.	-	O

Legend:

Damage Category: 0 - Negligable, 1 - Very Slight, 2 - Slight, 3 - Moderate, 4 - Severe
Probable Cause: R - Reactive foundations, L - Landslide, S - Structural, O - Other (see description), U - Undetermined

Notes:

1. Damage Categories were assigned in accordance with tables C1 and C2 of AS2870. Note 1 of Table C1 was applied when determining damage to timber clad structures. Damage ratings have only been assigned to items identified as building damage. No ratings were assigned to damage to ancillary items such as footpaths, minor retaining walls etc.
2. The Probable Causes assigned carry a large degree of uncertainty and are only a best estimate based on information collected on site.

5. Photographs

Reference 953 - Photo 1658	Reference 953 – Photo 1659
Reference 953 – Photo 1660	**Reference 953 – Photo 1661**

Reference 954 – Photo 1662	Reference 955 – Photo 1663
Reference 956 – Photo 1664	Reference 956 – Photo 1665

6. Disclaimer

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Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendix F - Proposed Locations for New Inclinometer, Vibrating Wire Piezometer and Permanent Survey Monuments

DRAFT

Revised Ground Control Points for Landslide Monitoring

Author: Colin Mazengarb

Date: 6/06/2013

Legend

Proposed new GCPs

Existing GCPs

Integrity

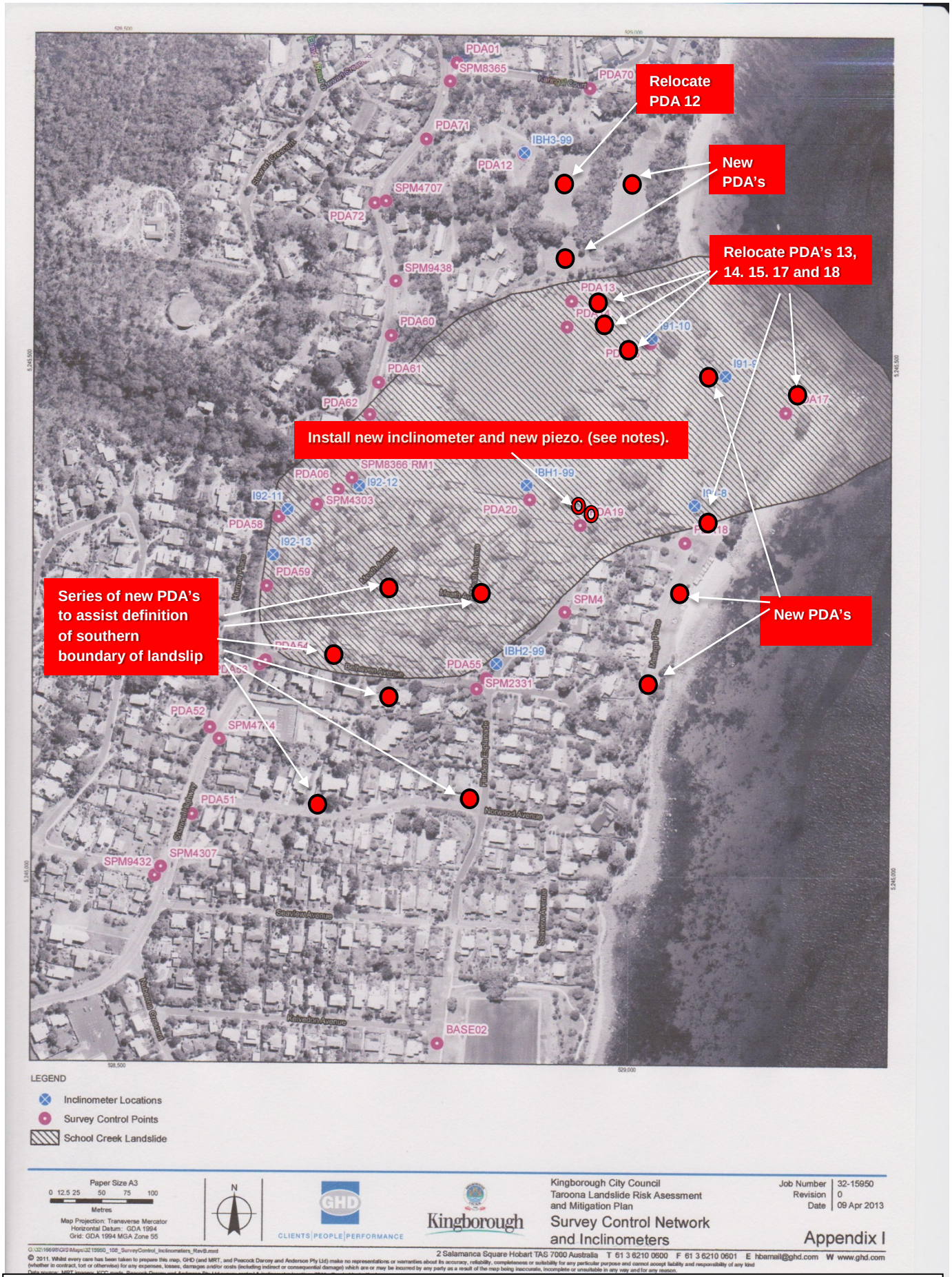
High spec. GCP

Medium (steel bars, etc)

Low (rivets, ramset nails, plaques, etc)

Landslide

Fill (to be avoided)



Proposed locations for the new permanent survey marks and installation of the new inclinometer and piezometer boreholes.

DRAFT

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Document Status

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		Name	Signature	Name	Signature	Date
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B	K McIntosh					4/6/2013