



SITE LOCATION

DRAWING LIST		
DRAWING NO. #	DRAWING NAME	REVISION NO. #
	COVER INDEX PAGE	
S01	EXISTING GROUND FLOOR LEVELS PLAN	1
S02	EXISTING ATTIC FLOOR LEVELS PLAN	1
S03	GROUND FLOOR RE-LEVELING PLAN	1
S04	ATTIC FLOOR RE-LEVELING PLAN	1
S10	RE-LEVELING DETAILS	1

ISSUED DATE :04-04-2025

Christchurch City Council



Page 1 of 38

BCN/2025/2438

Exemption from building consent

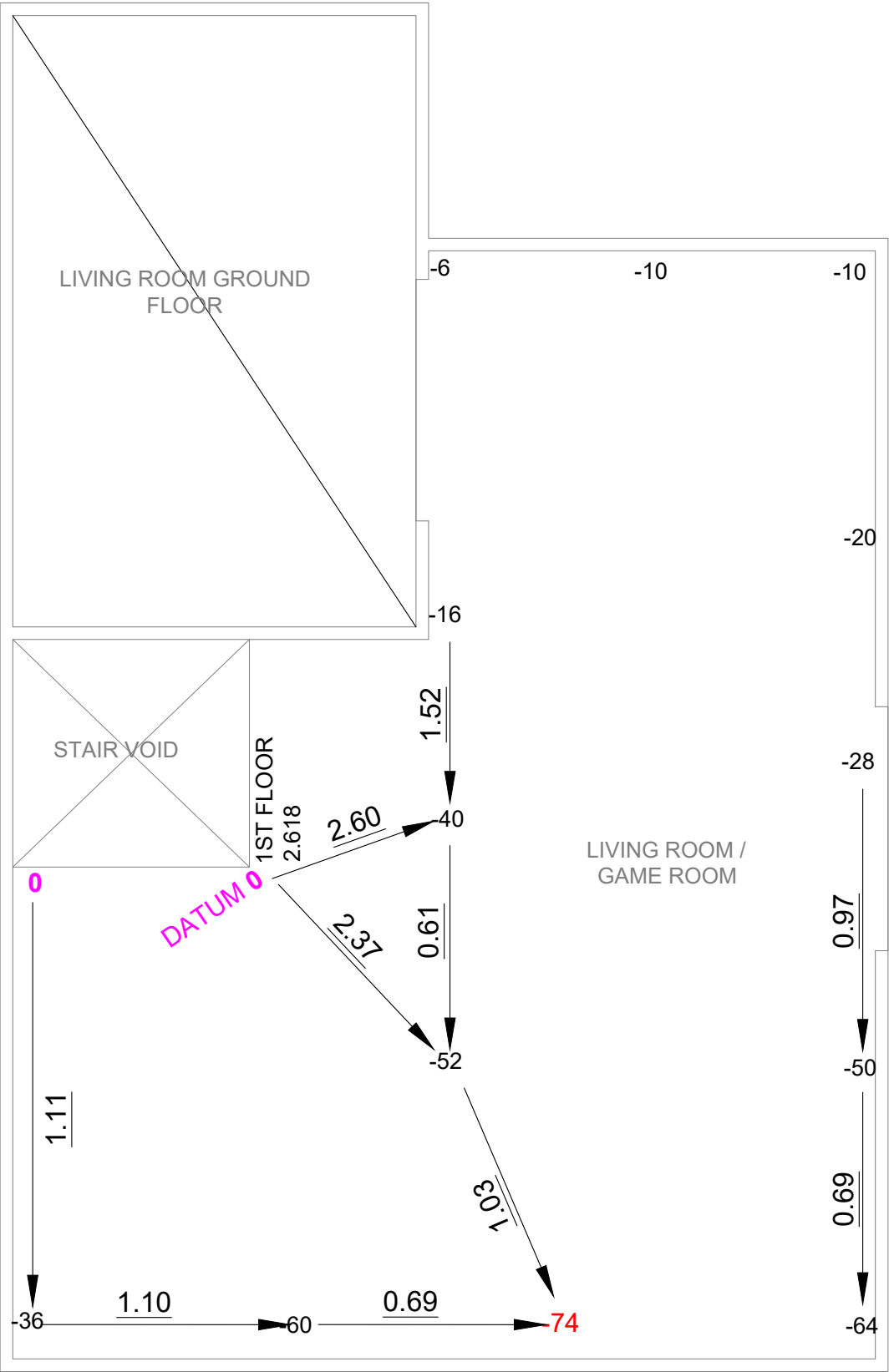
16/04/2025

Boorer, Jonathan

Notwithstanding any drawings or specifications accepted herein, all building work must comply with the New Zealand Building Code.

STRUCTURAL ASSESSMENT
49B INWOODS ROAD,
PARKLANDS,
CHRISTCHURCH
PROJECT NO. 1371-2502



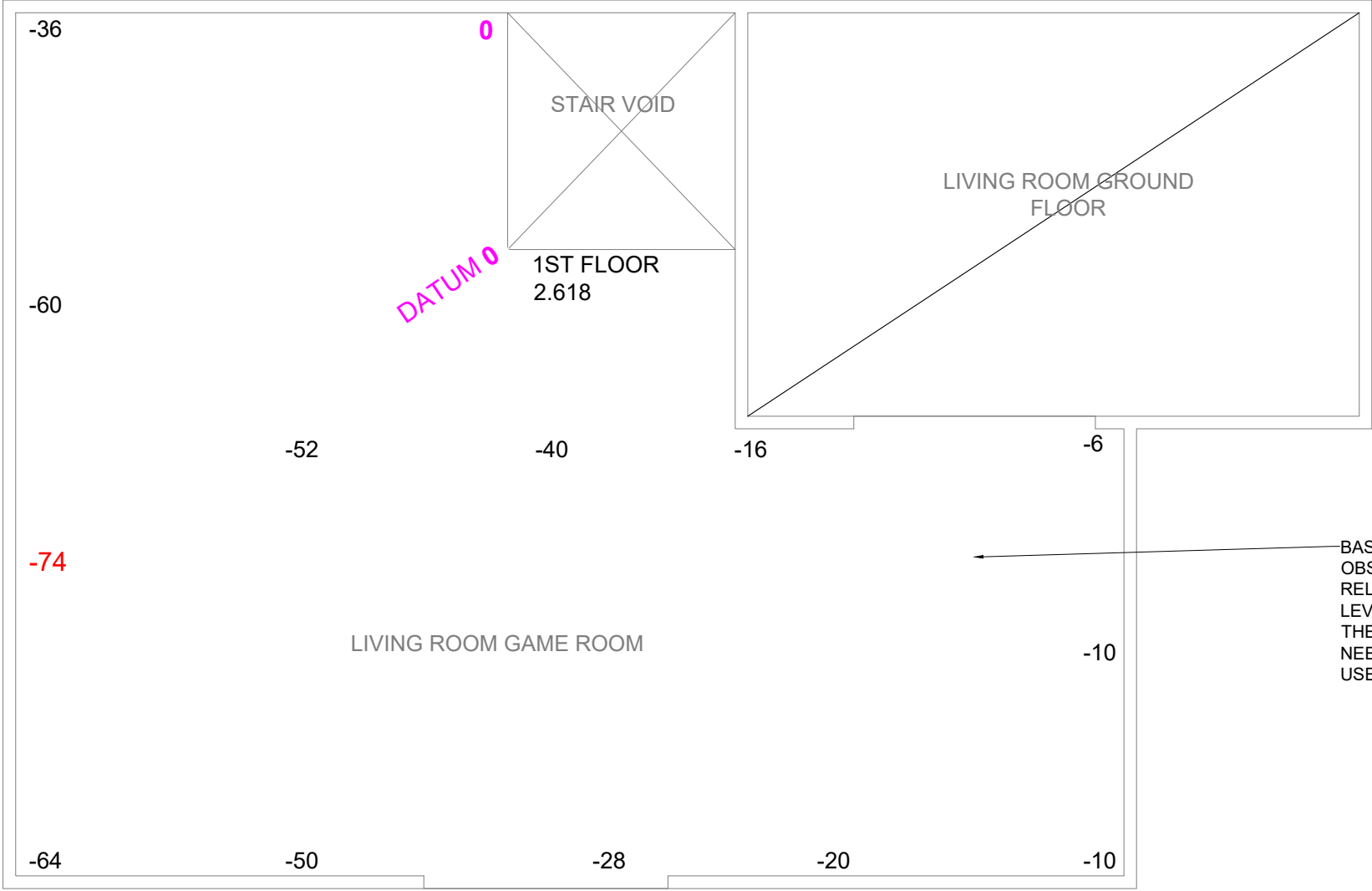


NOTES:

1. MEASUREMENTS LOCATION ARE APPROXIMATE & INDICATIVE ONLY
2. FLOOR PLAN LAYOUT IS INDICATIVE ONLY & NOT TO SCALE.
3. INSTRUMENT USED FOR MEASUREMENT HAS A RATED ACCURACY OF +/-3.0mm (ZIP LEVEL PRO 2000). OTHER SOURCES OF VARIATION TO THE MEASUREMENTS CAN INCLUDE CONSTRUCTION TOLERANCES, CARPET, WEAR & ATMOSPHERIC TEMPERATURE CHANGES.
4. ALL MEASUREMENTS HAVE BEEN ADJUSTED TO THE FLOOR COVERING TYPE AT THE DATUM.
5. FLOOR LEVELS DIFFERENCES BETWEEN HIGHEST & LOWEST POINT ARE AS FOLLOWS:
 - 74mm OVER THE DWELLING TIMBER FIRST FLOOR
6. THE FLOOR SLOPE EXCEEDED 1/200 TOLERANCE DENOTED WITH % SLOPE AND DIRECTION OF FALL
7. DO NOT SCALE FROM THIS DRAWING IN EITHER PAPER OR DIGITAL FORM. USE WRITTEN DIMENSIONS ONLY.

KEY:

- 6 - FLOOR LEVELS
- 530 - LEVEL AT WINDOW SILL
- 1986 - LEVEL AT DOOR FRAME HEAD
- 0 HIGHEST LEVEL ACROSS THE FLOOR
- 74 LOWEST LEVEL ACROSS THE FLOOR



RE-LEVELING NOTES:

1. MAXIMUM MEASURED FLOOR LEVEL DIFFERENCE POINT ARE AS FOLLOWS:
- 74mm OVER THE DWELLING TIMBER FIRST FLOOR
2. TARGET LEVEL : RE-LEVEL TO WITHIN 25 - 30mm OVERALL, AND REMEDIATE ALL LOCAL SLOPES EXCEEDING 1:200
3. CONTRACTOR TO VERIFY THE LEVELS BEFORE RE-LEVELING
4. LOCATE & ENSURE SERVICES CAN ACCOMMODATE LIFT HEIGHTS, OR DETACH OR RELOCATE THESE BEFORE THE LIFT BEGINS.

LEGEND:

- 34 FLOOR LEVEL
- 0 HIGHEST LEVEL ACROSS THE FLOOR
- 74 LOWEST LEVEL ACROSS THE FLOOR

NOTES:

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OUR STRUCTURAL ASSESSMENT REPORT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK
4. THE AREAS AND AMOUNTS ARE INDICATIVE ONLY. BUILDER TO ENSURE THE BUILDING IS RE-LEVELED TO WITH TARGET TOLERANCES.



**CIVIL
STRUCTURAL
GEO**

SL Engineering Group Ltd
8/27 Tyne Street, Addington
www.slengineering.co.nz
admin@slengineering.co.nz | 03 261 6014

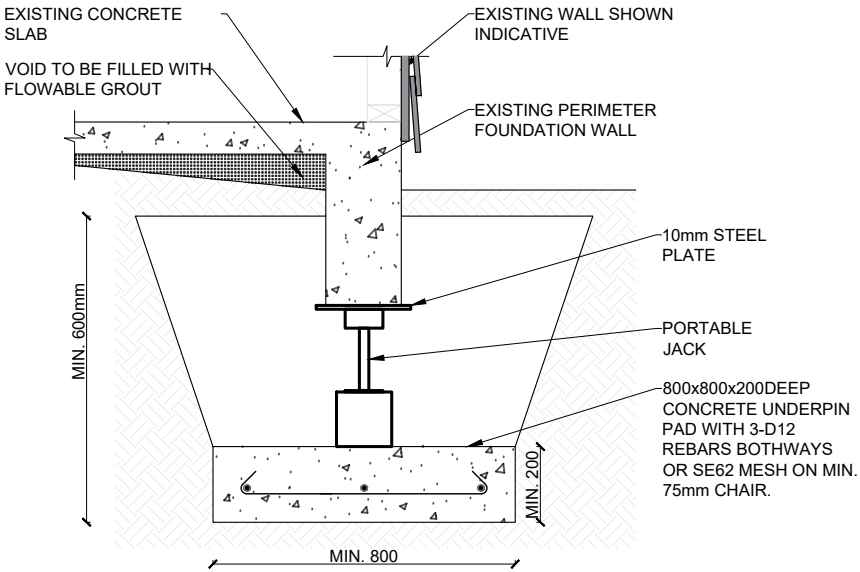
Project:	STRUCTURAL ASSESSMENT
Address:	49B INWOODS ROAD, PARKLANDS , CHRISTCHURCH.

Drawing Title:	ATTIC FLOOR RE-LEVELING PLAN
Client:	

1	BUILDING CONSENT ISSUE	04-04-2025
0	PRELIMINARY ISSUE	01-04-2025
Rev.	Remark/Comment	Date

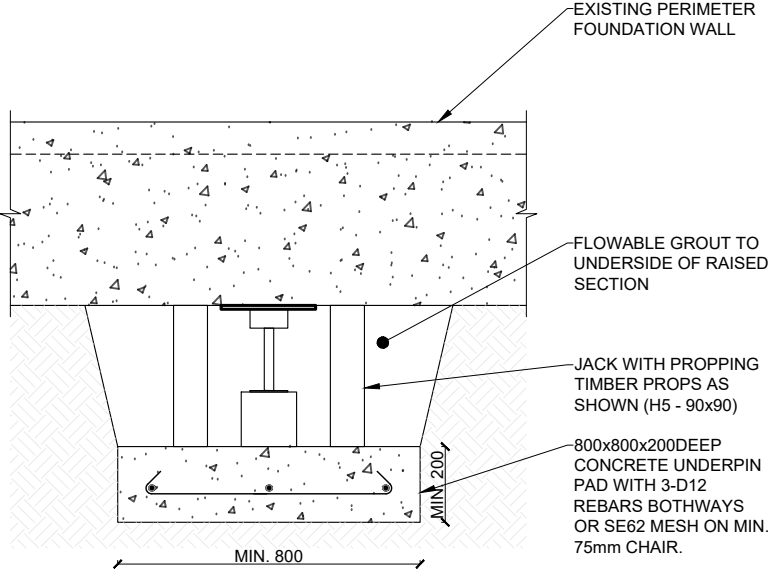
Job Ref:	1371-2502		
Design:	AS	Drawn:	KRISH
Approved:	AS	Scale:	1:100

Sheet:	S04
Original size:	A3



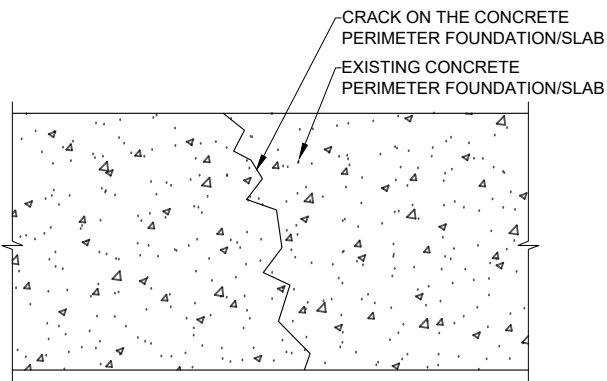
1
S02
N.T.S

JACKING PAD DETAIL FOR PERIMETER BEAM



2
S02
N.T.S

JACK DETAIL UNDER PERIMETER BEAM

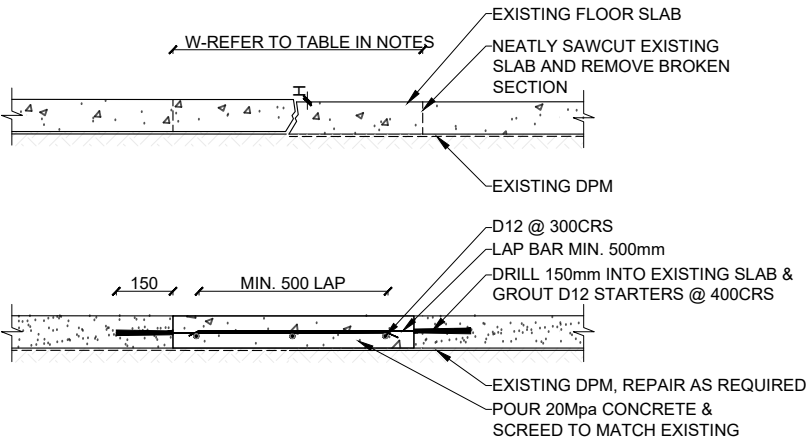


3
S10

CRACK IN CONCRETE FOUNDATION (INDICATIVE)

CRACK WIDTH	REPAIR METHOD	PRODUCT / MATERIAL
HAIRLINE TO 0.2mm	NO REPAIR IS REQUIRED	SPECIFICATION
0.2mm - 5mm	LOW VISCOSITY EPOXY RESIN INJECTION	SIKADUR-52 NORMAL OR SIMILAR APPROVED
5mm - 20mm	CEMENTITIOUS GROUT INJECTION	SIKADUR 31CF / SIKADUR-31+ OR SIMILAR APPROVED
>20mm OR WITH >2mm VERTICAL DISPLACEMENT OR OUT OF PLANE MOVEMENT	BREAKOUT AND REBUILD PERIMETER FOUNDATION / NEW SLAB	NOT APPLICABLE

- NOTE FOR CRACK REPAIR:
1. PREPARE ALL CONCRETE CRACK'S SURFACES CLEAN & FREE FROM LOOSELY ADHERING PARTICLES, OR CONTAMINANTS SUCH AS DIRT, OIL DUST, GREASE ETC.
 2. APPLICATION OF PRODUCTION TO INTERFACE SHALL BE DONE IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.
 3. CRACK INJECTION SHALL BE LEFT FOR 5-7DAYS TO FULLY CURE BEFORE FULL STRUCTURAL INTEGRITY IS ACHIEVED.
 4. CONTRACTOR TO CONFIRM CRACK REPAIR HAS BEEN COMPLETED IN ACCEPTABLE STANDARD AND PROVIDE PS3 FOR THE WORK COMPLETED

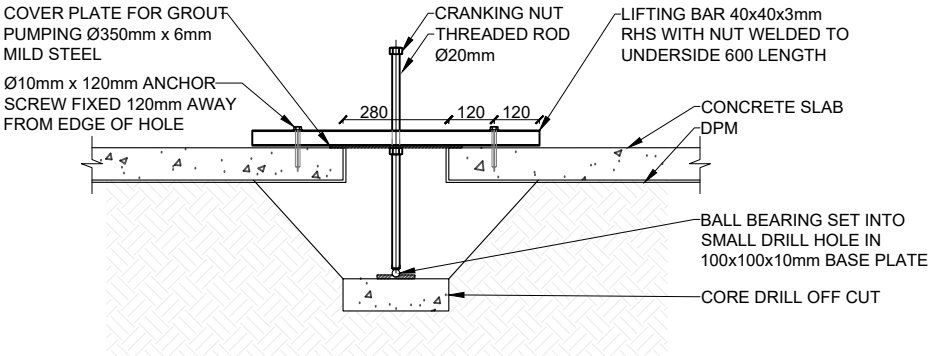


4
S02

CONCRETE SLAB REPAIR

- NOTE:
1. TAKE CARE TO MINIMIZE DAMAGE TO POLYSTYRENE INSULATION OR DPM UNDER SLAB WHEN CUTTING & REMOVING SECTION TO BE REPLACED.
 2. H<2mm GRIND DOWN HIGH SECTION & REPAIR ACCORDING TO CRACK REPAIR SPECIFICATION.

H (mm)	W (mm)
2-4mm	800
4-6mm	1200



5
S02
N.T.S

INTERNAL JACKING POINT



NOTE:
REFER TO SHEET C02 FOR
SEDIMENT CONTROL DETAILS

- CATCH DRAIN
- SEDIMENT
COLLECTION
TRENCH
- SEDIMENT FENCE

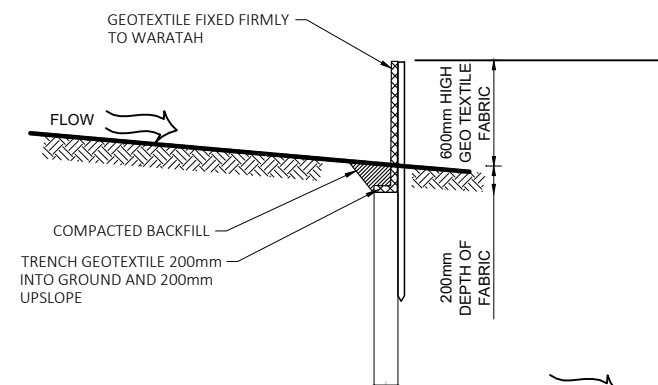
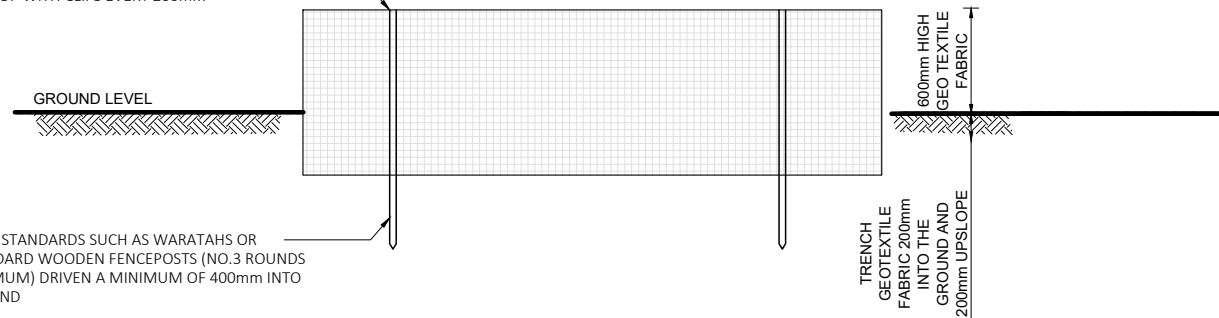
SL ENGINEERING CIVIL STRUCTURAL GEO SL Engineering Group Ltd 8/27 Tyne Street, Addington www.slengineering.co.nz admin@slengineering.co.nz 03 261 6014	Project:	STRUCTURAL ASSESSMENT	Drawing Title:	SEDIMENT CONTROL PLAN				Job Ref:	1371-2502			Sheet: S01
	Address:	49B INWOODS ROAD, PARKLANDS , CHRISTCHURCH.	Client:	VISION360 THE VISIBILITY OF YOUR PROJECT THROUGH EVERY ASPECT								
					1	BUILDING CONSENT ISSUE	16-04-2025	Design:	AS	Drawn:	KRISH	Original size: A3
					Rev.	Remark/Comment	Date	Approved:	AS	Scale:	1:75	



**STANDARD DETAIL
FOR FABRIC JOIN**

POST SPACING CAN BE INCREASED FROM 2 METERS TO 4 METERS IF SUPPORTED BY A 2.5mm DIAMETER HIGH TENSILE WIRE ALONG THE TOP WITH CLIPS EVERY 200mm

STEEL STANDARDS SUCH AS WARATAHS OR STANDARD WOODEN FENCEPOSTS (NO.3 ROUNDS MINIMUM) DRIVEN A MINIMUM OF 400mm INTO GROUND



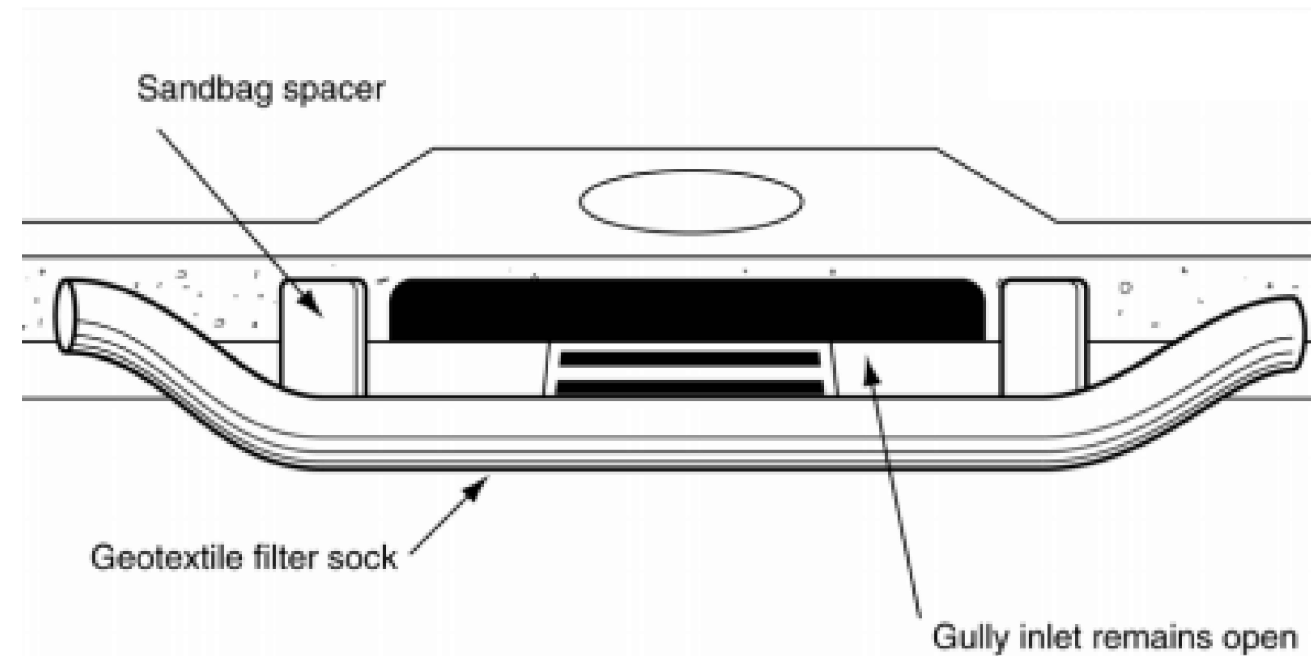
RETURN 1-3 METERS IN LENGTH TO REDUCE VELOCITY ALONG THE SILT FENCE AND PROVIDE INTERMEDIATE IMPOUNDMENT

ENDS WIRED BACK TO STAKE OR WARATAH

PROVIDE LEAK PROOF JOINT AT THE JUNCTION OF THE RETURNS AND MAIN SILT FENCE ALIGNMENT

PROVIDE LEAK PROOF JOINT USING WOODEN STAKES BURIED 200mm INTO THE GROUND AND EXTENDING THE FULL HEIGHT OF THE FABRIC

**SILT FENCE WITH RETURNS AND SUPPORT
WIRE**



GULLY INLET DETAIL

 CIVIL STRUCTURAL GEO SL Engineering Group Ltd 8/27 Tyne Street, Addington www.slengineering.co.nz admin@slengineering.co.nz 03 261 6014	Project:	STRUCTURAL ASSESSMENT	Drawing Title:	SEDIMENT CONTROLS DETAIL			Job Ref:	1371-2502			Sheet:
	Address:	49B INWOODS ROAD, PARKLANDS, CHRISTCHURCH.	Client:								S01
							Design:	AS	Drawn:	KRISH	Original size:
							Approved:	AS	Scale:	1:75	A3
					Rev.	Remark/Comment	Date				

PRODUCER STATEMENT – PS1 DESIGN

BUILDING CODE CLAUSE(S): B1 | **JOB NUMBER:** 1371 - 2502 |
ISSUED BY: SL Engineering Group Limited |
(Engineering Design Firm)
TO: Vision 360 |
(Owner/Developer)
TO BE SUPPLIED TO: Christchurch City Council |
(Building Consent Authority)
IN RESPECT OF: Repairs to existing dwelling- Floor re-levelling and earthquake repairs |
(Description of Building Work)
AT: 49B Inwoods Road, Parklands, Christchurch |
(Address, Town/City)
LEGAL DESCRIPTION: Lot 2 DP 38785 | **N/A** ☐

We have been engaged by the owner/developer referred to above to provide *(Extent of Engagement):*
 Structural repair scoping, construction monitoring |
 in respect of the requirements of the Clause(s) of the Building Code specified above for Part only , as specified in the
 Schedule, of the proposed building work.

The design carried out by us has been prepared in accordance with:

- ☒ Compliance documents issued by the Ministry of Business, Innovation & Employment *(Verification method/acceptable solution)* B1/VM1 & VM4 & AS1 | and/or;
- ☒ Alternative solution as per the attached Schedule. [\(MBIE Guidelines\)](#)

The proposed building work covered by this producer statement is described on the drawings specified in the Schedule, together with the specification, and other documents set out in the Schedule.

On behalf of the Engineering Design Firm, and subject to:

- Site verification of the following design assumptions: As per our site soil bearing verification (1371 - 2502, 20/02/25) |.
- All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that:

- the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the Schedule, will comply with the relevant provisions of the Building Code and that;
- the persons who have undertaken the design have the necessary competency to do so.

I recommend the CM 3 level of **construction monitoring**.

I, *(Name of Engineering Design Professional)* Sananthanan Amirthalingam , am:

- ☒ CPEng number 1023988 |
 and hold the following qualifications B.Sc Eng(Hons), M.Sc (Struc) CPEng CMEngNZ

The Engineering Design Firm holds a current policy of Professional Indemnity Insurance no less than \$200,000
 The Engineering Design Firm is not a member of ACE New Zealand.

SIGNED BY *(Name of Engineering Design Professional):* Sananthanan Amirthalingam
(Signature below):



ON BEHALF OF *(Engineering Design Firm):* SL Engineering Group Limited

Date: 04/04/2025

Note: This statement has been prepared solely for the Building Consent Authority named above and shall not be relied upon by any other person or entity. Any liability in relation to this statement accrues to the Engineering Design Firm only. As a condition of reliance on this statement, the Building Consent Authority accepts that the total maximum amount of liability of any kind arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in tort or otherwise, is limited to the sum of \$200,000.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

SCHEDULE to PS1

Please include an itemised list of all referenced documents, drawings, or other supporting materials in relation to this producer statement below:

1. Structural Assessment Report

2. Shallow investigation report

3. Drawings (As below)

Titled "Structural Assessment" (Ref.: 1371 - 2502) dated 04/04/2025 as per the drawing list

4. CM schedule

GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on the Engineering New Zealand website

<https://www.engineeringnz.org/engineer-tools/engineering-documents/producer-statements/>

Producer statements were first introduced with the Building Act 1991. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects (NZIA), Institution of Professional Engineers New Zealand (now Engineering New Zealand), Association of Consulting and Engineering New Zealand (ACE NZ) in consultation with the Building Officials Institute of New Zealand (BOINZ). The original suite of producer statements has been revised at the date of this form to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with part of the reasonable grounds necessary for the issue of a Building Consent or a Code Compliance Certificate, without necessarily having to duplicate review of design or construction monitoring undertaken by others.

PS1 DESIGN Intended for use by a suitably qualified independent engineering design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;

PS2 DESIGN REVIEW Intended for use by a suitably qualified independent engineering design review professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;

PS3 CONSTRUCTION Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2013 or Schedules E1/E2 of NZIA's SCC 2011²

PS4 CONSTRUCTION REVIEW Intended for use by a suitably qualified independent engineering construction monitoring professional who either undertakes or supervises construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate.

This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACE New Zealand and Engineering New Zealand to interpret the Producer Statement.

Competence of Engineering Professional

This statement is made by an engineering firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its personnel.

The person signing the Producer Statement on behalf of the engineering firm will have a professional qualification and proven current competence through registration on a national competence-based register such as a Chartered Professional Engineer (CPEng).

Membership of a professional body, such as Engineering New Zealand provides additional assurance of the designer's standing within the profession. If the engineering firm is a member of ACE New Zealand, this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent engineering professional".

Professional Indemnity Insurance

As part of membership requirements, ACE New Zealand requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI Insurance minimum stated on the front of this form reflects standard practice for the relationship between the BCA and the engineering firm.

Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers³). The building Consent Authority is encouraged to require that the service to be provided by the engineering firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Refer Also:

- ¹ Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2013
- ² NZIA Standard Conditions of Contract SCC 2011
- ³ Guideline on the Briefing & Engagement for Consulting Engineering Services (ACE New Zealand/Engineering New Zealand 2004)
- ⁴ PN01 Guidelines on Producer Statements

www.acenz.org.nz

www.engineeringnz.org

CONSTRUCTION MONITORING NOTICE – 49B INWOOD, PARKLANDS

The design is based on the verification of specific design aspects of the construction by a suitably qualified Chartered Professional Engineer in accordance with ACENZ/ENG NZ. SLEG recommends a construction monitoring level “CM3”. This is an audit of a sample of work, rather than a detailed inspection of every component.

The number of inspections listed in the Inspection Schedule will depend on the contractor’s method of construction, concrete pour sequencing, etc. and shall be agreed with the contractor as the works progress.

A producer statement (PS4 Construction Review) will be issued once all the above inspections have been completed, and once a producer statement (PS3 Construction) or a Memorandum Record of building work covering all structural items has been provided by the contractors involved.

A minimum of 48 hours’ notice is required to carry out any inspections. The following inspections are required:

Inspections	Elements to be inspected
1. Underpinning Pad Foundation Excavation	• Observe the ground condition. • Verify the ground bearing • Observe the floor slab cracks
2. Pre-pour inspection of the foundation	• Footing depth, size • Size and spacing of reinforcing bars. • Concrete cover • Ties to steel
3. Final Inspection	• Final floor levels • Concrete foundation beam/slab repairs, internal lining repairs, and other structural elements in the structural assessment report.

Please contact SLEG for any construction enquiries or inspection notifications on

Email: admin@slengineering.co.nz

Phone: 03 26 16 014

Mobile: 021 95 44 92

STRUCTURAL ASSESSMENT REPORT

49B Inwoods Road, Parklands, Christchurch



Ref: 1371 - 2502

Date: 27/02/2025

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Revision	Date	By	Description
0	25/02/2025	AA	Draft Issue
1	27/02/2025	AA	BC Exemption

1 INTRODUCTION

1.1 GENERAL

SL Engineering (SLEG) has been engaged by Vision 360 to undertake a superstructure and foundation damage assessment and to provide recommendations for re-levelling, reinstatement or foundation rebuild as necessary for the existing dwelling at 49B Inwoods Road, Parklands, Christchurch. The assessment and recommendations have been based on engineering judgment, on-site observations, information, and reports provided to us. The MBIE guidelines “Repairing and rebuilding houses affected by the Canterbury earthquakes” have been referenced where appropriate.

1.2 SCOPE AND NATURE OF THE SERVICES

As part of the structural assessment, SLEG Engineers carried out a site visit on 20th February 2025. Our inspection was limited to a visual inspection of all accessible areas. We have not removed fixtures or fixed linings or carried out any destructive investigations.

In preparation of the report, we have:

- Undertaken a visual assessment of exposed elements of the building.
- Measured and recorded all floor levels.
- Undertaken Amenity survey as necessary.
- Considered pre-and post-Canterbury Earthquake Sequence (CES) building works.
- Not reviewed any property files as no information was available.

1.3 MEANS OF COMPLIANCE

The structural design of new or repaired works will comply with the New Zealand Building Code (NZBC), Section B1 and Ministry of Business, Innovation and Employment (MBIE) Guidelines, as appropriate. The following New Zealand Standards have been used:

- AS/NZS1170:2001 Structural Design Actions
- NZS3101:2006 Concrete Structures Standard
- NZS3604:2011 Timber-framed Buildings
- NZS4210:2001 Masonry Construction.

2 SITE AND BUILDING STRUCTURE

2.1 SITE DESCRIPTION

The site is in a residential area Parkland approximately 8 km northeast of Christchurch City Centre and has a legal description of “Lot 2 DP 38785”. The site has a flat topography. The total site area is approximately 1153 m².



Figure 1: Site Layout (Source: Canterbury Map)

2.2 BUILDING STRUCTURE

The building is a single storey dwelling with an Attic and an attached garage. The structure is on a flat ground

The building appears to have been built in circa late 1970s. It is a lightweight timber-framed dwelling. The foundation is a concrete slab on grade foundation (Type C foundation as per the MBIE Guidance). The dwelling exterior cladding is a lightweight weatherboard. The roof was observed to be a lightweight decramastic tiles.



Southwest elevation (front)



North elevation (Rear)

3 GEOTECHNICAL CONDITION SUMMARY

3.1 GEOTECHNICAL INFORMATION DESKTOP STUDY

A desktop review of available geotechnical information has been carried out and is summarised below.

- **EQC Observed Ground Crack Location**

No ground cracks were identified within the property. However, crack widths of more than 50 mm were observed approximately within a 100 m radius area from the site.

- **EQC Vertical Ground Movement**

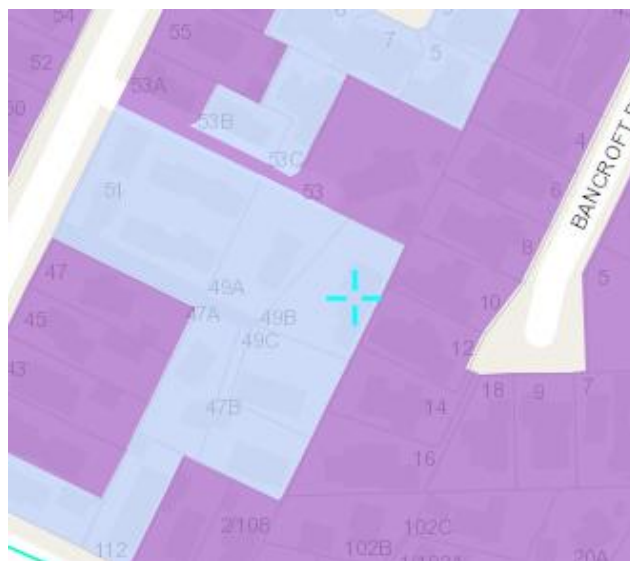
Cumulative vertical ground movement obtained from EQC map indicated the site's elevation had settled by approximately 0 mm to 500 mm.

3.2 MBIE LANDING ZONE

The site is currently mapped as “Technical Category 3” defined by the Ministry of Business, Innovation and Employment (MBIE) Residential Technical Categories. MBIE states that land damage from liquefaction is possible on TC3 land in future large earthquakes.

3.3 EQC LIQUEFACTION ANALYSIS

EQC liquefaction and lateral spreading observations obtained from the Canterbury Geotechnical Database show that the property has sustained “minor liquefaction” and the surrounding properties have sustained “moderate liquefaction” following the February 2011 earthquake event. No site-specific deep geotechnical investigation was undertaken as a part of this assessment. A shallow investigation report was prepared by SL Engineering to investigate the subsoil condition and soil bearing as part of the design.



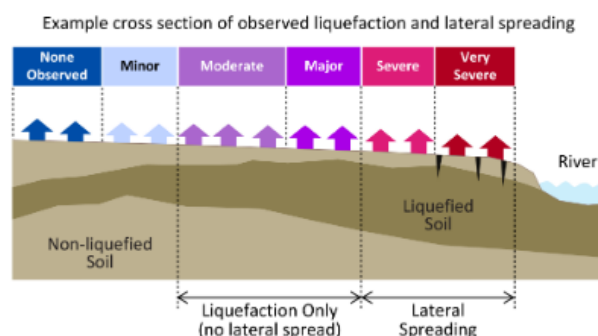
Map Legend:

Figure 2: Observed liquefaction and lateral spreading (Source: Canterbury Map)

4 BUILDING OBSERVATION

4.1 SUPERSTRUCTURE

Internal wall lining had been removed at a few locations in the dwelling at the time of inspection. In other locations, no noticeable damages were observed on the internal wall lining and ceiling. Please refer to the Appendix A.

4.2 SLAB ON GRADE FOUNDATION

No noticeable cracks were observed on the foundation. We also recommend a structural engineer's inspection to determine the foundation condition before commencing the re-levelling repair works.

4.3 BUILDING FLOOR LEVELS

A floor level survey using Zip-Level Pro-2000 was carried out during the inspection and is presented in the Floor Level Plan attached in Appendix C of this report. The overall floor level variations were measured to be approximate as follows,

- 110 mm over the dwelling concrete floor
- 74 mm over the dwelling timber floor
- 56 mm over the garage concrete floor

The dwelling floor level variations exceed the 50 mm suggested threshold of “no foundation re-level” but do not exceed the 150 mm concrete floor and 100 for timber floor suggested threshold of “foundation rebuild as per Table 2.3 of the MBIE Guidance. Moreover, the floor slopes exceed the MBIE tolerance for variation 1:200 (0.5%) at multiple locations. Hence, the building falls into the category of “foundation re-level required” as per the MBIE Guidance.

5 DISCUSSION AND CONCLUSION

It is understood that the building was constructed circa in late 1970s. As such, it is difficult to quantify the earthquake-related settlement against pre-existing conditions. Considering the type of

construction, and the age of the building, some historical settlement/pre-existing conditions could be expected.

However, measured floor levels in the dwelling indicate that the house has sustained damage and settlement. Amenity slope measurements at windowsills were taken throughout the dwelling. Most of the measurements show that the slopes were consistent with the floor settlement trend.

In general, on the ground floor, the lower floor levels were observed around the northeast area of the dwelling at the dining, kitchen, and laundry. The higher floor levels were observed at the southwest elevation of the dwelling. The highest settlement was observed in the dining room. The floor slopes are also inclining towards the east elevation of the dwelling from the west.

The maximum floor level difference measured on the first floor is 74 mm. The floor slopes exceeded 0.5% between any two points at multiple locations. The floor levels taken at the first-floor correlate with the floor settlement trend on the ground floor. Based on the construction details observed on site, foundation releveling at the ground floor will bring the attic floor level to the pre-earthquake condition.

Based on the record from Canterbury Map, a minor liquefaction was observed within the property, and “moderate liquefaction” in the surrounding properties following the February 2011 event. Further, the ground cracking observed within the 100 m radius indicates that the ground has moved laterally. EQC vertical ground movements obtained from the Canterbury Geotechnical Database show “0 m to 0.5 m vertical elevation change” following all earthquake events.

Hence, based on our engineering judgment and considering the site measurements, and the above observations, we are of the opinion that the floor settlement to the building is attributed to the CES. Therefore, the foundation of the dwelling needs to be remedied to bring the floor levels to within MBIE recommended tolerance or reasonably within the pre-earthquake condition.

5.1 FOUNDATION REMEDIATION

The slab on grade foundation of the dwelling and garage is proposed to be remedied by bringing the floor levels to within MBIE recommended tolerance. As per the discussion in the previous sections of this report, the findings indicate that the dwelling has sustained earthquake-related settlements. Since we consider that the dwelling foundation is to be relevelled, the following foundation remediation options may be considered to relevel the dwelling floor:

- 1) Perimeter concrete foundation is to be repaired using portable jacks using an underpinning pad in accordance with Option 1, Appendix A1.1.2, Part A of the MBIE Guidelines. We recommend undertaking cautious performance-based releveling to prevent damage to the foundation and the building.
- 2) Based on the construction details observed, the ground floor foundation releveling shall bring the Attic floor level to pre-earthquake condition. Should the any floor level correction needed, floor levelling compound can be used.

- 3) Cracks to the concrete foundation beam can be repaired by epoxy repairs (crack width < 5 mm), or cementitious grout repairs (Crack width 5 mm to 15 mm) in accordance with Appendix A 4.4, Part A of the MBIE Guidelines. Surface preparation and application shall be followed through the manufacturer's instructions as required.

Repair details can be seen in Appendix C -Structural repair plans of the structural assessment report.

5.2 SUPERSTRUCTURE (WALL/CEILING LINING)

SLEG has recorded the superstructure damaged where possible. However, a licensed Builder should assess the superstructure, including the roof structure, following the foundation re-levelling and shall undertake necessary remediation as appropriate.

- **Case 1** (window/door openings diagonal cracks less than 50 mm long, sheet joints cracks) Re-stop to wall and ceiling. Installation of new fasteners is required where fasteners have pulled through or plaster bulges around fastener heads.
- **Case 2** (window/door openings diagonal cracks greater than 50 mm long, panel fractured) Recommended to replace the wall and ceiling with equivalent bracing elements (GIB or equivalent). Installation of new fasteners shall be placed as per the manufacturer's instructions.

Should you have any queries or any further clarification on any aspects of this report, please contact the undersigned below.

Prepared by:	Approved by:
	
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RISK AND LIMITATIONS

- a. This report has been prepared for the exclusive use of **Vision 360** and its relevant building consent authority and is subject to and issued in accordance with the provisions of the contract between SL Engineering Group Ltd and **Vision 360**. No liability is accepted by SL Engineering Group Ltd or any employee or sub-consultant of SL Engineering Group Ltd with respect to its use by any other parties. This report is copyright of SL Engineering Group Limited. Except for the use of Vision 360, subject to the terms of the Agreement, either wholly or part of this publication cannot be copied without SL Engineering Group Limited's written permission.
- b. The investigation of the existing building comprised a visual inspection, limited onsite non-destructive investigation, and the review of available documentation. A floor level survey using Zip-Level Pro-2000 instrument of a typical accuracy of $\pm 3\text{mm}$ was carried out during the inspection and is presented in the Floor Level Plan attached to this report. It should be noted that the purpose of the floor level survey is to help in determining possible structural damage to the building and therefore should be treated as indicative only. Where a high-level dependence and an accurate and credible presentation of the survey information are required, a registered professional surveyor should be engaged to carry out the survey.
- c. This report is for the structural aspects of the building only. SL Engineering Group Limited does not report on cosmetic damage or provide recommendations for cosmetic repairs or those required for weather tightness.
- d. The above report does not constitute our confirmation that the building is “safe”, “earthquake resistant” or similar. We have not checked the level of actual structural compliance with the current Building Code, nor assessed the level of actual past seismic activity at the particular site on which the building is situated. SL Engineering has carried out a visual non-destructive inspection of readily accessible areas and has used our professional judgment to assess the extent of structural earthquake damage (if any) sustained from 4 September 2010 to date.
- e. The common aim of levelling a floor is firstly to return the floor to its pre-earthquake state and secondly to bring the floors to level or within what is considered to be a reasonable tolerance. Generally, a maximum floor slope of 0.5% is targeted. In this instance, as the pre-earthquake condition of the house includes past settlement in our opinion, then a traditional floor levelling reinstatement may not be achievable without causing further damage to the existing superstructure.
- f. The scope of any foundation re-levelling is to return the building foundations to as close to as reasonably practicable to its structural pre-earthquake condition (i.e. NZBC Section 112 repair). This clause states that the repair strategy does not have to improve the overall performance of the structure; rather it cannot be made any worse than it was prior to the earthquake sequence. The re-levelling of the foundations will not lead to any “betterment” of the existing foundation structure. The re-levelling work does not prevent/mitigate liquefaction induced ground settlements in future earthquake events. The foundation and superstructure may require floor re-levelling or re-instatement and superficial damage repairs, should another earthquake event occur.

REFERENCES

- Canterbury Earthquake Recovery Authority, Christchurch City Council, Selwyn District Council and Waimakariri District Council: Canterbury Geotechnical Database (<https://canterburygeotechnicaldatabase.projectorbit.com/>)
- Canterbury Geotechnical Database. Earthquake Commission (EQC) Liquefaction interpreted from aerial photography.
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- Ministry of Business, Innovation and Employment (MBIE) (2012). Repairing and Rebuilding Houses affected by the Canterbury Earthquakes (<http://www.dbh.govt.nz/guidance-on-repairs-afterearthquake>).
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- Standards New Zealand. (2002). Structural Design Actions – General Principles: Amendment 4, NZS 1170.0:2002. Standards New Zealand, Wellington.
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Appendix A

Building Observation

1. The foundation was observed to be reasonably in good condition.

However, it is advisable for the builders to undertake a survey once the floor relevelling is completed. If any cracks are found, it can be repaired as recommended in section 5.1



2. Internal wall lining has been removed at few rooms at the time of the inspection. No noticeable damages were observed in other locations.

However, it is advisable for the builders to undertake a survey once the floor relevelling is completed. If any cracks are found, it can be repaired as recommended in section 5.2.



	
3. Cracking on the garage floor To be repaired following the foundation relevening.	

Appendix B

Engineering Calculations

For slab house lifting

Input Data

Dead Load (G)	Load (kPa)	Span (m)	Pad Spacing (m)	Load (kN)
Roof	0.60	6.00	2.00	7.20
Wall+Cladding	0.50	5.00	2.00	5.00
Attic Floor	0.60	1.20	2.00	1.44
Pad	5.00	0.70	0.80	2.80
Attic Floor	2.50	1.20	2.00	6.00
Foundation (500 mm deep)	12.50	0.30	2.00	7.50

Live Load (Q)				
Roof	0.25	0.00	2.00	0.00
Attic Floor	1.50	1.20	2.00	3.60
Attic Floor	1.50	1.20	2.00	3.60

Snow Load (Su)				
Roof	0.70	0.00	2.00	0.00

Wind Load (Wu)				
Roof	-1.50	0.00	2.00	0.00

Loading

Dead, G	29.94 kN	Soil Data	
Live, Q	7.20 kN		
Snow, S	0.00 kN	Allowable bearing	100 kPa
Wind Uplift Serv, W_{serv}	0.00 kN	Ultimate soil bearing	200 kPa
Wind Uplift Ult, W_{ult}	0.00 kN		

ULS

Load Combinations

1.35G	40.42 kN	Design Load	46.73 kN
1.2G + 1.5Q	46.73 kN		
0.9G + Wu	26.95 kN		
1.2G + $S_u + \gamma_c Q$	38.81 kN		

SLS

Load Combinations

G	29.94 kN	Design Load	34.98 kN
G + $\gamma_l Q$	32.82 kN		
G + $\gamma_s Q$	34.98 kN		
G + $\gamma_s S_s$	29.94 kN		
G + W_s	29.94 kN		

Pad size:	800 mm diameter	OK	
	A = 0.502654816 m ²	P_{sls} =	69.6 kPa
		P_{uls} =	93.0 kPa
	700 mm square	OK	
	A = 0.49 m ²	P_{sls} =	71.4 kPa
		P_{uls} =	95.4 kPa

Min. Pad Area (ULT)	0.2336 m ²
Min. Pad Area (SLT)	0.3498 m ²

Hence the minimum pad size is	667 m (circular pad)	OK
	591 m (square pad)	OK

Provide 600mm square x200mm (D) or 800mm Circular x 200mm pad

Appendix C

Structural Drawings



SHALLOW SOIL INVESTIGATION REPORT

49B Inwoods Road, Parklands, Christchurch

Project Ref: 1371-2502

Revision: 0

Prepared for: Vision 360

20th February 2025

Should you have any queries or any further clarifications, do not hesitate to contact following undersigned

Inspected and Prepared by:	 A. Anburuvel <i>BScEng (Civil), PhD</i> <i>Civil/Geotechnical Engineer</i> <i>anbu@slengineering.co.nz</i>	Reviewed and verified by:	 Sana Amirthalingam <i>BSc Eng (Hons), MSc (Structural), CPEng, CMEngNZ</i> <i>Director/ Senior Structural Engineer</i> <i>sana@slengineering.co.nz</i>
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LIMITATIONS

The recommendations and ideas presented in this report are based on geotechnical information received at specific test locations by using appropriate investigation techniques with a limited number of tests. This geotechnical advisory report is prepared based on data available at the time of reporting, best engineering practices, judgment, and experience. Surface ground conditions depend on the test location point on site. Also, subsurface conditions may change as a result of human-induced events and natural phenomena. Further geotechnical assessment may be required where the actual ground condition varies from the assumed model.

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1 INTRODUCTION AND SCOPE OF WORK

SL Engineering Group Limited has been engaged by Vision 360 to carry out a shallow geotechnical investigation at 49B Inwoods Road, Parklands, Christchurch. This shallow investigation was to determine the bearing capacity and subsoil type for the shallow foundation underpinning pad. This report has been issued for the Council consent exemption application.

The shallow soil investigation procedure for the property is as follows:

- 1 dynamic cone penetrometer (DCP) tests to determine the bearing capacity of the soil and 1 hand auger (HA) boreholes to evaluate the subsurface soil type.
- Reporting of investigation findings.

2 SITE DESCRIPTION

The site is located on a flat topography within a residential area of Parklands to the northeast of Christchurch city, approximately 8 km from CBD. Its legal description is "Lot 2 DP 38785". The total site area is approximately 1153 m².

There is an existing single storey dwelling with an Attic and an attached garage. It is understood that the existing dwelling floor level is to be repaired by foundation re-levelling.

2.1 MBIE Land Classification

The site is currently mapped as "Green Zone, Technical Category 3, blue" as defined by the Ministry of Business, Innovation and Employment (MBIE) Residential Technical Categories. This indicates that moderate to significant land damage from liquefaction is possible in future significant earthquakes.

2.2 Published Information

A few available subsurface investigation logs, within an approximately 100 m radius of the site area, were reviewed. The investigation logs indicate that the area is typically underlain by sand and silt.

3 INVESTIGATION RESULTS

The HA borehole at test location 1 showed that approximately 200 mm layer of topsoil, followed by approximately 200 mm layer of grey non-plastic sandy silt at depth from 200 mm to 400 mm, and approximately 300 mm layer of grey non-plastic fine sand with traces of silt at depth from 400 mm to 700 mm below natural ground level (NGL). At this location, HA was terminated at 700 mm depth below NGL.

3.1 Ground Water

HA test was undertaken up to 700 mm below the existing ground level. No static water was encountered during the test.

3.2 Bearing Capacity

Based on DCP test results, at least 3 blows per 100 mm penetration can be achieved at this site from 300 mm depth below NGL. However, it is recommended that a site-bearing verification should be carried out by a geotechnical engineer at this site after excavating the ground for construction.

This penetration resistance shows that Ultimate Bearing Capacity (UBC) of 200 kPa can be assumed below 300 mm below NGL. A strength reduction factor of $\phi = 0.5$ should be applied to the Ultimate Bearing Capacity to obtain the Dependable Bearing Capacity, which should be equal to or greater than the factored Ultimate Foundation Bearing Pressures.

4 CONCLUSIONS

4.1 Floor Level and Foundation Remediation

The maximum measured differences in floor level over the dwelling concrete floor, timber floor and garage floor are 110 mm, 74 mm and 56 mm, respectively. It indicates that the floor level variation exceeds the 50 mm threshold for “no foundation relevel necessary” stipulated in Table 2.3, MBIE Guidance: Part A. Assessing the site conditions and based on the engineering judgment, we are of the opinion that the foundation can be re-levelled to correct the floor level.

The foundation releveling design and methodology should be designed by a Chartered Professional Structural Engineer. Should there be any underpinning pad or new pile foundation necessary, the foundation shall be designed for the soil bearing and design criteria given above.

It is recommended that all topsoil (organic soil, soft soil) or a minimum depth of 300 mm soil below NGL, whichever is greater, should be removed from the proposed foundation excavation prior to construction.

4.2 Limitation

This report is only intended for the repair/relevel strategy of the existing dwelling. The suitability for occupancy must be re-assessed by a structural engineer and geotechnical engineer after any future moderate earthquakes.

The recommendations provided above are based on the site observation, a limited number of tests, and the nature and continuity of subsoil conditions are inferred. Ground conditions may vary across the site between the inspected, tested, and sampled locations. Subsurface ground conditions may also change or be modified because of anthropogenic events and natural events. The geotechnical advice provided in this report is based on data available at the time of preparation of this report, best engineering practices, experience, and engineering judgment. Where the actual ground condition deviates from the assumed condition, further geotechnical testing and assessment may be warranted, including supervision and auditing of site works by a chartered geotechnical engineer.

5 CONSTRUCTION MONITORING AND OBSERVATION

A qualified engineer should be engaged to carry out observations during underpinning pad excavations to confirm soil bearing and condition are consistent with the findings and recommendations of this report.

REFERENCES

- Canterbury Maps, 2020. Property search <https://propertysearch.canterburymaps.govt.nz/#/>
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- Stockwell, M.J.: Determination of allowable bearing pressure under small structures. New Zealand Engineering (32, 6), dated 15 June 1977
- The New Zealand Geotechnical Database (NZGD). Online database for new and existing geotechnical information (<https://www.nzgd.org.nz/>)

APPENDICES

Appendix A – Site Location Plans

Appendix B - Shallow Soil Investigation logs

APPENDIX A – SITE LOCATION PLANS



Legend

●

Hand Auger

●

Scala Penetration

SPT1

HA1

49B

49C



APPENDIX B – SHALLOW SOIL INVESTIGATION LOGS



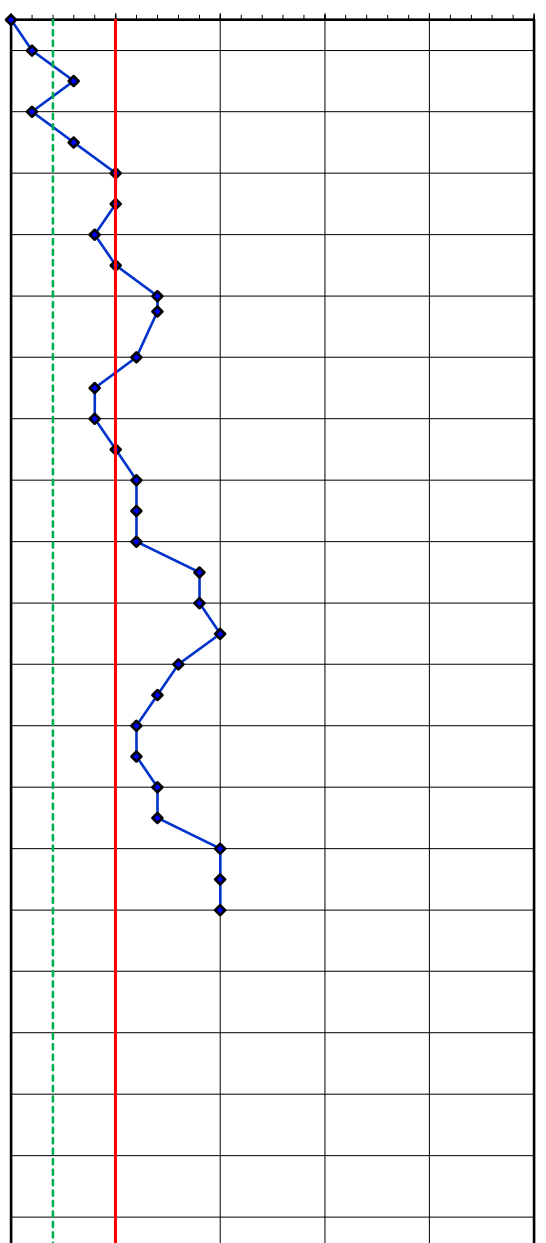
SITE INVESTIGATION RECORD

Project	49b Inwoods Rd
Date Tested	20-Feb-25
Project Ref	1371-2502
Test Location	SPT 1& HA1
Prepared by	AA
Checked by	KM

Scala Penetrometer Test Results

Depth	Bore Logs	
	DCP Blows	Description
GL		
	1	Top soil
0.2	3	
	1	Sandy silt, Grey, Loose, No Plasticity
0.4	3	
	5	Fine sand with traces of silt, Grey, Loose, No plasticity
0.6	5	
	4	
0.8	5	HA terminated at 700 mm below EGL
	7	
1.0	7	
	6	
1.2	4	
	4	
1.4	5	
	6	
1.6	6	
	6	
1.8	9	
	9	
2.0	10	
	8	
2.2	7	
	6	
2.4	6	
	7	
2.6	7	
	10	
2.8	10	
	10	
3.0		
3.2		
3.4		
3.6		
3.8		
4.0		
4.2		
4.4		
4.6		
4.8		

DCP Blows per 100 mm



◆ Test Results
— 5 Blows per 100 mm
- - - 2 Blows per 100 mm