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Natural Disaster Land Damage Assessment - Landslip

For IAG NZ Ltd c/- Lumley New Zealand Limited

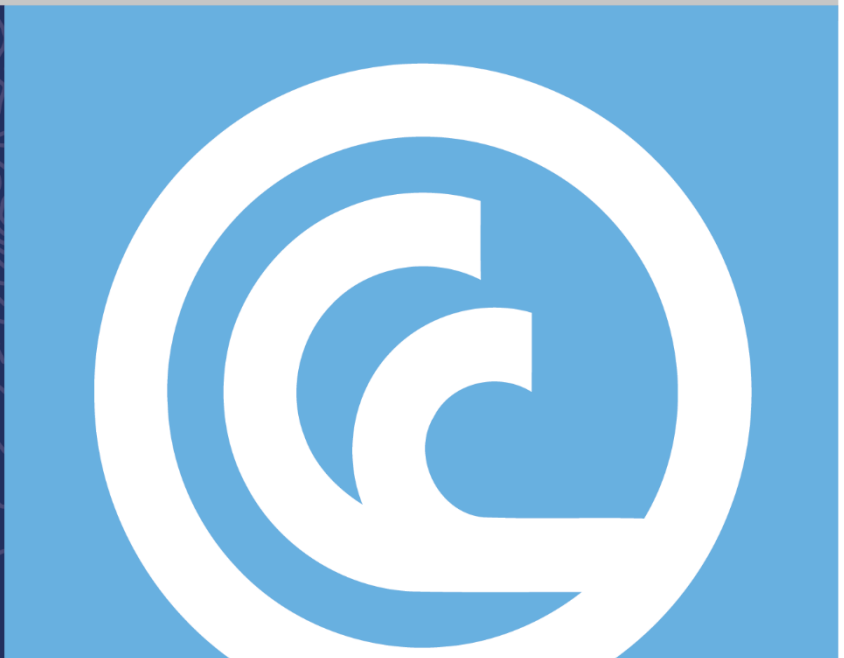
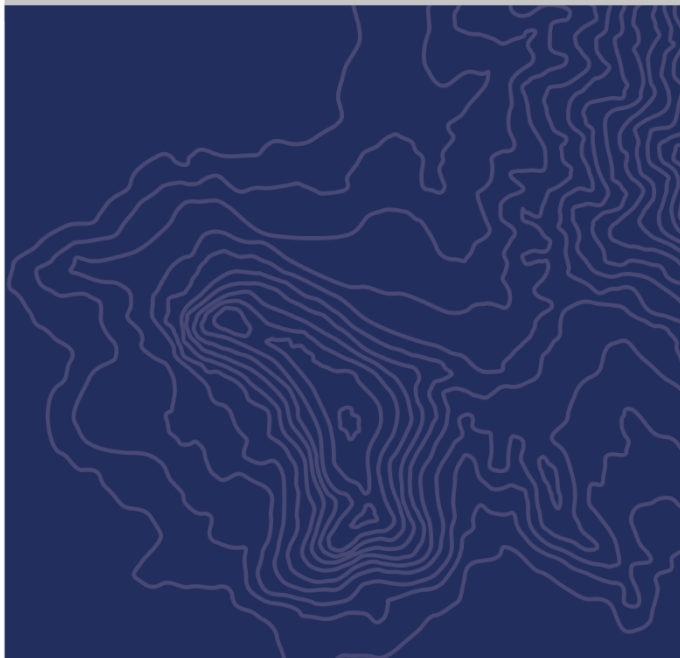
394 Huia Road, Titirangi, Auckland

Version 1

CCL Project No: 17119-148

Insurer Claim Ref No: 8090515 Land

15/09/2023



LIMITATIONS & DISCLAIMERS

This report has been prepared for the benefit of IAG NZ Ltd c/- Lumley New Zealand Limited as our client with respect to the geotechnical assessment of land damage at the property located at 394 Huia Road, Titirangi, Auckland. The reliance by other parties on the information or our opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Cook Costello has performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for assessments. No guarantees are either expressed or implied.

No structural analysis has been carried out to assess the strength of the buildings and/or structures or to determine whether they comply with the current and/or any previous Building Code. Cook Costello has not made any assessment of structural stability or building safety in connection with any future natural disaster events.




This report and documentation are limited by the restricted ability to carry out inspections due to possible health and safety considerations. This report and documentation do not comment on the damage that is not reasonably noted through visual inspection, including any damage that is in inaccessible places or has occurred latently.

Cook Costello has assumed that all documentation and information provided by the client and or any third party relating to the buildings and/or structures is accurate and reliable. This documentation and information include but are not limited to Council records, plans, details, and geotechnical information. No responsibility or liability is accepted by Cook Costello for any loss or damage whatsoever stemming from inaccuracies in all documentation and information provided by the client and/or any third party.

The conceptual remedial solutions provided in this information report shall not be used for repair works to the dwelling and appurtenant structures to which it relates without further involvement of an experienced Chartered Professional Engineer (CPEng).

Where repairs or replacement of building components are necessary, further investigation is required to confirm that the remedial works comply with current New Zealand standards and legislation.

If there are any queries regarding the content of this report, please do not hesitate to contact the undersigned.

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1 INTRODUCTION

1.1 Scope of Engagement

IAG NZ Ltd c/- Lumley New Zealand Limited has engaged Cook Costello Ltd to inspect the property at 394 Huia Road, Titirangi, Auckland to assess the claim for natural disaster damage. In particular, the visit was undertaken to determine whether physical loss or damage to property is imminent as a direct result of the landslip event that occurred.

This claim relates to a landslip event that was triggered by rainfall that occurred circa January 2023. The date of loss is not stated on the Sedgwick request form.

Cook Costello Ltd. visited the property on 13th March 2023.

The conclusions and recommendations in this report are based solely on a visual assessment of the site. No detailed site investigations have been undertaken during this assessment. It must therefore be acknowledged that the assessment is limited in this regard and subsurface conditions may vary from those inferred in this report.

Property boundaries are based on LINZ information overlain on aerial imagery.

1.2 Rainfall Event

On 27 January 2023, Auckland experienced its heaviest rainfall event since records began. Based on the measurements obtained across the Auckland region, approximately half of the entire region (including the majority of urban Auckland) experienced rainfall intensities in excess of the 100-Year Average Recurrence Interval (ARI) event. The Albert Park gauge (Auckland CBD) recorded 280.5 mm of rainfall in 24 hours and 261.8 mm was recorded at Auckland Airport during the same period.

An analysis of the Albert Park rainfall data, undertaken by Tonkin & Taylor, indicated that it would not be unreasonable to label this event as “greater than a 2000-year ARI storm” for large parts of urban Auckland (Tonkin & Taylor, 2023).

1.3 Background Information

Cook Costello has been provided with the following additional information/instructions:

Known issues: Retaining walls, Evacuated Land, Inundated Land, Potential Services Damage.

1.4 Historical Claims

No information regarding historical claims at this property was made available at the time of our assessment. Cook Costello has progressed the report on the assumption that previous claims have no bearing on the current damage/claim; however, if the damage were to overlap or be in a similar location then Cook Costello reserves the right to amend the report accordingly.



2 GENERAL SETTING

2.1 Site Description

The property, 394 Huia Road, Titirangi, is a residential lot covering approximately 1,432m² – legal description LOT 6 DP 42669. The property is located on a gently sloping, west-facing site on Huia Road, Titirangi, Auckland. The site is accessed via a driveway directly off Huia Road on the southern side of the property. An attached garage is located at the entrance of the property from the driveway. The dwelling is a two-storey residence which is located in the southern portion of the site.

Two timber post retaining walls are located north of the dwelling. RTW-01 supports the path along the north side of the dwelling, and RTW-02 supports a flat area for the playhouse and trampoline. A stream is located directly north of RTW-02. There is a fence attached to the top of RTW-02, that continues beyond the western end of RTW-02. Figure 1 shows an aerial view of the property and the approximate location and extent of RTW-01 and RTW-02. Dimensions and properties of the retaining walls are summarised in Table 1 below.

Table 1: Summary of retaining walls.

Wall I.D.	Location	Description	Length (m)	Height (m)	Purpose of RTW
RTW-01	North of the dwelling	125 mm square timber post wall at 1.5 m centres with 200 mm by 50 mm lagging and capping beam.	13.5	0.6 (average)	Retains a flat lawn, and path north of the house.
RTW-02	North of the dwelling	125 mm square timber post wall at 1.2 m to 1.4 m centres embedded 300 mm to 600 mm deep, with 200 mm by 50 mm lagging.	11.0	0.0 – 1.2	Retains a flat lawn for the playhouse and trampoline.





Figure 1: Aerial view showing approximate location of retaining and appurtenant structures (Auckland Council GeoMaps, 2023).



2.2 Site Geology

According to the GNS Science NZ Geology Map, the site is composed of Early Miocene sedimentary rocks, specifically the Nihotupu Formation of the Manukau Subgroup (Waitemata Group). The dominant rock type is submarine volcanoclastic grit, sandstone, and siltstone.

2.3 Landslip Description

During the heavy rain event, water flow flooded the small creek that runs along the north side of the dwelling. A landslip has occurred upslope on the south side of the creek, north of RTW-02, causing two posts of RTW-02 to be entirely undermined, with another two posts rotating outwards. Scouring behind RTW-02 has also occurred, and fill was observed in the landslip face. Tension cracking was also observed behind RTW-02 beneath the trampoline.

The land movement and large tension cracks have caused the rotation of the playhouse piles.

The location of the landslip and the extent of the damage are shown in the sketches and photographs appended to this report.



3 PROPERTY ASSESSMENT

3.1 Damage Description

The damage to the property consists of a 5.6 m wide, 2.7 m high landslip adjacent to the northern side of RTW-02, which has resulted in:

1. Evacuation of insured land;
2. Undermining and rotation of a 5.6 m length of RTW-02; and
3. Rotation of the playhouse piles.

There is observed structural damage to the playhouse. This damage consists of subsidence to the northern three piles of the playhouse, which in turn has caused the playhouse to shift to the north, rotating on all six of its piles. The identified imminent risk of ongoing ground creep due to the release of horizontal support from the land will impact the playhouse.

3.2 EQC Considerations

We consider the damage in the numbered list above to be natural disaster (landslip) damage as defined by the Earthquake Commission Act 1993 (EQC Act).

Given that the retained height of RTW-02 is greater than its embedment depth, we conclude that the embedment depth for RTW-02 was not sufficiently designed. Given that the retained height of RTW-02 is less than 1.5 m, a building consent would not have been required for this wall. This did not cause the natural disaster damage or make it worse.

3.3 Imminent Risk

Within the following 12 months (under normal annual rainfall conditions) and as a direct result of the landslip that has occurred, there is an imminent risk of regression of the landslip head scarp resulting in:

1. Evacuation of additional insured land; and
2. Further rotation of 1.4 m length of RTW-02.

The dwelling has not been damaged and is not considered to be at imminent risk as a direct result of the natural disaster (landslip) that has occurred.

The playhouse has been damaged and is considered to be at imminent risk of collapse as a direct result of the natural disaster (landslip) that has occurred. Should the imminent risk be realised, then the playhouse would likely collapse and become a total loss.

There may be a risk of landslips on adjacent slopes due to future large storm or earthquake events. However, this risk is not considered imminent within the next 12 months as a direct result of the landslip that has occurred. We recommend that the owners consider engaging a geotechnical specialist to assess the stability risk of the adjacent slopes and implement remedial work if required.



4 CONCEPTUAL REMEDIAL SOLUTION

The information in the following section is provided solely to IAG NZ Ltd for claim settlement purposes. The conceptual works are for cost estimation only, to assess the likely costs of repairing the damaged insured property and/or, the cost of preventing damage to insured property that is considered imminent as a direct result of the natural disaster that has occurred. The conceptual scope of works, and drawings, are not to be used for obtaining building consent or for construction purposes.

There may be an alternative remedial works solution that is more cost-effective or appropriate for the customer and wider property (beyond EQC-insured land). It may be possible to implement an alternative solution.

A conceptual remedial works solution that reinstates the land damage to a similar condition and/or removes imminent risk to insured property would comprise the following:

1. Prepare the area for stockpiling spoil and materials.
2. Relocate the playhouse and trampoline, and temporarily remove and store mesh wire fence and posts. Remove the six rotated playhouse piles.
3. Remove the affected retaining wall (5 posts, 5.6 m length) and dispose of it off-site.
4. Construct a timber pole retaining wall with the following dimensions and properties:
 - a. 5.6 m long wall, tied into the existing undamaged section of RTW-02.
 - b. 2.7 m maximum retained height.
 - c. Minimum pole embedment of 2.7 m, for a total pole length of 5.4 m.
 - d. 300 mm diameter H5-treated SED timber poles at 1.4 m centres.
 - e. 200 mm x 50 mm H4-treated timber lagging.
 - f. Drainage metal wrapped in A29 Bidim filter cloth (geotextile).
 - g. 110 mm diameter Novaflo drain wrapped in filter fabric connected to an existing stormwater system.
5. Install six new playhouse piles comprising 125X125 SG8 H4 treated timber piles embedded in 400W x 400L x 400 mm deep 25 MPa concrete footings, on minimum 500 mm compacted AP40 hardfill compacted with a minimum of 95% MDD in max 150mm layers (0.48 m³ total).
6. Reinstall the mesh wire fence and posts attached to the new retaining wall (required by Building Code if a person could fall more than 1.0 m).

Sketch drawings of this conceptual remedial works solution are shown in the appendices of this report. For the purpose of costing, the following table illustrates possible construction difficulties.

Construction Issues	Easy	Moderate	Hard	Comments
Construction access	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Access is available to RTW-01, however, the playhouse and trampoline between RTW-01 and RTW-02 will need to be relocated to allow for access to the top of the slip. Machinery access is not readily available to the toe of the slip.
Earthworks Required	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minimal earthwork is required, with a flat area to the southwest of RTW-01 for stockpiling spoil and materials.



Construction Issues	Easy	Moderate	Hard	Comments
Constructability/Reinstatement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Constructability will be easy with a typical design. Many contractors are capable of constructing the proposed conceptual solution.

A building consent is likely to be required due to the retained height, and a resource consent is likely to be required due to working in a waterway. These should be confirmed with the Local Authority prior to any remedial works being undertaken.

Subsurface investigation, engineering design and subsequent sign-off by a Chartered Professional Engineer (CPEng) is likely to be required as part of the building consent application. Regular inspections by a CPEng may also be necessary during the works to enable sign-off in accordance with the Building Act and the conditions of the building consent. Failure to obtain the required consents could mean that the building works have to be removed.

Considering the relative simplicity of the design and construction of the remedial solution at this property, a site survey is not required to facilitate the land remediation.

All remedial solutions should consider safety in design. Any construction works should be undertaken in a safe and appropriate manner, including the allowance for all necessary protection and temporary stabilisation works as required to ensure the safety of all persons working or present on site during construction.

We estimate the cost (excluding GST) to design and consent the proposed solution will be as follows:

- Geotechnical engineering investigation, design, and drawings. Estimated cost at \$6,000.
- Building/Resource consents. Estimated cost at \$3,500.
- Construction monitoring and Producer Statements. Estimated cost at \$3,000.
- Project management. Estimated cost at \$1,500.
- Grand total estimated cost to be \$14,000.

Considering the complexity of access to the work area, the site investigations, design, and construction monitoring fees of the remedial solution at this property may be subject to change, the above costs are indicative only.

Should the imminent risk for the landslip be realised, then the playhouse would likely collapse, changing the playhouse remedial solution to a total loss.



5 SUMMARY OF INFORMATION

Is this natural disaster damage?	Yes (Landslip)
Land within 8 m of dwelling or appurtenant structures	
Area of insured land damaged :	
Evacuated:	13.3 m ²
Inundated:	Nil
Area of insured land at imminent risk :	
Evacuation:	8.6 m ²
New inundation:	Nil
Re-inundation:	Nil
Main access way within 60 m of dwelling	N/A
Retaining Walls supporting or protecting insured buildings and/or land located within 60 m of Dwelling (or appurtenant structure)	
<u>RTW-01</u> Timber pole retaining wall – 125 mm x 125 mm square posts at 1.5 m centres:	
Whole wall length:	13.5 m
Retained height:	0.6 m (average)
Damaged (insured face area):	Nil
Imminent damage (insured face area):	Nil
Insured wall: (face area):	8.2 m ²
Total wall: (face area):	8.2 m ²
<u>RTW-02</u> Timber pole retaining wall – 125 mm x 125 mm square posts at 1.2 – 1.4 m centres:	
Whole wall length:	11.0 m
Retained height:	0.0 – 1.2m
Damaged (insured face area):	4.2 m ²
Imminent damage (insured face area):	1.7 m ²
Insured wall: (face area):	8.1 m ²
Total wall: (face area):	8.1 m ²
Dwelling and appurtenant structure(s)	
Has the dwelling or appurtenant structure been damaged as a result of the natural disaster?	Yes, playhouse piles rotated
Is damage to the dwelling (or appurtenant structure) imminent as the direct result of a natural disaster?	Collapse and total loss of playhouse should imminent risk be realised.
Services within 60 m of dwelling	N/A



Bridges or culverts situated on insured land	N/A
Conceptual Remedial Works	
Remediate damage to remove the imminent risk to insured land. Remove the affected retaining wall and dispose off-site. Construct a cantilevered timber pole retaining wall tied into the existing wall.	\$14,000 + construction costs* (excl. GST)
* To be assessed by a cost estimator	



APPENDIX I: SITE PHOTOGRAPHS



Photo 1: RTW-02, playhouse, and trampoline, looking southeast.



Photo 2: Northern elevation of RTW-02, looking southeast.

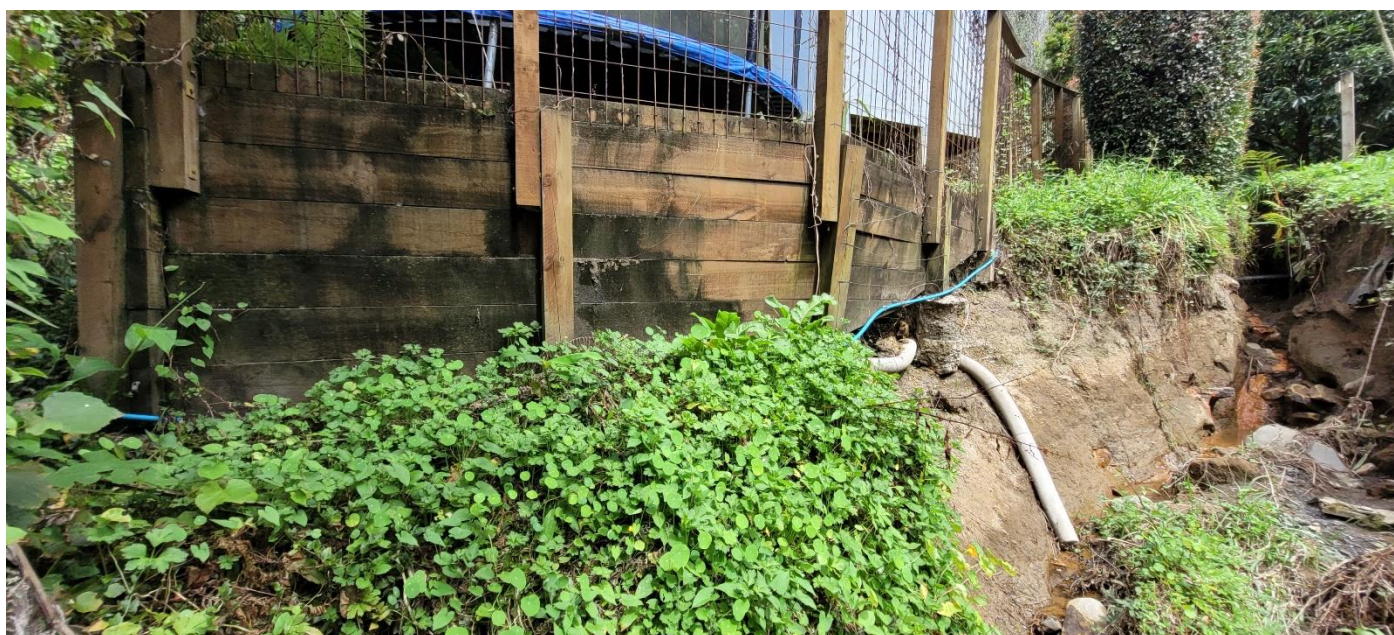


Photo 3: Rotated and undermined sections of RTW-02, looking south.



Photo 4: Undermined section of RTW-02, looking south.

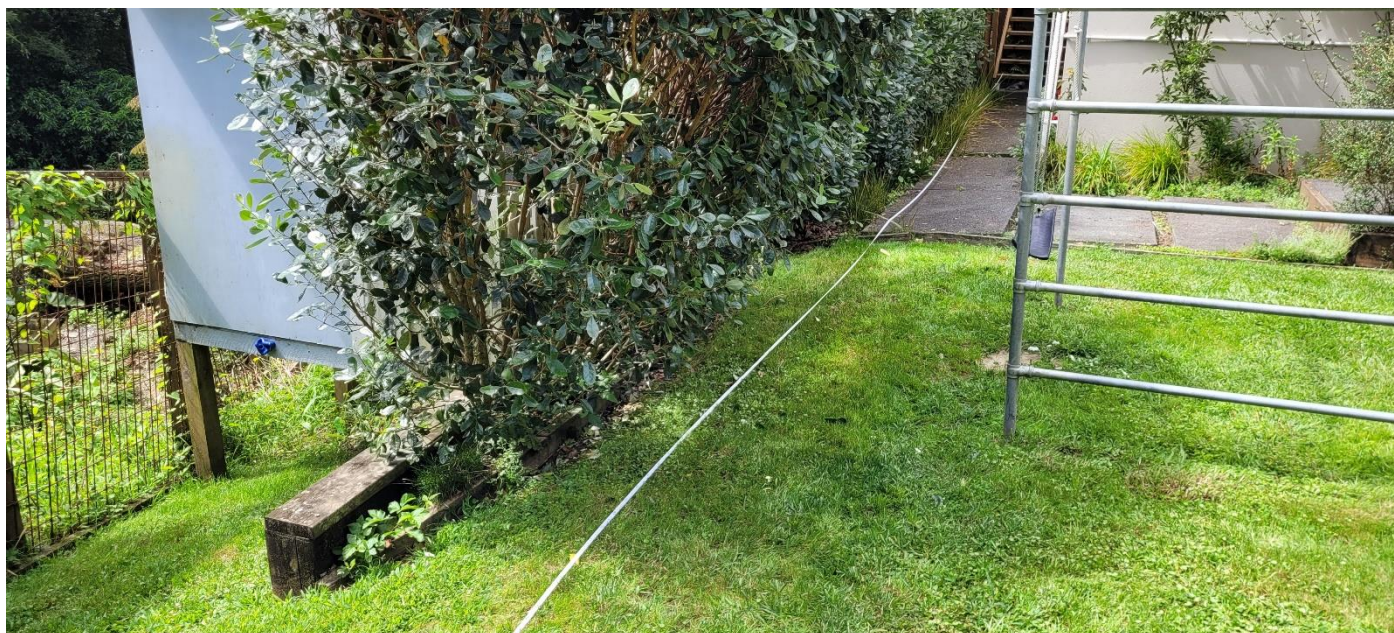


Photo 5: Looking southeast towards the playhouse and west end of RTW-01 to the north of the dwelling.



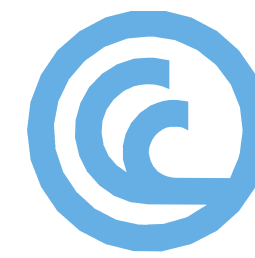
Photo 6: Looking southwest towards the east end of RTW-01.



Photo 7: Western elevation of the playhouse, looking east.

APPENDIX II: ANNOTATED AERIAL PHOTOGRAPH, DAMAGE & REMEDIAL DRAWINGS





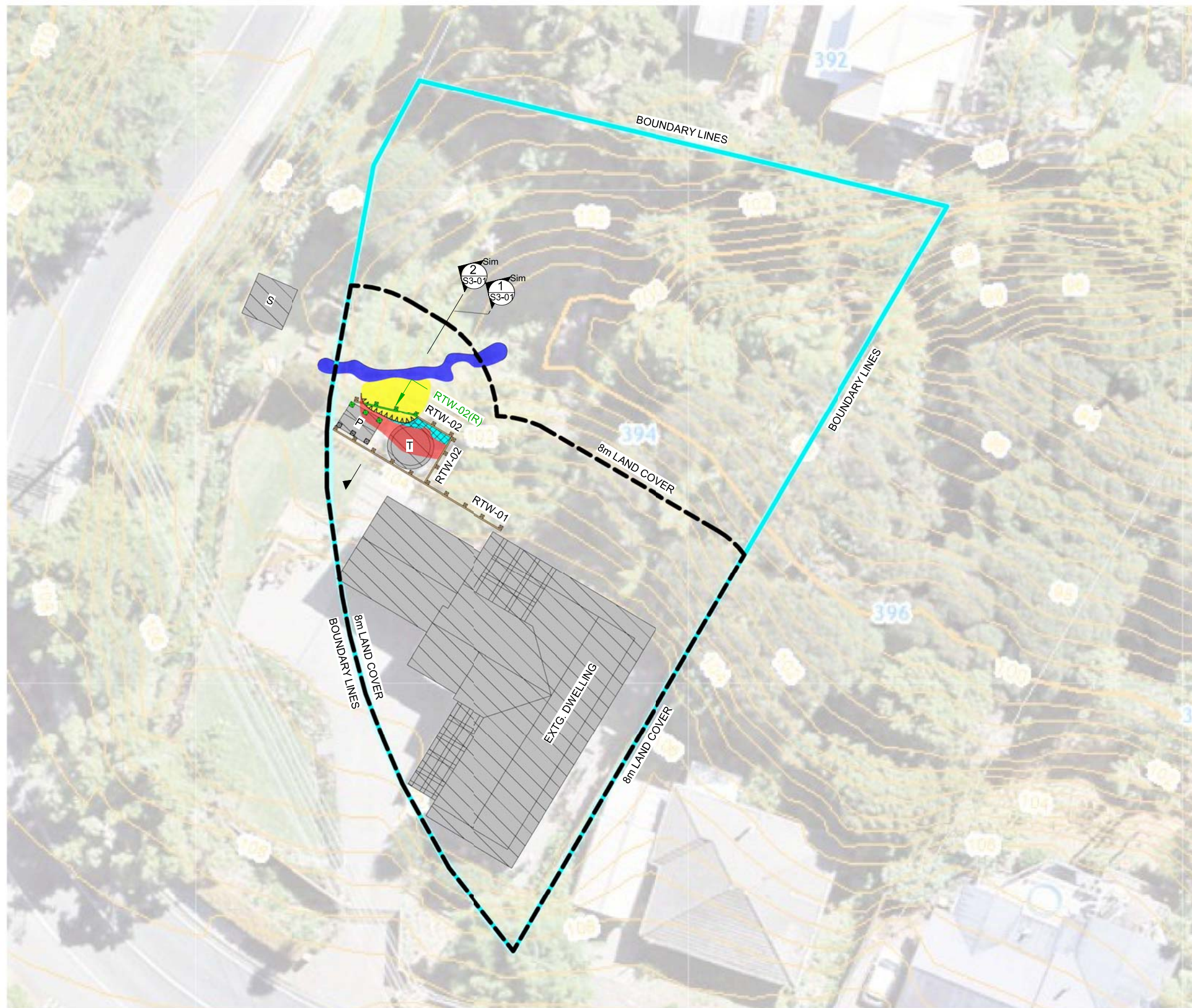
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**LANDSLIP DAMAGE AND REMEDIAL STRATEGY
394 HUIA ROAD, TITIRANGI
AUCKLAND 0604, NEW ZEALAND**

PRELIMINARY

JOB NO.: 17119-148
DATE ISSUED: 17/07/2023
REVISION: 1

CONTENTS			
SHEET	SHEET NAME	REVISION	DATE
S1-01	COVER PAGE	1	17/07/2023
S2-01	LANDSLIP DAMAGES PLAN	1	17/07/2023
S3-01	LANDSLIP DAMAGES & REMEDIAL SECTIONS	1	17/07/2023



LANDSLIP DAMAGES LEGEND	
	LAND WITHIN 8m COVER
	EXISTING SITE BOUNDARY LINES
	LANDSLIP HEADSCARP (INDICATIVE)
	EXISTING STREAM / CREEK (INDICATIVE)
	SCOUR BEHIND RTW-02(R) & RTW-02 DUE TO THE LANDSLIP (INDICATIVE)
	AREA OF EVACUATED LAND FROM THE LANDSLIP (INDICATIVE)
	AREA OF IMMINENT RISK OF FURTHER EVACUATION (INDICATIVE)
	EXISTING DWELLING UNDAMAGED FROM THE LANDSLIP, NO WORKS REQUIRED
	RTW-01: EXISTING TIMBER PILE RETAINING WALL PARALLEL TO NORTHERN SIDE OF EXISTING DWELLING, UNDAMAGED FROM THE LANDSLIP, NO REPAIRS REQUIRED
	RTW-02: EXISTING TIMBER PILE RETAINING WALL SECTIONS (TRANSITIONS TO TIMBER FENCE @ WEST END) THAT ARE UNDAMAGED FROM THE LANDSLIP, NO REPAIRS REQUIRED, ALLOW TO TIE INTO PROPOSED TIMBER POLE RETAINING WALL
	RTW-02(R): EXISTING SECTION OF THE TIMBER PILE RETAINING WALL THAT ROTATED FROM LANDSLIP SOIL EVACUATION AND SCOUR (BEHIND), WALL INTEGRITY HAS SINCE BEEN COMPROMISED AND REQUIRES A PROPOSED REMEDIAL WALL
	T: EXISTING TRAMPOLINE UNDAMAGED FROM THE LANDSLIP, NO REPAIRS REQUIRED
	S: EXISTING SHED OUTSIDE OF THE PROPERTY BOUNDARY LINES
	P: EXISTING PLAYHOUSE FOUNDED ON TIMBER PILES. THE NORTHERN 3 PILES (SHADED GREEN) SUSTAINED LANDSLIP DAMAGES AND IS TILTING. ALLOW TO PROP, REMOVE AND REPLACE THE DAMAGED PILES, REINSTATE AND MAKE GOOD



NOTE: THIS DRAWING SET PROVIDES INDICATIVE INFORMATION ONLY AND SHOULD NOT BE RELIED UPON FOR EXACT DIMENSIONS OR SCALED FROM. ALL MEASUREMENTS ILLUSTRATED ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE PRIOR

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A LANDSLIP DAMAGES PLAN
1 : 300

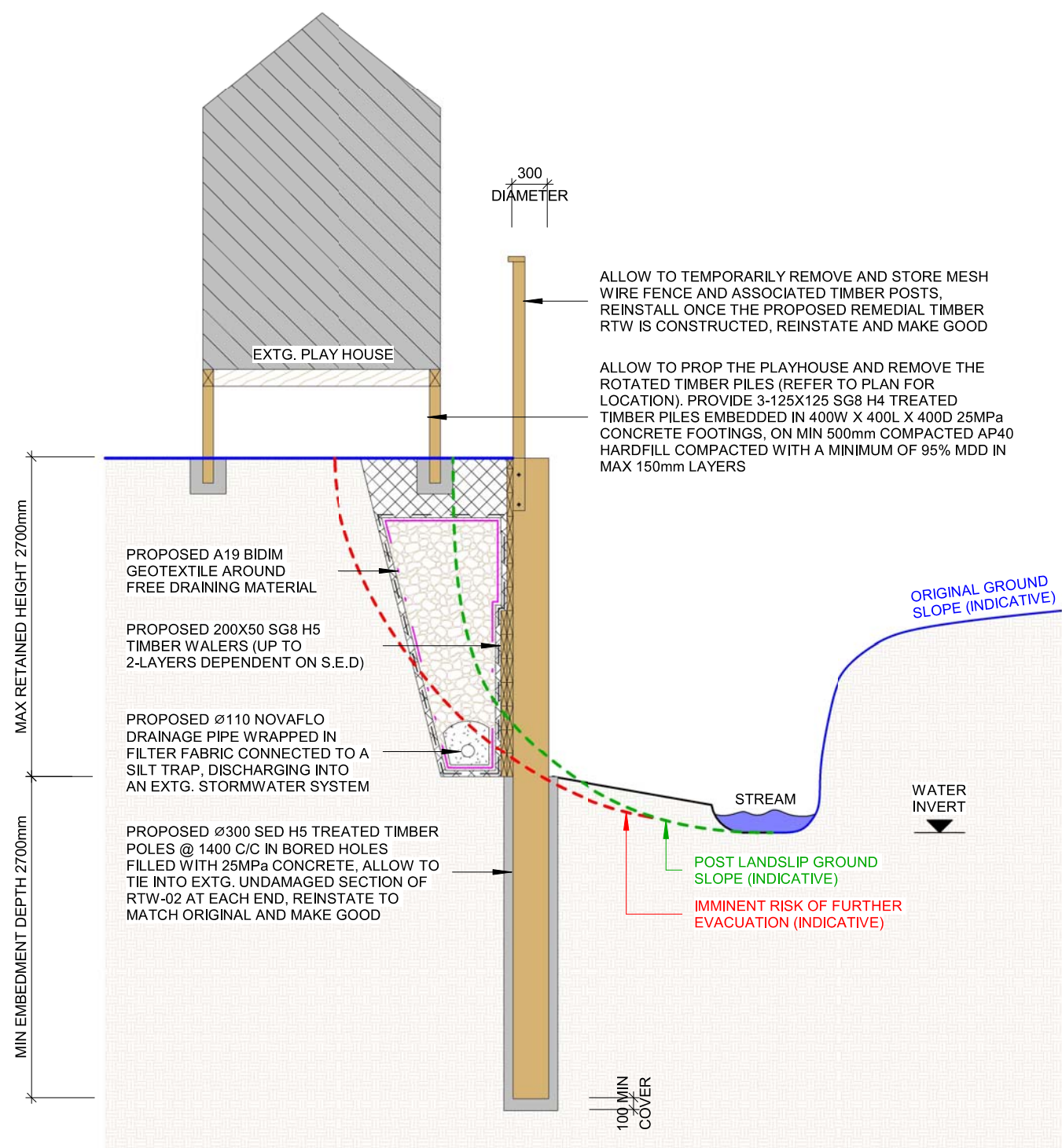


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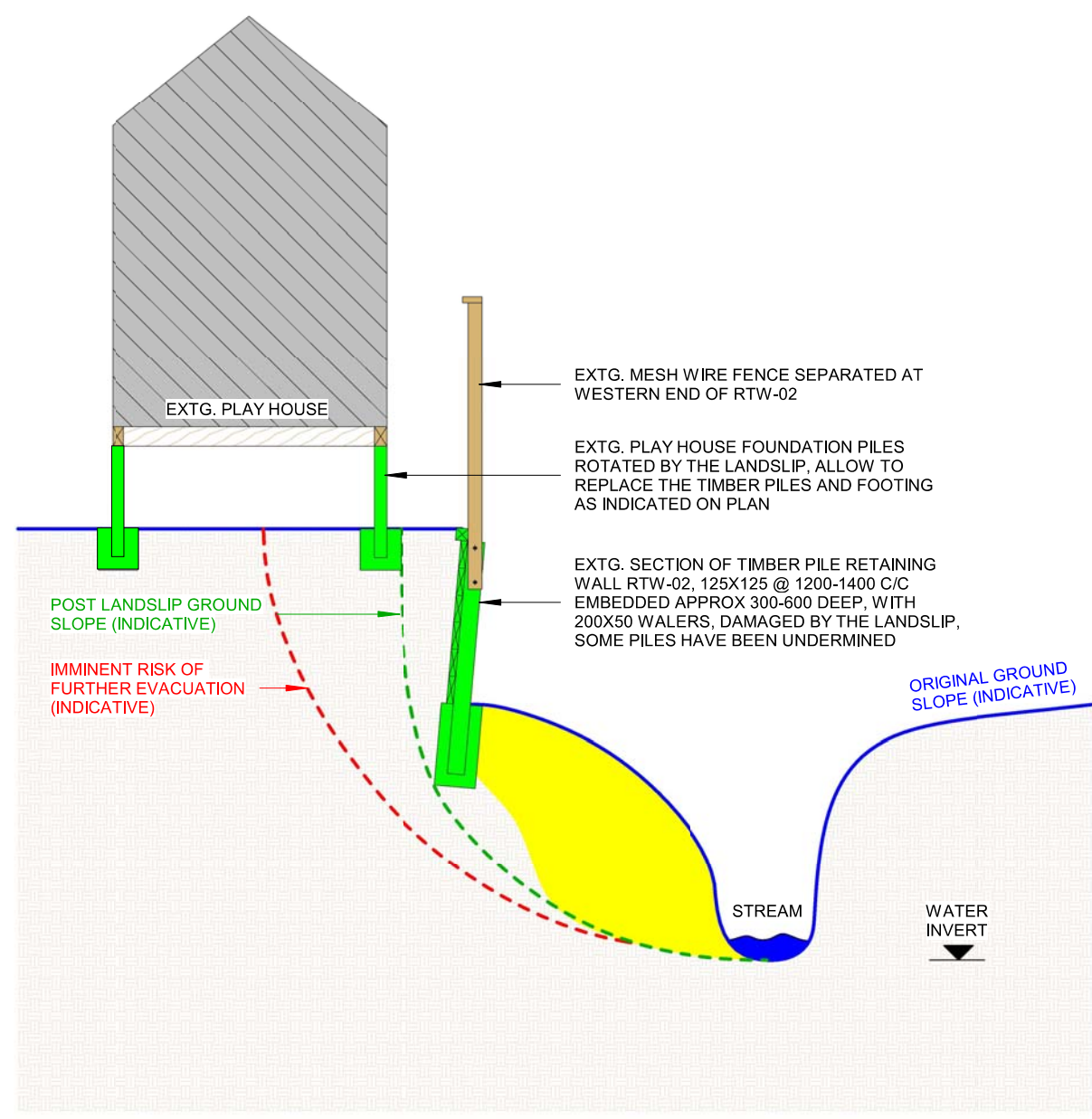
PROJECT DETAILS	
LANDSLIP DAMAGE AND REMEDIAL STRATEGY 394 HUIA ROAD, TITIRANGI AUCKLAND 0604, NEW ZEALAND	

TITLE	
LANDSLIP DAMAGES PLAN	

DATE CREATED	DRAWN	DESIGNED	CHECKED	APPROVED
17/07/2023	JX	RV	RV	RV
CCL REF NO	SCALE	STATUS		
17119-148	As indicated @ A3	PRELIMINARY		
DWG NUMBER	REVISION			
S2-01	1			



2 LANDSLIP REMEDIATION SECTION
S2-01 1 : 50



1 LANDSLIP DAMAGE SECTION
S2-01 1 : 50

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PRELIMINARY



REV	REVISION DETAILS	DRWN	APP.	DATE
1	PRELIMINARY	JX	RV	17/07/2023

PROJECT DETAILS	
LANDSLIP DAMAGE AND REMEDIAL STRATEGY 394 HUIA ROAD, TITIRANGI AUCKLAND 0604, NEW ZEALAND	

TITLE
LANDSLIP DAMAGES & REMEDIAL SECTIONS

DATE CREATED	DRAWN	DESIGNED	CHECKED	APPROVED
17/07/2023	JX	RV	RV	RV
CCL REF NO	SCALE	STATUS		
17119-148	As indicated @ A3	PRELIMINARY		
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S3-01	1			