Geotechnical Investigation Report

Proposed Dwelling

594 Koutu Loop Road, Koutu Point

Lot 6, Deposited Plan 546669

For

First Homes NZ

Haigh Workman reference 22 128

August 2022

Phone: +64 9 407 8327 • Fax: +64 9 407 8378 • info@haighworkman.co.nz • www.haighworkman.co.nz

PO Box 89 • 6 Fairway Drive • Kerikeri 0245 • New Zealand

Revision History

Revision Nº	Issued By	Description	Date
A	John Power	First Issue	August 2022

Prepared By	Reviewed By	Approved By
John Power	Wayne Thorburn	John Papesch
Geologist Member NZGS	Senior Geotechnical Engineer CPEng, CMEngNZ	Director CPEng, CMEngNZ

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Executive Summary

Haigh Workman Limited (Haigh Workman) were engaged by First Homes NZ (the Client) to undertake a geotechnical investigation at 594 Koutu Loop Road, Koutu Point (Lot 6, DP 546669). Concept drawings for the proposed development have been provided by the client. Based on the concept drawings, we understand that the client intends to place a relocatable dwelling on the site and that the dwelling will be supported on concrete encased post foundations.

The soils directly underlying the site comprise natural soils of the Karioitahi Group. The soils were generally described as being very stiff, silt soils. Groundwater was measured shortly after completion of drilling with groundwater recorded in all three boreholes at depths of between 0.8mbgl (BH01) and 1.6mbgl (BH03). Groundwater levels can and do fluctuate and higher groundwater levels may be encountered following periods of prolonged or heavy rainfall.

Based on our findings, we consider the natural ground conditions are expected to be consistent across the proposed development area and are considered suitable for supporting foundations subject to ground verification during construction. Foundation recommendations are outlined in Section 5 of this Report with construction recommendations outlined within Section 6.

Foundations can be designed using an ultimate bearing capacity of 300kpa and a geotechnical reduction factor of 0.5. Shallow concrete encased timber post foundations can be designed in accordance with NZS3604:2011 and subject to the recommendations herein, provided a minimum embedment depth of 800mm is adopted.

Provision should be allowed for modifying the foundation solution at this time should unforeseen ground conditions be encountered.

1 Introduction

1.1 Project Brief and Scope

Haigh Workman Ltd (Haigh Workman) has been commissioned by First Homes NZ (the Client) to undertake a geotechnical investigation for a proposed dwelling at 594 Koutu Loop Road, Koutu Point (Lot 6 DP 546669). This report presents the information gathered during the site investigation, interpretation of data obtained and site-specific geotechnical recommendations relevant to the site.

The scope of this report encompasses the geotechnical suitability in the context of the proposed development as defined in the Short Form Agreement dated 01 August 2022. This appraisal has been designed to assess the subsoil conditions for foundation design and identify geotechnical constraints for the proposed development.

This report provides the following:

- A summary of the published geology with reference to the geotechnical investigations undertaken.
- Analysis of the data obtained from site investigations, providing a geotechnical ground model.
- Foundation recommendations.
- Provide comment on ground stability and.
- Identification of any additional geotechnical risks and/or hazards.

1.2 Proposed Development

Concept drawings for the proposed development have been provided to us by the client. Based on the concept drawings, we understand that the client intends to develop the site with the addition of a relocatable dwelling with a footprint of 60m² (approx.) on the site. We envisage that the relocatable dwelling will comprise a lightweight structure with a suspended timber floor supported on concrete encased post foundations. We understand that the proposed dwelling will be located on generally flat ground within the northern third of the subject property, refer Drawing 22 128/01 & 02. No significant earthworks are anticipated for the proposed development other than foundation excavations.

This geotechnical investigation and report considers the geotechnical aspects of the proposed development, with particular reference to the proposed development location, (refer Drawing 22 128/02, Appendix A).

Should the proposed development vary from the proposal described above and/or be relocated outside of the investigated area, further investigation and/or amendments to the recommendations made in this report may be required.

Figure 1 - Site Location

1.3 Site Description

The property is legally described as Lot 6, Deposited Plan 546669 with a total land area of 8,163m². The subject property is approximately rectangular in plan shape, elongated northeast to southwest and comprises an upper terrace across the northeast third of the property with a lower terrace to the southwest. Moderate to steep (5° to 17°) southwest facing slopes connect the upper and lower terraces. The property comprises an undeveloped residential Lot that is currently grassed.

We understand that the proposed relocatable dwelling will be located on the generally flat upper terrace with access gained from a yet to be formed driveway that will extend to the proposed dwelling location from the northeast corner of the property. A newly formed private Road (Dune Rise) extends to the northeast from Koupu Loop Road, providing vehicle access to the subdivision and the subject site. An open stormwater drain flows from southeast to northeast across the lower terrace with an existing culvert and bridge crossing the open drain, providing access to the lower southwest part of the site. The property is bordered to the northeast and southwest by undeveloped residential Lots, to the southwest by undeveloped rural block and to the northeast by Dune Rise and developed residential Lots.

At the time of our site investigation, the surface conditions were generally wet to saturated with some shallow ponding observed in minor depressions across the grassed Lot.

2 Geology

2.1 Published Geology

Sources of Information:

- Institute of Geological & Nuclear Sciences, 1:250,000 Scale, Geological Map 1, 1996: "*Geology of the Kaitaia Area*".
- NZMS 290 Sheet O 06/07, 1: 100,000 scale, 1980: "Waipoua-Aranga" (Soils)*",*
- NZMS 290 Sheet O 06/07, 1: 100,000 scale, 1982: "Waipoua-Aranga" (Rock Types)*".*

The site is within the bounds of the GNS Geological Map 1 "Geology of the Kaitaia area", 1:250,000 scale*. The published geology shows the site to be located near a geological boundary with the subject site underlain by soils of the Karioitahi Group (eQa) with soils of the Whangai Formation (Northland Allochthon) to the east of the site. The Karioitahi Group soils comprise partly consolidated sand, mud and peat or lignite of estuarine, lacustrine, swamp, alluvial and colluvial origins. The Karioitahi Group is of Pleistocene age. To the east, the Whangai Formation (Kkw) comprises dark grey, white weathering, siliceous and calcareous mudstone. Minor thin-bedded micritic limestone. Minor black carbonaceous shale (Waipawa Black Shale). The Whangai Formation is of Late Cretaceous to Early Paleocene age.

An exert of the geological map is shown in Figure 2 below, with geological units presented in Table 1 below.

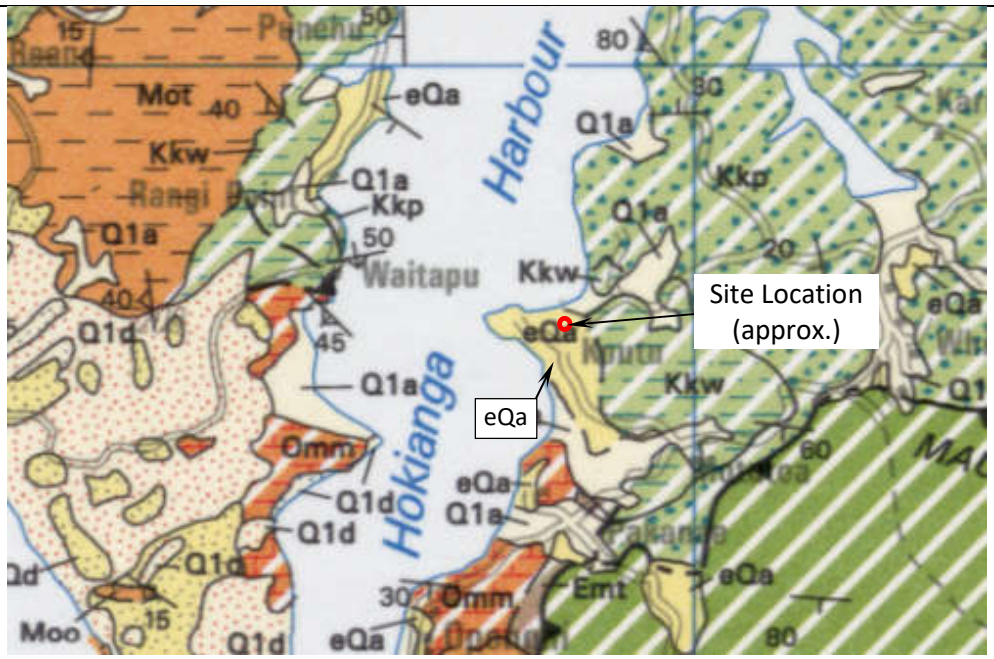

Figure 2 - Geological Map (Kaitaia area, 1:250,000)

* Isaac, M.J. (compiler) 1996. Geology of the Kaitaia area. Institute of Geological and Nuclear Sciences 1:250 000 geological map 1.

Table 1 - Geological Legend

Symbol	Unit Name	Description
eQa	Karioitahi Group	Partly consolidated sand, mud and peat or lignite of estuarine, lacustrine, swamp, alluvial and colluvial origins. Pleistocene age.
Kkw	Whangai Formation (Northland Allochthon)	Dark grey, white weathering, siliceous and calcareous mudstone. Minor thin-bedded micritic limestone. Minor black carbonaceous shale (Waipawa Black Shale). Late Cretaceous to Early Paleocene age.
Q1a	Karioitahi Group	Unconsolidated to poorly consolidated sand, mud, peat and shell deposits of estuarine, lacustrine, swamp, alluvial and colluvial origins. Pleistocene to Holocene age.

Further reference to the published New Zealand land inventory maps (Waipoua-Aranga), indicates the site is underlain by *'soils of the undulating terraces and lowlands, imperfectly to very poorly drained Kara clay (KRe) and Kara silt loam (KR)'.*

3 Ground Investigations

3.1 Subsurface Investigations

Haigh Workman undertook geotechnical investigations on 02 August 2022. The investigations comprised the drilling of three hand auger boreholes (BH01 to BH03), located across the approximate proposed dwelling location. Hand auger boreholes were undertaken to a maximum depth of 1.9 metres below ground level (mbgl). Vane shear tests were undertaken at regular intervals during the advancement o the hand auger boreholes with all vane shear tests recorded as unable to penetrate (UTP). Unsuccessful tests where soils ae too stiff to penetrate with the shear vane are recorded as UTP and are inferred to represent soils with vane shear strengths in excess of 100kPa.

Where required, Scala penetrometer testing was undertaken during the advancement of the boreholes to 'punch' through very stiff to hard material with further over drilling by hand auger at the completion of the Scala penetrometer testing. An additional Scala penetrometer test was undertaken adjacent BH01 with the test undertaken from existing ground surface to a maximum depth of 1.3m, where effective refusal of the Scala penetrometer was met. Refusal of the Scala penetrometer test was recorded adjacent BH01 with blow counts at 1.3mbgl exceeding 20 blows per 50mm of penetration with the Scala penetrometer "bouncing", indicative of very stiff to hard material. Scala penetrometer tests were undertaken in order to determine an in-situ density within the soils encountered.

Investigations were logged in accordance with The New Zealand Geotechnical Society, "Guidelines for the Field Classification and Description of Soil and Rock for Engineering Purposes" (2005). Investigation locations are shown on the drawings in Appendix A and investigation hand auger logs with Scala penetrometer test results included within Appendix B.

3.2 Ground Conditions

Based on the results of the geotechnical investigation conducted by Haigh Workman and review of published geological maps, it is considered that the soils directly underlying the site comprise natural soils of the Karioitahi Group (eQa). All three boreholes encountered natural Karioitahi Group soils below a thin (0.2m to 0.3m) veneer of topsoil. For the purposes of this report, subsoil conditions on the site have been interpolated between the boreholes and some variation between borehole positions are likely. Table 2 summarises the materials encountered, with depth to base of each unit provided.

Table 2 - Summary of Borehole Results

Borehole Number	Topsoil (mbgl)	Karioitahi Group Soils (mbgl)	Scala Penetrometer (mbgl)	Groundwater Observations
BH01	0.0 to 0.3	0.3 to >1.8	1.2 to 1.35, 1.5 to 1.6 & 1.6 to 1.8	Groundwater measured at completion of drilling at 0.8mbgl.
SP01 (Adjacent BH01)	NA	NA	0.0 to 1.3 (refusal)	NA
BH02	0.0 to 0.2	0.2 to >1.8	1.5 to 1.65, 1.65 to 1.7 & 1.7 to 1.8	Groundwater measured at completion of drilling at 1.4mbgl
BH03	0.0 to 0.2	0.2 to >1.9	1.4 to 1.75 & 1.8 to 1.95	Groundwater measured at completion of drilling at 1.6mbgl.

Note - Depths measured from existing ground surface level.

NA – Not Applicable

3.2.1 *Topsoil*

A thin veneer of topsoil was encountered within all boreholes to a depth of between 0.2 and 0.3mbgl. The topsoil comprised a soft, dark brown silt that was generally saturated with no plasticity and fibrous organic content (rootlets). The topsoil was generally saturated as a result of recent heavy rains and an apparent low permeable soil horizon below the topsoil veneer.

3.2.2 *Karioitahi Group*

Karioitahi Group soils were encountered within all three boreholes and were generally consistent across the proposed development area. The soils were generally described as a very stiff, dark brown, greyish brown and grey, becoming light brown, light grey to light greenish grey with increasing depth that was mottled and dark brown to light orange and orange. The soils were further described as dry to moist and of having no to low plasticity with trace to minor clay and trace fine sand to fine gravel content. Scale penetrometer testing undertaken during the advancement of the hand auger boreholes and adjacent borehole BH01 indicated the soils typically below 1.0m depth were very stiff to hard with blow counts of between greater than 10 blows per 100mm of penetration with lenses of very dense granular material returning blow counts of >20 per 100mm below 1.3m to 1.8mbgl.

Refusal of the Scala penetrometer test was recorded adjacent BH01 with blow counts exceeding 20 blows per 50mm of penetration with the Scala penetrometer "bouncing", indicative of very stiff to hard material. Recorded Scala penetrometer test results are shown on the appended borehole logs within Appendix B.

The ground surface across the proposed development area and nearby slopes was determined by a tape and clinometer survey. The geological cross section shows the ground conditions across the investigation area to be relatively consistent, i.e., natural soils of the Karioitahi Group below a veneer of topsoil. The geological cross section is included within Appendix A.

3.2.3 *Groundwater*

Groundwater was measured shortly after completion of drilling with groundwater recorded in all three boreholes at depths of between 0.8mbgl (BH01) and 1.6mbgl (BH03). Soil moisture observations were recorded with soil moisture conditions generally being dry to moist throughout the soil column, below a veneer of saturated topsoil. It is considered that groundwater levels will not have had sufficient time to reach equilibrium, i.e., the fine grained, very stiff soils have low permeability, and it may take several days for the groundwater level to equalise. It is also considered possible that the overlying saturated topsoil veneer may have added to the apparent groundwater level, with saturated topsoil "draining" into the open hand auger boreholes. Measured groundwater levels can be expected to change after the effects of ground investigations have dissipated, i.e., water levels may reduce over time. At the time of drilling, surface conditions were wet to saturated. Groundwater levels can and do fluctuate and higher groundwater levels may be encountered following periods of prolonged or heavy rainfall.

4 Slope Stability Assessment

4.1 Visual Assessment

Topography across the proposed development areas was generally flat with slope angles of less than 1° recorded. No ground instability or soil creep was observed around the proposed development area during the walkover survey. To the southwest of the proposed development area, the ground contour descends to the southwest some 7m to 8m to the lower terrace, with slope angles of between 14° to 17° recorded across the grassed slopes. No evidence of soil creep or slope instability was observed across the moderately steep slopes.

Provided the proposed development location remains as per the concept drawings and that all proposed structures are located more than 10.0m from the crest of the moderately steep southwest slopes, it is considered that there is currently no risk to the proposed development from future potential instability of the southwest facing slopes. It is considered that at present, the existing site and the proposed development location is currently stable and suitable for development.

5 Foundation Recommendations

5.1 General

Based on the concept drawings, we understand that the proposed dwelling will comprise a relocatable dwelling of light weight construction with a suspended timber floor supported on concrete encased timber post foundations. Haigh Workman are not aware of any planned earthworks, i.e., cutting to create a level building platform and or building any retaining walls as part of the proposed development. No significant earthworks are anticipated as part of the proposed development other than those required for foundation excavations. Foundation recommendations for the proposed dwelling are based on the existing site topography only.

Based on our findings, we consider the natural ground conditions are expected to be consistent across the proposed development area and are considered suitable for supporting foundations subject to ground verification during construction.

5.2 Shrink Swell Soil Characteristics

The natural, fine grained cohesive soils of the Karioitahi Group are considered susceptible to swelling and shrinking under seasonal variations of water content. For the purposes of design, the site may be designated as moderately reactive (Class M) in accordance with AS2870:2011.

5.3 Seismic Site Subsoil Category

The site comprises fine grained cohesive soils of the Karioitahi Group. The site conditions have been assessed to be consistent with seismic subsoil Class C (shallow soil site) in accordance with NZS1170.5.

5.4 Shallow Foundations

Ground investigations across the proposed development area identified that the subsoils are suitable for supporting foundations subject to ground verification. We recommend that foundations comprise post foundations that are taken to found into very stiff natural soils. We recommend a minimum embedment for all concrete encased timber pole foundations of 800mm below existing ground level.

We recommend that all post holes are subject to verification by a geotechnical engineer at the time of drilling to confirm that posts holes are terminating within very stiff natural soils. All post holes should be inspected by a suitable qualified engineer prior to placement of posts and concrete. Shallow concrete encased timber post foundations can be designed in accordance with NZS3604:2011.

Foundations can be designed using an ultimate bearing capacity of 300kpa and a geotechnical reduction factor of 0.5. The foundations should be founded into natural in-situ, very stiff soils and may be designed as follows:

- Ultimate bearing capacity of 300kPa.
- Minimum concrete encased timber post embedment of 800mm below cleared ground level for standard and braced post in accordance with NZS3604:2011.

- Minimum concrete encased timber post embedment of 900mm below cleared ground level for anchor posts in accordance with NZS3604:2011.
- Seismic class – Site Class C (Shallow soil site).

Bearing capacity values included in this report are for vertical loads only and do not take into account horizontal shear or moment.

6 Construction

6.1 Earthworks

At the time of writing, no earthworks plans were available for the proposed development. We envisage that the proposed relocatable dwelling will be located over the existing topography with no significant earthworks other than foundation excavations being undertaken.

Should any cuts or excavations be intended as part of the proposed development, then we recommend that any cut faces greater than 1.0m high be supported by an appropriately designed retaining wall. If cut faces less than 1.0m high are intended, then any such cut face shall be battered back to a sustainable slope angle, therefore eliminating the requirement for retaining structures. We recommend that batter slope angles not exceed 1V:3H (18 degrees). All retaining walls shall be designed by a Chartered Professional Engineer familiar with soil mechanics, geology of the area and recommendations of this report. Design of retaining walls is not within the scope of this report. However, we recommend that no earthworks are undertaken except for foundation excavations without further engineering advice being sought.

Groundwater levels were measured at between 0.8m and 1.6mbgl during our investigations. We envisage that groundwater levels could be generally shallow, especially during periods of extended or heavy rainfall. We recommend that excavations be kept to a minimum and that only excavations required for installation of services and for foundation excavations. We recommend that any intended earthworks, including foundation excavations be undertaken during drier periods when groundwater levels are expected to be low.

6.2 Construction Observations

Specific engineering inspections of building platform preparation and/or foundation construction with certification by a Producer Statement, PS4, are often required by Council and outlined in the Building Consent documents. These observations are generally required to ensure that the foundation soils exposed at the time of construction are consistent with the assumptions made in this geotechnical report.

We consider the following specific items, but not limited to will need to be addressed prior to and at the time of construction to ensure the foundation soils are consistent with the assumptions made in this geotechnical report:

1. Geotechnical drawing review to confirm the foundation design is as per the geotechnical recommendations.

2. Observe the ground conditions within foundation excavations prior to pouring of concrete and ensure foundations are founded into very stiff natural soils.

Provision should be allowed for modifying the foundation solution at this time should unforeseen ground conditions be encountered.

We are able to carry out the engineering inspections and provide the PS4 documentation if required. Should any required inspections not be completed, then any required PS4 documentation may not be obtained for the work which may result in a Code Compliance Certificate being withheld. We strongly recommend that all required inspections as stated on the Building Consent inspections are undertaken by a suitable qualified engineer. Prior notification of at least 48 hours ahead of any site inspection is appreciated

6.3 Filling

We recommend that filling be avoided. Should any filling be proposed, then we recommend that a detailed settlement analysis be undertaken prior to the placement of any proposed fill. No filling around the foundation posts should be undertaken as this could result in negative skin friction/down drag on the foundation posts. Further advice should be sought if filling is required.

6.4 Retaining Walls

It is our understanding that no retaining walls are to be constructed as part of this development. Should retaining walls be proposed, then all retaining walls should be designed by a Chartered Professional Engineer who is familiar with the contents of this report.

6.5 Services

At the time of writing, no known underground services cross beneath the proposed development area. We recommend that any new services are accurately located on site and the depth to invert be determined prior to the commencement of foundation excavations.

6.6 Planned Vegetation

The foundation designer and architect must take into account the proximity of trees when preparing designs as trees can exacerbate the normal seasonal variation of soil moisture levels and associated with that, the vertical and horizontal movement of the founding soils. Further, mechanical interference with foundations by tree roots should be considered.

6.7 Stormwater Disposal

Stormwater shall be piped well away from any proposed building platform to avoid over saturation of the subsoils. All stormwater overflow drainages should be well channelled away from the development area to be disposed of in a controlled and dispersive manner, preferably into the existing open drainage channel to the southwest of the proposed development area.

7 Limitations

This report has been prepared for the use of First Homes NZ with respect to the particular brief outlined to us. This report is to be used by our Client and their Consultants and may be relied upon when considering geotechnical advice.

Furthermore, this report may be utilised in the preparation of building and/or resource consent applications with local authorities. The information and opinions contained within this report shall not be used in other context for any other purpose without prior review and agreement by Haigh Workman Ltd.

The recommendations given in this report are based on site data from discrete locations. Inferences about the subsoil conditions away from the test locations have been made but cannot be guaranteed. We have inferred an appropriate geotechnical model that can be applied for our analyses. However, variations in ground conditions from those described in this report could exist across the site. Should conditions encountered differ to those outlined in this report we ask that we be given the opportunity to review the continued applicability of our recommendations. Furthermore, should any changes be made, we must be allowed to review the new development proposal to ensure that the recommendations of this report remain valid.

Appendix A – Drawings

Drawing No.	Title	Scale
22 128/01	Site Location Plan	1:5000@ A3
22 128/02	Site Features and Investigation Plan	1:200 @ A3
22 128/03	Geological Cross Section A-A’	1:200 @ A3

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

Issue	Date	Revision
A	04/08/2022	FIRST ISSUE

DWG: Site Location Plan

Scale 1:5000 @A3 | Date 04 August 2022

Drawn CN | Checked WT | Approved JP

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HAIGH WORKMAN LTD
Civil & Structural Engineers

6 Fairway Drive
Kerikeri, BOI

T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

Project: Geotechnical Investigation
594 Koutu Loop Road, Koutu Point (Lot 6 DP 546669)

Client: First Homes NZ

Project No. 22 128 | RC no. N/A

DWG No. **G01**

Sheet No. **1** of **2**

Plotted By Craig Nelder at 4/08/2022 10:56:50 AM

NOTES:

1. LOT BOUNDARIES AND AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).
2. LOCATIONS HAVE NOT BEEN SURVEYED AND ARE INDICATIVE ONLY.
3. DRAWING OVERLAY & BUILDING LOCATIONS PROVIDED BY FIRSTHOMES. REFER DRAWING 22 128/04 APPENDED.

Issue	Date	Revision
A	04/08/2022	FIRST ISSUE

DWG: Site Features & Investigation Plan

Scale 1:200 @A3 | Date 04 August 2022

Drawn CN | Checked WT | Approved JP

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HAIGH WORKMAN LTD
Civil & Structural Engineers

6 Fairway Drive
Kerikeri, BOI

T: 09 407 8327
F: 09 407 8378
E: info@haighworkman.co.nz

Project: Geotechnical Investigation
594 Koutu Loop Road, Koutu Point (Lot 6 DP 546669)

Client: First Homes NZ

Project No. 22 128 | RC no. N/A

DWG No. **G02**

Sheet No. **2** of **2**

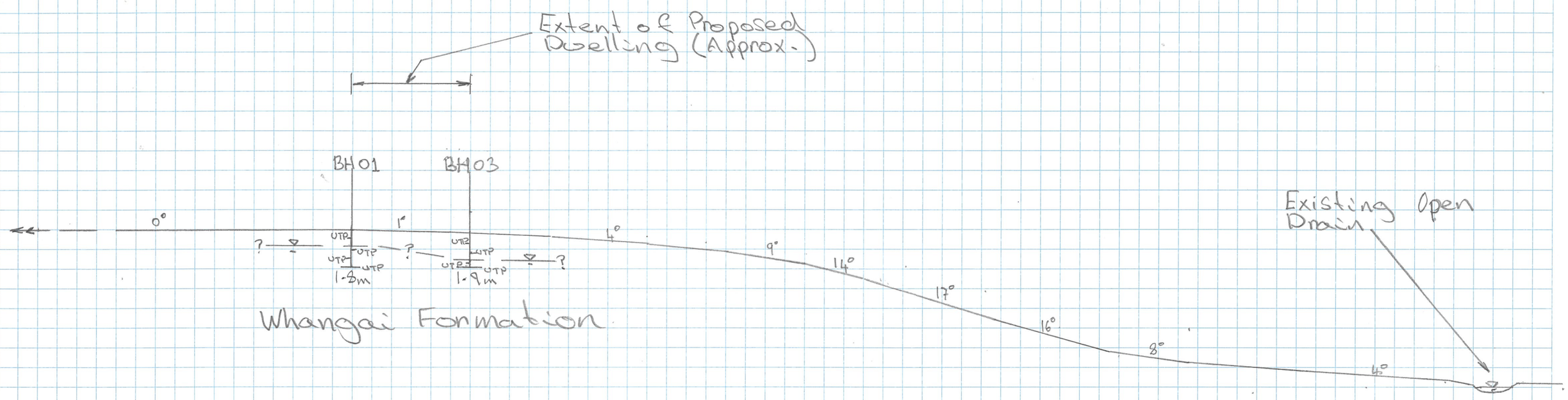
Plotted By Craig Nelder at 4/08/2022 10:56:53 AM

Geological Cross Section A-A'

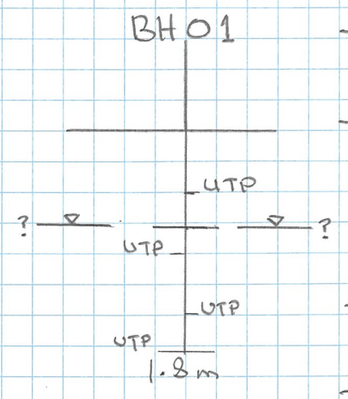
594 Kouta Loop Road, Kouta Point (Lot 6, DP546669)

A — Northeast

A' — Southwest



Legend



- Borhole Name
- Existing Ground Level
- Measured Groundwater Level
- Vane Shear Strength (kPa) (UTP = Unable to Penetrate)
- Borehole Depth (m)

Scale.	1:200
Drawing No.	22128/03
Job No.	22128

Appendix B – Hand Auger Logs

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

HAIGH WORKMAN LTD
Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH01

Hole Location: Refer to Site Plan

JOB No. 22 128

CLIENT:	First Homes Ltd	**SITE:**	594 Koutu Loop Road, Kouto Point (Lot 6 DP 546669)		
Date Started:	02/08/2022	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JP
Date Completed:	02/08/2022	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description
Based on NZGS Logging Guidelines 2005

SILT; dark brown. Soft, saturated, no plasticity. Rootlets. [Topsoil]

From 0.2m: Minor fine sand.

SILT, minor fine sand; grey, mottled dark brown to black. Very stiff, moist to wet, no plasticity. [Karioitahi Group]

Frtom 0.4m: Minor amorphous organics, black. Dry.

SILT, trace clay; light brown to light greenish brown, streaked and mottled dark brown. Very stiff, dry to moist, no plasticity.

SILT, trace fine gravel; light grey to light greenish grey. Very stiff, dry to moist, no plasticity. Gravel: weakly cemented.

SILT, trace clay; light grey to light greenish grey, streaked orange. Very stiff, moist, low plasticity.

From 1.7m: Becomes light grey to grey, streaked orange.

End of Hole at 1.8m (Unable To Penetrate)

Scala penetrometer used down auger hole to 'punch' through very stiff material at 1.2m to 1.35m, 1.5m to 1.6m & 1.6m to 1.8m.

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: T.S. / KARIOITAHI GROUP

Graphic Log

Water Level: Groundwater Measured at 0.8m

Sensitivity

Vane Shear and Remoulded Vane Shear Strengths (kPa): UTP, UTP, UTP, UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20 25

LEGEND

TOPSOIL, CLAY, SILT, SAND, GRAVEL, FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing undertaken from 0.0m to 1.3m adjacent hand auger borehole.
Hand Held Shear Vane S/N: DR1617. Groundwater measured at 0.8mbgl at completion of drilling.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

HAIGH WORKMAN LTD
Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH02

Hole Location: Refer to Site Plan

JOB No. 22 128

CLIENT:	First Homes Ltd	**SITE:**	594 Koutu Loop Road, Kouto Point (Lot 6 DP 546669)		
Date Started:	02/08/2022	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JP
Date Completed:	02/08/2022	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description
Based on NZGS Logging Guidelines 2005

SILT; dark brown. Soft, saturated, no plasticity. Rootlets. [Topsoil]

SILT, trace fine sand; dark brown to dark greyish brown. Firm, wet to saturated, no plasdticity. Rootlets. [Karioitahi Group]

SILT; light brown, streaked dark brown. Very stiff, dry to moist, no plasticity.

From 0.6m: Becomes light brown and light grey. Dry.

SILT, trace fine gravel; light grey to whitish grey, streaked light orange. Very stiff, dry, no plasticity. Gravel: weakly cemented.

From 1.2m: Becomes light grey to light greenish grey.

SILT, minor clay; light grey, streaked light orange. Very stiff, dry to moist, low plasticity.

SILT, trace clay; light grey. Very stiff, no plasticity.

End of Hole at 1.8m (Unable To Penetrate)

Scala penetrometer used down auger hole to 'punch' through very stiff material at 1.5m to 1.65m, 1.65m to 1.7m & 1.7m to 1.8m.

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: T.S. / KARIOITAHI GROUP

Water Level: Groundwater Measured at 1.4m

Vane Shear and Remoulded Vane Shear Strengths (kPa): UTP, UTP, UTP, UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20 25

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing undertaken down hole to 'punch' thriough very stiff material.
Hand Held Shear Vane S/N: DR1617. Groundwater measured at 1.4mbgl at completion of drilling.

PO Box 89, 0245
6 Fairway Drive
Kerikeri, 0230
New Zealand

HAIGH WORKMAN LTD
Civil & Structural Engineers

Phone 09 407 8327
Fax 09 407 8378
www.haighworkman.co.nz
info@haighworkman.co.nz

Borehole Log - BH03

Hole Location: Refer to Site Plan

JOB No. 22 128

CLIENT:	First Homes Ltd	**SITE:**	594 Koutu Loop Road, Kouto Point (Lot 6 DP 546669)		
Date Started:	02/08/2022	**DRILLING METHOD:**	Hand Auger	**LOGGED BY:**	JP
Date Completed:	02/08/2022	**HOLE DIAMETER (mm)**	50mm	**CHECKED BY:**	WT

Soil Description
Based on NZGS Logging Guidelines 2005

SILT; dark brown. Soft, saturated, no plasticity. Rootlets. [Topsoil]

SILT, trace clay; brownish grey, streaked and mottled dark brown. Very stiff, moist, low plasticity. Trace fibrous organics. [Karioitahi Group]

SILT, trace clay; light brown, streaked dark brown. Very stiff, moust, low plasticity.

From 0.6m: Becomes light greyish brown, streaked and mottled brown to dark brown. Trace fibrous organics.

From 0.8m: Becomes light grey. Trace fibrius and amorphous organics.

SILT; light grey to light greenish grey, streaked light orange. Very stiff, dry to moist, no plasticity.

From 1.4m: Trace fine gravel, light greenish grey. Weakly cemented.

SILT, trace clay; light grey and light orange. Very stiff, moist, low plasticity.

SILT, trace fine gravel; light greenish grey. Very stiff, dry to moist, no plasticity. Gravel: weakly cemented.

End of Hole at 1.9m (Unable To Penetrate)

Scala penetrometer used down auger hole to 'punch' through very stiff material at 1.4m to 1.75m & 1.8m to 1.95m.

Depth (m): 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Geology: T.S. / KARIOITAHI GROUP

Water Level: Groundwater Measured at 1.6m

Vane Shear and Remoulded Vane Shear Strengths (kPa): UTP, UTP, UTP, UTP

Scala Penetrometer (blows/100mm): 0 5 10 15 20 25

LEGEND

TOPSOIL | CLAY | SILT | SAND | GRAVEL | FILL

Corrected shear vane reading
Remoulded shear vane reading
Scala Penetrometer

Note: UTP = Unable To Penetrate. T.S. = Topsoil.
Scala penetrometer testing undertaken down hole to 'punch' thriough very stiff material.
Hand Held Shear Vane S/N: DR1617. Groundwater measured at 1.6mbgl at completion of drilling.

Appendix C – Concept Drawings

SHEET	Title	Description
1	Contents Page	
2	Site Plan	(Existing/Location)
3	Site Plan	(Planning)
4	Site Plan	(Proposed/Final)
5	Elevations 1 & 2	
6	Elevations 3 & 4	
7	Drainage Plan	
8	Drainage Details	
9	Floor Plan	
10	Subfloor Layout	
11	Subfloor Details .1	
12	Subfloor Details .2	

RELOCATED NEW BUILD

firsthomes

NOTES:
3d indicative only

Summary of works (consentable items)

Building yard (house only): Tauranga

- Building structure - Piles(temp)bearers, floor joist, wall frames, roof structure
- Closing in - Roof cladding, gutters, soffits, wall cladding, joinery/glazing
- Drainage - N/A
- Plumbing - Plumbing first fix (pressure tested), final fit off
- Gas - Fitted & Certified
- Electrical - Fully installed and certified
- Interior - Ceiling linings, wall linings, internal doors, skirting & architraves
- Fixtures - Vanities & toilets installed, kitchen installed
- Finishings - Interior and exterior painting, floor coverings (carpet & vinyl), back

Destination Consent: Opononi

- Building structure - Piles/connection
- Closing in - Subfloor cladding
- Drainage - Full as per plans
- Plumbing - N/A
- Electrical - Connection to Meterbox
- Gas - Bottles location checked for compliance
- Interior Linings - N/A
- Fixtures - Tiling to shower
- Finishings - Floor coverings (tiles)
- Decks, driveway & landscaping

READY FOR CONSENT

NOTE
Transportable Building designed for:

Wind Zone: High
Earthquake Zone: 1
Exposure Zone: D
Climate Zone: 2
Rain intensity: 126mm/hr
Snowload: 0.0kPa

CLIENT:

Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

SITE DATA: *for zones upto & including*

Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Contents Page

Reports used and required on-site

Subdivision completion report (as per consent notice)	= Site Suitability Report for Prposed Subdivision of 594 Koutu Loop Road by Haigh Workman Ltd ref: 18-173 dated: September 2018
Geotechnical report used for foundation design	= Site Suitability Report by Haigh Workman Ltd ref: 18 173 dated: September 2018
Liquefaction assessment	= Low/negligible (as per subdivision report)
Storm-water design / method	= Overflow & paved areas to natural water course (as per subdivision report)
Waste-water design / method	= On Site Wastewater Design by Haigh Workman Ltd ref: 21 330 dated: 19 Jan 2022
Water treatment design / method	= Marley Rainwater combined with UV and Filter System / Potable water certificate provided prior to code of compliance

Consent notices

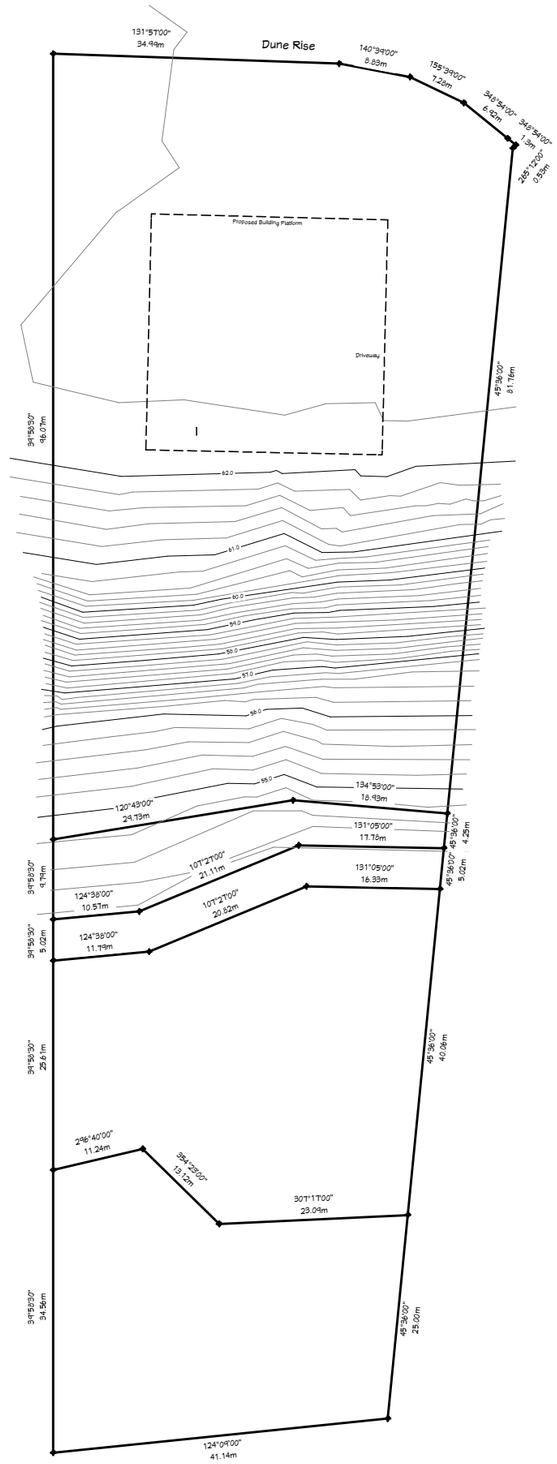
Consent Notice - 11953531-2: (Parent Lot) Specific Design Wastewater, Engineering Assessment for Ground Suitability. Firefighting Water Supply Required, Any Building In Flood Areas to have a Minimum Floor Level set by Engineer, Control Stormwater Flow from Site as per Haigh Workman Report noted, Owner responsible for Telecommunication Services

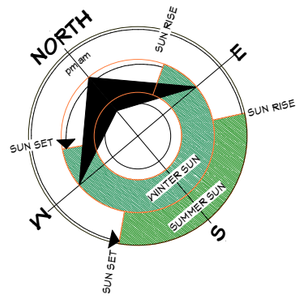
Consent Notice - 11374098-3: (Parent Lot) Specific Design Wastewater, Firefighting Water Supply Required,Specific Design Foundations, Owner responsible for Telecommunication Services

Minimum floor level

No specific requirement, as per E1/AS1 (>150mm above lowest point on site)

JOB No: FH21016	DESIGN:	LBA
SIZE: A3 LAYOUT	DRAWN:	LBA
PRINT DATE:		4/04/2022
SCALE:	SHEET:	1 OF 12





firsthomes

NOTES:

- All boundary bearings, lengths & peg locations are to be confirmed on site prior to commencing foundations. The house position is to be confirmed as correct and any discrepancies are to be reported to 'Lightbulb Architecture' immediately.
- Finished floor level in relation to height to boundary recession plane requirements are the responsibility of the floor layer, any discrepancies between the plan and physical site levels are the responsibility of the floor layer. 'Lightbulb Architecture' takes no responsibility for any error that may occur.
- Sewer & stormwater connections are to be confirmed on site prior to commencement of foundations.
- Drain layer to confirm downpipe locations prior to commencement of construction.

Public protection from onsite hazards

- Site safety fencing (when required by T.A), 2.0m(min) to prevent site hazards from harming traffic or passers-by, to restrict unauthorized entry by children - ensure fencing is difficult to be climbed, gates and doors do not project beyond site when open, and encloses the whole site.
- All building sites to have O.S.H compliant warning signs erected.
- Any hazardous equipment or materials will be stored onsite only if secured, by portable building lock up or in the house being built (after lock-up stage)
- Sites to be assessed on a individual basis by construction managers for compliance with NZBC clause F5 and if specific hazards exist then a work-site barrier must be erected.

CLIENT:

Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

SITE DATA: *for zones upto & including*

Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Site Plan (Existing/Location)

JOB No:	FH21016	DESIGN:	LBA
SIZE:	A3 LAYOUT	DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:750	SHEET:	2 OF 12

Geotechnical

According to available geological plans and the Haigh Workman walkover survey, the underlying soil geology across the site comprises Kara clay and Kara silt loam, typically described and categorised as 'imperfectly to very poorly drained'; consistent with superficial soils. Superficial soil deposits are indicated to be underlain (at depth) by solid geology comprising Whangai Formation (Kkw) of the Mangakahia Complex, a subsidiary group of the Northland Allochthon Formation.

Fieldworks were undertaken by a Haigh Workman Geotechnical Engineer in a single stage on 20 February 2017 and comprised the drilling of five hand augured boreholes to profile shallow underlying stratum to depths ranging from 0.50 m to 1.00 m below ground level. Following interpretation of field data it is concluded and recommended that:

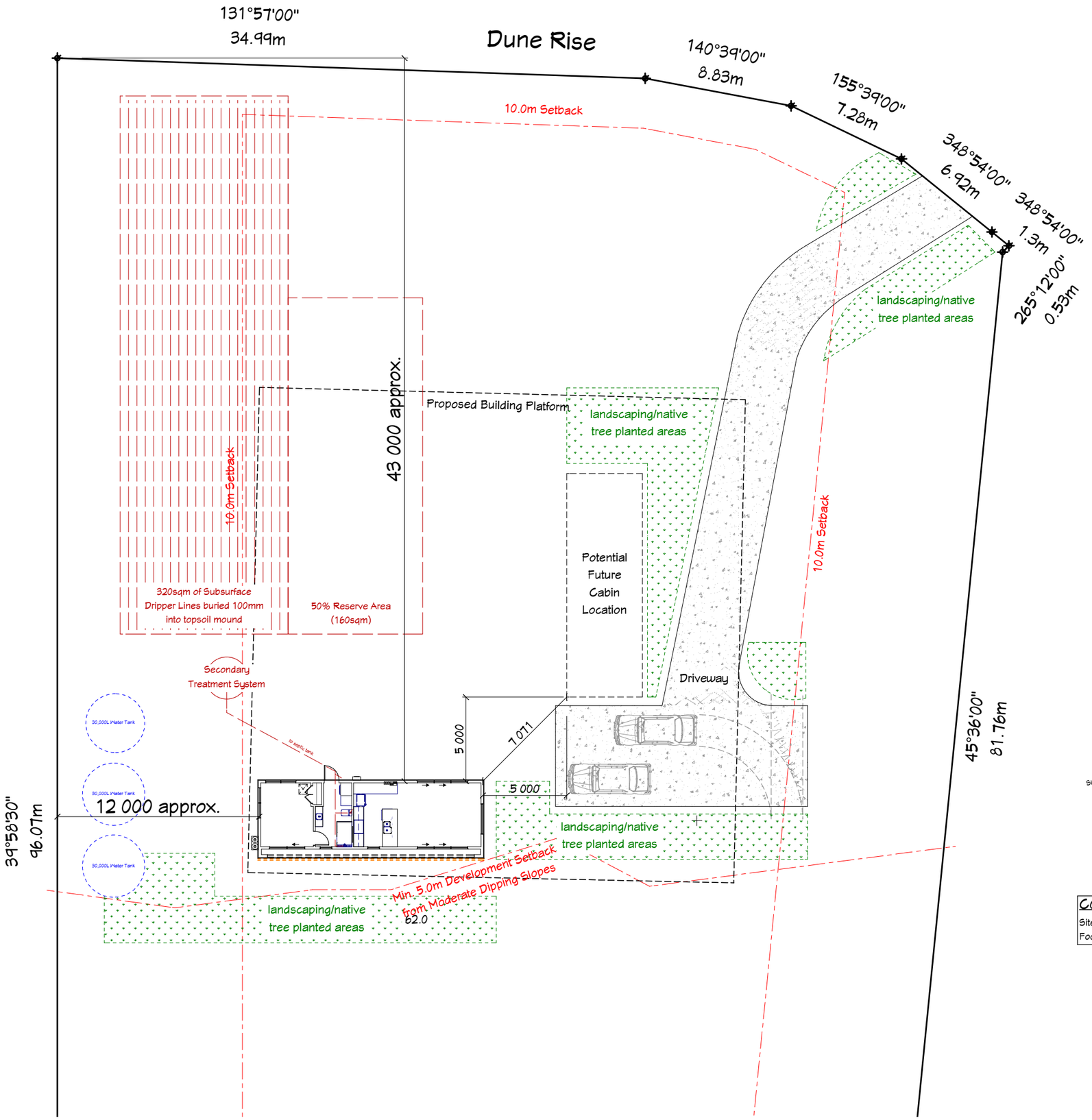
- All investigated house sites are suitable for a final low-rise residential end-use;
- Generally uniform strata was encountered across the seven proposed house sites conforming to available geological mapping. Stratigraphy generally included loose natural granular soils overlying a hard pan at shallow depth;

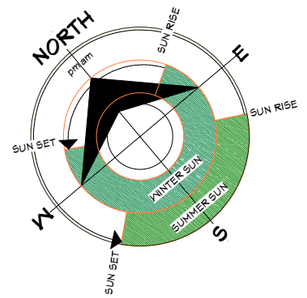
As soil properties did not meet the minimum requirement for bearing capacity in accordance with NZS3604 at founding depth or within influencing distance of shallow foundations it is recommended all proposed lots are subject to further geotechnical investigation and specific foundation design at the time of building consent. It is recommended that foundations take the form of either:

- Piled foundations extended through shallow soils and the hard pan layer founding within underlying natural soils of adequate strength/bearing capacity, or;
- Concrete slab on grade specifically designed for soils of 50 kPa allowable bearing capacity and with an allowance to minimise differential settlement across granular/cohesive soils for proposed lot 11.

To complete the subdivision process it is proposed to cut the existing bank to the north eastern face of the subdivision entrance. For this option it is recommended that the cut is retained by a specifically designed retaining wall. It is recommended the wall is designed as condition of consent.

Extract from Geo Report - Refer to full report





COVERAGE		
Site area	= 8163m²	
Footprint (over cladding)	= 53.2m²	= 0.06%

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NOTES:

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Public protection from onsite hazards

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- All building sites to have O.S.H compliant warning signs erected.
- Any hazardous equipment or materials will be stored onsite only if secured, by portable building lock up or in the house being built (after lock-up stage)
- Sites to be assessed on a individual basis by construction managers for compliance with NZBC clause F5 and if specific hazards exist then a work-site barrier must be erected.

CLIENT:

Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

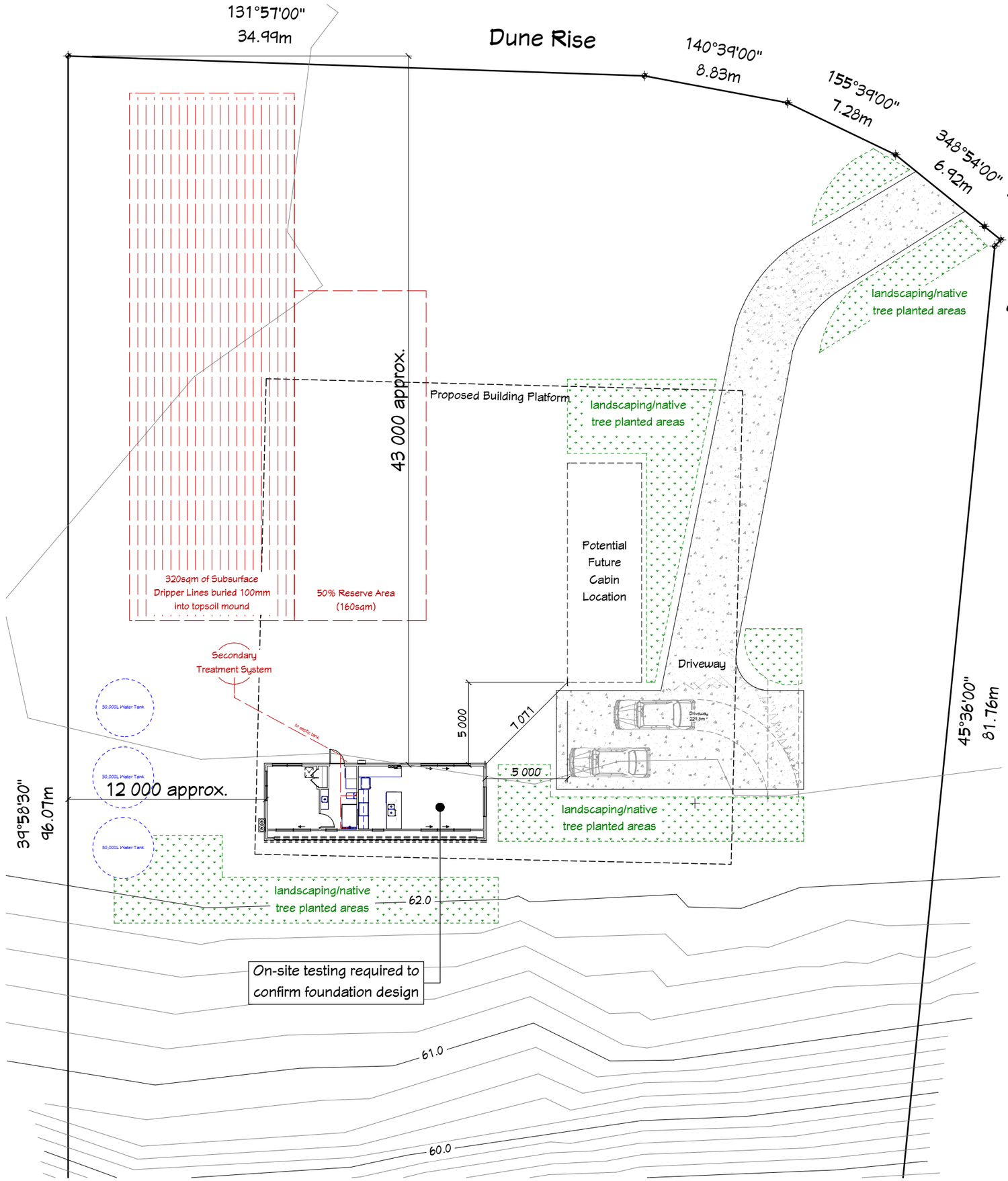
TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

SITE DATA: *for zones upto & including*

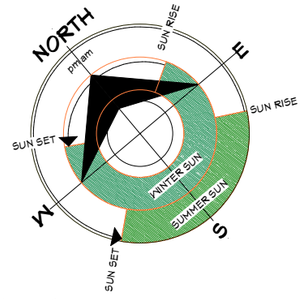
Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Site Plan (Planning)

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:250	SHEET:	3 OF 12



Onsite sediment control
- In accordance with TA's requirements.
- Access via stabilised entry/exit pad.
- Covered wind proof skip bin
- Site access, storage and construction should be controlled so that there is no adverse environmental effects.
- Temporary down pipes to be installed to control roof water run-off



Lot 6
DP 546669
Total Area = 8163sqM

- All dimensions shown are to the foundation unless noted otherwise.
- D.C.P indicates Daylight Control Point of recession plane.
- Paved exterior surfaces, refer to the foundation plan
- The finished ground level adjoining the concrete slab-on-ground shall be formed so as to carry water away from the building, at a slope of not less than 1:25, for a distance of at least 1.0m from the building as per NZS.3604.2011.
- The flow direction of surface water follows the slope of the natural ground.
- Levels in terms of Moturiki Datum / NZ Vertical Datum

firsthomes

NOTES:
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CLIENT:
Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

SITE DATA: *for zones upto & including*

Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Site Plan (Proposed/Final)

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:250	SHEET:	4 OF 12

Elevation 1

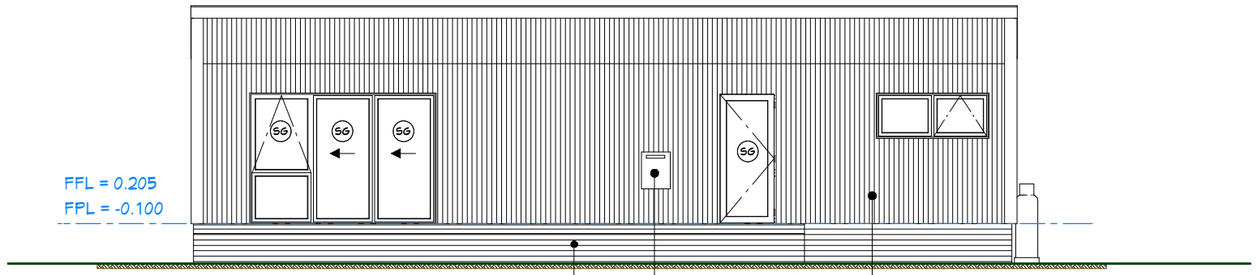
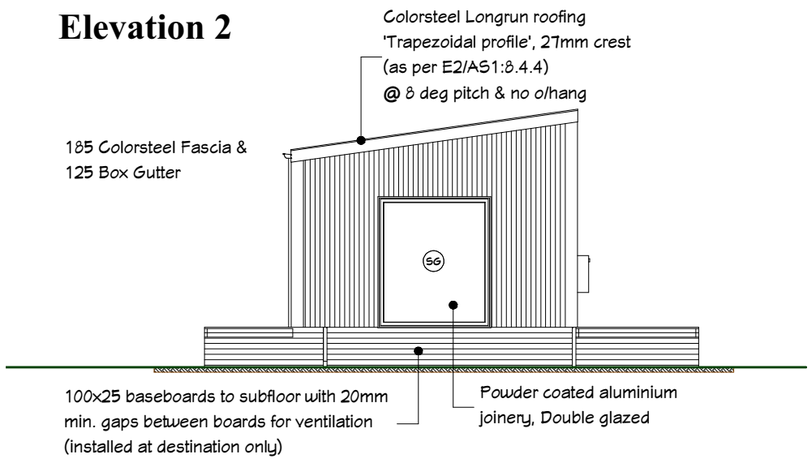


Table 2 Building envelope risk matrix Paragraph 3.1.2. Figure 1					
All Walls	Risk Severity				
Risk factor	Low	Med	High	Very High	Subtotals for each risk factor
Wind zone (per NZS 3604)	0	0	1	2	1
Number of storeys	0	1	2	4	0
Roof/wall intersection design	0	1	3	5	1
Eaves width	0	1	2	5	5
Envelope complexity	0	1	3	6	1
Deck Design	0	2	4	6	0
				Total Risk Score	= 8

Elevation 2



firsthomes

NOTES:
- All groundlines are indicative only and must be confirmed on site prior to commencement of any site works
- Finished floor levels in relation to height to boundary recession plane requirements are the responsibility of the floor layer. Any discrepancies between the plan and the actual site levels are the responsibility of the floor layer and must be reported to 'Lightbulb Architecture' immediately
- All claddings fixed as per manufacturers specifications
- Fill over 600mm requires Engineer Certification

- EGL = Existing Ground Level (black dash)
- FFL = Finished Floor Level (blue dash)
- FGL = Finished Ground Level(solid green)
- GL = Ground Level
- FPL = Finished Platform Level

Safety Glazing
- All glazing is to be in accordance with the NZ Building Code Handbook and NZS. 4223, Parts 1, 2, & 3 Code of Practice for Glazing in Buildings.
- All glazing panels to bathrooms and toilets to have safety glazing to the interior panel only
- All gazing to be confirmed by the manufacturer prior to construction

SG Indicates safety glass

CLIENT:

Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

SITE DATA: *for zones upto & including*

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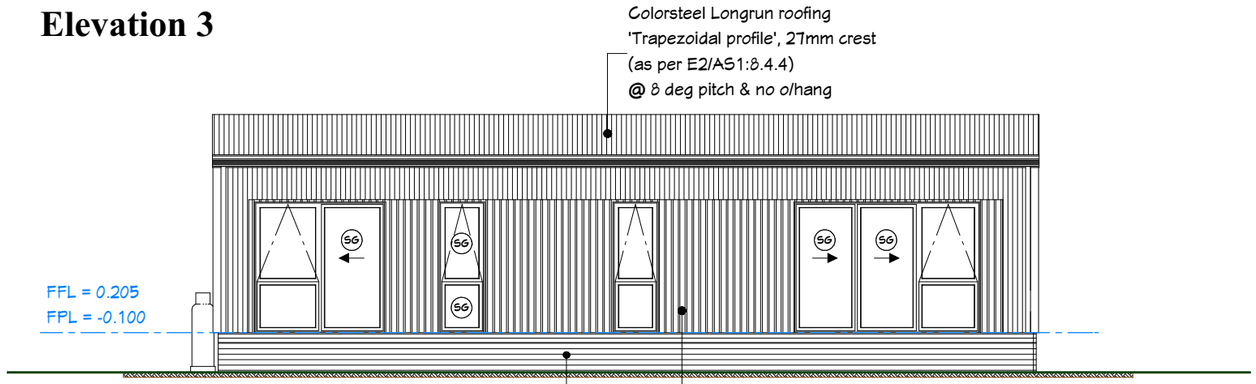
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Elevations 1 & 2

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:100	SHEET:	5 OF 12

Elevation 3



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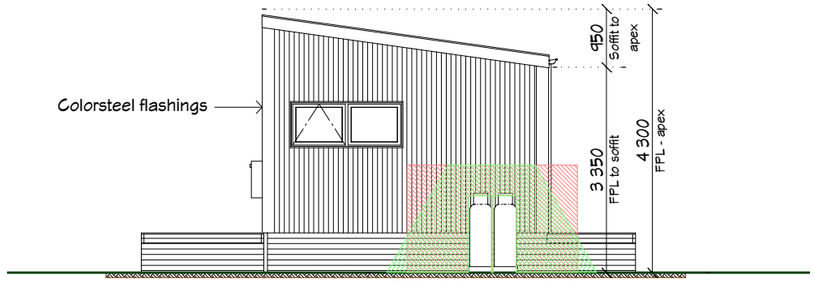
Number of storeys	0	1	2	4	0
Roof/wall intersection design	0	1	3	5	1
Eaves width	0	1	2	5	5
Envelope complexity	0	1	3	6	1
Deck Design	0	2	4	6	0
				Total Risk Score	= 8

Elevation 4



firsthomes

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Opononi

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Soil Classification	REF GEOTECH
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Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

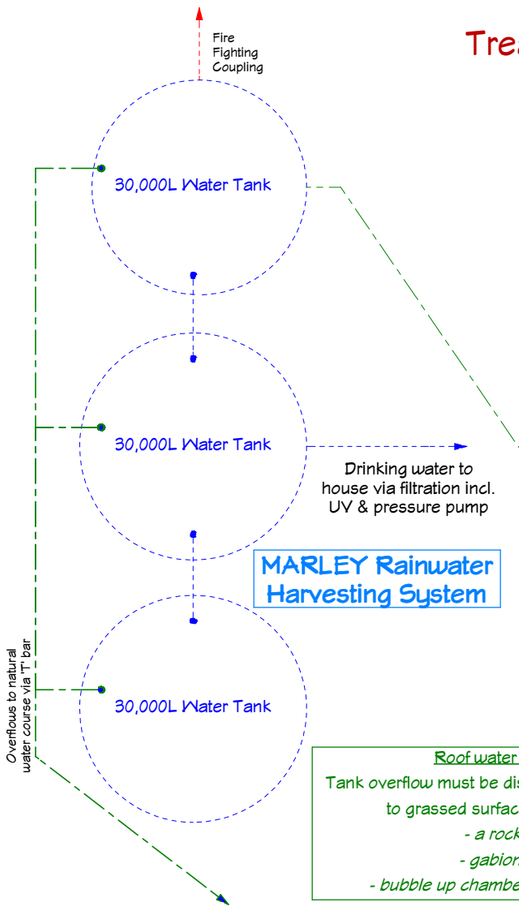
Elevations 3 & 4

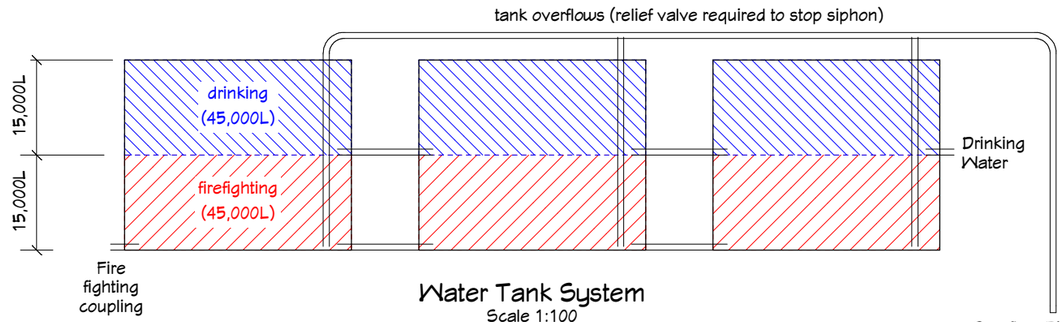
JOB No:	FH21016	DESIGN:	LBA
SIZE:	A3 LAYOUT	DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:100	SHEET:	6 OF 12

320sqm of Subsurface Dripper Lines buried 100mm into topsoil mound

50% Reserve Area (160sqm)

Secondary Treatment System





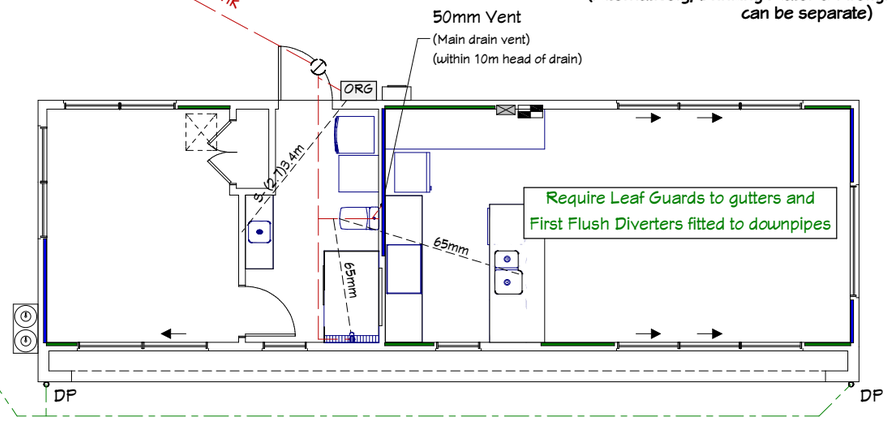
Water Tank System

Scale 1:100

Water Quality:
- Maintained via Marley System (attached) + UV filter system

Fire Fighting:
- 45001tr storage provided + coupling

(Alternatively, Drinking Water & Firefighting Water Tanks can be separate)



Roof water to Water Tank

Tank overflow must be discharged away from buildings to grassed surfaces via T-bar dispersal
- *a rock 'riprap' OR*
- *gabion basket OR*
- *bubble up chamber to disperse the energy*

Key

- = IP = Inspection Point
- = RE = Rodding Eye
- = DP = Down Pipe
- DGT = Disconnector Gully Trap
- FWG = Floor Waste Gully Trap
- ORG = Overflow Relief Gully Trap
- = 100mm PVC Stormwater Drain
- = 150mm PVC Stormwater Drain
- = 100mm PVC Wastewater Drain
- = Fixture Waste Pipes

EXTERNAL DRAINAGE

AS-NZS 3500, Pipe sizes
MCI - Minimum connection invert (below FFL)
Sewer drain - 100mm P.V.C pipe, 1:60 Gradient(min)
Stormwater drain - 100mm P.V.C pipe, 1:120 Gradient(min)
*All inverts allow 650mm below FFL at the head of the drain to allow for gully and pipe cover

INTERNAL PLUMBING WASTE KEY

S indicates a sink and has +700mm for developed length
T indicates a shower tray or bath and has +300mm for developed length
H indicates a H.W.C and has +700mm for developed length
(#.#) in all cases indicates the plan length

Fixture Type	Discharge Fixtures	Min. Discharge pipe size to FWG (mm)	Min. Discharge pipe size to DGT (mm)	Gradient
Basin	1	40	40	1:40
Bath	4	40	40	1:40
Shower	2	40	40	1:40
Laundry	5	50	50	1:40
Kitchen sink	3	Not Permitted	65	1:40
WC	4	Not Permitted	100	1:60
Note: All Fixtures are to include individual water traps				

Discharge Pipe Table

POINTS OF ACCESS GENERAL

Rodding points are preferred to inspection points in landscaped or sealed areas and within buildings.

Spaced at no further than:
50m where rodding points are used.
100m where inspection points, inspection chambers or access chambers are used.

Positioned at:
Changes in direction of greater than 45°
Changes in gradient of greater than 45°

Stormwater Specific
Plumber to ensure there is an inspection point within 2.0m of building were a stormwater pipe runs under the slab
At junctions of drains, other than a drain serving a single downpipe less than 2.0m.

Sewer Specific
Plumber to ensure there is an inspection point within 2.0m of building were a sewer pipe runs under the slab
Immediately prior to drain outfalls,
Immediately inside the boundary of the property served
At the junction of every drain with another drain, other than a drain serving a single gully trap less than 2.0m.

AS3500 LIMITS

MAXIMUMS
Max developed length to a Floor Waste Gully 2.5m.

VENT REQUIREMENTS
Vent at head of the drain to be within 10.0m(developed length) of last Gully trap/W.C.
One Gully trap to be used as a Overflow Relief Gully.
Max branch drain without venting is 10.0m(developed length)
Max developed length to a Disconnector Gully if exceeds add venting.
- DN40 = 3.5m
- DN50 = 6.0m
- DN65 = 10.0m

Developed length is from water seal to discharge (allow +200mm foundation to gully)

NOTES:
- All boundary bearings, lengths & peg locations are to be confirmed on site prior to commencing foundations. The house position is to be confirmed as correct and any discrepancies are to be reported to 'Lightbulb Architecture' immediately.
- Sewer & stormwater connections are to be confirmed on site prior to commencement of foundations.
- The sewer and stormwater disposal design is the responsibility of the plumber. 'Lightbulb Architecture' takes no responsibility for any errors that may occur. Compliance with all applicable codes are required at all times.
- Drain layer to confirm downpipe locations prior to commencement of construction.
- Holes in bracing elements may require remedial work
- It is recommended all vanity wastes put into walls to allow for the posibility of wall hung units

Onsite sediment control
- Temporary down pipes to be installed to control roof water run-off

Sink volumes must comply with NZBC:
- Laundry tub - to have a capacity to spill-level of no less than 35 litres, and be capable of fully containing a solid cylinder of 400 mm diameter and 200 mm depth
- Kitchen sink - The sink shall be capable of fully containing a solid cylinder of 300 mm diameter and 125 mm depth.

REFER TO DRAINAGE DETAILS ALSO
(Located on the following sheet)

CLIENT:
Jeff & Gwen McTainsh
Lot 6, DP 546669
Dune Rise, Whirinaki
Opononi

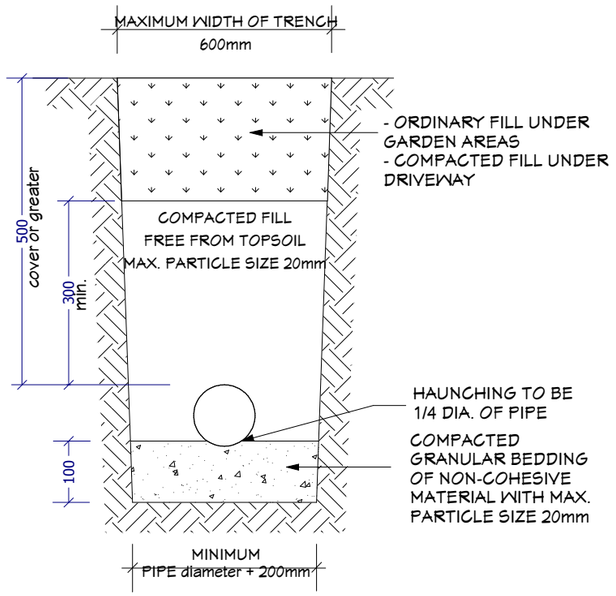
TERRITORIAL AUTHORITY:
Far North District Council
Coastal Living Zone

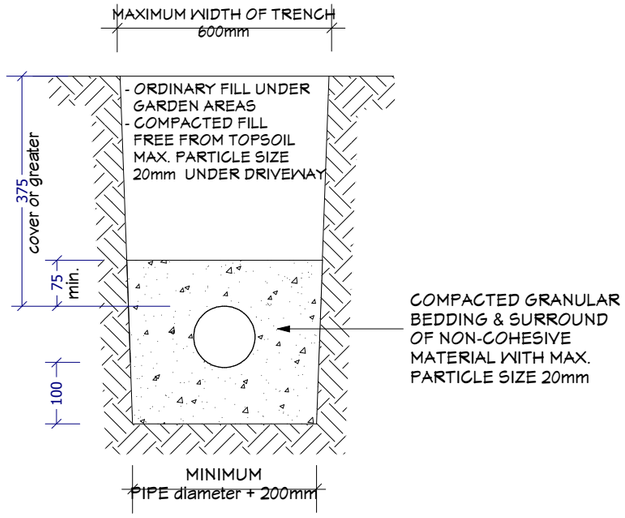
SITE DATA: *for zones upto & including*

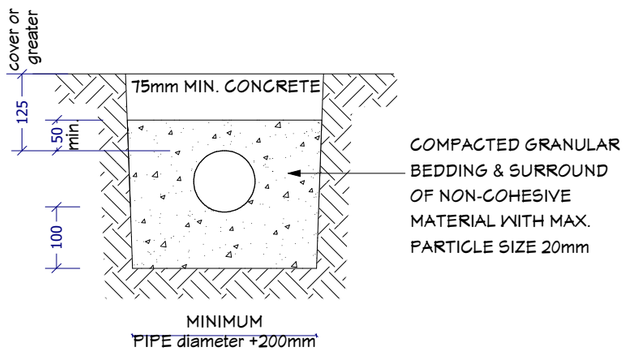
Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Drainage Plan

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:100	SHEET:	7 OF 12

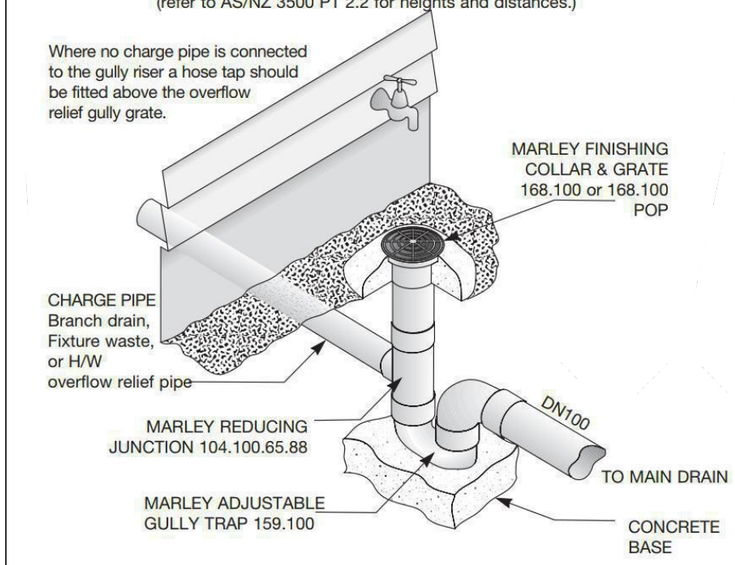


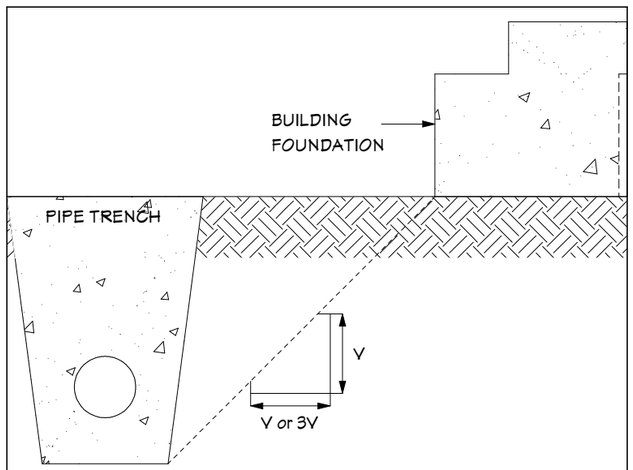




PIPE BEDDING AND BACKFILLING

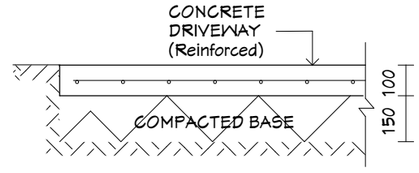
TYPICAL EXTERNAL OVERFLOW RELIEF GULLY LAYOUT
(refer to AS/NZ 3500 PT 2.2 for heights and distances.)





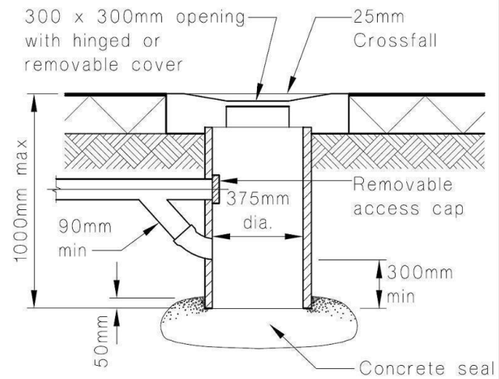
V = Pipe trenches open less than 48 hours
3V = Pipe trenches open more than 48 hours (except rock)

TRENCH NEXT TO FOUNDATION



DRIVEWAY EDGE DETAIL

Figure 8: **Type-one Surface Water Sump**
Paragraph 3.6.2



NOTES:
- All details are in accordance with E1 AS1

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Dune Rise, Whirinaki
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Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Drainage Details

JOB No: FH21016	DESIGN: LBA
SIZE: A3 LAYOUT	DRAWN: LBA
PRINT DATE:	4/04/2022
SCALE: NTS	SHEET: 8 OF 12

Roofing

Colorsteel Longrun roofing
'Trapezoidal profile', 27mm crest
(as per E2/AS1:8.4.4)
@ 8 deg pitch & no o/hang

Cladding

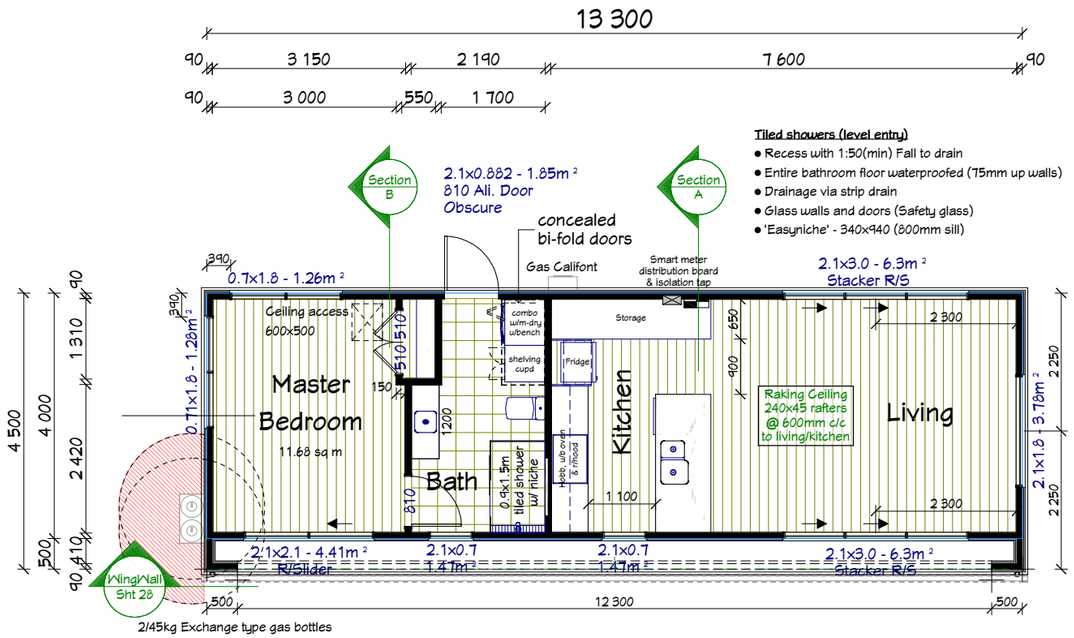
-1.Vertical Colorsteel Corrugate Wall Cladding on 20mm drained cavity
-2.Enduroclad Board & Batten System on a 20mm drained cavity

Windows

Powder coated aluminium joinery, Double glazed

Fascia + gutter

185 Colorsteel fascia + 125 Box gutter



2/45kg Exchange type gas bottles
Vents/Drains/Openings Exclusion Zone
Bottles to be on a concrete pad and restrained with chains, regulator cover to be installed

G:/Shared drives/F.H - Jobs/FH21016 - Jeff & Gwen - Koutu Bach - Street - (NI)/1. Job files/FH21016 - Koutu Bach - 20-10-21.plan

Total floor area = 53.2sqm(o/found.)

Total Roof area = 63.1sqm(o/fascia)

APPROXIMATE Exterior wall perimeter = 34.6m
APPROXIMATE Interior wall perimeter = 10.0m
APPROXIMATE Fascia & Gutter lineal meters = 13.5m
APPROXIMATE Barge lineal meters = 23.0m

FLOOR COVERINGS

= Vinyl/Laminate
= Carpet

Tiled showers (level entry)

- Recess with 1:50(min) Fall to drain
- Entire bathroom floor waterproofed (75mm up walls)
- Drainage via strip drain
- Glass walls and doors (Safety glass)
- 'Easyniche' - 340x940 (800mm sill)

WALL FRAMES

External / Load bearing up to 2.7m - 90x45@400c/c
External / Load bearing up to 3.0m - 90x45@300c/c
Internal / Non-load bearing - 90x45@600c/c
Dwangs @ 480mm c/c for Vertical Colorsteel Walls
Dwangs @ 600mm max c/c for Enduroclad Walls

BASIC SPEC F.H - Design and build NI

NZS3604 - Timber Subfloor

- Plumbing and drainage standard used - G13/AS3 (AS/NZS3500.2)
- Stud height - 2.42m stud to bedroom/bathroom & raking ceilings (rafters) to living/kitchen
- Truss heel height - 235mm
- Window reveals - H3.1 treated
- Window and door liners - 40x10mm Architraves
- Window joinery full depth unit - 2110mm
- Interior door leaf height - 1980mm
- Roof underlay - DriStud 'FRU36'
- Wall wrap - Tekton
- Insulation - walls = R2.2, ceilings = R3.2
- Ceiling lining - 10mm GIB on rondo battens @450c/c (direct fixed)
- Wall lining - 10mm GIB
- Coving / Skirting -75mm gib classic (40x18mm cupboards) / 60x10 skirting
- Bathrooms - GIB Aqualine® (Villaboard® tiled showers)
- Ceiling Access - 600x500 ceiling access
- Ceiling storage - N/A
- Hot water - Gas - Rinnai A-Series Califont & Gas Bottles

Elevation Guide

firsthomes

NOTES:

90x45 New Frames - H1.2 treatment (or equiv.) & graded to SG8 or LVL8

- Dimensions on this plan are to be checked by all trades prior to commencement of any works 'Lightbulb Architecture' takes no responsibility for any errors in the dimensions shown.
- All timber frame above subfloor to have a minimum treatment of H1.2
- All lintels and beams are calculated using appropriate NZS:3604 or Mitek lintel charts. Some may require the design by Design IT software, these are noted and design provided
- Kitchen bench finish options; Stainless steel or a decorative high pressure laminate
- Internal and external walking surfaces to comply with NZBC D1/AS1 2.1.2 and Table 2

Natural lighting & Ventilation

- Natural lighting is provided via glazing to 10% of floor areas for individual rooms. Ref:G7/AS1, Clause 1.0
- Natural ventilation is provided via exterior openings of no less than 5% of floor area for individual rooms. Ref:G4/AS1, Clause 1.2 Natural ventilation
- Key lock to internal garage door

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Coastal Living Zone

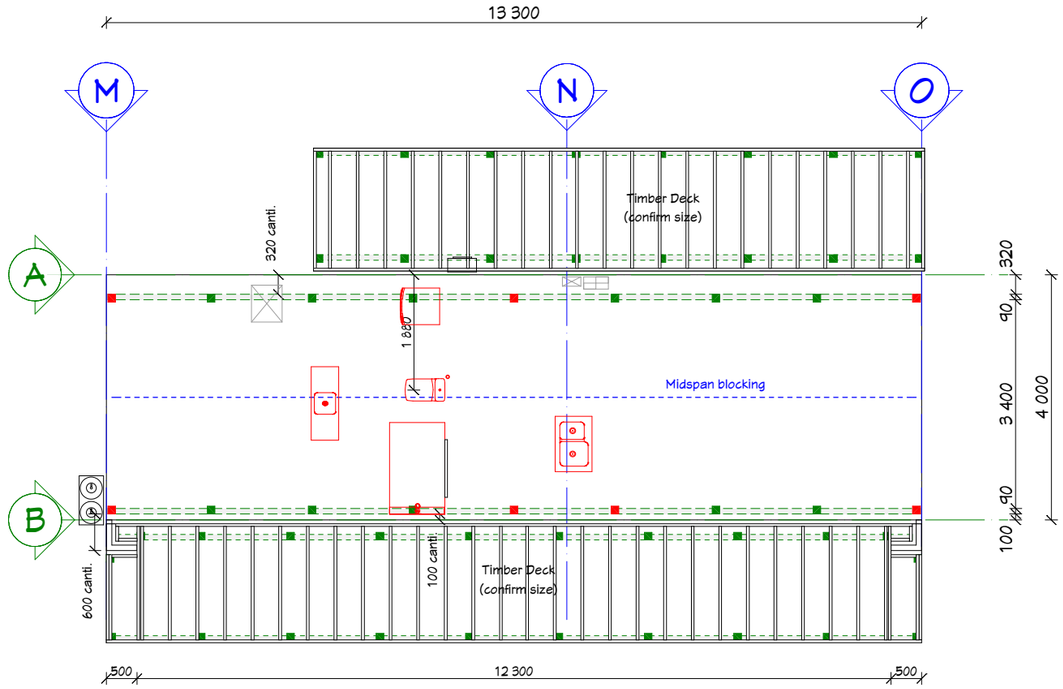
SITE DATA: *for zones upto & including*

Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Floor Plan

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:100	SHEET:	9 OF 12

NOTE:
- Ground preparation to be undertaken in accordance with site specific Geotechnical Report Recommendations



House Subfloor framing
- Piles - 125sq H5 timber piles (destination intention)
- Bearers - 2/140x45 H3.2 SG8 bearers (1.65m max. span) (Cantilever 300mm max)
- Joists - 190x45 SG8 H1.2 joists @ 450mm c/c (3.45m max span)
- Joists - Cantilever 600mm max (<4.0m roof span)
- Allow for H3.2 boundary joists

SCHEDULE 1 - non-consentable

Deck Subfloor framing (destination intention)
- Selected decking, 20mm min thickness
- 12mm weather gap
- Do not attach to the house / free standing
- 140x45 SG8 H3.2 joists @ 450mm c/c (2.05m max. span)
- 2/140x45 H3.2 bearers, 1.65m max. span
- 125sq H5 timber piles @ 1.65m max. c/c

■ = Ordinary Piles
A ■ = Anchor Piles

Footing size - Decks
= 225sq or 260dia x 200mm deep (min.)

Footing size - Under load bearing walls
400sq or 460dia x 200mm deep (min.)

- **Ground conditions to be confirmed in accordance with Geotechnical Report at time of construction**
- **Monitoring to be undertaken in accordance with Geotechnical Report**

NOTE: The dimensions on this plan are to be checked by all trades prior to commencement of any works as they are an indication only and have been shown to help verify each trades own calculation from the floor plan.

firsthomes

NOTES:
- Raft Slab designed for an ultimate bearing capacity of at least 175kPa if upon inspection ground is not achieved, then all site works are to be carried out in accordance with a geotechnical soils investigation report in accordance with NZS.3604.2011 and related documents. Site classifications for such investigations to comply with the requirements of AS2870 and referenced documents.
- Concrete strength shall be 20MPa at 28 days.
- All reinforcement to be supported on suitable bar 'chairs' @ 900c/c
- Compacted fill *(when required)* to be in accordance with NZS.3604.2011. Clause 7.5.3
- Granular fill material complying with 7.5.3.2 shall be placed and compacted in layers of 150 mm maximum thickness, over the area beneath the proposed ground slab, so that the total thickness of granular base is not less than 75 mm nor more than 600 mm.
- If hardfill used or existing subsoil could cause intrusions to DPM layer, protect it by blinding the hardfill with sand 5-25mm thick. As per NZS:3604
- Saucuts as per 6.2.1 of the Firth Ribraft Manual, they are for aesthetics only. If installed they are the contractors responsibility to position

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Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

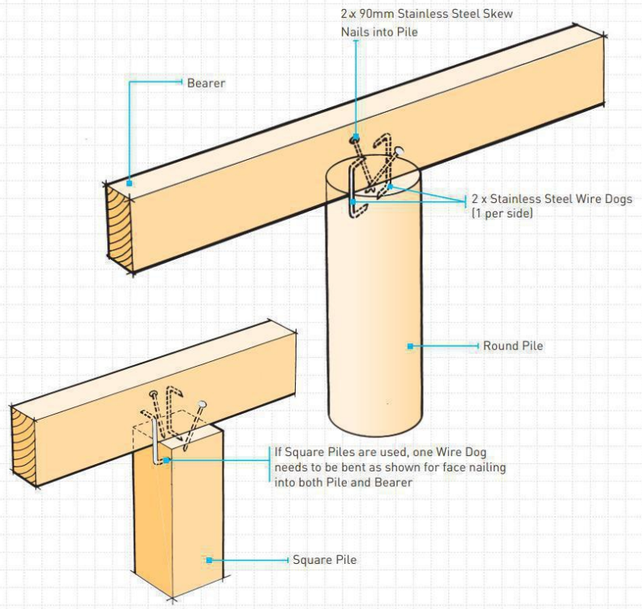
Subfloor Layout

JOB No: FH21016		DESIGN:	LBA
SIZE: A3 LAYOUT		DRAWN:	LBA
PRINT DATE:			4/04/2022
SCALE:	1:100	SHEET:	10 OF 12

ORDINARY PILE FIXING

COMPLIES WITH NZS 3604:2011

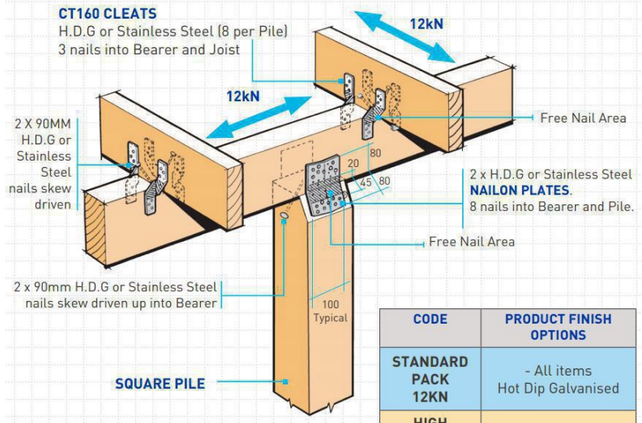
- All Fixings Stainless Steel
- For all Ordinary Piles (Refer to figure 6.3 NZS 3604:2011)



12kN PILE FIXING

FOR BRACED PILES OR ANCHOR PILES

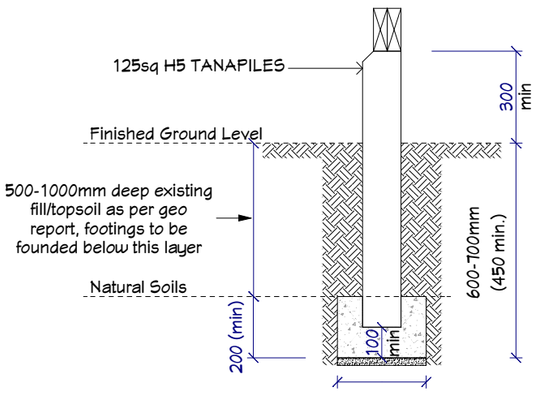
- The 12kN Pile Fixing must be installed in accordance with this brochure.
- Auckland University Tested Ref. 4613.
- All Subfloor construction must be in accordance with NZS 3604:2011.
- NZS 3604 requires lines of lateral support to floor joists within 300mm of bearer or bracing lines, refer clause 7.1.2.
- Joists deeper than 150mm require solid nogging over braced or anchor pile.



Anchor / Brace Pile Shown
(on internal bracing line)

CODE	PRODUCT FINISH OPTIONS
STANDARD PACK 12KN	- All items Hot Dip Galvanised
HIGH CORROSION PACK 12KNH	- All items Stainless Steel

NOTE:
- Ground preparation to be undertaken in accordance with site specific Geotechnical Report Recommendations



Concrete = 17.5MPa
Footing Size = Refer Subfloor Layout

ORDINARY PILE FOOTING

SCALE 1:20

NOTES

Pile support

Footing to be founded on a compacted granular bedding material to a minimum depth of 25 mm, on undisturbed good ground, to obtain even bearing to the excavated surface, together with cast-in-situ concrete embedment.

Fixings to bearer

Use 2/4.9mm wire dogs together with 2/100x3.75 nails or 4/100x3.75 nails, skew driven into the piles

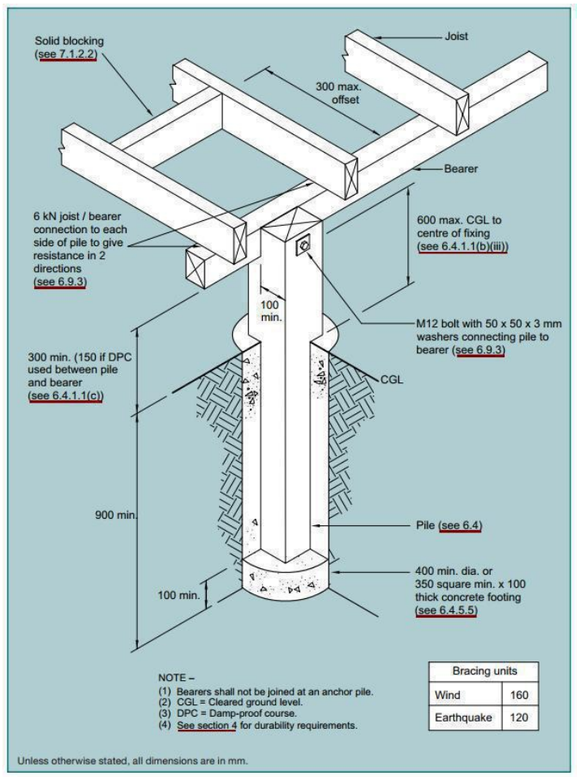
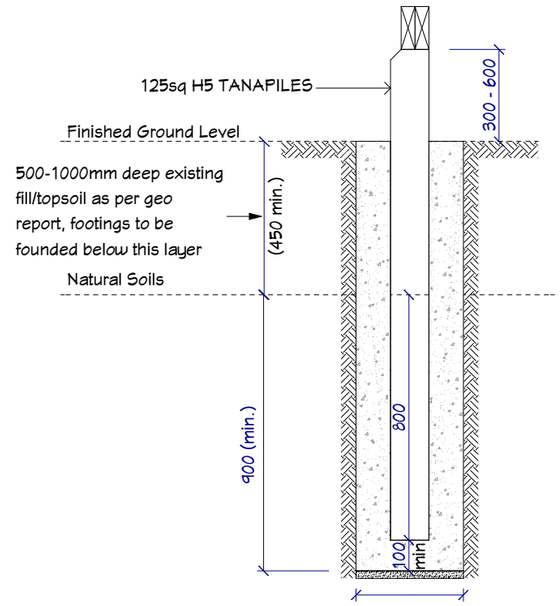


Figure 6.10 – Anchor pile directly connected to bearer only (see 6.9)

On-site testing required to confirm foundation design



Concrete = 17.5MPa
Footing Size = Refer Subfloor Layout

ANCHOR PILE FOOTING

SCALE 1:20

NOTES

Pile support

Footing to be founded on a compacted granular bedding material to a minimum depth of 25 mm, on undisturbed good ground, to obtain even bearing to the excavated surface, together with cast-in-situ concrete embedment.

Fixings to bearer

Refer to details

firsthomes

NOTES:
- Flashings to be in accordance with AS1/E2
- All fixings to be in accordance with section 4, Durability, NZS:3604
- All timber frame above subfloor to have a minimum treatment of H1.2 and be graded SG8

CLIENT:

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SITE DATA: *for zones upto & including*

Ground Bearing:	REF GEOTECH
Sub-soil Classification:	D
Soil Classification	REF GEOTECH
Wind Zone:	High
Earthquake Zone:	1
Exposure Zone:	D
Climate Zone:	1
Rain Intensity (10%AEP):	80mm/hr
Snowload:	0.0kPa (open ground)

Subfloor Details .1

JOB No: FH21016	DESIGN:	LBA
SIZE: A3 LAYOUT	DRAWN:	LBA
PRINT DATE:		4/04/2022
SCALE:	SHEET:	11 OF 12

Table 7.5 – Nailing schedule for hand-driven and power-driven nails (see 7.6)

Joint	Hand-driven nails		Power-driven nails	
	Length (mm) x diameter (mm) and type	Number/ Location	Length (mm) x diameter (mm) and type	Number/ Location
Floor framing				
Boundary joist to end of each joist	100 x 3.75	2 (end nailed)	90 x 3.15	2 (end nailed)
Curtailed joist not exceeding 3 m long to trimmer	100 x 3.75	3 (end nailed)	90 x 3.15	5 (end nailed)
Curtailed joist to trimmer when half housed	100 x 3.75	2 (end nailed)	90 x 3.15	3 (end nailed)
Flitched joint in joist	100 x 3.75	4 (each end)	90 x 3.15	6 (each end)
Herringbone strutting to joist	60 x 2.8	2 (skewed)	60 x 2.8	2 (skewed)
Joist to plate on foundation walls	100 x 3.75	12 (skewed) per 1.5 m length	90 x 3.15	18 (skewed) per 1.5 m length
Joist to plate or bearer	100 x 3.75	2 (skewed)	90 x 3.15	3 (skewed)
Lapped joint in joist	100 x 3.75	2 (each side)	90 x 3.15	3 (each side)
Solid blocking between joists to plate bearer or stringer	100 x 3.75	4 (skewed)	90 x 3.15	6 (skewed)
Solid blocking to joist	100 x 3.75 or 75 x 3.15	2 (end nailed) 4 (skewed)	90 x 3.15	2 (end nailed)
Flooring				
Sheet decking (not exceeding 21 mm thick): (a) Supports at sheet edges (b) Intermediate supports	60 x 3.06 ring shanked galv. or 60 x 2.8	150 mm centres 300 mm centres	60 x 2.8 ring shanked galv.	150 mm centres 300 mm centres
Strip flooring not exceeding 75 mm wide to floor joist	2½ x finished thickness	1	–	1
Strip flooring not exceeding 100 mm wide to floor joist	2½ x finished thickness	2	–	2

NOTE –
(1) Nail lengths and diameters are the minimum required.
(2) See 4.4 for required protective coatings for metal fasteners.

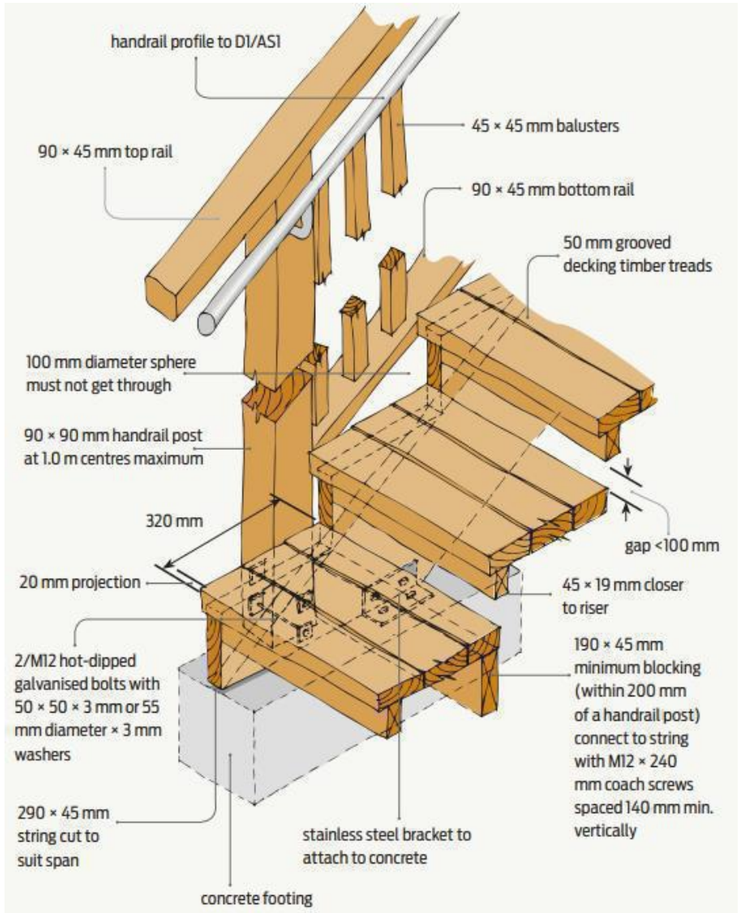
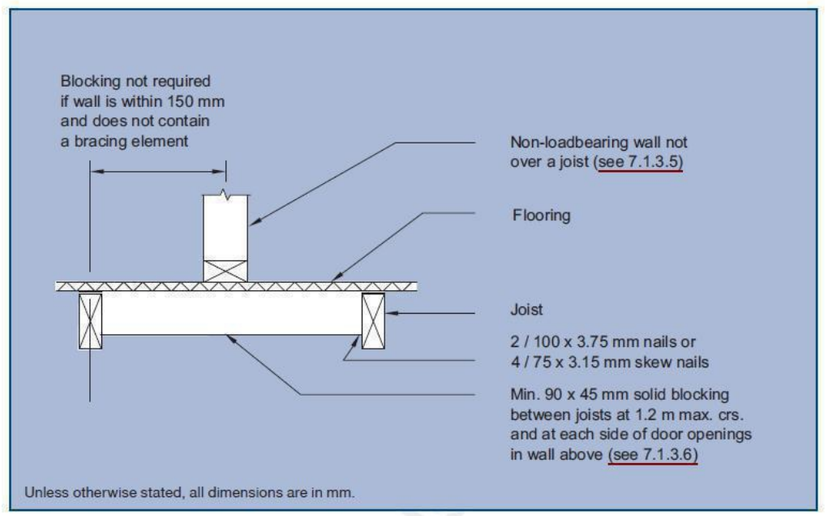


Figure 4 **Stair construction.**



Solid blocking detail (extract Figure 7.5 3604)

NOTES:
- Flashings to be in accordance with AS1/E2
- All fixings to be in accordance with section 4, Durability, NZS:3604
- All timber frame above subfloor to have a minimum treatment of H1.2 and be graded SG8

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Snowload:	0.0kPa (open ground)

Subfloor Details .2

JOB No: FH21016	DESIGN:	LBA
SIZE: A3 LAYOUT	DRAWN:	LBA
PRINT DATE:		4/04/2022
SCALE:	SHEET:	12 OF 12

Appendix D – Producer Statement Advisory Note

IMPORTANT ADVISORY NOTE

PRODUCER STATEMENT – CONSTRUCTION REVIEW (PS4)

The Building Consent Authority (BCA) frequently requires Producer Statements–Construction Review (PS4) to be submitted to the BCA in order for a Code of Compliance Certificate (CCC) to be issued. A PS4 is usually required for each specialist area. The requirement for a consultant to issue a PS4 related to their area of work will appear as a condition in the Building Consent documents.

It is the consent holder's responsibility to notify Haigh Workman Limited for geotechnical construction monitoring and testing required for subsequent issue of a PS4. An initial inspection of stripped or excavated ground must take place before any fill or blinding concrete is placed. Retrospective site monitoring of completed or partially completed geotechnical work is not possible and a PS4 will not be issued without all the required observations.

In order to secure our construction monitoring services and avoid delays on site, Haigh Workman Limited require at least 24 hours' notice prior to the time the site visit is required. Construction monitoring is limited to items that have been recommended, designed and detailed by Haigh Workman Limited. We are unable to inspect non-consented or unauthorised work. Haigh Workman Limited do not carry out construction monitoring or issue PS4's for work that has been recommended, designed or detailed by other consultants without prior approval from Haigh Workman Limited. Haigh Workman Limited will not issue a PS4 where construction monitoring and/or testing have been carried out by any other consultant. The PS4 must be sought from the consultant who carried out those inspections.

The full Building Consent, with stamped plans with consent numbers (or a legible copy of the same) including all amendments, shall be made available to us during inspections. We will not commence construction monitoring until the documentation is available or provided to us prior to our site visit.

Unless stated otherwise in our terms of engagement, the fees associated with construction monitoring and the issue of PS4's are separate from any work carried out prior to commencement of construction. We are able to provide a fee estimate for this work if required. We cannot provide a fixed quote because the quantum of work required frequently depends on the construction program and the performance of others. These things are not known to us in advance of construction. Our normal terms of trade require payment of fees monthly during the inspection period and full settlement prior to release of any PS4.