Ruru Homes Ltd
54 Green Lane
Motueka

28 February 2022

SURFACE WATER CONTROL UPDATE FOR 54 GREEN LANE MOTUEKA

Ref: 22011

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1. Situation

a) Due to changes to overall site development plan the surface water has been reassessed and an update provided below.

2. Surface Water control

a) A review of pre and post development surface water run-off from overland and modified catchment areas being roof and paved areas was carried out. A comparison with the surface water run-off from the proposed development will used to confirm the actual impact of surface water on this property.

b) The review will propose whether soakage is an appropriate solution for the surface water control compliant to Nelson Tasman Land Development Plan.

c) The total pre and post development areas:

I. Predevelopment

Roof area (dwelling + sheds, outbuildings): 248m²
Hardstand/accessway Areas 270m²
Grassed/garden area: 12652m²
Total 13170m²

II. Post development

Roof area (existing & proposed):1488m²
Construction hardstands 6760m²
Carpark/accessway Areas 1100m²
Grassed/garden area: 3822m²
Total 13170m²

d) Scaled site plan was provide by Allure Architectural for measurement and location purposes.

3. Predevelopment Catchment and Surface Water Run-off

A review of predevelopment catchment areas for 54 Green Lane are as follows:

a) Predevelopment overland surface water catchment excluding modified catchment being roof, paved and hardstand areas is 1.2652ha

Estimation of surface water run-off for 1% AEP event:
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (flat medium soakage grassed areas) 0.3
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112 mm/hr
A = Catchment in hectares 1.2652ha

= 0.3 x 112 x 1.2652
= 42.51 l/s or 0.04251 m^3/s

b) Predevelopment Roof surface water catchment:

Estimation of surface water run-off for 1% AEP event:
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (roof areas) 0.9
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.0248ha

= 0.9 x 112 x 0.0248
= 2.5 l /s or 0.0025 m^3/s

c) Predevelopment Paved surface water catchment within this catchment:

Estimation of surface water run-off for 1% AEP event:
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (paved, hardstand areas) 0.85
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.027ha

= 0.85 x 112 x 0.027
= 2.57 l/s or 0.00257 m^3/s

d) The total predevelopment catchment being overland and modified catchment surface water run-off is 47.58 /s or 0.04758 m^3/s.

4. Post Development Catchment and Surface Water Run-off

The overall changes to post development areas is that the development will increase the modified catchment and reduce overland flow to grassed areas. A review of post development catchment areas are as follows:

a) Post development overland surface water 0.3822ha:

Estimation of surface water run-off for 1% AEP:
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (flat medium soakage grassed areas) 0.3
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.3822ha

= 0.3 x 112 x 0.3822
= 12.84 l/s or 0.01284 m^3/s

b) Post development Roof surface water run-off 0.1488ha:

Estimation of surface water run-off for 1% AEP event
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (roof areas) 0.9
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.1488ha

= 0.9 x 112 x 0.1488
= 15 l/s or 0.015m^3/s

c) Post development parking/accessway surface water run-off 0.11ha:

Estimation of surface water run-off for 1% AEP event
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (paved, hardstand areas) 0.85
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.11ha

= 0.85 x 112 x 0.11
= 10.47 l/s or 0.01047m^3/s

d) Post development unsealed road equivalent surface water run-off 0.676ha:

Estimation of surface water run-off for 1% AEP event
using Q = CIA (LDM 2019)

Where Q in m/s
C = co-efficient value E1/VM1 Table 1 (paved, hardstand areas) 0.5
I = Rainfall Intensity (1% AEP 20 mins RCP8.5 2090) 112mm/hr
A = Catchment in hectares 0.676ha

= 0.5 x 112 x 0.676
= 37.86 l/s or 0.03786m³/s

e) The total post development surface water flow being overland and modified catchment surface water run-off is 76.17 l/s or 0.07617m³/s.

5. Pre and Post Development Surface Water Run-off Relationship

a) The proposed development increases the modified catchment surface water flow being roof & paved areas discharging to the stormwater outfall. The increase is from 5.07 l/s or 0.00507 m³/s to 63.33 l/s or 0.06333 m³/s being a total of 58.26 l/s or 0.05826m³/s.

b) Off set from the increase of modified development there is a decrease in overland surface water flow. The decrease is from 42.51 l/s or 0.04251 m³/s to 12.84 l/s or 0.01284 m³/s being a total of 29.67 l/s or 0.02967m³/s.

c) The total catchment surface water flow increasing from 47.58 /s or 0.04758 m³/s to 76.17 l/s or 0.07617m³/s therefore an increase of surface water flow across the catchment of 28.59 l/s or 0.02859m³/s.

d) Due to the increase in surface water flow the increase in surface water flow has to be addressed to comply with the Tasman Resource Management Plan.

e) It is proposed that on site soakage forms the solution to reduce impact on the stormwater network serving this property.

6. Test Hole Percolation

a) As discussed in 1 d) the intention is use soakage as the appropriate outfall for all surface water control. The soakaway capability will be assessed and designed based on these catchment areas.

b) Based on test pit investigations it is proposed that soakaway is an appropriate solution for all modified catchment that will be produced as part of this development.

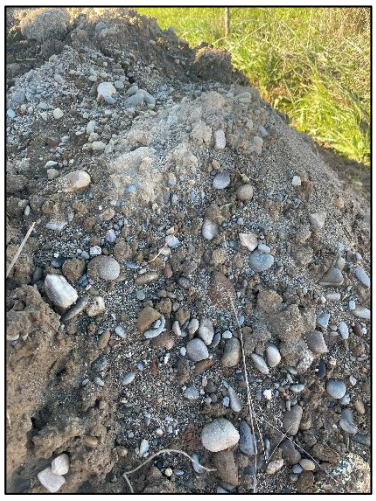
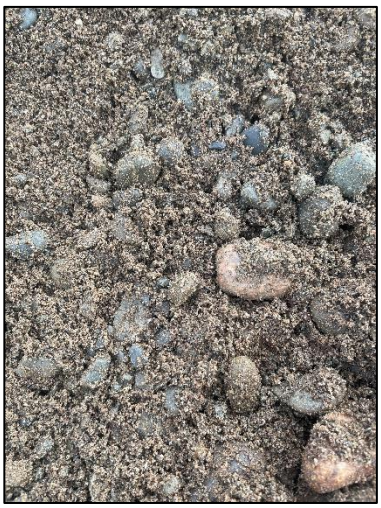
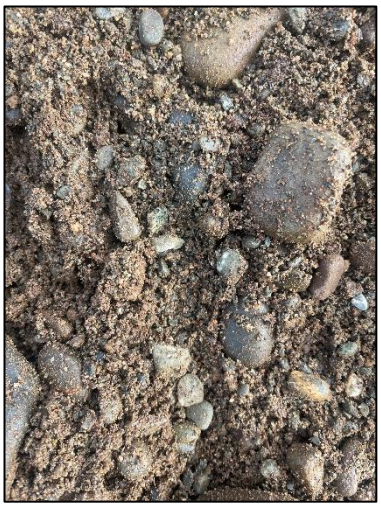
c) Test pits soil identified:

I. 0-350m Organic layer
II. 350-700mm Silty Loam
III. 700-1800mm Sandy Loam
IV. 1800-2500 Gravelly sand

a) A hole was excavated to 2500mm and tested for percolation. 1000L water was discharged to gravel sand base in hole. Water dispersed quickly without holding or ponding fully dispersing within <1.5 minutes. For the purpose of calculating soak-pit volume we will use an estimated soakage rate of 1000L/90 seconds or 64000L/hr.

Test hole percolation = 1000L/60 sec
= 40000L/hr (converted) or 40000 mm/hr

b) Soil identified as a gravelly sand with low plasticity good percolation.

7. Soak Pit Calculation

a) PART A – roofed area (1240m²)

The volume of storage required in the soak pit, Vstor (m3), shall be calculated by:

Vstor = Rc – Vsoak, where Rc = run-off discharged from catchment to soak pit in 1 hour (m3).

Vsoak = volume disposed of by soakage in 1 hour (m3).

And Rc = 10CIA where:

C = run-off co-efficient (roof area 0.9)
I = rainfall intensity based on one (1) hour duration of an event having a 20% probability of occurring annually (51.4mm/hr HIRDS RCP8.5 2090)
A = area (hectares) of the catchment discharging to the soak pit. (m² = 0.124ha)

Vsoak = AspSr/1000 where

Asp = area of the base of the soak pit (Area 2.25m²).
Sr = soakage rate (mm/hr) determined from above.

Rc = (10 x 0.9 x 51.4 x 0.124)
= 57.36m³

$$Vsoak = \frac{2.25m^2 \times 40000\ mm/hr}{1000}$$
= 90m³

Therefore Vstor = Rc – Vsoak

Vstor = 57.36m³- 90m³
= -32.64m³

Therefore no minimum storage required for proposed roof areas.

b) PART B – parking/accessway (1100m²)

The volume of storage required in the soak pit, Vstor (m3), shall be calculated by:

Vstor = Rc – Vsoak, where Rc = run-off discharged from catchment to soak pit in 1 hour (m3).

Vsoak = volume disposed of by soakage in 1 hour (m3).

And Rc = 10CIA where:

C = run-off co-efficient (sealed paved area 0.85)
I = rainfall intensity based on one (1) hour duration of an event having a 20% probability of occurring annually (51.4mm/hr HIRDS RCP8.5 2090)
A = area (hectares) of the catchment discharging to the soak pit. (m² = 0.11ha)

Vsoak = AspSr/1000 where
Asp = area of the base of the soak pit (Area 2.25m²).
Sr = soakage rate (mm/hr) determined from above.

Rc = (10 x 0.9 x 51.4 x 0.11)
= 50.88m³

$$Vsoak = \frac{2.25m^2 \times 40000\ mm/hr}{1000}$$
= 90m³

Therefore Vstor = Rc – Vsoak

Vstor = 50.88m³-90m³
= - 39.12m³

Therefore no minimum storage required for proposed parking/accessway areas.

c) PART C – unsealed construction area (6760m²)

The volume of storage required in the soak pit, Vstor (m3), shall be calculated by:

Vstor = Rc – Vsoak, where Rc = run-off discharged from catchment to soak pit in 1 hour (m3).

Vsoak = volume disposed of by soakage in 1 hour (m3).

And Rc = 10CIA where:

C = run-off co-efficient (sealed paved area 0.5)
I = rainfall intensity based on one (1) hour duration of an event having a 20% probability of occurring annually (51.4mm/hr HIRDS RCP8.5 2090)
A = area (hectares) of the catchment discharging to the soak pit. (m² = 0.676ha)

Vsoak = AspSr/1000 where
Asp = area of the base of the soak pit (Area of each soak pit 2.25m²).
Sr = soakage rate (mm/hr) determined from above.

Rc = (10 x 0.5 x 51.4 x 0.676)
= 173.73m³ (using 3 soak-pits therefore 57.91m³ each)

Using 3 soak-pits

$$Vsoak = \frac{2.25m^2 \times 40000\ mm/hr}{1000}$$
= 90m³ each soak-pit

Therefore Vstor = Rc – Vsoak

Vstor = 57.91m³-90m³
= -32.09m³

Therefore no minimum storage required for proposed unsealed hardstand areas.

8. Required Soakage Solution

a) Though soakage will be utilised for all surfaces, the roof and sealed parking/accessway areas do not require storage within the soakage system.

b) It is proposed that 7 gravel pits of 7.5m³ void storage volume are installed at regular intervals around the perimeter of the unsealed areas to provide the storage volume required. Each gravel pit to be 2.5m x 2.5m x 3m deep *(7.5m³ storage volume)* will also provide surface water entry to the underlying gravels.

c) Surface water channelling around the edge of the unsealed hardstand area will direct flow to the gravel pits. The location of the pits and channelling is shown on GS-01A Surface Water Overlay at Appendix A.

9. Conclusion

a) An onsite site and soil investigation identified soil category 3 with good percolation and filtration layers. To reduce the size of the land application system, secondary treatment through an AES single pass sand filter has been selected for discharge to land.

b) The property is in a rural 2 zone as located on Map 52 Tasman Resource Management Plan therefore shall comply with rule 36.1.2.4. Based on the requirements of the rule onsite wastewater and land application will not be a permitted activity and will require discharge consent.

c) Setback distances as required by AS/NZS1547:2012 are all compliant and there are no actual or potential limitations identified.

d) The proposed development increases the modified catchment surface water flow being roof & paved areas discharging to the stormwater outfall. The increase is from 5.07 l/s or 0.00507 m^3/s to 63.33 l/s or 0.06333 m^3/s being a total of 58.26 l/s or 0.05826m^3/s.

e) Off set from the increase of modified development there is a decrease in overland surface water flow. The decrease is from 42.51 l/s or 0.04251 m^3/s to 12.84 l/s or 0.01284 m^3/s being a total of 29.67 l/s or 0.02967m^3/s.

f) The total catchment surface water flow increasing from 47.58 /s or 0.04758 m^3/s to 76.17 l/s or 0.07617m^3/s therefore an increase of surface water flow across the catchment of 28.59 l/s or 0.02859m^3/s.

g) Percolation testing carried out confirms that due to basal and lateral ground water movement, soakage is appropriate outfall for surface water control of this development.

d) It is proposed that 7 gravel pits of 7.5m^3 void storage volume are installed at regular intervals around the perimeter of the unsealed areas to provide the storage volume required. Each gravel pit to be 2.5m x 2.5m x 3m deep *(7.5m^3 storage volume)* will also provide surface water entry to the underlying gravels.

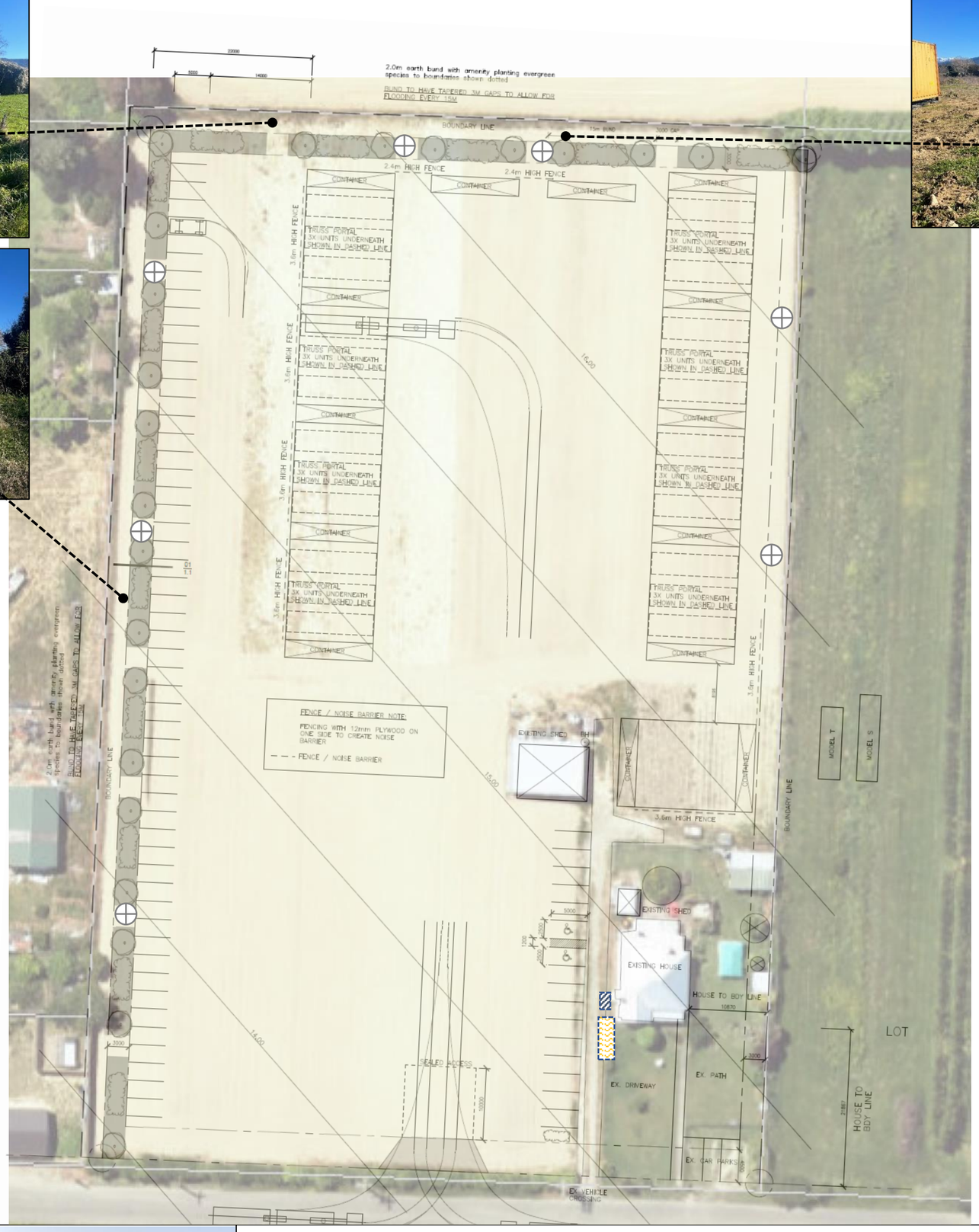
h) Surface water channelling around the edge of the unsealed hardstand area will direct flow to the gravel pits. The location of the pits and channelling is shown on GS-01A Surface Water Overlay at Appendix A.

Please forward any queries direct.

Gary Stevens
Plumbing Drainage Consultant

Attachments:
Appendix A – GS-01 Onsite Wastewater Location Overview & GS-01A Surface Water Control Overview

Appendix A – GS-01 Onsite Wastewater Location Overview & GS-01A Surface Water Control Overview



Key:

Gravel Pits ⊕

Surface Water Channel – – – –

Surface Water Control Notes:

I. The proposed development increases the modified catchment surface water flow being roof & paved areas discharging to the stormwater outfall. The increase is from 5.07 l/s or 0.00507 m^3/s to 63.33 l/s or 0.06333 m^3/s being a total of 58.26 l/s or 0.05826m^3/s.

II. Off set from the increase of modified development there is a decrease in overland surface water flow. The decrease is from 42.51 l/s or 0.04251 m^3/s to 12.84 l/s or 0.01284 m^3/s being a total of 29.67 l/s or 0.02967m^3/s.

III. The total catchment surface water flow increasing from 47.58 /s or 0.04758 m^3/s to 76.17 l/s or 0.07617m^3/s therefore an increase of surface water flow across the catchment of 28.59 l/s or 0.02859m^3/s.

IV. Percolation testing carried out confirms that due to basal and lateral ground water movement, soakage is appropriate outfall for surface water control of this development.

V. It is proposed that 7 gravel pits of 7.5m^3 void storage volume are installed at regular intervals around the perimeter of the unsealed areas to provide the storage volume required. Each gravel pit to be 2.5m x 2.5m x 3m deep *(7.5m^3 storage volume)* will also provide surface water entry to the underlying gravels.

VI. Surface water channelling around the edge of the unsealed hardstand area will direct flow to the gravel pits. The location of the pits and channelling is shown on GS-01A Surface Water Overlay at Appendix A.

G Stevens
Plumbing & Drainage Consultant
gary.gsconsulting@gmail.com
Ph: 021-222-8410

Drawing Name: GS-01.1A Surface Water Control Overview
Client: Ruru Homes Ltd
Project Address: 54 Green Lane, Motueka
Legal Description: Lot 12 DP 1512

Date: 28 February 2022
Scale: 1:1000@A4
Ref: 21130

NOTES:

NOTES:

GENERAL NOTE:
Alterations from systems or details shown on the attached documents without express approval from the designer shall void any liability to the designer.

SITE DIMENSIONS:
The Contractor is to verify all dimensions on site before ordering or manufacturing.

FITTINGS AND ITEMS:
The Contractor is to check and obtain copies of the manufacturers and suppliers installation and dimension details for all products and items to be used prior to installation and or use.

ASSOCIATED DRAWINGS:
Contractor is to confirm with the designer that he has copies of all relevant drawings and specification so as to make a complete set. Any inconsistencies between drawings and speaks to be brought to the designers attention for clarification.

CLADDING
All building cladding works including roofing shall confirm strictly with the requirements of NZBC-E2/AS1.

SITE NOTES:

ALL WORKS SHALL CONFORM WITH ALL STATUTORY AND LOCAL AUTHORITY REQUIREMENTS, NZS 3604 AND NEW ZEALAND BUILDING CODE

ALL MATERIALS TO BE SUPPLIED AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.

ALL PLUMBING PIPE WORK CAST INTO AND BELOW THE FLOOR SLAB SHALL BE WRAPPED IN DENSO TAPE TO ENSURE ADEQUATE THERMAL MOVEMENT.

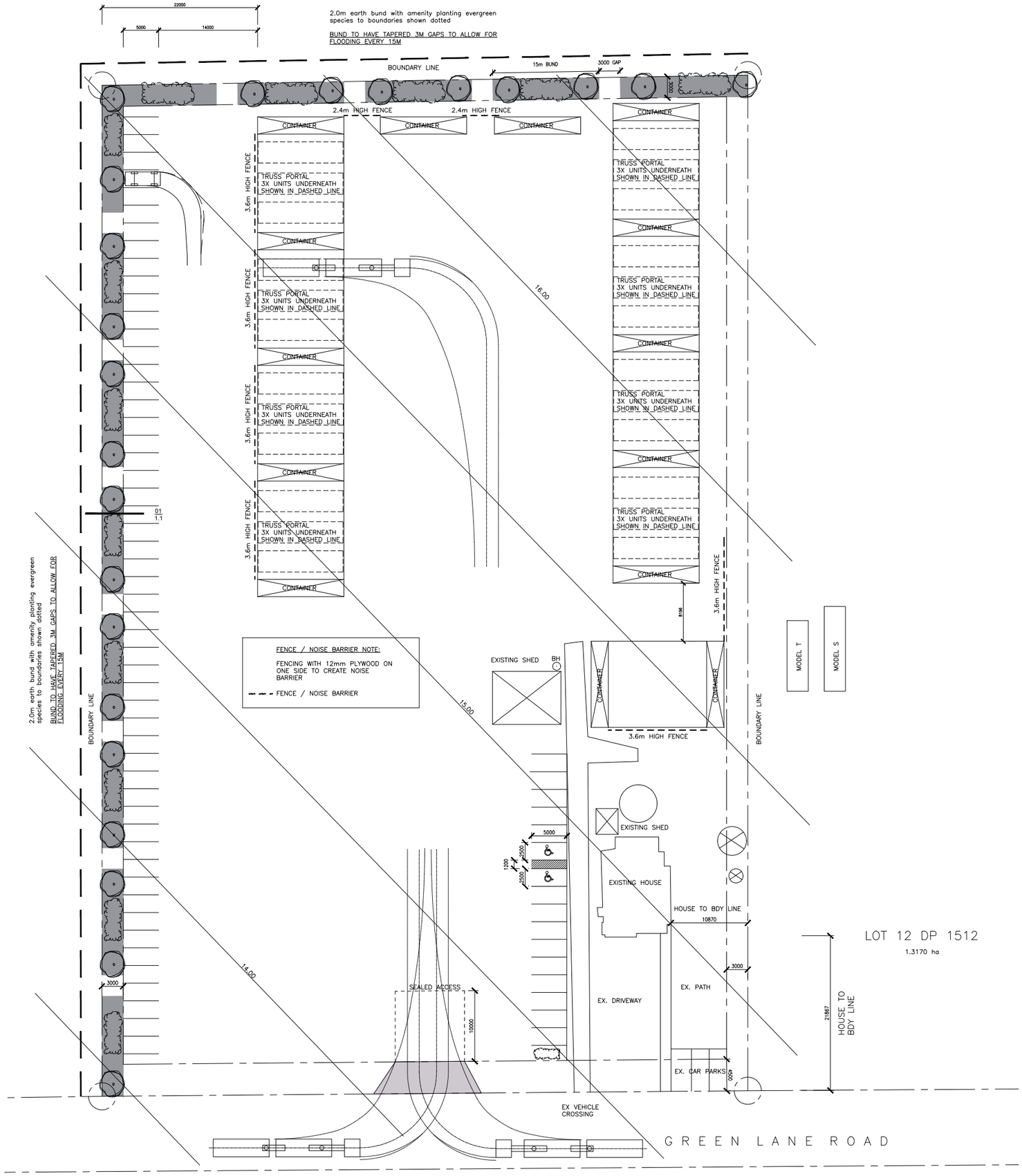
FLOOR LEVELS AND BUILDING SETOUT TO BE CONFIRMED TO CONTOURS ON SITE.

DEVELOPMENT SCHEDULE

SITE:	54 Green Lane, Motueka
DP:	Lot 12 DP 1512
CT:	NL3D/643
SITE AREA:	1.370 HA
TERRITORIAL AUTHORITY:	TASMAN COUNCIL
EXISTING BLDG COVERAGE:	248 sq m
EXISTING TOTAL:	248 sq m – 1.8%
PROPOSED SHED:	1240 sq m
PROPOSED TOTAL:	1488 sq m – 10.5%

LOCATION PLAN

NTS



SITE PLAN

SCALE 1:300 @ A1, 1:600 @ A3

REV.	DATE	
5	23.2.22	Client issue
4	13.8.21	Consultant Issue
3	6.8.21	Consultant Issue
2	26.7.21	Consultant Issue
1	12.5.21	RC Issue

ruru homes

ALLURE architectural

architectural design prefab modular homes custom build

Jarrod@allurearchitectural.co.nz - 0278453121

Project
RURU HQ
New Site Layout
54 Green Lane
Motueka 7120

Title
Site Plan
Proposed

Design: Jarrod
Drawn: Jarrod
Checked:
Date: Feb 2021
Scale A1: 1:400
Scale A3: 1:800

Job No: 21-RURU 3 Rev: 5

Dwg: Ac 0.1

Status: Resource Consent