

21 330

19 January 2022

Jeff McTainsh
jmctainsh@gmail.com

On-site Wastewater Design for a Proposed New Dwelling
594 Koutu Loop Road, Opononi (Lot 6 DP 546669)

Background

Haigh Workman Ltd (Haigh Workman) was commissioned by Jeff McTainsh (the Client) to design an onsite wastewater system for a proposed new 1-bedroom dwelling and a provision to allow for camping for 4 people at Lot 6 on Koutu Loop Road, Opononi. The site is a part of a subdivision, and an engineering report for the subdivision was prepared by Haigh Workman (Ref 18 173 dated Nov 2018). A subdivision consent (#2190273 -RMAOBJ/A) was granted by council in September 2019. This report is prepared to satisfy the consent condition 8-d(i) of the issued consent.

Site Location

The site is legally described as Lot 6 DP 546669 having a total area of 8200m² and is located to the south of Hokianga Harbour in Opononi. The site lot is a part of subdivision will have access via a proposed new road to be formed as a part of the subdivision which will come off Koutu Loop Road. The site is almost rectangular in shape in plan and is currently grassed. The topography of the site is such that the area recommended for building platform and the proposed disposal field location is situated on a flat surface and the remainder of the site slopes moderately towards southwest. There is an existing small stream flowing through the site closer to the southern boundary of the site flowing into the Hokianga Harbour present to the west of the site. Refer figure 1 below.

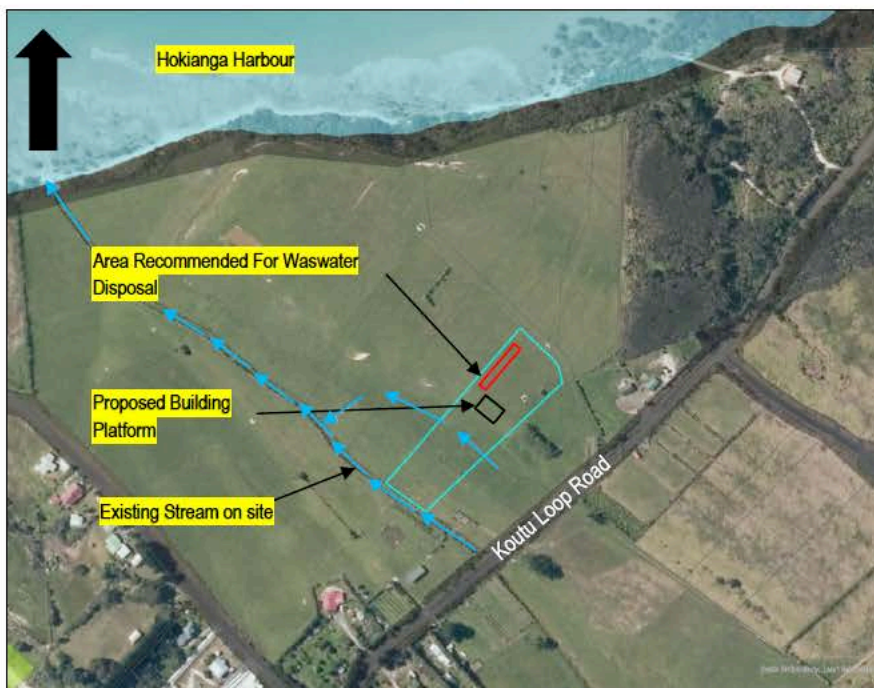


Figure 1: Site Location

Applicability

This report has been prepared for the sole use of our client, Jeff McTainsh for the particular brief and on the terms and conditions agreed with our client. It may not be used or relied on (in whole or part) by anyone else, or for any other purpose or in any other contexts, without our prior written agreement. This report may not be read or reproduced except in its entirety.

The comments and opinions presented in this report are based on FNDC standards and information provided by the client. There may be other facts prevailing for the site which have not been revealed by this investigation and which have not been considered by this report. Responsibility cannot be accepted for any conditions not revealed by this investigation.

Site Investigation

The site investigation for the lot was carried out by Haigh Workman in Feb 2017 at the time of subdivision and it was carried out in the area proposed for wastewater disposal. The same result of site investigation is being used for this report as it is unlikely that the ground conditions would have changed. The topsoil depth was measured as 150 mm, the subsoil comprised of fine to medium sand, typically dark grey colour, moist, no plasticity generally matching the soil map classification. The hand auger was terminated at 0.5m BGL and was UTP further due to a layer of deep hard pan underneath.

Refer borehole log attached to this report. Based on the results of our soil investigation and presence of hardpan, we classify the soil type at the proposed disposal field as TP 58 soil category 7 which are poorly draining or non-draining soils.

Wastewater Design

The client proposes to construct a 1-bedroom house on site currently with a provision to construct another 3-bedroom house in the future. In the current scenario the site will have a 1-bedroom dwelling and the lot will be used for camping during holidays. Hence considering the current scenario and the client's intention to construct a 3-bedroom house in the future, the system is designed for considering a design equivalent to a 4-bedroom dwelling i.e. a total of 6 people.

The new dwelling will have standard water fixtures (TP58 Table 6.2 Type C Households with 6/3 flush toilets, standard water reduction fixtures, no garbage grinder) and roof water supply.

The design flow is assessed using TP58 occupancy and daily flow rates.

1-bedroom dwelling:

- Flow Allowance = 160 L/p/d
- Design Occupancy: 2 persons
- Flowrate: $160 \times 2 = 320$ L/d

Provision for camping and future 3-bedroom dwelling:

- Design Occupancy = 4
- Flowrate: $160 \times 4 = 640$ L/d

Total design flowrate: 960 L/d.

Secondary Treatment System

A secondary treatment system capable of treating a consistent daily flow of 960L/day is recommended for the site. The plant shall meet the quality output of AS/NZS 1546.3:2003, being capable of producing effluent having less than 20 g/m³ of BOD₅ and 30 g/m³ TSS and be certified under Water New Zealand On-site Effluent Testing (OSET testing).

If the intended use of the dwelling is for holidays only, then the treatment system will be adjusted for intermittent design use only. The treatment system should be located at least 3m from buildings/retaining structures, 1.5m from site

boundaries. The treatment plant may be conveniently positioned in such a way allowing gravity connections to the treatment tank from both buildings and should provide access for maintenance.

The treatment plant should be installed to the manufacturer's specification and a commissioning certificate be provided as standard practice. A maintenance agreement shall also be entered into as part of the Code of Compliance process.

Disposal Field

The recommended effluent disposal method for secondary treated effluent is pressure compensating dripper irrigation. The proposed location of the disposal field is almost on a flat grade. The topography of the site is such that the flow from the dwelling can gravitate to the treatment tank. From the treatment tank, it is recommended to have a pressure compensating dripper irrigation. The disposal field will need to comply with rules for set-back distances and slopes given in both TP 58 and the Regional Plan.

The hardpan is located at 0.5m BGL and the Haigh Workman engineering report (Ref 18 173 dated Nov 2018) recommends that the disposal field be mounded or built up to give the required 600mm of separation distance between dripper lines and the ground water. It is recommended to have a topsoil mound of 300mm elevated in the centre and having side slopes diverting the surface runoff from percolating into the soil. With a topsoil mound on top of the existing ground, would mean the soil category can be classified as category 6 and can sustain an aerial loading of 3mm/day. With the topsoil mound in place, we adopt a conservative loading rate of 3mm/day. The site is suitable for either surface or subsurface irrigation. We recommended subsurface dripper lines 100mm into the topsoil mound. The disposal field to be densely planted with evapotranspiration suited plants. See Regional Council evapotranspiration plant species list appended.

The disposal field need to be sized for the proposed dwelling and for additional four people camping onsite. Design considerations are:

- Loading rate = 3 mm/day
- Total flowrate = 960L/d
- Field area: $960/3 = 320\text{m}^2$
- Reserve Area at 50% = 160m^2

The required disposal area is 320m^2 with a 160m^2 reserve area to remain undeveloped.

Regional Plan rules require a reserve area of 30-100% of the design area for secondary treatment. For this site a 50% reserve area shall remain undeveloped for use in the event of a system failure, or under estimation of daily wastewater production.

A suitable disposal field is shown on the wastewater plan appended compliant with rules for set-back distances. To achieve even and consistent irrigation across the disposal area we recommend subsoil tubing laid 100mm into the topsoil mound layer, spaced at 1m centres and incorporating 1.6L/hr drippers at 0.5m spacing (UniBioline or similar approved). Refer typical details enclosed.

Recommendations

To provide long term satisfactory treatment and disposal of domestic wastewater we recommend on-site treatment of effluent to secondary level with dripper irrigation comprising:

- A secondary treatment system be installed to service the proposed 1-bedroom dwelling and the additional people camping onsite. The secondary treatment plant should have sufficient capacity to treat a consistent daily flow of 960L/day and a peak of 1400L/day, to a standard less than 20 g/m^3 of BOD_5 and 30 g/m^3 TSS.
- The treatment plant be installed and maintained to the manufacturer's specifications.
- The disposal field be laid out in general accordance with the enclosed wastewater site plan (21 330/P2).

- Dripper lines by Techline™ AS Purple (Bioline AS) or similar approved, laid at 0.5m centre to centre with 1.6L/hr emitters spaced at 0.5m centres.
- Subsurface drippers buried 100mm into the topsoil mound layer and the field densely planted with evapotranspiration suited plants. See Regional Council evapotranspiration plant species list appended.
- Dripper laterals to be 50-75 m in length with each lateral fitted with a flush valve (refer to enclosed Typical Design Details).
- A 50% reserve area is available.

Prepared by:



Sagar Harhare
Civil Engineer
BE Civil, PGDip Eng, MEngNZ

Approved by:



John Papesch
Senior Civil Engineer
BE (Civil), CPEng, CMEngNZ

Encl:

1. Drawings
2. Site evaluation checklist
3. Producer Statement (PS1)
4. Soil Map fact sheet
5. Borehole log
6. Plant List



NOTES:
 ZONE : GENERAL COASTAL
 LOT 6 DP 546669 - 8200m²

| Issue | Date | Revision |
|-------|------------|----------------------|
| A | 14/01/2022 | FOR BUILDING CONSENT |

| | | |
|----------|---|-----------------|
| DWG | LOCATION PLAN | |
| Scale | 1:2500 @A3 | Date 14/01/2022 |
| Drawn | AM | Checked JP |
| Approved | JP | |
| File | S:\Clients\Jeffrey McTainsh\Jobs\21 330 - Lot 6 Koutu Loop Road (Lot 6 DP 546669)\Engineering\Drawings\21 330 WW Site Plan 01.dwg | |

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| | | |
|-------------|--|--------|
| Project | PROPOSED NEW DEVELOPMENT 594 KOUTU LOOP ROAD, LOT 6 | |
| Client | JEFF MCTAINSH | |
| Project No. | 21 330 | RC no. |

| | |
|-----------|---------------|
| DWG No. | P1 |
| Sheet No. | 1 of 2 |

NOTES:
 1. LOT BOUNDARIES INFORMATION TAKEN FROM QUICKMAP.
 2. AERIAL PHOTO INFORMATION TAKEN FROM LAND INFORMATION NEW ZEALAND (LINZ).

PROPOSED 320m² OF SUBSURFACE DRIPPER LINES BURIED 100mm INTO THE TOPSOIL MOUND

50% RESERVE AREA

SECONDARY TREATMENT SYSTEM

PROPOSED NEW DWELLING

KOUTU LOOP ROAD

MINIMUM SECONDARY TREATMENT PLANT SETBACKS:

- INVERT LEVEL AT INLET - NOT LESS THAN 0.5 m BELOW FLOOR LEVEL
- BUILDINGS - 3 m
- BOUNDARIES - 1.5 m
- EASILY ACCESSIBLE FOR MAINTENANCE.
- COASTAL MARINE AREA (CMA) - 30 m

CHECK ALL DIMENSIONS ON SITE.

SPECIFIC WASTEWATER DESIGN

MINIMUM EFFLUENT DISPOSAL SETBACKS:

- BOUNDARIES - 1.5 m
- BUILDINGS AND RETAINING WALLS - 3 m
- SURFACE WATER - 5 m (SECONDARY)
- COASTAL MARINE AREA - 30 m
- RIVERS AND WATERCOURSES - 15 m (SECONDARY)

CHECK ALL DIMENSIONS ON SITE.

| Issue | Date | Revision |
|-------|------------|----------------------|
| A | 14/01/2022 | FOR BUILDING CONSENT |

| | | | |
|-------|---|------------|-----------------|
| DWG | PROPOSED SITE PLAN | | |
| Scale | 1:750 @A3 | | Date 14/01/2022 |
| Drawn | SRH | Checked JP | Approved JP |
| File | S:\Clients\Jeffrey McTainsh\Jobs\21 330 - Lot 6 Koutu Loop Road (Lot 6 DP 546068)\Engineering\Drawings\21 330 WW Site Plan 01.dwg | | |

HAIGH WORKMAN
 Civil & Structural Engineers

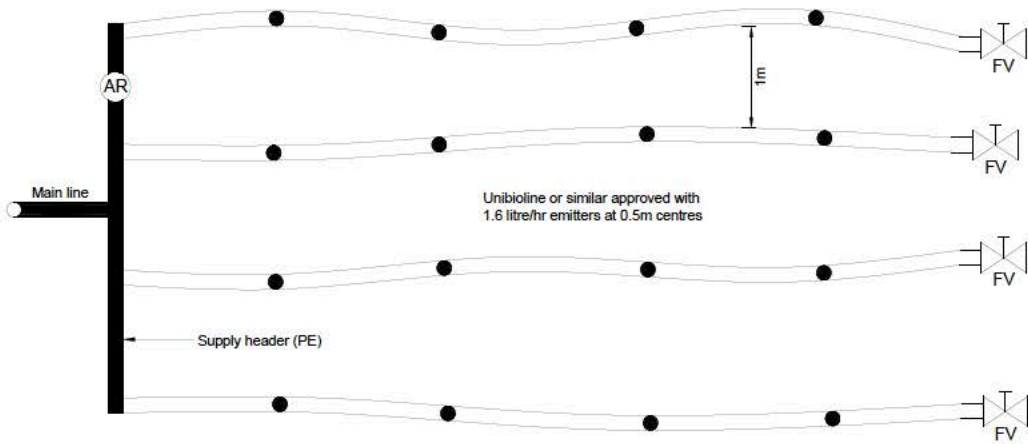
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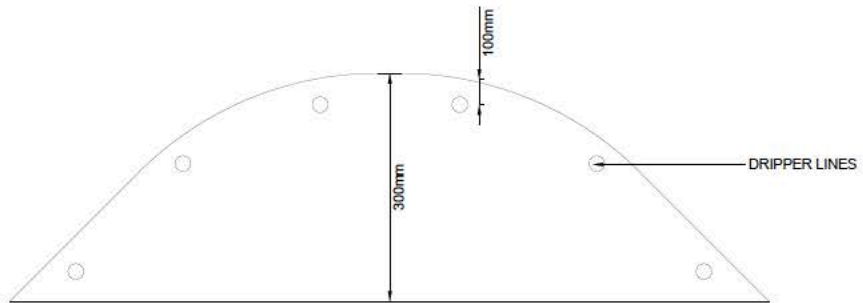
| | | |
|-------------|--|--------|
| Project | PROPOSED NEW DEVELOPMENT 594 KOUTU LOOP ROAD, LOT 6 | |
| Client | JEFF MCTAINSH | |
| Project No. | 21 330 | RC no. |

| | |
|-----------|---------------|
| DWG No. | P2 |
| Sheet No. | 2 of 2 |



Legend

-  Air / Vacuum release valve
-  Flushing valve



CROSS SECTION OF THE TOPSOIL MOUND



| | | | | | | | |
|---|-----|------------|--------|---|-----|-------------------------------------|--------|
| DWG | | | | HAIGH WORKMAN Civil & Structural Engineers | | Project PROPOSED NEW DEVELOPMENT | |
| ONSITE EFFLUENT DISPOSAL TYPICAL LAYOUT | | | | 6 Fairway Drive Kerikeri, BOI. T: 09 407 8327 F: 09 407 8378 E: info@haighworkman.co.nz | | Client JEFF MCTANISH | |
| DWG No. | DE1 | Sheet No. | 1 of 1 | Scale | NTS | Project No. | |
| Drawn | SRH | Checked | JP | Approved | JP | 21 330 | RC no. |
| File Name | | 14/01/2022 | | Date | | 14/01/2022 | |

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FAR NORTH DISTRICT COUNCIL
Appendix E TP58
On-site Wastewater Disposal
Site Evaluation Investigation Checklist

Part A –Owners Details

1. Applicant Details:

| | |
|------------------------|---|
| Applicant Name | <i>Jeffery Mctainsh</i> |
| Company Name | |
| Property Owner Name(s) | <i>Jeffery Alexander McTainsh, Gwendoline Mary McTainsh</i> |

| | |
|----------------------|--------------|
| Nature of Applicant* | <i>Owner</i> |
|----------------------|--------------|

(*i.e. Owner, Leasee, Prospective Purchaser, Developer)

2. Consultant / Site Evaluator Details:

| | | | |
|------------------------|---------------------------------|--------------------|---------|
| Consultant/Agent Name | <i>Haigh Workman</i> | | |
| Site Evaluator Name | <i>Sagar Harhare</i> | | |
| Postal Address | <i>PO Box 89</i> | | |
| | <i>Kerikeri</i> | | |
| Phone Number | Business | <i>09 407 8327</i> | Private |
| | Mobile | | Fax |
| Name of Contact Person | <i>Sagar Harhare</i> | | |
| E-mail Address | <i>sagar@haighworkman.co.nz</i> | | |

3. Are there any previous existing discharge consents relating to this proposal or other waste discharge on this site?

| | | | | |
|--|--|----|-------------------------------------|---------------|
| Yes | | No | <input checked="" type="checkbox"/> | (Please tick) |
| If yes, give Reference Numbers and Description | | | | |
| | | | | |

4. List any other consent in relation to this proposal site and indicate whether or not they have been applied for or granted

If so, specify Application Details and Consent No.

(e.g. Land Use, Water Take, Subdivision, Earthworks, Stormwater Consent)

| |
|-----------|
| <i>NA</i> |
| |
| |
| |
| |

Part B- Property Details

1. Property for which this application relates:

| | | | |
|---|--|--------------------------------------|---|
| Physical Address of Property | <i>Lot 6 DP 546669</i> | | |
| | | | |
| Territorial Local Authority | FAR NORTH DISTRICT COUNCIL | | |
| Regional Council | NORTHLAND REGIONAL COUNCIL | | |
| Legal Status of Activity | Permitted: <input checked="" type="checkbox"/> | Controlled: <input type="checkbox"/> | Discretionary: <input type="checkbox"/> |
| | <i>C.6.1.3</i> | | |
| Relevant Regional Rule(s) (Note 1) | | | |
| Total Property Area | <i>8200m²</i> | | |
| Map Grid Reference of Property If Known | | | |

2. Legal description of land (as shown on Certificate of Title)

| | | | | | |
|-----------------|----------|--------|---------------|--------|---------------|
| Lot No. | <i>6</i> | DP No. | <i>546669</i> | CT No. | <i>931016</i> |
| | | | | | |
| | | | | | |
| Other (specify) | | | | | |

Please ensure copy of Certificate of Title is attached

PART C: Site Assessment - Surface Evaluation

(Refer TP58 - Sn 5.1 General Purpose of Site Evaluation and Sn 5.2.2(a) Site Surface Evaluation)

Note: Underlined terms defined in Table 1, attached

Has a relevant property history study been conducted?

| | | | | |
|-----|-------------------------------------|----|--------------------------|-------------------|
| Yes | <input checked="" type="checkbox"/> | No | <input type="checkbox"/> | (Please tick one) |
|-----|-------------------------------------|----|--------------------------|-------------------|

If yes, please specify the findings of the history study, and if not please specify why this was not considered necessary.

| |
|---|
| <i>Site and soil evaluation with site walkover.</i> |
| |
| |
| |
| |
| |

1. Has a Slope Stability Assessment been carried out on the property?

| | | | | |
|-----|--|----|---|-------------|
| Yes | | No | ✓ | Please tick |
|-----|--|----|---|-------------|

If No, why not?

The area proposed for wastewater disposal is on a flat surface.

If Yes, please give details of report (and if possible, please attach report):

| | |
|---------------------------------------|----------------------|
| Author | |
| Company/Agency | <i>Haigh Workman</i> |
| Date of Report | To be prepared |
| Brief Description of Report Findings: | |
| | |

2. Site Characteristics (See Table 1 attached):

Provide descriptive details below:

Performance of Adjacent Systems:

Estimated Rainfall and Seasonal Variation:

1,300mm per year. 800mm winter, 500mm summer.

Vegetation / Tree Cover:

Native trees and bushes

Slope Shape: (Please provide diagrams)

The proposed location of the wastewater disposal is on a flat gradient.

Slope Angle:

≈2-3° at the location of wastewater disposal field

Surface Water Drainage Characteristics:

Surface runoff at the site is on a flat gradient

Flooding Potential: YES/NO

No.

If yes, specify relevant flood levels on appended site plan, i.e. one in 5 years and/or 20 year and/or 100-year return period flood level, relative to disposal area.

Surface Water Separation:

More than 5m

Site Characteristics: or any other limitation influencing factors

The proposed location of the wastewater disposal is on a flat gradient.

3. Site Geology
Check Rock Maps

The soil type in the area as published in NZMS Sheet 290 O06/07, 1:100,000 scale map, Edition 1, 1980: "Waipoua - Aranga" shows the site underlain by soils of the Undulating Terraces and Lowlands formation comprising Kara clay (KRe) and Kara silt loam (KR) which are imperfectly to very poorly drained soils.

Geological Map Reference Number

GNS (1:250,000) Map.

4. What Aspect(s) does the proposed disposal system face? (please tick)

| | | | |
|------------|--|------------|---|
| North | | West | |
| North-West | | South-West | |
| North-East | | South-East | |
| East | | South | ✓ |

5. Site clearances: (Indicate on site plan where relevant)

| Separation Distance from | Treatment Separation Distance (m) | Disposal Field Separation Distance (m) | FNDC / NRC minimum (m) |
|-------------------------------|-----------------------------------|--|------------------------|
| Boundaries | >1.5 | >1.5 | 1.5 |
| Surface water, creeks, drains | >20 | >5 | 5 |
| Groundwater | NA | >0.8 | 0.6 |
| Stands of Trees/Shrubs | NA | NA | NA |
| Wells, water bores | >50 | >50 | 20 |
| Embankments/retaining walls | >3 | >3 | 3 |
| Buildings | >3 | >3 | 3 |
| Coastal Marine area | >30 | >30 | 30 |

PART D: Site Assessment - Subsoil Investigation

(Refer TP58 - Sn 5.1 General Purpose of Site Evaluation, and Sn 5.2.2(a) Site Surface Evaluation and Sn 5.3 Subsurface Investigations)

Note: Underlined terms defined in Table 2, attached

1. Please identify the soil profile determination method:

| | | | | |
|------------------|---|-------------------|------------------|----------|
| Test Pit | | Depth _____ m | No of Test Pits | |
| Bore Hole | ✓ | Depth <u>0.5m</u> | No of Bore Holes | <u>1</u> |
| Other (specify): | | | | |

Soil Report attached?

| | | | | |
|-----|---|----|--|-------------|
| Yes | ✓ | No | | Please tick |
|-----|---|----|--|-------------|

2. Was fill material intercepted during the subsoil investigation?

| | | | | | |
|-----|--|----|---|--|-------------|
| Yes | | No | ✓ | | Please tick |
|-----|--|----|---|--|-------------|

If yes, please specify the effect of the fill on wastewater disposal

3. Percolation testing:

Please specify the method

| | | | | | |
|-----------------------|-----|--|----|---|-------------|
| Test Report Attached? | Yes | | No | ✓ | Please tick |
|-----------------------|-----|--|----|---|-------------|

4. Are surface water interception/diversion drains required?

| | | | | |
|-----|--|----|-------------------------------------|-------------|
| Yes | | No | <input checked="" type="checkbox"/> | Please tick |
|-----|--|----|-------------------------------------|-------------|

If yes, please show on site plan

4.a) Are subsurface drains required?

| | | | | |
|-----|--|----|-------------------------------------|-------------|
| Yes | | No | <input checked="" type="checkbox"/> | Please tick |
|-----|--|----|-------------------------------------|-------------|

If yes, please provide details

5. Please state the depth of the seasonal water table:

| | | | | | | |
|--------|------|---|----------|-------------------------------------|-----------|-------------------------------------|
| Winter | >0.5 | m | Measured | | Estimated | <input checked="" type="checkbox"/> |
| Summer | >0.5 | m | Measured | <input checked="" type="checkbox"/> | Estimated | |

6. Are there any potential storm water short circuit paths?

| | | | | |
|-----|--|----|-------------------------------------|-------------|
| Yes | | No | <input checked="" type="checkbox"/> | Please tick |
|-----|--|----|-------------------------------------|-------------|

If the answer is yes, please explain how these have been addressed

7. Based on results of subsoil investigation above, please indicate the disposal field soil category (Refer TP58 Table 5.1)

| | | | |
|---------------------|-----|-----------------------|-------|
| Is Topsoil Present? | Yes | If so, Topsoil Depth? | 150mm |
|---------------------|-----|-----------------------|-------|

| Soil Category | Description | Drainage | Tick One |
|---------------|--|---------------------------|-------------------------------------|
| 1 | Gravel, coarse sand | Rapid draining | |
| 2 | Coarse to medium sand | Free draining | |
| 3 | Medium-fine & loamy sand | Good drainage | |
| 4 | Sandy loam, loam & silt loam | Moderate drainage | |
| 5 | Sandy clay-loam, clay loam & silty clay-loam | Moderate to slow drainage | |
| 6 | Sandy clay, non-swelling clay & silty clay | Slow draining | |
| 7 | Swelling clay, grey clay, hardpan | Poorly or non-draining | <input checked="" type="checkbox"/> |

Reasons for placing in stated category

Soil colour and texture investigation and soil map classification

PART E: Discharge Details

1. Water supply source for the property (please tick):

| | |
|-----------------------------|-------------------------------------|
| Rainwater (roof collection) | <input checked="" type="checkbox"/> |
| Bore/well | |
| Public supply | |

2. Calculate the maximum daily volume of wastewater to be discharged, unless accurate water meter readings are available

(Refer TP58 Table 6.1 and 6.2)

| | | | | |
|-----------------------------------|-----|-----|-----|------------------------------------|
| Number of Bedrooms | 1 | | | |
| Design Occupancy | 6 | | | (Number of People) |
| Per capita Wastewater Production | 145 | 160 | 180 | (tick) (Litres per person per day) |
| Other - specify | | ✓ | | |
| Total Daily Wastewater Production | 960 | | | (litres per day) |

3. Do any special conditions apply regarding water saving devices

| | | | | | |
|-------------------------------------|-----|---|----|---|---------------|
| a) Full Water Conservation Devices? | Yes | | No | ✓ | (Please tick) |
| b) Water Recycling - what %? | | % | | | (Please tick) |

If you have answered yes, please state what conditions apply and include the estimated reduction in water usage

| |
|--|
| |
| |
| |
| |

4. Is Daily Wastewater Discharge Volume more than 2,000 litres:

| | | |
|-----|---|---------------|
| Yes | | (Please tick) |
| No | ✓ | (Please tick) |

Note if answer to the above is yes, an N.R.C wastewater discharge permit may be required

5. Gross Lot Area to Discharge Ratio:

| | | |
|-----------------------------------|--------|------------------|
| Gross Lot Area | 0.8200 | Ha |
| Total Daily Wastewater Production | 960 | (Litres per day) |
| Lot Area to Discharge Ratio | >3 | |

7. Does this proposal comply with the Northland Regional Council Gross Lot Area to Discharge Ratio of greater than 3?

| | | | | |
|-----|---|----|--|-------------|
| Yes | ✓ | No | | Please tick |
|-----|---|----|--|-------------|

8. Is a Northland Regional Council Discharge Consent Required?

| | | | | |
|-----|--|----|---|---------------|
| Yes | | No | ✓ | (Please tick) |
|-----|--|----|---|---------------|

PART F: Primary Treatment (Refer TP58 Section 7.2)

1. Please indicate below the no. and capacity (litres) of all septic tanks including type (single/dual chamber grease traps) to be installed or currently existing: If not 4500 litre, dual chamber explain why not

| Number of Tanks | Type of Tank | Capacity of Tank (Litres) |
|-----------------|----------------|---------------------------|
| NA | | |
| | | |
| | | |
| | | |
| | Total Capacity | |

2. Type of Septic Tank Outlet Filter to be installed?

NA

PART G: Secondary and Tertiary Treatment

(Refer TP58 Section 7.3, 7.4, 7.5 and 7.6)

1. Please indicate the type of additional treatment, if any, proposed to be installed in the system: (please tick)

| | | | |
|------------------------------|-------------------------------------|---------|--|
| Secondary Treatment | <input checked="" type="checkbox"/> | | |
| Home aeration plant | <input type="checkbox"/> | | |
| Commercial aeration plant | <input type="checkbox"/> | | |
| Intermediate sand filter | <input type="checkbox"/> | | |
| Recirculating sand filter | <input type="checkbox"/> | | |
| Recirculating textile filter | <input type="checkbox"/> | | |
| Clarification tank | <input type="checkbox"/> | | |
| Tertiary Treatment | <input type="checkbox"/> | | |
| Ultraviolet disinfection | <input type="checkbox"/> | | |
| Chlorination | <input type="checkbox"/> | | |
| Other | <input type="checkbox"/> | Specify | |

PART H: Land Disposal Method

(Refer TP58 Section 8)

1. Please indicate the proposed loading method: (please tick)

| | |
|-------------------------|-------------------------------------|
| Gravity | <input type="checkbox"/> |
| Dosing Siphon or Flout™ | <input type="checkbox"/> |
| Pump | <input checked="" type="checkbox"/> |

2. High water level alarm to be installed in pump chambers

Yes No

If not to be installed, explain why

3. If a pump is being used, please provide the following information:

| | | |
|--------------------------|--|----------|
| Total Design Head | | (m) |
| Pump Chamber Volume | | (Litres) |
| Emergency Storage Volume | <i>(to be confirmed by manufacturer)</i> | (Litres) |

4. Please identify the type(s) of land disposal method proposed for this site: (please tick)

(Refer TP58 Sections 9 and 10)

| | | |
|--------------------------------|-------------------------------------|---------|
| Surface Dripper Irrigation | | |
| Sub-surface Dripper irrigation | <input checked="" type="checkbox"/> | |
| Standard Trench | | |
| Deep Trench | | |
| Mound | | |
| Evapo-transpiration Beds | | |
| Other | | Specify |

5. Please identify the loading rate you propose for the option selected in Part H, Section 4 above, stating the reasons for selecting this loading rate:

| | | | |
|---------------|---------|-----|------------------------------|
| Loading Rate | 3 | | (Litres/m ² /day) |
| Disposal Area | Design | 320 | (m ²) |
| | Reserve | 160 | (m ²) |
| | TOTAL | 480 | (m ²) |

Explanation *(Refer TP58 Sections 9 and 10)*

| |
|--|
| <i>Design loading rate for secondary treated effluent in TP58 based on Category 7 soil type (refer Table 9.2 in TP58).</i> |
| |
| |
| |

6. What is the available reserve wastewater disposal area *(Refer TP58 Table 5.3)*

| | |
|---|-----|
| Reserve Disposal Area (m ²) | 160 |
| Percentage of Primary Disposal Area (%) | 50% |

7. Please provide a detailed description of the design and dimensions of the disposal field and attach a detailed plan of the field relative to the property site:

Description and Dimensions of Disposal Field:

| |
|--|
| <i>Effluent disposal of 320 linear metres of approved trickle irrigation tubing laid at 1m centres with 1.6 L/hour emitters at 0.5 m centres installed to the manufacturer's specifications. It is recommended to have a topsoil mound of 300mm elevated in the centre and having side slopes diverting the surface runoff from percolating into the soil.</i> |
| |
| |

| | | | | | |
|----------------|-----|-------------------------------------|----|--|----------------------|
| Plan Attached? | Yes | <input checked="" type="checkbox"/> | No | | <i>(Please tick)</i> |
|----------------|-----|-------------------------------------|----|--|----------------------|

If not, explain why not

| |
|--|
| |
| |

PART I: Maintenance & Management

(Refer TP58 Section 12.2)

1. Has a maintenance agreement been made with the treatment and disposal system suppliers?

| | | | | |
|-----|--|----|-------------------------------------|---------------|
| Yes | | No | <input checked="" type="checkbox"/> | (Please tick) |
|-----|--|----|-------------------------------------|---------------|

Name of Suppliers

To be provided at the time of construction.

PART J: Assessment of Environmental Effects

1. Is an assessment of environmental effects (AEE) included with application?

(Refer TP58 section 5. Ensure all issues concerning potential effects addressed)

| | | | | |
|-----|--|----|-------------------------------------|---------------|
| Yes | | No | <input checked="" type="checkbox"/> | (Please tick) |
|-----|--|----|-------------------------------------|---------------|

If Yes, list and explain possible effects

PART K: Is Your Application Complete?

1. In order to provide a complete application you have remembered to:

| | |
|---|-------------------------------------|
| Fully Complete this Assessment Form | <input checked="" type="checkbox"/> |
| Include a <i>Location Plan</i> and <i>Site Plan</i> (with Scale Bars) | <input checked="" type="checkbox"/> |
| Attach an Assessment of Environmental Effects (AEE) | <input checked="" type="checkbox"/> |

1. Declaration

I hereby certify that, to the best of knowledge and belief, the information given in this application is true and complete.

| | | | |
|----------|----------------|-----------|--|
| Name | Sagar Harhare | Signature |  |
| Position | Civil Engineer | Date | 14/01/2021 |

Note:

Any alteration to the site plan or design after approval will result in non-compliance.

ENVIRONMENTAL EFFECTS, MITIGATION MEASURES

A. Assessment of Environmental Effects

Impact on Surface Water (incl. flood times) [NA](#)

Impact on Ground Water [Minor](#)

Impact on Soils [Minor](#)

Impact on Amenity Values [None](#)

B. Public Health Issues:

Should access to the disposal area be discouraged? [Yes](#)

Will odour effects be greater than usual? [No](#)

Will noise effects be greater than usual? [No](#)

C. Mitigation Measures

Has conservative approach been taken in choosing system design capacity? [Yes](#)

Is system design robust (cope with fluctuations of load, climate)? [Yes](#)

Is level of treatment high? [High – final treatment within soil](#)

Protection against failure storage, alarms? [Alarms](#)

Is hydraulic loading rate conservative? [Yes, consideration of loading rate](#)

Is distribution area protected from hydraulic overload (interception drains)? [No](#)

Will soil type enhance treatment? [Yes](#)

Are desired separation distances attainable? (to surface water, groundwater, bores) [Yes](#)

Is the reserve area adequate? [Yes, 50%](#)

ON-SITE DOMESTIC WASTEWATER MANAGEMENT Advice to Home Owner/Occupier

Home owner and occupiers are legally responsible to keep their on-site wastewater system in good working order. The following schedule gives advice on the use and maintenance of the system.

1. Use of the System

For the on-site wastewater system to work well there are some good habits to encourage and some bad habits to avoid:

- 1.1 In order to reduce sludge building up in the tank:
 - (i) Scrape all dishes to remove fats, grease etc, before washing.
 - (ii) Keep all possible solids out of system.
 - (iii) Don't use a garbage grinder unless the system has been specifically designed to carry the extra load.
 - (iv) Don't put sanitary napkins, other hygiene products or disposable nappies into the system.

- 1.2 In order to keep bacteria working in the tank and in the land-application area:
 - (i) Use biodegradable soaps.
 - (ii) Use a low-phosphorus detergent.
 - (iii) Use a low-sodium detergent in dispersive soil areas.
 - (iv) Use detergents in the recommended quantities.
 - (v) Don't use powerful bleaches, whiteners, nappy soakers, spot removers and disinfectants.
 - (vi) Don't put chemicals or paint down drain.

- 1.3 Conservation of water will reduce the volume of effluent disposed to the land-application area, make it last longer and improving its performance. Conservation measures could include:
 - (i) Installation of water-conservation fittings.
 - (ii) Taking showers instead of baths.
 - (iii) Only washing clothes when there is a full load.
 - (iv) Only using the dishwasher when there is a full load.

- 1.4 Avoid overloading the system by spacing out water use evenly. For example, not doing all the washing on one day and by not running the washing machine and dishwasher at the same time.

2. Maintenance

- 2.1 The primary wastewater-treatment unit (septic tank) will need to:
- (i) Be desludged regularly i.e. every 3 to 5 years, or when scum and sludge occupy 2/3 of the volume of the tank (or first stage of a two-stage system).
 - (ii) Be protected from vehicles.
 - (iii) Have any grease trap cleaned out regularly.
 - (iv) Have the vent and/or access cover of the septic tank kept exposed.
 - (v) Have the outlet filter inspected and cleaned.
- 2.2 The land-application area needs protection as follows: -
- (i) Where surface water diversion drains are required by the design, these need to be kept clear to reduce the risk of stormwater runoff entering the effluent soakage area.
 - (ii) No vehicles or stock should be allowed on trenches or beds.
 - (iii) Deep rooting trees or shrubs should not be grown over absorption trenches or pipes.
 - (iv) Any evapo-transpiration areas should be designed to deter pedestrian traffic.
 - (v) The baffles or valves in the distribution system should be periodically (monthly or seasonally) changed to direct effluent into alternative trenches or beds, if required by the design.
- 2.3 Evapo-transpiration and irrigation areas should have their grass mowed and plants maintained to ensure that these areas take up nutrients with maximum efficiency.
- 2.4 For aeration treatment systems. Check equipment and:
- (i) Follow the manufacturer's instructions for maintaining and cleaning pumps, siphons, and septic tank filters.
 - (ii) Clean disc filters or filters screens on irrigation-dosing equipment periodically by rinsing back into the primary wastewater-treatment unit.
 - (iii) Flush drip irrigation lines periodically to scour out any accumulated sediment.

PRODUCER STATEMENT – PS1 DESIGN



association of
consulting and
engineering



| | | |
|--|--|---------------------------|
| Building Code Clause(s): | G13 | Job number: 21 330 |
| ISSUED BY: <i>(Engineering Design Firm)</i> | Haigh Workman Ltd | |
| TO: <i>(Client)</i> | Jeff McTainsh | |
| TO BE SUPPLIED TO: <i>(Building Consent Authority)</i> | Far North District Council | |
| IN RESPECT OF: <i>(Description of building work)</i> | New build | |
| AT: <i>(Address)</i> | 594 Koutu Loop Road, Opononi, Kaikohe 0473 | |
| LEGAL DESCRIPTION | Lot 6 DP 546669 | |

We have been engaged by Jeff McTainsh to provide:

A design for an onsite wastewater system in accordance with TP58

in respect of the requirements of the Clause(s) of the Building Code specified above for part only, as specified in the attached Schedule, of the proposed building work.

The design carried out by Haigh Workman Ltd has been prepared in accordance with:

- ✓ compliance documents issued by the Ministry of Business, Innovation & Employment (Verification method /acceptable solution): G13 for foul water

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

On behalf of Haigh Workman Ltd, and subject to:

- all proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that:

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

I recommend the CM1 level of construction monitoring.

I, John Papesch, am:

- CPEng number 224301
- and hold the following qualifications: B.E.

Haigh Workman Ltd holds a current policy of Professional Indemnity Insurance no less than \$200,000.

Job Number: 21 330
Job Address: 594 Koutu Loop Road, Opononi, Kaikohe 0473
Compilation Date and Time: 17 January 2022 at 11:24 AM

✓

Haigh Workman Ltd is a member of ACE New Zealand.

SIGNED BY:

John Papesch

(Signature):



Date: 21.01.2022

ON BEHALF OF:

Haigh Workman Ltd

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

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

SCHEDULE TO PS1

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

- Engineering Drawing Set: Engineering Site Plans and Details
- Engineering Calculations: Design Calculations and Report

Limited Scope of Engagement

We have been engaged by Jeff McTainsh to provide services in respect of the requirements of the Clause(s) of the Building Code specified above for the following parts of the proposed building work:

A design for an onsite wastewater system in accordance with TP58

GUIDANCE ON USE OF PRODUCER STATEMENTS

Information on the use of Producer Statements and Construction Monitoring Guidelines can be found on either the [ACE New Zealand](#) or [Engineering New Zealand](#) websites.

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

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

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

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

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

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

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

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

Competence of Engineering Professional

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

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

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

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

Professional Indemnity Insurance

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

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

Professional Services during Construction Phase

There are several levels of service that an engineering firm may provide during the construction phase of a project (CM1-CM5 for engineers³).

The BCA is encouraged to require that the service to be provided by the engineering firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

BCAs should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued. No design professional should be expected to provide a producer statement unless such a requirement forms part of Haigh Workman Ltd's engagement.

Refer Also:

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

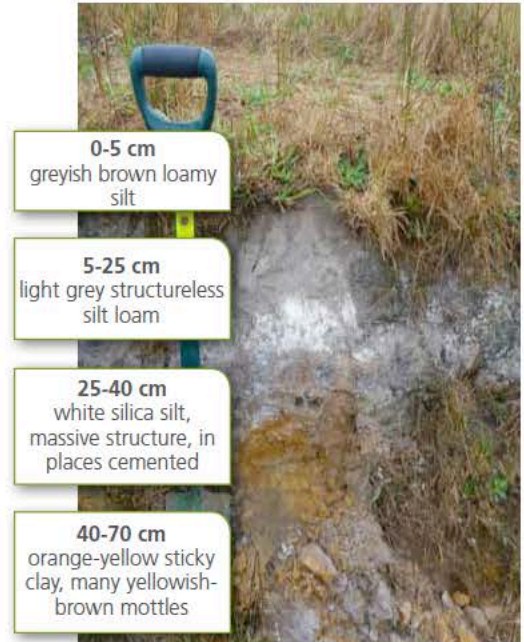
www.acenz.org.nz

www.engineeringnz.org

Very old podzol soils

Soil types in this group

- Kaikino sand - KK
- Kara clay - KRe
- Kara peaty silt loam - KRY
- Kara sandy loam - KRa, KRap[^]
- Kara silt loam - KR, KRp[^]
- Parahaki fine sandy loam and silt loam - PR, PRp[^]
- Ohia sand - OE
- Ohia peaty sand - OEy
- Omaiko gravelly silt loam - OV, OVH*, OVp[^]
- One Tree Point peaty sand - OT
- Parakao fine sandy loam - PL
- Te Hapua fine sandy loam - TX, TXp[^]
- Te Kopuru sand - TEK
- Te Kopuru sand wet phase - TEKm
- Te Kopuru peaty sand - TEKy
- Tinopai sandy loam and sandy clay - TP
- Wharekohe fine sandy loam - WKf, WKfp
- Wharekohe fine sandy loam ash variant - WKI, WKIp[^]
- Wharekohe sandy loam - WKa, WKaH, WKap[^]
- Wharekohe silt loam - WK, WKH*, WKp[^]
- Wharekohe silt loam with brown subsoil - WKr



Wharekohe silt loam (WK, WKH) soil profile

This fact sheet uses NZ Soil Bureau map series soil type names and abbreviations.

*The H denotes the hill variant of this soil type, which occurs on slopes over 20° and has a shallower profile.

[^]The p denotes the pan variant of this soil type.

Features of very old podzol soils

- These soils can be found throughout Northland and are regionally known as gumland soils or pipe clay
- Podzols formed on a wide variety of parent materials, including sands, sedimentary mud and sandstones, and volcanics
- Podzols developed under the acidic litter from kauri forests over a very long time
- Water draining through a deep litter of acidic kauri leaves and bark creates a mild acid which leaches nutrients and finer clay fractions from the soil
- Pale, fine-textured silica sand and silt, from which iron and aluminium have been leached, are left behind to form a dense layer or pan beneath the pipe clay
- Clay leached downwards makes a column-like subsoil below the pan
- Despite their limitations, these soils have been restored to productive use under well managed pasture

Structure and drainage management

| Issues | Management tips |
|--|--|
| Typically, podzols have very poor structure and can vary in form seasonally, from wet to set concrete | Careful winter grazing management can minimise pugging and compaction and protect soil structure |
| Subsoils are often structurally weak | Maintaining good pasture covers helps build soil organic matter and improve soil structure |
| Topsoils are generally thin and easily lost during cultivation | Careful management is needed when cropping and regrassing to protect soil structure and productivity |
| In some places, the silica pan layer can be well over 1m thick and vary widely at a paddock scale, making drainage and fencing difficult | Timing of tasks such as fencing and earthworks can be critical. There is often a small window between fluid and rock hard soil |
| | Seek advice on appropriate drainage options |

Erosion control

| Erosion risks | Soil type | Specific problems | Possible solutions |
|------------------------|------------------------------------|--|---|
| Gully erosion (severe) | All very old podzolised soil types | These soils lack structure Column-like subsoils beneath the pan are highly erodible | Early control of gully erosion is essential Plant willows in a zigzag pattern along gullies for stabilisation Stock exclusion will allow soil conservation plantings to establish Reducing the water's speed and energy by installing control structures in channels may also help |



Wharekohe silt loam (WK, WKH) gumland

Nutrient management

| Soil type | Nutrient status | Management strategies |
|------------------------------------|---|---|
| All very old podzolised soil types | Soils tend to be acidic | Regular applications of lime are essential to achieve optimum pH levels |
| All very old podzolised soil types | <p>Due to extreme stage of soil development, all nutrients have been leached from podzols; however, whatever nutrients are applied will not be fixed by clay and therefore are readily available to plants</p> <p>As stocking rates increase, nutrient and trace element deficiencies can affect plant and/or animal growth rates</p> | <p>A 'little and often' fertiliser regime will boost production and help avoid leaching losses</p> <p>Seek advice from your fertiliser consultant and vet</p> |

Drainage classes

| Soil symbol | Full name | Drainage class |
|--|--|--|
| KAIKINO SUITE Basement rock: sand | | |
| KK | Kaikino sand | 1⇒0 - Poorly to very poorly drained |
| KOHUMARU SUITE Basement rock: alluvium from dolerite and andesite volcanoes | | |
| PL | Parakao fine sandy loam | 1⇒0 - Poorly to very poorly drained |
| MAUNGAREI SUITE Basement rock: dacite, phylolite and granodiorite | | |
| PR, PRp | Parahaki fine sandy loam and silt loam | 1⇒0 - Poorly to very poorly drained |
| OMAIKO SUITE Basement rock: greywacke, argillite and quartzite | | |
| OV, OVH, OVp | Omaiko gravelly silt loam | 3⇒2 OV Moderately to imperfectly drained 1⇒0 OVH, OVp - Poorly to very poorly drained |
| OMU SUITE Basement rock: mudstone, claystone, shale | | |
| WK, WKH, WKp | Wharekohe silt loam | 1⇒0 - Poorly to very poorly drained |
| WKr | Wharekohe silt loam with brown subsoil | 1⇒0 - Poorly to very poorly drained |
| PINAKI SUITE Basement rock: sand and sand terraces | | |
| OE | Ohia sand | 5 - Very well drained |
| TX, TXp | Te Hapua fine sandy loam | 2⇒1 TX Imperfectly to poorly drained 1⇒0 TXp Poorly to very poorly drained |
| OEy | Ohia peaty sand | 1⇒0 - Poorly to very poorly drained |
| TEK | Te Kopuru sand | 1⇒0 - Poorly to very poorly drained |
| TEKm | Te Kopuru sand wet phase | 1⇒0 - Poorly to very poorly drained |
| TEKy | Te Kopuru peaty sand | 1⇒0 - Poorly to very poorly drained |
| PUHOI SUITE Basement rock: banded sandstone | | |
| WKf, WKfp | Wharekohe fine sandy loam | 1⇒0 - Poorly to very poorly drained |
| RUAKAKA SUITE Basement rock: sand terraces; groundwater podzol | | |
| OT | One Tree Point peaty sand | 4⇒1 - Well to poorly drained |
| TE KIE SUITE Basement rock: shattered breccia and tuffs | | |
| TP | Tinopai sandy loam and sandy clay | 1⇒0 - Poorly to very poorly drained |
| WAIOTIRA SUITE Basement rock: sandstone | | |
| WKa, WKaH, WKap | Wharekohe sandy loam | 1⇒0 - Poorly to very poorly drained |
| WAITEMATA SUITE Basement rock: rhyolite ash and alluvium | | |
| WKL, WKlp | Wharekohe fine sandy loam ash variant | 1⇒0 - Poorly to very poorly drained |
| WHAREORA SUITE Basement rock: terrace alluvium | | |
| KR, KRp | Kara silt loam | 2 KR - Imperfectly drained 1⇒0 KRp - Poorly to very poorly drained |
| KRa, KRap | Kara sandy loam | 1⇒0 - Poorly to very poorly drained |
| KRy | Kara peaty silt loam | 1⇒0 - Poorly to very poorly drained |
| KRe | Kara clay | 1⇒0 - Poorly to very poorly drained |



Te Kopuru sand (TEK) soil profile

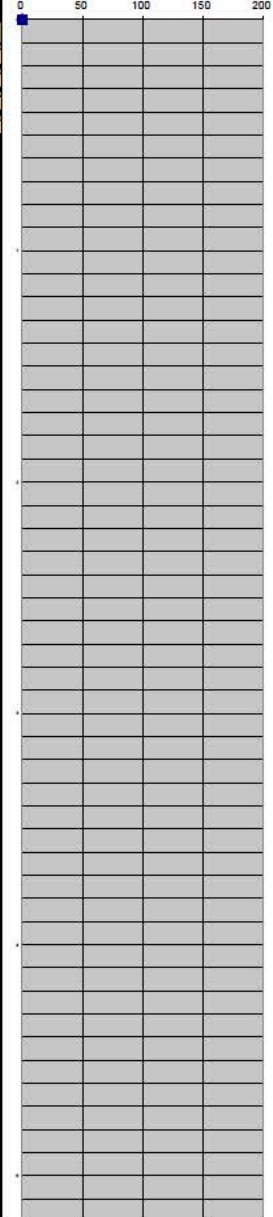
Northland soil factsheet series

- Northland's climate, topography, historic vegetation and mixed geology have combined to form a complex pattern of soils across the region. There are over 320 soil types in Northland. Other regions in New Zealand average only 20 soil types per region.
- The information in this fact sheet is based on a 1:50,000 mapping scale. Therefore, it is not specific to individual farms or properties. However, it may help you to understand general features and management options for recent alluvial soils.
- Knowing your soils' capabilities and limitations is the key to sustainable production in Northland. Northland Regional Council (NRC) land management advisors are available to work with landowners to provide free soil conservation advice, plans and maps specific to your property.
- Regular soil tests are recommended. If you are concerned about your soil structure or health, the Visual Soil Assessment test could be useful. Contact the land management advisors at Northland Regional Council for more information.
- Further background information about the processes that have formed these soils can be found here: www.nrc.govt.nz/soilfactsheets

Contact a land management advisor on
0800 002 004 or visit www.nrc.govt.nz/land

P O Box 124
 3 Elizabeth Street
 Warkworth, New Zealand

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

| Borehole Log | | JOB No. 18 173 | | Borehole no. BH105 | |
|--|----------------------------|----------------|--|---------------------------|-------------------------------|
| Client | B & T Family Trust | | | Date | 20-Feb-17 |
| Location | 594 Koutu Loop Road, Koutu | | | | |
| Drilling Method: | Hand Auger | Diameter: | 50mm | Logged: | EC |
| | | | | Checked: | JP |
| Soil Description | Depth | Legend | Shear Strength (kPa) | Moisture | Sample, Other Tests, Remarks. |
| | | | 0 50 100 150 200 | | |
| Grassed TOPSOIL comprising silty fine to medium SAND . Dark grey, wet. | 0.0 | wwwwww |  | Wet Moist | |
| Fine to medium SAND . Grey and light grey, moist. | 0.1 | oooooooooooo | | | |
| Dense HARD PAN recovered as fine to medium SAND . Yellowish and organish brown, moist. | 0.4 | oooooooooooo | | | |
| | 0.5 | oooooooooooo | | | |
| Borehole terminated at 0.5 m | | | | | |
| | 1.0 | | | | |
| | 1.5 | | | | |
| | 2.0 | | | | |
| | 2.5 | | | | |
| | 3.0 | | | | |
| | 3.5 | | | | |
| | 4.0 | | | | |
| | 4.5 | | | | |
| | 5.0 | | | | |

Soils Legend

| | | | | | | | |
|---------|--------------|------|-------------|--------|---------|------|-----------|
| Topsoil | wwwwww | Fill | /////// | Clay | ----- | Silt | xxxxxxxxx |
| Sand | oooooooooooo | Peat | v.v.v.v.v.v | Gravel | 0000000 | Rock | xxxxxxx |

**SUITABLE PLANTS FOR
EVAPO-TRANSPARATION SYSTEMS**

Native Shrubs and Trees

| | |
|---------------------|--------------------------------|
| Coprosma | <i>Coprosma propinqua</i> |
| Hebe | <i>Hebe</i> |
| Manuka | <i>Leptospermum Scoparium</i> |
| Weeping Mapou | <i>Myrsine Divaricata</i> |
| Flax (fast) | <i>Phormium Tenax</i> |
| Pokaka (slow) | <i>Elaeocarpus Hookerianus</i> |
| Cabbage Tree (fast) | <i>Cordyline Australias</i> |
| Rangiora (fast) | <i>Brachyglottis Repanda</i> |
| Lacebark (fast) | <i>Hoheria Populnea</i> |
| Ribbonwood (fast) | <i>Plagianthus Regius</i> |
| Poataniwha | <i>Melicope Simplex</i> |
| Heketara | <i>Olearia Rani</i> |
| Poataniweta | <i>Carpodetus Serratus</i> |
| Kohuhu (fast) | <i>Pittosporum Tenufolium</i> |

Grasses

| | |
|---|-----------------------------|
| Jointed Twig Sedge | <i>Baumea Articulata</i> |
| Longwood Tussock | <i>Carex Comans</i> |
| Pukio | <i>Carex Secta</i> |
| Toetoe (use native species- not invasive Pampas Grass) | <i>Cortaderia Fulvida</i> |
| Umbrella Sedge | <i>Cyperus Ustulatus</i> |
| Oioi | <i>Leptocarpus Simillis</i> |
| Hooksedge | <i>Uncinia Unciniata</i> |

Introduced Species

Canna Lilies, Taro, Aralia,
Fuschia, Philodendrons,
and Begonias



CARING FOR NORTHLAND AND ITS ENVIRONMENT

WHANGAREI: 36 Water Street, Private Bag 9021, Whangarei; Phone 09 438 4639, Fax 09 438 0012.

OPUA: Unit 10, Industrial Marine Park, Opuia; Phone 09 402 7516, Fax 09 402 7510.

DARGAVILLE: 61B Victoria Street, Dargaville; Phone 09 439 3300, Fax 09 439 3301.

KAITIARA: 192 Commerce Street, Kaitiara; Phone 09 408 6600, Fax 09 408 6601.

Tel: 0800 002 004 Environmental Hotline: 0800 504 639 Website: www.nrc.govt.nz