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David Kepes

Engineering Report

- Onsite Wastewater Management System

924 Queen Charlotte Drive, Mahakipawa Arm, Linkwater

05 August 2013

Our ref: 4030

David Kepes
New Dwelling
924 Queen Charlotte Drive, Mahakipawa Arm

Contents

Issue No.	1	2	3	4	5	6
Date	05.08.13					
Prepared By	KS					
Approved By	RE					

1 Executive Summary

Smart Alliances have carried out an engineering appraisal of the on-site wastewater management criteria for the proposed new dwelling for David Kepes (the client) at 924 Queen Charlotte Drive, Mahakipawa Arm, Linkwater.

The client wishes to construct a three bedroom house.

There is sufficient area to treat and dispose of the wastewater created from the house.

The wastewater management system for the proposed dwelling should comprise:

- A primary treatment unit (septic tank)
- Filter at the tank outlet
- Dual Flout in a dosing chamber (or pump if falls do not permit a Flout).
- Raised ETS bed land application area.

The application area should be two beds totalling a minimum of 124m^2 area.

Installation is to be in accordance with the requirements and recommendations of AS/NZS 1547:2012.

The recommendations listed above should not be taken in isolation and must be read in conjunction with the remainder of this report and the context of the proposed residential development at the site.

2 Introduction

Mr Kepes proposes to construct a three bedroom house at his property located at Lot 924 Queen Charlotte Drive, Mahakipawa Arm, Linkwater.

The purpose of this report is to present the results of site investigations carried out in relation to the on-site wastewater treatment and land application for the dwelling.

The site investigations were carried out on 17 June 2013.

3 Location & Site Description

The property is located on the southern side of Queen Charlotte Drive. The road separates the property from the foreshore of the Mahakipawa Arm.

The property borders the road reserve and a privately owned property.

The property generally consists of gentle to moderate north sloping topography.

The property has been occupied for many years and was once part of farm land.

There is another house on the property which has its own wastewater treatment system. The field is sufficiently offset from the proposed field location and no assessment of the existing field has been undertaken as the load on this system will be unaltered by the new house.

Locations of all the features of the property are shown on the site plan attached in Appendix A.

4 Wastewater Assessment

The site investigation has identified that the property is suitable for wastewater disposal by primary treatment (septic tank), dose loaded (dual flout or pump) coupled with raised ETS bed/s land application.

The site is relatively remote and maintaining a secondary system will be costly and problematic, however primary treatment systems require little maintenance and have few moving parts. Hence our recommendation that a gravity fed system is used.

Three hand augured boreholes and excavated pit were put down in the proposed land application area. Locations of observations are shown on the site plan provided in Appendix A.

Based on the soil assessment carried out, an average drainage category of 5 has been adopted. Logs of the representative soil properties are provided in Appendix B.

Groundwater was encountered within the subsurface investigation and is only 0.45m below ground level. Augers were undertaken following a period of heavy rain, in winter, which is expected to be near worst case.

The site is exposed to both wind and sun.

An assessment of the best practical option has determined that primary treatment (septic tank) coupled a dose loaded (flout) and raised ETS bed land application is appropriate for the site conditions and constraints.

The primary treatment system is expected to achieve the following treatment levels:

BOD after 5 days (average) < 150 g/m^3
Suspended solids (average) < 80 g/m^3

A wastewater design sheet is provided in Appendix B with the design calculation based on the following criteria for the proposed development:

- 6 person occupancy
- Loading of 990 litres/day.
- Soil category 5
- Design loading rate of 8mm/day
- Standard water reduction fixtures installed.

Standard water reduction fixtures are to be installed in accordance with note 2 in table H3 of AS/NZS 1547:2012 to assist in minimising water usage, such fixtures include:

Dual flush 11/5.5 litre water closets, shower-flow restrictors, aerator faucets (taps) and water conserving automatic washing machines.

Based on the criteria above, the minimum total area of the application field is $124m^2$.

We therefore recommend the application field be two beds, 26m long and 2.4m wide. Details of the application bed are shown in Appendix A.

5 Assessment of Environmental Effects

An onsite wastewater system is required as there is no reticulation in the area.

Because of the following reasons we do not envisage the wastewater becoming an environmental risk:

- Reduced water usage
- Raised wastewater field
- Restrictive soil qualities (light clay)
- Large property size
- Remote Location
- The environmental buffering capacity of land

The proposed wastewater treatment system that will treat the wastewater created from the extension generally complies with AS/NZS 1547:2012 and the Council Guidelines.

Field percolation rates vary according to the soil type. We have classified the soil as a category 5 type soil which has limitations for on-site disposal due to a low percolation rate. The soil is prone to biological slime clogging of the clay pores, in dry weather shrinkage channels form in the upper layers of clay and effluent passes through the cracks without effective treatment. In order to overcome this issue adequate disposal area is required to provide long term disposal capacity.

The filter installed at the outlet of the septic tank will improve the BOD_5 and SS and lessen the risk of soil clogging.

The property is not permanently occupied and used mainly in the summer months as a holiday home. The effluent disposal system will work more efficiently during summer due to higher soakage and evaporation rates.

The risk from the wastewater system contaminating drinking water is negligible. The property is located adjacent to the foreshore and at close to the lowest part of the surrounding land, any water take would be located much higher up the catchments.

Public health risks from an underperforming on-site system in this location would come from unlikely contamination of the marine environment.

Due to the gentle to moderate slopes between the field and the foreshore the environmental buffering capacity of land is sufficient to treat the wastewater to a suitable standard to avoid risk to public health.

Coliform numbers, the indicators used to measure the various pathogens present in sewage effluent are not considered to be a concern as bacterial, (and viral etc), numbers are reduced exponentially with passage of effluent through mid-range textured soils. The distributed field assists in the effectiveness of this by reducing the quantity of effluent required to be treated by the soil in a single location. This will also provide a greater safety margin for accommodation of any fluctuations in discharge that may not be able to be accommodated or adequately treated by the soil within the existing field.

It is generally accepted that a "path length of 0.3 – 0.4 metres would be sufficient to reduce (bacterial) numbers to insignificant levels in normal soils i.e. soils that are of a mid-range texture, not too sandy or too clayey, and not saturated all the time".

The soil on the property, whilst at the upper end of the range (light clay) falls into this mid-range soil category. It is therefore our opinion that no significant adverse effect on the environment will result from the proximity to the sea.

The foreshore in this location is gravelly and rocky above low tide and silty mud below. There are limited numbers of shellfish for gathering and little opportunity for recreational use.

In the unlikely event of the system failure the effects will be less than minor.

A report titled Water and Sanitary Services Assessment 2005 produced by the Marlborough District Council also supports a minor effect in areas where there are less than 16 houses per square kilometre (as in this case).

In a system failure, it is likely the wastewater will seep above the field or track through the soils and create a seepage further down the slope, possibly to the road below the field. There will be an unpleasant odour and saturated unusable areas.

The effects will be easily identifiable, inhibit the applicant's use of the land and be generally unpleasant. The owner will want to address the failure and repair / install a new wastewater system.

The property is relatively large and more than 100% reserve area is available to relocate the field should the field fail.

The effect of a failed system will primarily affect the applicant's property. The land predominately falls towards the sea, probable infiltration into the topsoil before reaching the sea as well as the environmental buffering capacity of the land between the field and sea and will produce very minor effects to the foreshore.

Regular maintenance and inspection by the owner will ensure the onsite wastewater system is operating to a suitable standard.

Provided the proposed system is installed, operated and maintained any effects on the environment will be in accordance with the environmental outcome provided for by the Council guidelines.

6 Conclusion

There is sufficient area to treat and dispose of the wastewater created from the proposed 3 bedroom house.

The wastewater management system for the proposed dwelling should comprise a primary treatment unit (septic tank) fitted with a filter at the outlet and a dual flout or pump in a dosing chamber. The wastewater should be distributed into a raised ETS bed land application area.

The application area should be two beds 2.4m wide and 26m long totalling a minimum of 124m^2 in area.

Installation is to be in accordance with the requirements and recommendations of AS/NZS 1547:2012.

7 Limitations

This report is valid for five years from the date of issue and covers the onsite wastewater treatment for a three bedroom house at 924 Queen Charlotte Drive for David Kepes. Any other areas are outside the scope of this report.

The reliance by other parties on the information or opinions in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

8 References

1. NZS 1547:2012 On-site Domestic Wastewater Management.
2. Marlborough District Council Guidelines for New On-site Wastewater Management Systems, July 2005.
3. Water and Sanitary Services Assessment 2005 – Marlborough District Council
4. Marlborough Sounds Resource Management Plan

SMART ALLIANCES LTD

Khalid Suleiman
Engineer

05 August 2013

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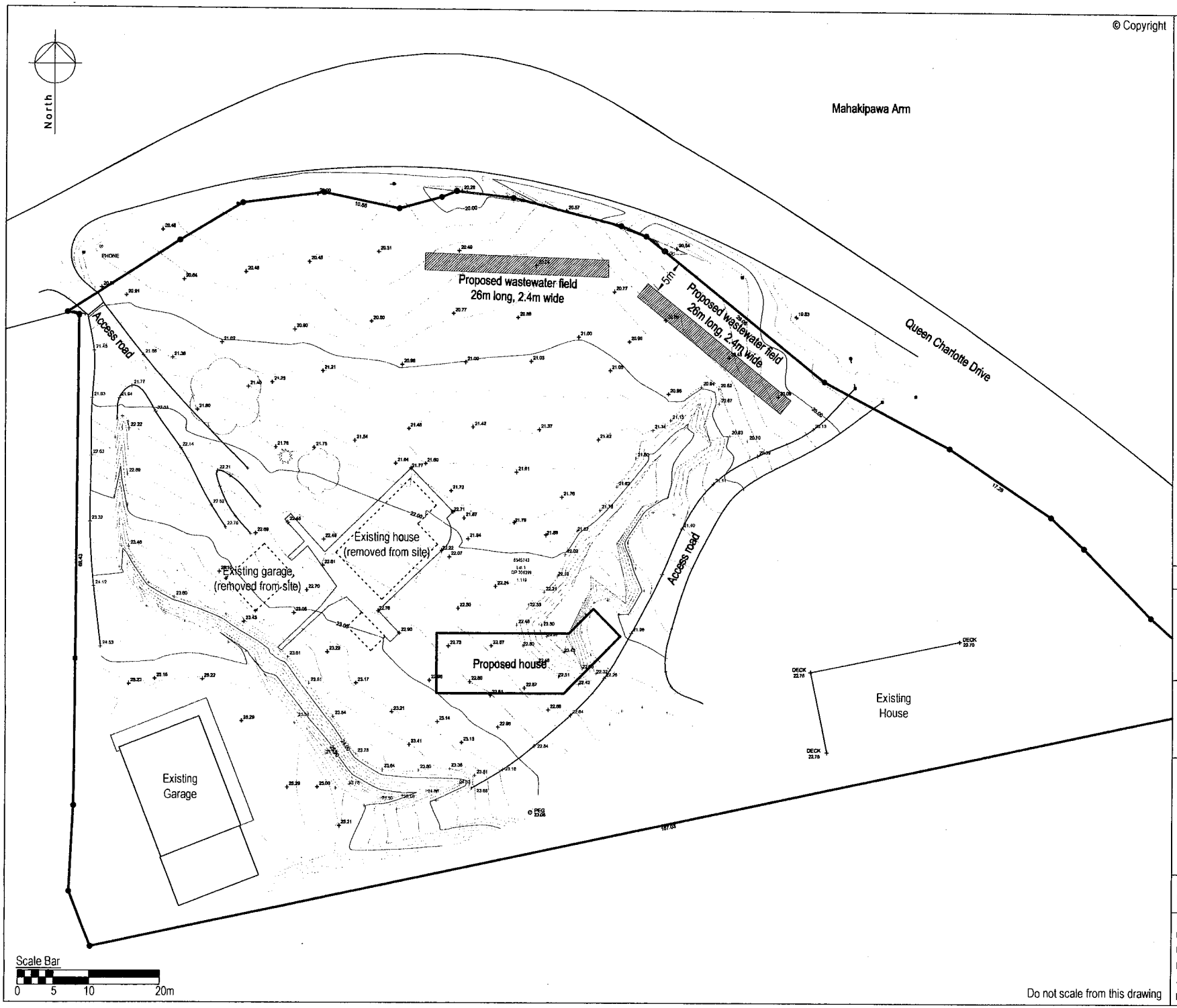
Appendix A - Drawings

- **Site Plan Drawing**
- **Typical bed application area details**



NOTES

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CLIENT

DAVID KEPES

PROJECT

NEW DWELLING
924 QUEEN CHARLOTTE DRIVE

DRAWING

SITE LAYOUT

ISSUE

REPORT

DATE	SCALE (A3)
05 AUG 13	1:500
DRAWN	REVISION
KL	**01**
APPROVED	DWG NO.
KS	**4030-C01**

Do not scale from this drawing

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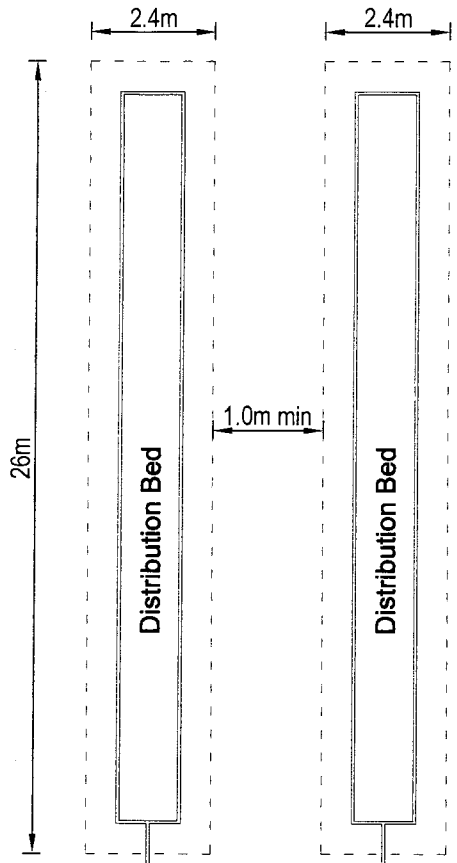


SYSTEM USE & MAINTENANCE

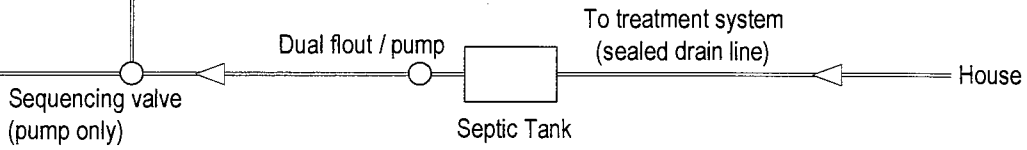
The household sewage should not contain anything other than human waste and toilet paper, and food material such as may go down a kitchen sink drain.

Garbage grinders are not recommended, although they need not be forbidden. More frequent de-sludging of the system may be needed if a garbage grinder is used.

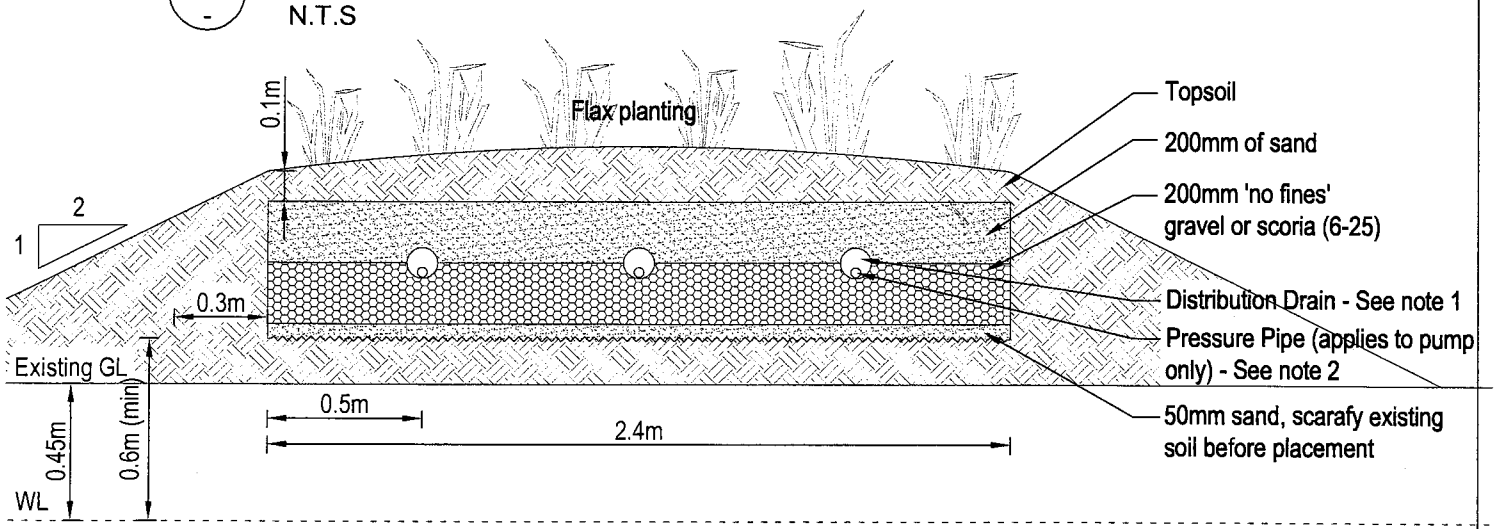
Normal use in the house of soaps, detergents, bleaches, plumbing fixture cleaners, drain cleaners and disinfectants will not harm the functioning of the system or the soil absorption system.

Prohibited discharge to the system:
* Oil/grease from a deep frier (for example).
* Stormwater or any drainage other than sewerage generated in the house.
* Petrol, oil or other flammable/explosive substances
* Garden, garage, and workshop chemicals (e.g. pesticides, paint cleaners,photographic chemicals, motor oil or trade waste.
* Disposable nappies & sanitary napkins.

It is an MDC requirement that any wastewater treatment system be regularly serviced and maintained by a contractor experienced in this field.



01 - TYPICAL BED LAYOUT
N.T.S



02 - TYPICAL BED CONSTRUCTION
N.T.S

Note:
1. Distribution drains to be U-PVC 100mmØ perforated pipe laid flat with perforations comprising at least 2% of surface area. (10mmØ slots at 100mm centres from 4 to 8 o'clock positions).
2. 32mmØ pressure pipe 3/3mmØ holes @ 1m c/c at 10, 12 & 2 o'clock positions test prior to backfilling

Do not scale from this drawing

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DRAWING
TYPICAL FIELD LAYOUT

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05 AUG 2013	N.T.S
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KL	**0**
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KS	**4030-C10**

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Appendix B – Wastewater Details, Calculations and Logs

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Project: New Dwelling
Client: David Kepes
Location: 920 Queen Charlotte Dr
Date: 24/07/2013
File No: 4030

WASTEWATER SYSTEM DESIGN SHEET

To AS/NZS 1547:2012

Intended water Supply:

~~*Public Supply*~~ *Bore/Stream/Dam* ~~*Rain water (roof collection)*~~

Site Conditions:

Gentle slopes, grassed
The site is exposed to both wind and sun - north facing slopes

Septic Tank or similar (Primary treatment):

OK when installed properly with a correctly sized level drainage area and maintained.

Secondary treatment:

Produce high quality effluent suitable for irrigation. Increased loading rate can be used if trench disposal is used - less disposal area required

Recommendation for this site: ***New septic tank, filter on outlet, flout / pump in chamber and raised ETS bed field***

DRAINAGE CONTROLS:

Need for surface water collector / cut-off drains? ***No***

AVAILABILITY OR RESERVE / SETBACK AREAS

Reserve area available for extensions, % of design area: ***100%***

Setback distance? (between development and disposal system): ***N/A***

Ksat, (m/day): ESTIMATED SOIL CATEGORY: ***Category 5***

Design

Design Loading Rate: ***8.0*** mm/day

Occupancy:	**6** persons	***165***	**990**	L/day from Table L1 AS/NZS 1547:2012
DESIGN DAILY FLOW:			**990**	L/day
AREA REQUIRED:			**123.8**	m^2
LENGTH REQUIRED:			**52** m with **2.4**	metre wide beds
RESERVE AREA REQUIRED:			***100%***	of specified drainage area

RECOMMENDATION :

PROJECT:	New Dwelling		
CLIENT :	David Kepes		
REF:	4030	Eng:	KS
DATE:	17 June 13	Page:	1 of 1

Soil Evaluation

924 Queen Charlotte Drive
Mahikapawa Arm, Linkwater

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Aug 1

Horizon	Lower depth (mm)	Moisture content	Colour	Classification	Textural class	Course fragments % volume	Structure	Strength	Stickiness	Soil Category
A	350	Moist	Light brown	Silty loam	ZL	<5%	Single grain	Very weak	Slightly	2
B	500	Moist	Yellowy brown	Clayey silt	CZ	10-20%	Single grain	Weak	Moderately	4
C	600	Saturated	Yellowy brown	Silty clay	ZC	5-10%	Single grain	Firm	Moderately	5

Aug 2

Horizon	Lower depth (mm)	Moisture content	Colour	Classification	Textural class	Course fragments % volume	Structure	Strength	Stickiness	Soil Category
A	300	Moist	Light brown	Silty loam	ZL	<5%	Single grain	Very weak	Slightly	2
B	450	Moist	Yellowy brown	Clayey silt	CZ	10-15%	Single grain	Weak	Moderately	4
C	600	Saturated	Yellowy brown	Silty clay	ZC	5-10%	Single grain	Firm	Moderately	5

Aug 3

Horizon	Lower depth (mm)	Moisture content	Colour	Classification	Textural class	Course fragments % volume	Structure	Strength	Stickiness	Soil Category
A	300	Moist	Light brown	Silty loam	ZL	<5%	Single grain	Very weak	Slightly	2
B	450	Moist	Yellowy brown	Clayey silt	CZ	10-20%	Single grain	Weak	Moderately	4
C	600	Saturated	Yellowy brown	Silty clay	ZC	5-10%	Single grain	Firm	Moderately	5

Moisture content: Dry, moist, very moist, saturated
Structure: Single grain (non coherent) or massive (coherent)
Strength: Loose, very weak, weak, firm, very firm, strong, very strong, rigid
Stickiness: Non, slightly, moderately, very

NOTES

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DATE SCALE (A3)

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CAD FILE REF:

North

Mahakipawa Arm

Queen Charlotte Drive

Access road

Proposed wastewater field
26m long, 2.4m wide

Proposed wastewater field
26m long, 2.4m wide

5m

Existing house
(removed from site)

Existing garage,
(removed from site)

Proposed house

Existing
Garage

Existing
House

PHONE

PEG
23.08

DECK
22.75

DECK
22.70

DECK
22.75

Lot 1
DP 306399
1 119

6545743

10.85

17.29

167.03

58.43

Scale Bar

0 5 10 20m

Do not scale from this drawing

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NEW DWELLING
924 QUEEN CHARLOTTE DRIVE

DRAWING
SITE LAYOUT

ISSUE
REPORT

DATE	SCALE (A3)
05 AUG 13	1:500
DRAWN	REVISION
KL	**01**
APPROVED	DWG NO.
KS	**4030-C01**

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