

5.1.5 Topography

The topography of the area consists of relatively flat parcels of land near the coast with rolling hills as the land extends inland. This can be seen on the topographical map¹⁰ (refer Figure 5.1).

Steep land is not ideal for the irrigation of effluent to land as there is an increased risk of run-off occurring during wet weather periods, thus limiting the ability of the land to receive wastewater.

5.1.6 Summary

For the purposes of land disposal, soils of poor drainage located on hilly topography are seen as non-viable options.

This is due to the risk to the environment of using land with these characteristics. For hilly topography there is a high potential for the treated wastewater to run off the hillside and not soak into the soil. For poorly drained soils, significant areas of land are required to achieve the necessary soakage ability for the wastewater.

The most favourable location for any land disposal would be the WD soil type land west of the Taipa township which is described as *"excessively to somewhat excessively well drained"*. However this land is zoned coastal residential and coastal living and is the current site of the Kerifresh citrus orchard.

The second best option would be the soils described as RU. Most of this area includes the Cable Bay Township and has been excluded from the study. However there is some land to the south east of Cable Bay (including the land described as RU and MNH+MN) which is zoned for rural production and could have the potential to be used for land disposal. This area requires further assessment and this is carried out in section 5.4.

5.2 Disposal Options

The land disposal options considered in this investigation include:

- Overland flow.
- Rapid infiltration.
- Spray or drip irrigation (surface and sub-surface).
- Deep bore disposal

A description of the options is included below.

5.2.1 Overland Flow

During land disposal of treated wastewater by overland flow, treated wastewater is distributed across the upper portions of carefully graded (preferably vegetated) slopes. The treated wastewater flows over the sloped surfaces to runoff collection ditches at the bottom of the graded slope. Depending on the percolation through the soil profile, especially if this percolation is minor, then most of the applied treated wastewater will be collected as surface runoff. This then still needs to be disposed of to water.

In this specific discharge situation, the surrounding land area has unsuitable topography and drainage for overland flow.

In addition discharge of treated wastewater via overland flow does not meet the NRC definition of land disposal; *"Discharges shall be considered to have been disposed onto land or into land where they have been passed through soil, or a constructed wetland where there is no discharge to surface water."*

Accordingly, this method is not considered further in this report.

5.2.2 Rapid Infiltration

In rapid infiltration schemes, treated wastewater is applied to rapidly draining soils on an intermittent basis. The disposal area will typically be unvegetated and within a basin. Due to the rapid infiltration of the treated wastewater, the hydraulic flow path needs to be considered to determine whether or not recovery underdrains are required to avoid groundwater contamination.

Given that the rapid infiltration method relies on highly permeable soils, which are not present in the study area, it is not considered a suitable disposal method.

5.2.3 Slow Rate Irrigation

Slow rate irrigation of treated wastewater can be used to discharge treated wastewater to soils which do not provide for perfect drainage conditions. Examples of slow rate irrigation methods for disposal of treated wastewater are:

- Spray Irrigation
- Drip Irrigation (surface and sub-surface)

These slow rate disposal methods are used typically on vegetated land (such as exotic forests). This disposal method can be used to provide further treatment and to meet the growth needs of the vegetation.

5.2.4 Deep Bore Disposal

Deep bore disposal is currently used at the Russell township to dispose of treated wastewater. Deep bores are drilled into the fractured rock and treated wastewater is disposed to them. This disposal method relies on the presence of highly permeable subsurface geology.

There is a significant unknown component regarding life expectancy of any deep bore disposal system as this is new technology and is unproven.

As stated by MWH in their peer review of the Russell Wastewater Scheme¹¹; *“There are serious concerns about the long term suitability of the borehole system for disposal of treated wastewater....Noting the monitoring that has been carried out to date, it is considered that the system has an unknown life, an unproven capacity and the effects on the stability of the area and the environment are uncertain. There is a risk that faecal coliforms and pathogens from the treatment plant could enter the streams in the area. It is the opinion of the review that the boreholes cannot be relied upon to provide an effective disposal system for a minimum of 20 years as their life and effect is unknown. There is a significant risk that at some time the boreholes will not be able to accept the flows from the treatment plant and as there is no alternative, except some limited irrigation opportunities, this would render the entire system inoperable.*

Due to these serious concerns a new deep bore disposal scheme is unlikely to be implemented and is not investigated further.

5.3 Land Area Requirements

For the purposes of this desktop study, slow rate irrigation methods have been investigated as a means of disposing treated wastewater to land. This provides the basis for the following site assessment based on the following criteria:

Table 5.1 Land Area Requirements

Average Dry Weather Flow	1570 m ³ /day (refer Section 4.1)
Average Annual Infiltration Factor	1.5 ¹²
Average Daily Irrigation Rate	3.0 mm per day for clay soils, moderate slope and low permeability ¹² .

This results in an irrigation area of approximately 78.5 hectares. However, this irrigation area needs to be duplicated to allow for land use operations. For example, forestry operations such as thinning

and harvesting cannot be carried out while the land is being irrigated. A net irrigated area of 157 hectares is therefore required.

Further land is also required for:

- Buffer zones/separation distances from neighbouring land users;
- Internal unusable areas within the catchment, e.g. steep slopes, set back requirements from streams and buildings, etc;
- Management of irrigation, e.g. rest and rotation of irrigation plots.

Assuming that the further land required would be approximately 20% of that needed for irrigation, this results in a gross land area of at least 188 hectares. This is considered to be the absolute theoretical minimum area needed, and in practice larger areas would most likely be required for land disposal.

In addition, a storage facility will need to be constructed to enable storage of effluent during times when the flow experienced at the ECB WWTP exceeds the capacity of the disposal area. This occurs during heavy or prolonged rainfall and storms when increased flows to the treatment plant coincide with saturated ground conditions.

5.4 Potential Disposal Options

As discussed in section 5.1 the two most favourable pieces of land for land disposal of treated effluent are the Taipa and Cable Bay Townships. As these are residential zones it is impossible to utilise these areas for land disposal.

Therefore the remaining area for land disposal is that situated on land to the south east of Cable Bay with soil types RU and MNH+MN and zoned for Rural Production.

The two sites are adjacent to each other and can be described as:

Site 1: Land zoned Rural Production and Coastal Living to the west of Cable Bay Road with an area of 225ha. Only 122 ha of this site is zoned for rural production and hence usable for land disposal. This land consists of soil types RU+remnants of TEK and TEK. The TEK soil would not be as suitable as the RU soil type as it is described as imperfectly to very poorly drained. Further limitations in this site are that the Opoi Stream flows for a portion through it. The land is also described in the New Zealand Land Inventory Map¹³ as "strongly rolling" and "moderately steep"

Site 2: Land Zoned Rural Production to the south west of Site 1 north of Barriball Rd with an area of 76 ha. This land consists of soil types MNH+MN and RU + remnants of TEK.

Based on the assessment of land area requirements in Section 5.3 indicating that 188 ha of land is required and the characteristics of the two sites described above, it is likely that both sites would be required to undertake land disposal at the East Coast Bays Wastewater System.

Site 1 does not have sufficient gross land area (122ha vs 188ha needed), however when the steep portions of the land, the unsuitable TEK soils are removed and buffer zones are created for the Opoi Stream, the remaining land is further limited. At most only half of the 122 ha of rural production zoned land could be used for land disposal. It is therefore unlikely that Site 1 would be suitable for land disposal.

Due to lack of size, Site 2 would not be suitable as a land disposal site by itself and therefore could only be used in conjunction with Site 1. However due to the reduction in available land in Site one and the fragmented nature of the remaining land even this option is not feasible.

It is also important to note that the topographical map¹⁰ indicates the presence of an historical Maori Pa in the vicinity of this area (refer Fig 5.1). Any land disposal would have to avoid this Pa.

5.5 Feasibility of Land Disposal

There are benefits to land disposal of effluent. However, public perception and industry policies need to be carefully considered when choosing a site. Using produce from land irrigated with effluent, for the grazing of dairy cows or for produce to feed dairy cows, is not an acceptable option based on current dairy industry policies. While other industries do not have standards or policies prohibiting the use of human effluent to land, there may well be some in the future that will prohibit or curtail this activity. Furthermore, if knowledge was obtained about the irrigation of treated effluent to land producing goods for consumption, then there is the risk that the public would be reluctant to purchase this produce. There needs to be an awareness of the potential for adverse market reaction and the implications this could have.

The above assessment shows that land disposal within the area of interest is not feasible due to lack of suitable land.

5.6 Best Practicable Disposal Option

The alternative disposal method when compared to land disposal is to continue to discharge treated wastewater to the tributary of the Parapara Stream. The effects of this discharge on the receiving environment are outlined in Section 4.

As part of this initial desk top approach two potential sites were initially identified as worthy of further investigation. These investigations showed that one of the sites was unsuitable due to steepness of the land and the presence of the Opoi Stream meaning that there was insufficient suitable land remaining for land disposal. The other site did not have sufficient land area available even when combined with the remaining land from Site 1.

Therefore, at this stage of the investigation, the Best Practicable Option for disposal of effluent from the East Coast Bays Wastewater Treatment Plant is to continue to discharge treated effluent to the tributary of the Parapara Stream.

Section 6

6. Consultation

In accordance with the Fourth Schedule of the Resource Management Act (1991), those parties identified as interested in or affected by the proposal will be consulted.

A summarised record of the consultation completed to date is included below. The outcomes of any additional consultation will be provided to NRC when completed.

6.1 Iwi

A list of Iwi contacts was requested from and supplied by the FNDC Maori Development team. Contact was made with those organisations advising them of the resource consent renewal and extending an invitation to them to contact VKCEE or the FNDC for further information. A copy of letters which were forwarded to local iwi is included in Appendix F.

A site visit to the East Coast Bays WWTP was held with members of Te Runanga a Iwi o Ngati Kahu on 13th February 2008. During this site visit representatives were shown around the treatment plant and the consent renewal process was discussed. Iwi advised that they were interested in maintaining dialogue during the renewal process and that their preference was that discharge of wastewater was to ground and not the tributary of the Parapara Stream. A copy of the supporting information report has been forwarded to representatives who attended the site visit.

Far North District Council Maori Development will manage the iwi consultation that will be on-going throughout this consent renewal. It is the intention of FNDC to hold a consultation hui and present the project to local iwi representatives.

6.2 Landowners

Neighbouring landowners have been advised of the consent renewal. An invitation to contact VKCEE or FNDC for additional information and to discuss concerns was extended. A copy of letters which were forwarded to neighbouring landowners is included in Appendix F.

6.3 Department of Conservation

The Department of Conservation has been advised of the consent renewal. An invitation to contact VKCEE or FNDC for additional

information and to discuss concerns was extended. A copy of letters which were forwarded to DoC is included in Appendix F.

A site visit to the East Coast Bays WWTP was held with members of The Department of Conservation on 13th February 2008.

During this site visit representatives were shown around the treatment plant and the consent renewal process was discussed. DoC advised that they were interested in maintaining dialogue during the renewal process and that they would like to see some more riparian planting in the tributary and reduction in the level of ammonia discharged.

A copy of the supporting information report was forwarded to DoC at this time of lodgement of this application.

6.4 Northland Health

Northland Health has been advised of the consent renewal. An invitation to contact VKCEE or FNDC for additional information and to discuss concerns was extended. A copy of letters which were forwarded to Northland Health is included in Appendix F.