Assessment on the need for a new rural zone for subdivision in the Central Hawkes Bay District

Report for the Central Hawkes Bay District Council

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1 EXECUTIVE SUMMARY

There has been a history of indiscriminate subdivision of small lifestyle blocks within the Central Hawkes Bay district for many years. Many of these blocks are located on highly productive and versatile land or soils. The effects of this are land fragmentation and the potential for reserve sensitivity issues. Although some lifestyle blocks do continue to be productive in terms of agricultural or horticultural product, more often than not they become un-productive and their productive potential is lost for ever.

Analysis shows that the Central Hawkes Bay district contains large areas of highly productive and versatile soil and land. The most versatile of these are found on the flat to rolling country formed from alluvium, loess or tephra and are generally classified under the land use capability classification system as classes 1 to 3 land. Overall there are an estimated 82,881 ha of LUC class 1 to 3 land in the district. This represents about 26% of the total land area.

Of the 82,881 ha of LUC class 1 to 3 land, about 21,805 ha is described as both highly productive and highly versatile. This means that with very little effort the land or soil is capable of a multitude of uses with high outputs. The remaining 61,076 ha is also very highly productive land or soil but its versatility is slightly lower. There are also areas within the district that have low soil versatility but high economic value for viticulture. These are generally gravelly soils associated with the alluvial plains and terraces and total about 6,427 ha.

Judge Treadwell (1997) listed attributes that should be considered in determining whether land/soil is highly versatile or not. Overall there are large areas within the district where the land/soils can be classified as a resource of national significance, or at the very least, of regional significance. Hence it is vital that these areas of highly productive land are protected from subdivision and their productive potential being lost for ever.

In order to protect the highly productive land it is recommended that the Central Hawkes Bay District Council create a 'highly productive rural zone' that protects these soils/land for productive purposes. The 'highly productive rural zone' would include those concentrated areas of LUC classes 1 to 3 land. This approach is consistent with many other districts within New Zealand. The minimum lot size suggested is 12 ha. This is considered large enough to retain some level of economic productive potential whilst minimising the effects of fragmentation and reverse sensitivity.

On the other areas outside the recommended 'productive rural zone' a 'general rural zone' should be created with the purpose of preserving the open natural character of the rural area and maintaining its amenity values. The minimum lot size should be at least 20 ha in order to achieve this. These minimum lot sizes are consistent with the neighbouring Hastings District Council.

The boundary for the 'productive rural zone' provides the greatest challenge. There are many ways to achieve this but any option needs to be easily identifiable and defendable. The LUC classification system is commonly used throughout the country to differentiate between the highly productive land and the rest. Using this classification system four main options were considered and include:

1. Restricting the boundary to these units with a slight buffer zone to minimise fragmentation and reverse sensitivity.
2. Refining the areas of LUC classes 1 to 3 to where there are concentrations of these classes and creating a boundary using roads, waterways and cadastral boundaries.
3. Further refining the area of 'highly productive land' and creating a boundary using the cadastral boundaries.
4. Further refinement of the highly productive land based on further considerations of Judge Treadwell's list of criteria.

Option 1 minimises the amount of 'other' (non-highly productive land) that is incorporated into the zone. However it would be difficult for the planners to properly define this boundary and write rules around it. Option 2 would have a large area of 'non-highly productive land' incorporated within the zone but it is far easier to adapt into the planning documents. Option 3 in some ways is similar to Option 2 but there is possibly more clarity as to where the boundary is located. Option 4 is very similar to option 3 but excludes the area of highly productive land to the west of Porangahau. There is a strong argument to exclude this land due to its proximity to services and ease of transport. The use of excluding cadastral parcels with a lower percentage of 'highly productive land' provides more fairness to the approach.

Even if the productive potential of a parcel of land is not currently being realised, but it is retained in agricultural use then future generations still have the option to realise this. If the Council continue to allow for indiscriminate subdivisions of the highly productive land then it will be lost forever.

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3 PURPOSE & OBJECTIVES

The purpose of this report is to advise the Central Hawkes Bay District Council on whether a new "versatile" rural zone for subdivision needs to be included in the Proposed District Plan.

This report provides the following:

- A definition of versatile land and the factors needed to be taken into consideration when clarifying land as such.
- A versatile land assessment.
- An assessment of whether the "versatile land" resource is of local, regional or national significance.
- An assessment of the rural subdivision lot sizes drawing on examples from other districts throughout the country.
- A recommendation to the Central Hawkes Bay District Council as to future subdivision rules.

4 BACKGROUND INFORMATION

The Operative District Plan for the Central Hawkes Bay currently includes only one rural zone for the whole district. This single zone is considered to not accurately represent the differences in productive potential of land within the district. As part of the 2018 District Plan Review, the Central Hawkes Bay District Council is therefore considering the introduction of new zone/s in the rural environment.

4.1 Issues

The Central Hawkes Bay District contains areas of highly productive land and is occasionally subdivided into smaller lots. Once this highly productive land is subdivided, more often than not its productive potential is lost forever from future generations. Maps 1 and 2 in Appendix 2 show the extent of lifestyle blocks and properties less than 10 ha respectively. Many of these properties are located on areas of highly productive land.

The issue for the Central Hawkes Bay District Council is to ensure the districts highly productive land is protected and sustainably managed.

4.2 Objectives

The objectives for the Central Hawkes Bay Council in relation to rural zoned land are based on the report on Proposed Amendments to the Rural Zone – Report to District Plan Working Party, August 2015.

These include:

- Enabling the sustainable management of productive and versatile land for future generations;
- Protecting the districts highly productive and versatile land from inappropriate subdivision;
- Providing for large rural residential in identified rural residential zones;
- Retaining the rural character, amenity and productive potential in other rural parts of the District.

5 VERSATILE SOILS AND LAND VS PRODUCTIVE SOILS AND LAND

The terms “soil” and “land” are often misinterpreted and misused interchangeably. There are numerous different definitions and opinions of each of these words but in short soil is only one factor of land.

Both soil and land can then be described as “versatile” and/or “productive”. In other areas of New Zealand they are described as “high-class”, “high value”, “elite” or “fertile”. The following sections describe both.

5.1 Soil

Soil is defined by the United States Department of Agriculture (2017) as “a natural body comprised of solids (minerals and organic matter), liquid, and gases that occurs on the land surface, occupies space, and is characterized by one or both of the following: horizons, or layers, that are distinguishable from the initial material as a result of additions, losses, transfers, and transformations of energy and matter or the ability to support rooted plants in a natural environment.”

5.1.1 Productive Soils

Definitions of productive include “having the power to produce” (Collins, 2001). Soil productivity is defined by the GOWA Department of Primary Industries and Regional Development (2017) as being “largely determined by its ability to provide water and nutrients to allow deep rooting of agricultural plants.”

To have a better understanding of the productivity of a soil, it is important to have an understanding of the key soil properties, such as soil texture, structure, soil organic matter, and drainage. These are discussed below.

5.1.2 Versatile Soils

The best soils in New Zealand are coined to be “versatile” or “high-class”. Hewitt (2017) states, versatile soils are critical for the supply of nutrients required for optimum plant and food growth. A versatile soil is one that is “*capable of many uses needs to be deep, fine-textured, moist, free-draining, loamy, and have organic-rich topsoil. These properties best enable plant roots to take up nutrients, water and oxygen, and get enough support for rapid growth. Fertility is highest in soils young enough not to have been leached and old enough to have built up organic matter. They are also derived from parent rocks that are well supplied with essential nutrients.”*

Versatile soils in New Zealand are rare (found in only 5.5% of New Zealand) and are therefore of very high value for food and crop production. These soils should be protected from the development of urban areas and instead reserved for agriculture and horticulture use.

5.2 Land

Land is “the entire complex of surface and near surface attributes of the solid portions of the earth surface, which are significant to human activities” (Collins, 2001). It generally includes a wide variety of attributes including soil, ecosystems (both native and exotic) as well as urban settlements.

5.2.1 Productive Land

Productive land is land which is said have very few to no limitations, whether that be climate, erosion, wetness or soil. This land, even more particularly highly productive land, would be highly fertile and have the potential to produce significant yields of plants and other products.

The productivity of land in New Zealand is loosely based on the Land Use Capability system which is described in Section 7.2. This is different to the land versatility which takes in a wide range of bio-physical, social and economic factors (see below).

5.2.2 Versatile Land

The term versatile land is not limited to land that has versatile soils but instead it includes a number of different physical and social factors. Versatile land is land "which supports the production and management of a wide range of crops. It is characterised by certain soil and physical characteristics, which have few to no limitations like poor drainage, low soil nutrient status or slope instability. In the agriculture sense versatile land is also characterised by its proximity to services and transport" Chapman (2010).

In Section 6.1 below Environment Court Judge Treadwell has provided an alternative definition of versatile land. It also includes a range of soil, climate and water characteristics; transport and industrial services, labour; and other resources as well as absence of conflicts. These are all factors that need to be considered when identifying versatile land.

6 VERSATILE LAND ASSESSMENT

6.1 Court ruling

A number of court rulings have made attempts to limit urban development in areas with versatile land. Each of the rulings has been variable but the common outcome is that the protection of 'versatile soils' alone is not sufficient to refuse subdivision.

In the case of *Canterbury Regional Council v Selwyn District Council [W142/96],* Environment Court Judge Treadwell presented a comprehensive list of factors that need to be taken into consideration when labelling land "versatile". These are included in Table 1 below:

Table 1. *A list of factors in determining versatile land (Treadwell, 1997)*

• Soil texture	• Transport, both ease and distance
• Soil structure	• Effect of use on neighbours
• Soil water holding capacity	• Effects of the neighbours on the use
• Soil organic matter stability	• Access from the road
• Site's slope	• Proximity to airport
• Sites drainage	• Proximity to port
• Temperature of the site	• Supply of labour
• Aspect of the site	• Previous cropping history
• Storm water movements	• Relevant contamination
• Flood plain matters	• Sunlight hours
• Wind exposure	• Electricity supply
• Shelter planted	• District scheme
• Availability of irrigation water	• Economic and resale factors

6.2 Assessment of Factors

The following sections provide some commentary around the Treadwell "versatility factors" contained in Table 1 above that are relevant to the Central Hawkes Bay District.

6.2.1 Soil Texture

Soils are often described by the relative proportions of particles (sand, silt or clay) they contain. This is known as Soil Texture. The soil textural class is the grouping of soils based on these relative proportions as shown in Figure 1 below.

Soils with a predominantly fine texture are referred to as clay soils and those with a predominantly coarse texture are known as sands. A soil which has a relatively even mixture of sand, silt and clay are known as loams.

Soil texture is important in agriculture as many different soil textures have potential benefits and drawbacks for different plants (McLaren & Cameron, 1996). For example, soils with large proportions of sand (sandy soils) will drain better and promote root growth however they tend to dry out quicker compared with finer soils. Finer soils have a

greater surface area to volume ratio and therefore more exchange sites to hold on to nutrients. Hence they are inherently more fertile compared with coarser soils.

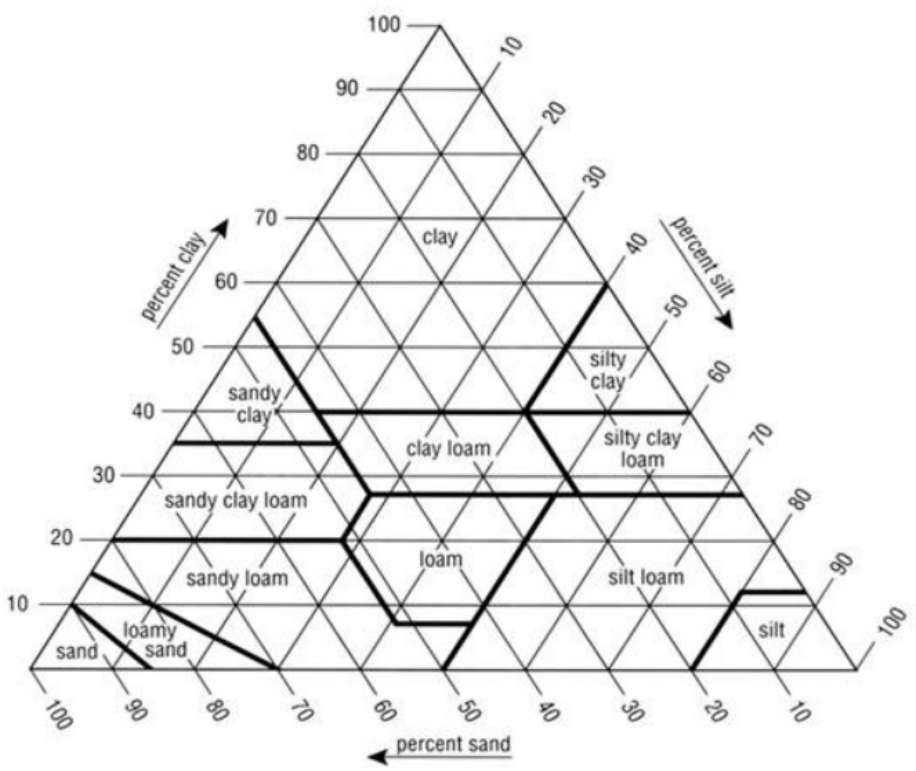

Figure 1. *Textural classes triangle (University of Hawaii at Manoa, 2017).*

6.2.2 Soil Structure

Soil structure refers to the arrangement of pores and fissures within a matrix of solid materials (soil particles and organic matter). Soil structure is classified by type (shape), class (size) of soil aggregates (peds), and grade (strength of cohesion) of the aggregates. The type, class, and grade of the aggregates determine the pore structure and how easily air, water and roots move through the soil. A “well-structured soil” has plenty of living and storage spaces for utilisation by water, gases, nutrients, roots and vast array of organisms. A “poorly structured soil” is much less endowed and therefore much less productive (McLaren & Cameron, 1996).

Soil structure is equally as important as soil texture to consider when classifying a versatile soil. Two soils with similar textures can behave very differently depending on their structure. For example, a clay soil with good structure can be easy for air water and roots to move through but can be almost impenetrable when its structure has been destroyed by compaction.

6.2.3 Soil Water Holding Capacity

The soil water holding capacity is the “ability of soil to store water” (McLaren & Cameron, 1996). It is a very important agronomic characteristic because a soil which holds generous amounts of water is less subject to leaching nutrients or applied pesticides.

Soil water holding capacity is controlled primarily by soil texture and the soils organic matter content. In general, the higher the percentage of silt and clay sized particles in the soil the higher the water holding capacity. These smaller particles have a much larger surface area compared to sand particles – the larger surface area the easier the soil

retains water. Likewise, the larger the amount of organic matter in a soil the larger the water holding capacity, due to the affinity of organic matter for water.

6.2.4 Soil Organic Matter Stability

Soil organic matter (SOM), in the widest sense, is the "whole range of organic materials present in the soil" (McLaren & Cameron, 1996). Bot & Benites (2005) state that from an agricultural standpoint this is important for two main reasons:

- Soil organic matter acts as a "revolving nutrient fund" – It contains all the essential plant nutrients which are released in plant available form upon decomposition.
- Soil organic matter is the 'glue' for soil structure – active SOM components together with microorganisms is useful for binding soil particles into larger aggregates (peds). This important for good soil structure and in turn aeration and drainage.

6.2.5 Sites Drainage

There are two types of drainage in soils – natural or artificial drainage. Natural drainage is the ability of the soil to natural drain excess water whilst artificial drainage is 'man made'. Examples of artificial drains include tiles or open drains.

Drainage is important as it provides an aerobic growing medium for plant roots. Generally plant roots require aerobic conditions for growth and if the soil is waterlogged for even a short term then it will also be anaerobic.

Both soil texture and the depth to the water table influence soil drainage.

6.2.6 Soil Temperature

Soil temperature is influenced by the position in the landscape, sunlight hours, aspect, type of vegetative cover, soil moisture status, soil texture and previous management (McLaren & Cameron, 1996).

6.2.7 Slope

A sites slope is measured from the horizontal in degrees and is part of the Land Resource Inventory of LUC classification system (See Section 7.2). Table 2 below describes the slope classes used in the land resource inventory and the LUC system.

Table 2. *Slope classes used in the LRI and LUC classification systems.*

Slope class	Degrees	Slope description	Access suitability
A	0-3°	Flat to gentle undulating	Tractor
B	4-7°	Undulating	Tractor
C	8-15°	Rolling	Tractor
D	16-20°	Strongly rolling	Some tractor, four-wheel bike
E	21-25°	Moderately steep	Two-wheel bike

F	26-35 o	Steep	Walking and some two-wheel bike
G	>35	Very steep	Walking

Slope has a marked effect on farming and forestry operations, soil erosion and stability. Areas with slopes of 0-7 degrees present few obstacles and are therefore considered much more versatile than areas with greater slopes. As the slope increases the versatility reduces.

6.2.8 Wind exposure, erosion and shelterbelts

The exposure of productive soils to wind can have an effect on that lands versatility. Wind erosion on some soil types is a problem particularly on arable or cultivated land in the Central Hawkes Bay.

Wind erosion can be overcome by a number of sustainable management techniques including shelterbelts, directional cultivation, type of cultivation, cover crops etc. In the opinion of the Author, not having them does not necessarily make the soil or land less versatile, it can just delay the time in which the full potential of that piece of land can be achieved under a sustainable operation.

7 CLASSIFICATION OF SOILS

The physical, chemical and biological properties of soils (such as those mentioned in Section 6.2) can be measured using a range of techniques such as visual soil assessments and laboratory techniques. Soils with similar characteristics are classified into 15 different groups based on Molloy (1998). These groups can then be further divided using a "regional soil series" describing a local soil (Series). This series can then be further divided based on its textural class (Soil Type) and then by Phase which indicates a distinctive soil property (wetness, stoniness) etc.

Soil series and type is often considered easy for farmers and farm and council advisors to use possibly because the names represent local and easy to recognise references. Soils in New Zealand can be identified using a number of published soil surveys including Soil Fundamental Data Layers and S-map (both at 1:50,000 scale). The scale of these surveys is fine at the district level where the smallest map unit is about 12 ha. Those undertaken at the paddock scale (about 1:7,000 scale) are much more reliable with the smallest mapping unit of about 0.5 ha.

7.1 Classifying "Versatile Soils" in the CHB

The most comprehensive description of soils for the Central Hawkes Bay is that by Griffith (2001) where the dominant soils (29 soils in total) are described along with some small scale (1:50,000) soil maps. The Griffith report also included other information such as texture, structure, drainage, water holding capacity and susceptibility to erosion are provided to give recommendations and management guidelines for cultivation, drainage, and irrigation.

7.1.1 Highly versatile soils with high productive value

The most versatile soils of the Central Hawkes Bay are found on the flat to rolling country formed from alluvium, loess and tephra. These soils support a range of intensive primary production activities and include:

- The deep free draining alluvial soils (>45 cm) with high natural fertility and mostly silty, and/or fine sandy loam textures. Soils include: Manawatu silt loam, the Twyford series and Hastings series.
- The deep alluvial soils with high natural fertility, but slow natural drainage in the subsoils. With appropriate drainage a wide range of crops can be grown. Typical soils include the Kairanga silt loam.
- Moderately deep soils (45-90 cm of alluvium overlying gravels). Soils are light textured and slightly more susceptible to summer drought. With adequate soil moisture, summer irrigation and conservation methods to alleviate slight wind erosion potential, a wide range of crops can be grown. Soils include the Kopua series.
- Well drained deep soils formed from tephric loess overlying gravels. Topsoils are light textured silt loams which are susceptible to wind erosion when cultivated. With adequate soil conservation methods a wide range of the crops can be grown.

7.1.2 Less versatile soils with high productive value

There are a number of soils in Central Hawkes Bay with lower versatility because of limitations such as wetness, soil impediments, and susceptibility to drought. These soils are still of high productive value but require an increased level of management, including artificial drainage and irrigation, to achieve yields similar to highly versatile soils. Soils of this type include: Takapau series and Waipukurau sandy loam.

The Central Hawkes Bay also includes very low versatility soils but with high economic viticulture values. These soils are very patchy (<15cm deep) with numerous boulders throughout the profile and on the surface. This makes them unsuitable for intensive crop production; however grapes do thrive on these soils. These soils include the Tukituki series.

7.2 Classifying Land using the Land Use Capability Classification System

The land use capability classification (LUC) system (see Glossary for definition) used in the US Mid-West was adopted for New Zealand in the mid 1960's for the purpose of soil conservation. Since this time the whole of New Zealand has been mapped at the 1:50,000 scale and the system is commonly used for both regulatory planning by councils and farm planning (when remapped at a smaller scale) throughout the country.

The LUC system has two key components:

1. Land Resource Inventory (LRI): the compilation of five physical factors which include underlying rock type, the soil type, slope, erosion type and severity, and dominant vegetation. These five factors are considered to be critical for land use and management.
2. Land Use Capability: The five LRI factors described above are used to determine the land use capability classification (LUC). There are three components to the LUC system and these are shown in Figure 2 and described in the sections below.

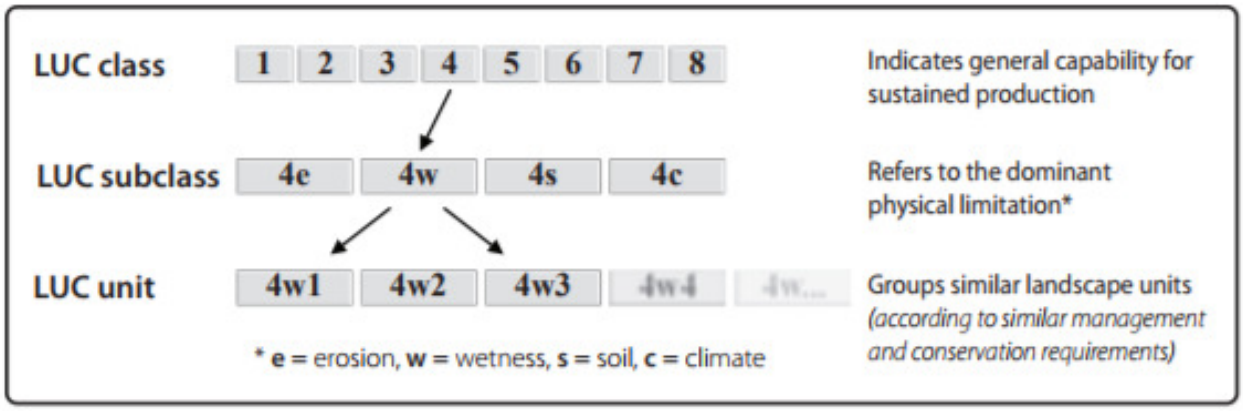

Figure 2. *Land Use Capability nomenclature (Eyles et al., 2009)*

7.2.1 LUC Class

Based on the LRI land is categorised into eight classes according to its long-term capability to sustain one or more productive uses. These classes increasing from 1 to 8 increase in their limitations to use and therefore decrease in sustainable productivity.

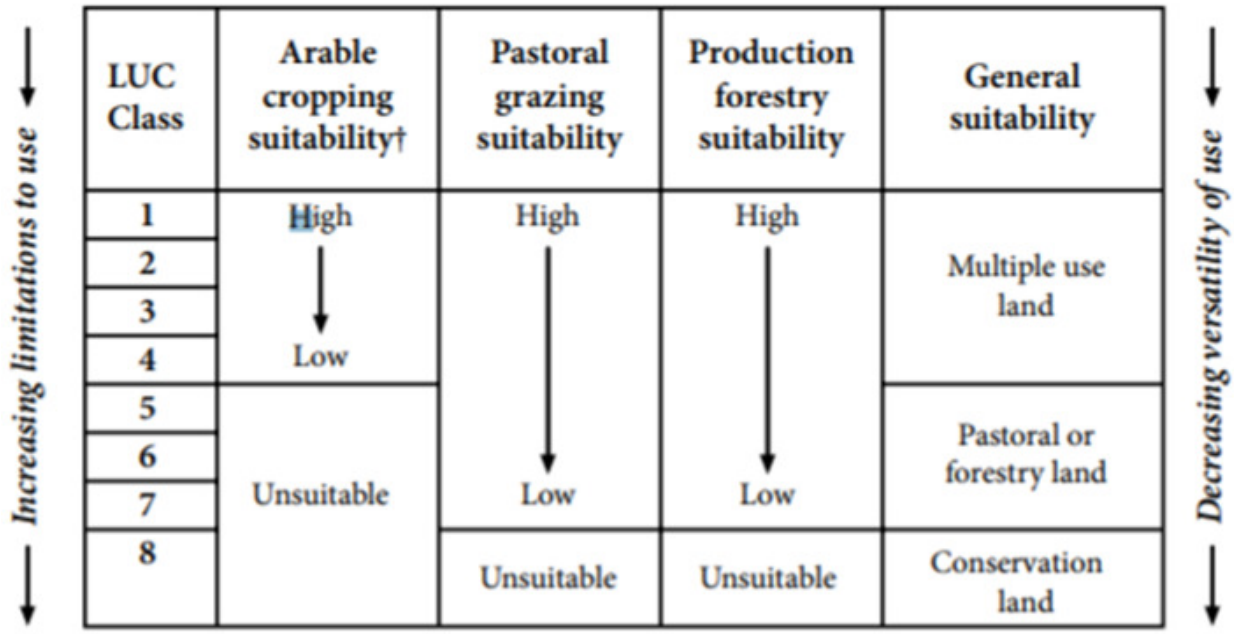

Figure 3. *Increasing limitations to use and decreasing versatility of use from LUC Class 1 to LUC Class 8 land.*

7.2.2 LUC Subclass

The LUC subclass is the subcategory of the LUC class which identifies the main limitation to land use. Four limitations are used in the classification system and include:

1. "**erodibility**" – land susceptible to erosion.
2. "**wetness**" – high water table, slow internal drainage, and/or flooding are main limitations.
3. "**soil**" – limitation is within the soil (stoniness, shallow profiles, salinity etc.).
4. "**climate**" – climate is main limitation. Could include: summer drought, high rainfall, high winds etc.

7.2.3 LUC Unit

The LUC unit groups together areas mapped with similar land inventories (factors) which require the same kind of management; the same kind of conservation treatment; or which are suitable for the same crops. For examples LUC class IIs1 is class 2 land, with a soil limitation, that requires very little management for maximum production.

7.3 LUC Classification in the Central Hawkes Bay

Like the majority of New Zealand, land units within the Central Hawkes Bay have been described by the New Zealand Land Resource Inventory (NZLRI). This is a national database of physical resources compiled using aerial photography, published and unpublished material as well as extensive fieldwork.

The extent of the different LUC units found in the Central Hawkes Bay is shown in Appendix 1 and shown on Map 3 in Appendix 2.

7.3.1 Highly versatile soils and Land Use Capability

Chapman (2010) is one of many people which link highly versatile soils to productive land based on the NZLRI and Land Use Classification system –

> "Versatile soils are classified as LUC class I, II or III, on the New Zealand Land Inventory Worksheets, provided that land classified as III is further described as containing well drained and moderately well drained soil"

Many Councils, including the Waikato District Council and Manawatu District Council (Section 10), use the LUC classification system to define soils which are worthy for protection for their "potential life supporting life capacity and protection for future generations". They define these soils as "high quality" or versatile.

7.4 Classifying Productive Land in the CHB

7.4.1 Highly productive land with highly versatile soils

Using the definition of productive land discussed in Section 5.2.1, the following LUC units are classified as being highly productive land with highly versatile soils. These have been summarised by Noble (1985) and described below. In total there are 21,805 ha of highly productive land with highly versatile soils. This is about 7% of the district. The extent of these LUC units are shown in Appendix 1 and shown Map 6 in Appendix 2.

Class I land

Ic1 – land consists of deep fertile free draining soils (Manawatu, Twyford and Hastings series) on plains and river terraces not subject to flooding or erosion. Slight summer droughts give this unit a climate ("c") limitation – irrigation during summer periods is needed for intensive horticulture especially on the well-drained sandier soils. Approximately 5,977 ha of class Ic1 land is recorded in the district.

Iw1 – land occurs on plains and river terraces with deep fertile alluvial soils, although, soils have heavier textured subsoils giving the unit a slight wetness ("w") limitation. These soils (Manawatu series) retain moisture for longer periods than those found in LUC unit Ic1. Approximately 328 ha of Iw1 land has been mapped.

Class II land

IIw1 – land is mapped on flat river terraces with deep soils, high natural fertility but slow natural drainage in the subsoils (Kairanga series). A continuing slight wetness limitation continues even with drainage, and water tables do rise seasonally. Unit can grow a wide range of crops with the implementation of drainage. Approximately 5,322 ha of Central Hawkes Bay area is in LUC class IIw1 land.

IIs1 - land is mapped on the flat high river terraces and plains. The soils found on this unit (Kopua series) are more susceptible to summer drought than the LUC class I units. With summer irrigation this unit is able to grow a wide variety of crops. Approximately 3,701 ha of the district is LUC class IIs1 land.

IIc1 – the unit is mapped on flat or gently undulating terraces, sheltered by the prevailing westerly winds. The soils (Dannevirke series) are well drained but the frequent winter frosts are a slight limitation to the cropping versatility of this unit. Shelter is essential for horticulture or cropping purposes. Approximately 853 ha of the districts area is in LUC class IIc1 land.

Class III land

IIIe1 – this unit is similar to IIc1 but occurs on landforms closer to Ruahine Ranges where strong westerly winds are prevalent. Soils here (Dannevirke series) are well drained but have light textured topsoil which are subject to wind erosion when cultivated. Shelterbelts are essential if cultivation is a regular practice. Approximately 5,612 ha of the district are in LUC class IIIe1 land.

7.4.2 Land with lower versatile soils but high productive value

There are substantial areas of the Central Hawkes Bay District where the land is still highly productive but the soil is less versatile as discussed in Section 7.1.2. Examples of this include intensive cropping. Although the soils are limited by factors such as wetness, drainage impediments, and susceptibility to drought they are known to produce well when suitable drainage and irrigation is installed. Because of this, these areas are of high productive value and are deserving of protection.

The extent of highly productive land but with lower versatility soils is shown in Appendix 1 and on Map 5 in Appendix 2. The LUC units are described below.

IIIe2 – This unit is mapped on the undulating to rolling country formed from loess material. The soils are similar to those found on the IIIs2 unit and are prone to drought. There are approximately 5,601 ha of IIIe2 land.

IIIe3 - Rolling colluvial terrace slopes with heavy textured subsoil formed from intergrades of YGE and YBE soils with slow internal drainage. Its slope gives it a moderate sheet and rill erosion potential when cultivated. Typical soils include the Atua and Bideford series. There are approximately 3,304 ha of LUC class IIIe4 land in the district.

IIIw1 – This unit is mapped on the poorly drained alluvial flats. Soils include Kairanga silt loam which has developed under conditions of slow natural drainage. With artificial drainage installed a variety of crops including cereals and green vegetables can be grown. There are approximately 10,504 ha of LUC class IIIw1 land in the district.

IIIw2 – Includes flat terraces and depressions with a moderately high water table. Heavy textured subsoils impede drainage. Typical soils include the Raumati series. There are approximately 2,244 ha of LUC class IIIw2 land in the district.

IIIs1 – This unit is mapped on the flat, loess covered terraces. Soils include the Waipukurau sandy loam, which has light textured topsoil and compacted dense subsoils. Slow internal drainage does limit permanent horticultural or orchard crops (except grapes and strawberries). With artificial drainage installation a range of crops can be grown. There is approximately 12,378 ha of LUC class IIIs1 land in the district.

IIIs2 – This unit is mapped on flat terraces and plains with 30-45cm of free draining topsoil overlying gravel e.g. Takapau series. This unit is more susceptible to summer drought and with a shallow soil depth and light textured topsoils it is less versatile than LUC unit IIs1. The unit is susceptible to wind erosion when cultivated but with correct soil conservation methods (e.g. shelterbelts) and irrigation it is suitable for a wide variety of crops. There are approximately 23,238 ha of LUC class IIIs2 land in the district.

IIIs3 – Flat to undulating imperfectly to poorly drained high terraces or colluvial basins with heavy textured intergrades of YGE and YBE developed from loess or colluvial deposits. Typical soils include the Atua and Bideford series. There are approximately 1,141 ha of LUC class IIIs3 land in the district.

IIIs4 – This unit is mapped on the flat to undulating alluvial terraces in the Wilder depression (near Porangahau). These terraces are formed from argillaceous alluvium derived from the surrounding 'white' argillite hill country. There are approximately 2,667 ha of LUC class IIIs4 land in the district.

In total there are about 61,076 ha of land that is highly productive but with lower versatile soils. This is about 18% of the district.

There are areas within the district that have low soil versatility but high economic value for viticulture. These areas are predominantly LUC class IVs1, VIs4, and VIIs1 and total about 6,427 ha.

7.5 Classifying "Versatile" Land in the CHB

In the case of the *Canterbury Regional Council v Selwyn District Council [W142/96],* Judge Treadwell stated that when classifying versatile land a number of social and human factors need to be taken into consideration. It is the opinion of the author that a number of these factors are considered of less importance when classifying versatile land in the Central Hawkes Bay District.

Table 3 below details those 'versatility assessment factors' from the Treadwell List (1997) that were considered less important for the Central Hawkes Bay District.

Table 3. *The less important assessment factors for the Central Hawkes Bay District from the Treadwell List (1997).*

Assessment factor	Comment
Site aspect	For the better classes of land, these are usually flat or slightly undulating and consequently aspect is irrelevant.
Storm water movement	Reflected in the soil characteristics found onsite.
Flood plain matters	It is very common for versatile land to be found on flood plains.
Availability of irrigation water	Should the Ruataniwha dam proceed there should be ample water. The current political climate suggests that it will not proceed however consent has been granted.
Transport, both ease and distance. Proximity to airport and ports	Considered static throughout the district.
Effect of the use on neighbours	Generally covered by other rules under the District Plan.
Effects of neighbours on use	Highly variable.
Access from the road	Generally all of the high value land in the district is easily accessible to the road.
Supply & quantity of labour	Hastings.
Previous cropping history	Should not be limited to cropping but previous land uses. Chemical fertility can easily be rectified whereas the fixing of physical properties more difficult.
Relevant contamination	Highly variable from farm to farm.
Sunlight hours	Maybe slight variations across the district but most probably insignificant.
Electricity supply	Well connected over entire area.
District scheme	

Economic and resale factors	

Instead when classifying versatile land in the CHB we should be adhering to the definition given by Chapman (2010) in Section 5.2.2 that versatile land "supports the production and management of a wide range of crops. It is characterised by certain soil and physical characteristics, which have few to no limitations like poor drainage, low soil nutrient status or slope instability. In the agriculture sense versatile land is also characterised by its proximity to services and transport."

Table 4 below summarises the highly productive land and soil versatility in the district.

Table 4. *A summary of highly productive land and soil versatility in the Central Hawkes Bay District.*

Category	Area (ha)
Highly productive land and highly versatile soils	21,805
Highly productive land and lower versatile soils	61,076
Subtotal of highly productive land	**82,881**
Stony soils with low versatility but high productive value for grapes	6,427
Total of highly productive land plus land suited to grapes	**89,308**
Total area of land in the district (includes all land)	332,644

7.5.1 Proximity to services (towns, airport, port,)

The productive and versatile land and soils within the district are all within close proximity (<50 km) to urban centres or towns (Waipukurau and Waipawa) available to supply services and within computing distance to Napier port or Napier or Palmerston North airport. .

7.5.2 Transport – both ease and distance

The productive and versatile land and soils is well connected to main urban centres and service towns by a number of State Highways and rural roads. These include:

- State Highway 2 (SH2) – Runs from Dannevirke to the South of the District to Napier/Hastings to the North (approximately 122 km). SH2 runs along the eastern section of the plains and through the main urban settlements of Waipukurau and Waipawa. Highway contains sealed roading and the transport of primary products along this section is considered easy.
- State Highway 50 (SH50) – Separates from SH2 just south of Takapau and runs through to Hastings in the North (approximately 90 km). SH50 runs along the western section of the plains and through the small service towns of Onga Onga and Tikokino. Highway contains sealed roading and is a major link road for the transport of primary products from the area to other districts.
- Rural Roads – Other rural roads are just as important as the State Highways in the area. In particular are Tikokino Road (linking Tikokino and Waipawa), Onga Onga Road (linking Onga Onga and Waipawa) and Onga Onga-Waipukurau Road linking the two named towns. These are important as not only do they dissect the plains they link the two state highways together. These roads are important as there is a considerable ease of transport of primary goods away from source to other sections of the district and beyond.

7.5.3 In summary

Given the areas setting, inclusion of versatile soils, high productivity, and its ease of access of all parts to services and transport, areas of highly productive/highly versatile soils and highly productive/lower versatile soils must be classified as "versatile land".

8 PROTECTION OF VERSATILE SOILS AND LAND IN THE CHB

The most versatile land in the District has provided a significant base for arable, finishing, dairying, and viticulture land uses. Furthermore, production from these areas and the neighbouring Heretaunga plains has made the Hawkes Bay the largest producing horticultural region in the country. These areas, therefore, are of particular significance for a number of reasons Palmer (Undated) highlights:

- Versatile soils are scarce in NZ.
- There is a cumulative effect from sub-division.
- Versatile soils once built on are a non-renewable resource.
- The market cannot predict future values and needs.
- In almost every case, planning could see poorer quality soils subdivided in preference.
- The natural attributes of versatile soils cannot be replaced without much cost and energy.
- Versatile soils grow better food more cheaply and with fewer environmental consequences.
- Retaining versatile soils close to urban areas lowers transport costs, creates local economy.

Because versatile soils and the accompanying versatile land are particularly rare in New Zealand, this area should be classified as a resource of national significance, or at the very least, regional significance. In very few other places in the country would you find the concentration and extent of versatile soils/land supporting a wide range of land uses as you do in the central Hawkes Bay.

Therefore, it is imperative that the protection of the versatile soils/land of the District be one of the core objectives of the Central Hawkes Bay District Plan. This is vital in "sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations" and "safeguarding the life capacity of… soil" (RMA).

8.1 Competing demands

Bloomer (2011) noted that land is a "critical and finite resource for the future of New Zealand" which is currently serving a number of roles. These include:

Meeting demands for:

- Agriculture and forestry
- Housing
- Recreation and tourism

Rutledge (2008) and Palmer (Undated) stated that the conversion rate of productive land to non-productive uses (such as urban expansion) is highest for those most versatile soils (Class I and II land).

8.2 Economic Growth

The Central Hawkes Bay's economic growth direction for the next 30 years was prepared by Bevin (2017). This report recorded a number of positive trends from 2013-2017 and provided cause for some optimism with regard to future growth in the district. They include:

- A population growth of 470 or 3.5%.
- Approximately 160 new households (including urban and rural). The estimated new rural households for this period are 30.
- Significant lift in urban house prices.
- 114 new farm buildings.
- Meat and wool sector export receipts have steadily increase and overall by 18%.
- National pip-fruit sector export receipts (includes Hawkes Bay and CHB) account for 65% - this has risen steadily and by 51% of normal terms.

Based on a number of these trends a projection on future growth was able to be conducted by Bevin (2017). This is as follows:

- A "halfway median to high growth" projection is considered and would see the number of houses increasing in the area by 10% (5,625 in 2018 to 6,160 in 2028. An extra increase of 9% is also calculated from 6,160 in 2028 to 6,700 in 2048) (throughout the district).

8.2.1 Extent of past rural subdivision

In the past, rural subdivision in the Central Hawkes Bay have been generally concentrated to the urban fringes particularly around the main urban centres of Waipukurau and Waipawa as shown in the Subdivision History Map in Appendix 2.

8.2.2 Land Fragmentation issues

In New Zealand versatile land is under pressure from a range of competing uses. In particular, highly versatile land is becoming increasingly fragmented, mostly as a result of rural subdivision. Rural subdivision is where a "single parcel of rural land is divided into two or more parcels". The resulting smaller land parcels can often "prevent the use of land for many types of primary production" therefore affecting that particular piece of lands versatility.

Land fragmentation is the "division of a land resource that changes the current or future range of possible activities and thereby alters the actual or potential uses of that land resource across a number of scales" (Hart et al., 2013).

Land fragmentation has four key fundamental characteristics that can change individually. These include:

1. **Cover** – physical changes (infrastructure etc.) which affect the range of possibilities and therefore uses of the land resource.
2. **Title** – changes to the spatial distribution of rights to the land resource (e.g. by subdivision)
3. **Rights** – changes to the range of activities in connection with the land resource.
4. **Ownership** – changes in the person or people who have rights to the land resource.

A number of councils in New Zealand, including the Central Hawkes Bay, have recognised the issues related to land fragmentation. Loss of versatility and the productive capability of rural land was the key issue noted by many councils. This can happen through a number of processes which include:

- Land use change from productive to non-productive (urban development)
- Reverse sensitivity effects where productive land becomes socially unacceptable (productive land has traditionally been a rural or productive landscape)
- Property values increasing to the point that makes productive land uses unprofitable
- Productive land uses become unprofitable because small lot sizes limit management options.
- Other issues relate to land fragmentation have been highlighted by a number of councils and are described in Table 5 below.

Table 5. *Issues identified by councils related to land fragmentation (Hart et al., 2014)*

Issue	Number of councils
Loss of land (especially highly 'versatile' or 'high quality' soils.	14
Reverse sensitivity effects.	10
Social and economic impacts of a changing rural landscape (both positive and negative impacts, eg loss of rural open space).	10
Infrastructure provision (eg expense of servicing remote and very low density development).	9
Decreasing options for productive land use (ie due to smaller title size and/or increasing property values in traditionally productive/rural land areas).	6
Increased water supply/allocation pressure.	3
Regional sustainability (ie unsustainable land uses, where cumulative effects of development put food production at risk).	3
Increased pressure on water quality 9eg as a result of increasing septic tank numbers).	3
Land contamination problems (depending on the land use adopted at new sites).	3
Increasing hazard risk (eg increased storm water pressures with increased impervious surface area).	3
Loss of access to regionally important resources (eg mineral extraction potential).	1
Degradation of soil ecosystem services.	1
Inefficient development of rural land.	1
Impacts on biodiversity.	1

Of key concern are a number of negative social and economic impacts such as the undermining of rural economies by reducing options for productive land uses and increase in costs of infrastructure provision and maintenance of low density, fragmented development.

9 CENTRAL HAWKES BAY OPERATIVE PLAN

The Central Hawkes Bay District plan recognises that "agriculture is the predominant land use in Central Hawkes Bay and pastoral land use is a major contributor to the economy of the District".

It also recognises that to strengthen the district economy the Council have to provide for a diverse range of land uses within the Rural Area. However, it is of greatest priority to sustain productive potential of the land and the rural character which is a key element to the Central Hawkes Bay. Productive uses include intensive farming, forestry, quarrying etc.

The existing rural provisions highlighted in the District Plan do not currently actively promote the protection of versatile land. Only one Rural Zone has been included, which applies to the whole rural land of the District – less versatile land of the hill country has been zoned together with highly versatile land of the plains.

A number of implications have arisen from the inclusion of only one rural zone in the plan. The main implication revolves around the minimum lot size for rural subdivision which has been set at 4,000m^2. This standard has the potential to cause increased fragmentation of the districts most versatile soils. In the same token, if this minimum lot size was set higher at say 12 ha, then potentially there would be 12 ha (rather than 4,000 m^2) of highly versatile land that becomes unproductive when subdivided into one 'lifestyle' block. The term 'unproductive' has been used by the authors solely from their observations in the field. When the primary income for a property comes from off-farm the productivity of the land becomes minimal with time unless the land is leased to a neighbouring farmer or horticulturalist whose primary income is from the land.

This standard also raises issues relating to the productive capacity of properties of this size and the sustainable use of the natural and physical resources. It creates the potential for two major adverse effects such as:

- Loss of productivity as a result of rural subdivision irrespective of size.
- Increase in fragmentation of highly productive land creating a number of issues as shown in Table 5 above.

A minimum lot size of this standard applying to the whole rural sector of the Central Hawkes Bay is effectively encouraging land fragmentation. This can have the potential to undermine the productivity of highly versatile land and create significant reverse sensitivity issues. The council recognises these facts and is willing to review the current Rural Zone provisions.

10 ALLOTMENT SIZES

In determining the minimum lot size there should still be the opportunity to achieve an economic return on the land size. Sheppard (per. com. 2017) suggests that this should be at least $120,000 total EBIT (earnings before interest and taxes) and based on drawings of about $60k. Sheppard also stated that this figure is dependent on debt loadings, and the cost of development for each land use is completely varied. Table 6 below shows the EBITs per hectare for a range of land uses from Eaton *et al* (2016). These EBITs per hectare have been extrapolated out to achieve a 'crude' minimum area for something to be considered an 'economic unit'.

Table 6. *EBITs for various land uses and estimated areas required for an economic unit.*

Land Use	EBITS $/ha	Estimated area required (ha)
1. Sheep & Beef Extensive	$454	270
2. Sheep & Beef Dry Stock	$381	315
3. Finishing	$537	223
4. Mixed	$625	192
5. Arable	$415	289
6. Dairy heavy soils	$1,070	112
7. Dairy light soils	$2,628	46
8. Pip fruit	$16,367	7
9. Viticulture	$3,686	33

Therefore using this 'crude' method of suggesting economic unit, any lot sizes less than say 7 ha would not be viable for the any of the above land uses. Obviously some of these land uses are dependent on soil quality and the provision of water.

When determining a minimum allotment size standard for rural subdivision it is important to understand that the smaller the allotment standard the larger the potential for increased fragmentation e.g. in the current rural zone in the CHB, there is the potential for much of the Rural Zone (including highly versatile land) to be subdivided into 4,000 m^2.

It could also be argued that if the same number of subdivisions occurs in the rural areas irrespective of size then if the lot sizes are larger the impact on productive land and versatile soils would be increased.

If a new zone is developed for the most versatile and productive land, then based on standards set by other councils of similar size described in Section 10, it is recommended a minimum allotment size for rural subdivision be set between 10-12 ha. This planned land fragmentation at this size will help to ensure that the districts highly productive and versatile land is protected and sustainably managed.

There are a number of pros and cons related with minimum allotment sizes for rural subdivision. Table 7 summarises these with a comparison between the current minimum allotment size (4,000 m^2) for the CHB and a common standard (12 ha) used by other District councils (Section 10).

Table 7. *Pros and cons of different allotment sizes based on current allotment size (4000m^2) and common standard from other District councils (12 ha).*

4000 m^2 lot sizes		**12 ha lot sizes**	
Pros	**Cons**	**Pros**	**Cons**
• Potential for increased fragmentation could have positive knock-on effects – improved water quality, revitalisation of rural towns	• Higher potential for increased land fragmentation – reverse sensitivity issues • Loss of productive capacity – management options limited. • Block of this size are too small – unproductive and unviable for rural activity	• Larger rural areas of versatile land are sustainable and profitable.	• Large areas of productive/versatile land could go to waste if not farmed to potential. • Larger areas limit potential for subdivision. 30 blocks at 4000m^2 could be subdivided in 12 ha land.

Similarly when determining allotment sizes for the less productive wider Rural Zone it is important to set a standard which truly reflects the rural character. In this zone there is less emphasis on the productive unit as well as a number of management issues including steeper land, more erosion prone, remote and less services available – a larger unit of land will be needed to make the farming enterprise profitable. Because of this, and based on examples from other district councils it is the opinion of the author, that the minimum allotment size for the wider Rural Zone be set at around 20 ha. This standard will truly reflect the rural character all the while helping to alleviate the reverse sensitivity issues on the boundary between the productive and versatile land and the wider Rural Zones.

Determining minimum allotment sizes for rural subdivision is difficult, but based on Table 8 the larger the allotment size the fewer the negative impacts and potential for land fragmentation. Alternative options to counteract the potential for land fragmentation could also include:

- Controlled fragmentation - where rules are set to allow only one subdivision per legal title.
- Controlling rural subdivision – lifestyle development could be contained within a rural residential area/s. These areas would need to be situated on LUC class III and above. This will help to safeguard the versatile rural areas all the while helping to meet demands for lifestyle opportunities.

11 OVERVIEW OF RURAL ZONES IN OTHER

The following sections outline how other district councils have dealt with subdivisions on highly productive and versatile land and soils.

11.1 Gisborne District Council

The Gisborne District Council has identified four rural planning zones each with their specific policies and rules. These are identified and summarised in Table 8 below.

Table 8. *Planning zones in the Gisborne district.*

Zone	Location	Physical Features	Other Features	Minimum allotment sizes
Rural Production (Rural P) Zone	Poverty Bay Flats	Determined solely on soil quality. Soils are top 5% in New Zealand for life supporting capacity.	Located far enough away from urban zones to avoid conflicts between urban and rural use (noise, dust etc.). Also free of topographic and physical constraints	8 ha
Rural Residential (Rural R) Zone	Predominantly on fringes of rural townships where peri-urban development can be accommodated.	Less fertile soils where poor drainage may exist. Hills, streams, drains and road reduce potential for productive farming.	Zone acts as a buffer between urban settlements and Rural P zone assisting in mitigating conflicts e.g. noise and dust etc. Density to one hectare is considered appropriate.	1 ha
Rural Lifestyle (Rural Z) Zone	Covers areas on Poverty Bay flats less suited for intensive farming, those areas in close proximity to Gisborne urban area and semi-rural property areas with a history of denser settlement history.	Less fertile soils where drainage impediments may exist.	Zone complements Rural P zone as it intends to divert peri-urban development from the most productive and fertile land. Greater density is considered appropriate.	5,000m^2
Rural General (Rural G) Zone	Covers the rest of the district not covered by the other zones.	Predominantly less fertile soils.	Suitable for a range of activities provided any effects can be remedied and mitigated. Low population densities	1,000m^2

11.2 Manawatu District Council

The Manawatu District Council have emphasised that “versatile land” is a special resource for a number of reasons. Firstly, it is land which can be used for a range of potential uses. Secondly, it can be used for intensive production without the need for extensive artificial inputs such as fertilisers. Thirdly, the land contains versatile soils which have the greatest potential for supporting life. And lastly, there is such a small abundance of versatile land (locally and nationally) compared to any other land classes – the Manawatu District has half as much Class 1 land (14,350 ha) than the whole South Island (28,900 ha).

The Manawatu District Council has raised concerns regarding this versatile land being under a lot of pressure locally from uniform small lot subdivision. The council regards versatile land as being a special and limited resource and that their management is a real issue for the districts people, and also regionally. They have, therefore, implemented policies to help “minimise the quantity of versatile land lost for reasons such as being put under large expanses of building and pavements or put into urban use”.

The Manawatu District Plan identifies versatile land as Class I and II except Class IIs2. This is defined using the Land Use Capability classification based on the Land Resource Inventory. This land has very little to no limitations to land use and is suitable for a number of productive purposes. Class IIs2 is a specific type of land which occurs around the Ashhurst, Bunnythorpe, Sanson region. This theoretically has the same wide range of productive uses as the other Class II land but is limited by drainage impediments within the soil. This drainage impediment is in practice hard to overcome and is not therefore considered to have the same level of versatility as the other Class II land.

Interestingly, the Manawatu District Council defines versatile land based predominantly on LUC class without truly taking into consideration other factors such as location, land use, water, climate, community values, drainage, and infrastructure. The Regional policy statement states “All land shall be managed sustainably, in particular, the adverse effects of land use activities resulting in a significant irreversible loss of Class I and Class II land. This shall be avoided, remedied or mitigated”

The District Plans rural land is classified into two zones – Rural 1 Zone (versatile land) and Rural 2 Zone (less-versatile land). Rural 1 Zone requires an 8ha minimum average lot size with the plan recognising the potential effects on the lands productive options. The average lot size for Rural 2 zone has been set at 4 ha.

11.3 Ashburton District Council

The Ashburton District Council has classified its rural land into 3 different zones – Rural A, Rural B and Rural C zone. These zones are summarised in Table 9 below.

Table 9. *Ashburton District Council planning zones.*

Rural Zone	Location	Zone Characteristics	Allotment sizes
Rural A	Zone adjoins the outskirts of the main settlements (Ashburton, Rakaia and Methven)	Zone is characterised by close proximity to local services and facilities. Land is characterised by pastoral agriculture, some business development and fenced lifestyle blocks.	8 ha
Rural B	The vast plains interspersed by large braided rivers, Southern Alps to the west and coastal cliffs to the east.	Characterised by agriculture activities. Zone is anticipated to provide open spaces for farm house, as well as small urban settlements.	50 ha
Rural C	Large scale mountains, valleys and basins, with scattered vegetation, lakes and wetlands.	Large natural landscapes which are vast and spacious. Dominated by extended views and natural features	50 ha

11.4 Tasman District Council

The Tasman District Council classifies a number of rural zones based on actual and potential productivity of the land. They have used an eight class classification system which assesses factors such as ground slope, soil depth, drainage and inherent fertility as well as climatic factors of soil temperature, available soil moisture, and sunshine. The rural zones are summarised below:

Rural Zone 1:

This zone, about 5% of the total area, covers land with the highest existing and potential productive value. In this zone a number of rules and regulations on subdivision and urban development have been implemented to safeguard these qualities. The minimum area for allotments created by subdivision is set at 12 ha.

Rural Zone 2:

This zone includes land with not the highest productive value. It generally has a lower intensity of use and development compared with Rural Zone 1. The minimum area of allotments created by the subdivision is set at 50 ha.

Rural Zone 3:

Rural Zone 3 covers a specific section of the coastal Tasman District. The section contains land of high productive value, generally more coastal land, and also land of lesser productive value. Rules and regulations have been set to accommodate residential development in this zone particularly on the land of lesser productive value, safeguarding areas of higher productive value. This zone has been introduced to meet the demand for residential living in a rural context in an area close to main urban centres, transport routes and the coast. It is intended to absorb and therefore

reduce pressure for rural residential development and particular Rural 1 areas. At the time of writing, a minimum area of allotments for subdivision in Rural Zone 3 is yet to be set.

11.5 Tararua District Council

The Tararua District Council have categorised the District's land into five broad areas each having a particular character, level of amenity and environmental quality associated with it. These management areas are summarised in Table 10 below:

Table 10. The Tararua District Councils' planning management areas.

Management Area	Location	Description
Rural	Covers the remainder of the district including numerous un-serviced settlements	Characterised by mostly rural land uses including farming, forestry, and natural open space as well as a variety of residential, commercial and industrial activities which serve and support the rural function.
Residential	Found within the towns of Dannevirke, Woodville, Pahiatua, and Eketahuna	Areas within the districts urban centres consisting of mostly dwelling houses but also include community and commercial activities which serve and support the residential function.
Commercial	Found within the towns of Dannevirke, Woodville, Pahiatua, and Eketahuna	Areas found within the urban centres that are generally business orientated and include activities such as shops, commercial services, trades, offices, distribution and light manufacturing.
Industrial	Found within the towns of Dannevirke, Woodville, Pahiatua, and Eketahuna	Areas containing industrial and manufacturing activities and some supporting commercial services.
Settlement	Apply only to Norsewood, Ormondville, Pongaroa and Akitio	Applies to small rural settlements serviced by community sewerage and water supply schemes. These areas contain a mixture of rural, residential, commercial and industrial activities and serve vital social, economic and cultural functions for the community.

The Tararua District plan acknowledges that the "loss of the productive capability of the land (urban expansion)" is an issue but because of the low-medium level of urban development in the area the issue is not as significant as others. The plan also acknowledges that the townships of Pahiatua and Eketahuna and the small urban settlements of Ormondville, Makotuku, Mangatainoka, and Mangamutu are all sited on "elite" Class I and Class II soils and therefore careful urban development is needed to protect elite rural soils in the rural-urban fringe.

The Tararua District Plan states that "arbitrary size standards, whether in urban or rural areas, often lead to people being forced to have more land than they actually want or need for their intended purpose, and often results in a lack of stewardship of the land". Instead by adopting performance standards the Tararua District Plan is able to cater for new trends in a flexible manner by concentrating on the potential environmental effects and desired outcomes for the area concerned. Therefore the plan does not specify District minimum lot sizes, only "urban buffer areas" around the margins of the main towns have a minimum lot size of 8,000m^2.

11.6 Horowhenua District Council

The Horowhenua District Plan categorises all land into six zones. These are summarised in Table 11 below.

Table 11. Horowhenua District Councils' management zones.

Management Zone	Description	Minimum average lot size
Rural	Covers the majority of the Horowhenua District. The character, amenity values and productive uses of rural land underpins the social, economic and cultural well-being of the people of the District. Rural Zone divided into coastal, plains (most versatile soils) and hill country areas	Coastal Environment (5 ha) Coastal Lakes (5 ha) Hill Country (40 ha) Kuku (10 ha) Moutoa-Opiki Plains (20 ha)
Residential	This zone is characterised by residential environments in each settlement. Settlements include: Levin, Foxton, Shannon as well as Waitarere Beach, Waikawa Beach and Manakau.	HDC recognises character and amenity values different residential environments in different settlements, therefore, standards (minimum lot size) differ between settlements.
Greenbelt Residential	This zone is at the urban edge, providing a residential choice with large open space and a semi-rural context. This zone is split into either serviced or unserviced zones (zones serviced by the Councils reticulated water and wastewater infrastructure)	Serviced (330 m^2) Un-serviced (5,000 m^2)
Commercial	Commercial and retail activities are the predominant land use. These include the main towns CBD's	No minimum allotment size
Industrial	Range of industrial and service activities are undertaken in this zone providing goods and services for the local, regional, national and international markets	No minimum allotment size.
Open Space	Areas in the district which have the opportunity for both passive and active recreational activities. These could include golf courses, parks, reserves etc.	No minimum allotment size.

11.7 Timaru District Council.

The Timaru District Council have identified a number of rural zones. They have recognised that rural activities can give rise to a number of undesirable environmental effects. Their policy is to therefore provide for a wide range of land use activities in particular rural zones all the while avoiding or mitigating the adverse environmental effects. The rural zones have been summarised in the Timaru District Council Plan and below:

Rural 1 Zone (General Rural)

The Rural 1 Zone includes a large proportion of the plains and downland areas with the exclusion of all the Class I and II land. This zone contains a wide range of primary production activities although residential use is subject to varying servicing limitations. On the downlands there is also limited capacity to store water through rural water supply schemes. The intention for this land is still to provide for a range of activities such as rural lifestyle blocks. Any rural allotments created by subdivision in this zone need to have a minimum area of 40 ha.

Rural 2 Zone (High Quality Land)

Rural Areas in the Timaru District Council with the most versatile land (Classes I and II) are classified in Rural 2 Zone. Limitations on the development of this land in residential use are aimed to protect the most versatile land for future generations. Rural allotments may be subdivided and shall have a minimum area of 10 ha.

Rural 3 Zone (Coastal)

Rural 3 Zone covers the coastal section of the District which retain a high degree of natural character. Strict rules are implemented in this area so that inappropriate use and development would threaten those natural values. Any subdivision in this zone requires a minimum allotment size of 10 ha.

Rural 4A Zone (Geraldine Downs)

This zone was created to recognise the high natural values of the Geraldine Downs. The creation of this zone is to "not only retain but enhance the areas landscape character. It seeks to provide for artisan, travellers accommodation, commercial recreational activities as well as the protection of established productive activities". To achieve this strict rules on limiting new development have been implemented. Minimum allotment size for rural lifestyle subdivision is set at 10 ha, whereas, for rural production subdivision it is 40 ha.

Rural 4B Zone (Blandswood)

Zone 4B recognises the high natural or amenity values of the Blandswood region. Any proposal for future development in the area needs to have minimal or no effect on the natural landscape. The area should be characterised by holiday homes. Any rural allotments created by subdivision in this zone need to have a minimum area of 40 ha.

Rural 5 Zone (Hill and High Country)

Rural 5 Zone includes the hill and high country within the district. These areas are considered to have outstanding natural landscape values which include indigenous flora and habitats for indigenous fauna. Strict controls have been put in place so that any "major land use change or development needs to be well designed and compatible with the existing landscape values". All subdivision of land in this zone is provided to have a minimal area of 40 ha.

11.8 Hastings District Council

There are a number of zones the Hasting District Council categorise the land there into. The minimum allotment sizes for each zone are summarised in Table 12.

Table 12. *Hastings District Council planning zones and minimum allotment sizes.*

Management Zone	Minimum allotment size
Rural Zone	20 ha
Rural Residential Zone	0.8 ha
Plains Production Zone	12 ha
Tuki Tuki Special Character Zone	3 ha

The Hastings District Council subdivision rules used to be much more flexible until the most recent plan review. They have effectively tightened up on the subdivision rules, particularly in the Heretaunga Plans, as a result of recognising the value of the plains as a food producing area and the issues of fragmentation and reversed sensitivity of previous subdivisions.

12 RECOMMENDATIONS FOR THE CHB DISTRICT COUNCIL

Three zones for rural subdivision are recommended in the Central Hawkes Bay district and include:

1. A zone for highly productive land – The 'highly productive rural zone'.
2. A zone for the less productive land – the 'general rural zone'.
3. A rural residential zone.

The following sections detail options for each of these zones and the recommended minimum lot size.

There are isolated areas of highly productive and versatile land/soils that have not been captured in the highly productive rural zone due to their 'patchiness' or location and do not warrant the same degree of protection.

12.1 Minimum Lot Size

The minimum lot size recommended for the 'highly productive rural zone' is 12 ha. The main reason for this is that firstly this is considered the minimum area needed to retain some level of economic viability and hence not lose its productive capability so commonly seen with smaller 'lifestyle' blocks. Secondly it is consistent with the neighbouring Hastings District Council rules for the Heretaunga Plains. Furthermore, a 12 ha minimum lot size will reduce the degree of fragmentation and issues related to reverse sensitivity.

The minimum lot size recommended for the 'general rural zone' Table 13 below shows the recommended rural zones for subdivision for the Central Hawkes Bay District Council. It is noted that the zones and associated minimum lot sizes are consistent with the neighbouring Hastings District with the exception of the Rural Residential Zone. The recommended Rural Residential Zone is 0.4 ha and this is consistent with the existing District Plan. This consistency is seen as being positive for the community.

Table 13. *Recommended Rural Zones*

Name	Description	Minimum lot size
Highly productive land rural zone	To protect the highly productive and versatile land/soils within the district. The boundary could be based on either a blanket area incorporating all land/soils irrespective of its productive potential or versatility or confined to just the highly productive and versatile land/soils.	12 ha
General Rural Zone	For subdivision of all other land throughout the region.	20 ha
Rural Residential Zone	More concentrated smaller lifestyle properties.	0.4 ha

A 20 ha minimum lot size is recommended for the Proposed General Rural Zone. The reason for this is to preserve the open rural natural character and the amenity values of the rural area. It will also reduce the fragmentation of the proposed General Rural Zone. This is also consistent with the neighbouring Hastings District Council Plan.

12.2 Highly Productive Rural Zone

The highly productive and versatile land/soils in the Central Hawkes Bay District are of regional significance, if not national significance, and at the very least, require protecting. In recognising this there are two general ways of capturing this area to form the 'highly productive and versatile land rural zone' and these include:

1. Incorporating just the highly productive and versatile land, and

2. ‘Ring fencing’ the highly productive and versatile land along with less productive and versatile land to form a blanket boundary.

Potential options for these are discussed further in the following sections.

To be consistent with the Hastings District Council the minimum lot size for the recommended Highly Productive Rural Zone should be 12 ha.

12.2.1 Option 1 – Concentrate primarily on the highly productive and versatile land/soils

Option 1 involves concentrating primarily on the highly productive and versatile land/soils within the district. In order to minimise the potential issues associated with reverse sensitivity a 100 m buffer zone has been included around the highly productive and versatile land/soils. The pros and cons of this option are shown in the following table and the area affected is shown on the Map in Appendix 2.

Table 14. *The pros and cons for Option 1.*

Pros	Cons
• Incorporates all highly productive land within the region. • Defines land based on LUC classes, albeit not particularly accurate. • Land owners in the Tukituki Catchment are already familiar with the LUC classification system with the Tukituki Plan Change 6 requirements for nutrient management. • A slight adaption to the HBRC LUC application on their website is all that is required to show the boundaries of the proposed zone areas. • The 100m buffer reduces the effects on fragmentation and reverse sensitivity.	• Because it incorporates all highly productive land it creates patches of land. This makes it difficult to manage. • A large area of ‘other land’ is also incorporated with a 100 m buffer zone to reduce fragmentation and reverse sensitivity. • There can be discrepancies between regional scale mapping (1:50,000) and paddock scale mapping. If a subdivision applicant feels aggrieved by this then they could have it remapped at an appropriate scale by a professional. This currently works well in the Rangitikei district. • Concern over fragmented areas of highly productive and versatile land/soil that could create reverse sensitivity issues of less versatile or productive land/soils that was allowed to be subdivided. This issue can be removed with a buffer zone of say 100 m around the highly productive and versatile land. • From a planning perspective it may be difficult to define the boundary between “versatile” and “non-versatile” zones. This is easily overcome with a application similar to that used by the HBRC for nitrogen leaching limits. • Sudden changes in regional scale LUC units from “versatile” to “non-versatile” could see different regulations from paddock to paddock e.g. an area to be subdivided in the non-versatile zone could be more fragmented (given a lower minimum lot size regulation) than a neighbouring unit in the “versatile zone” (greater minimum allotment size). This could raise a number of issues including reverse sensitivity values.

The extent of Option 1 compared with the area of highly productive land in the district is shown in Table 15.

Table 15. *A breakdown of the areas in Option 1.*

Category	District Area (ha)	Option 1 Area (ha)
Highly productive land and highly versatile soils	21,805	21,760
Highly productive land and lower versatile soils	61,076	60,256
Total highly productive land	**82,881**	**82,016**
Other land		22,987
Total land		**105,003**

Table 15 shows that although practically all the highly productive land is captured, there is an additional 23,000 ha of land outside these criteria that is also incorporated. If the 100m buffer is excluded this 'other land' is eliminated. There is a insignificant difference between the Option 1 areas and the district areas. This has been brought about by excluding the proposed areas of rural residential.

12.2.2 Option 2 – The creation of a boundary around the highly productive land based on roads, streams & cadastral boundaries

In order to remove the 'patchiness' of Option 1, small isolated patches of highly productive land have been excluded to form Option 2 as it is questionable whether, based on their size, they trigger the definition of highly productive and versatile land. To create a boundary where the planners can practically describe with certainty for the land holders a boundary has been created that incorporates the main areas of highly productive land. This boundary also incorporates large areas of less productive land. Where practical the boundary uses a combination of roads, waterways and cadastral boundaries. The pros and cons of this option are shown in Table 16 below and the area affected is shown on Map 8 in Appendix 2.

Table 16. *The pros and cons for Option 2.*

Pros	Cons
• The small areas of highly productive land are excluded to better define the boundary and reduce both fragmentation and reverse sensitivity.	• For ease of creating a boundary not all highly productive and versatile land/soils were incorporated within the boundary. • The boundary is difficult to define from a planning perspective. • Incorporates land/soils that are considered less productive and versatile. • Potentially the issue of reverse sensitivity still exists where on one side of the road the land is part of the highly productive rural Zone and not on the other side of the road.

Map 6 in Appendix 2 shows the extent of Option 2 and a summary of the areas is contained in Table 17 below.

Table 17. *A breakdown of the areas in Option 2*

Category	District Area (ha)	Option 2 Area (ha)
Highly productive land and highly versatile soils	21,805	16,566
Highly productive land and lower versatile soils	61,076	43,852
Total highly productive land	**82,881**	**60,418**
Other land		17,692
Total land		**78,110**

Table 17 shows that the total area within the boundary (78,110 ha) captures about 73% of the highly productive land (60,418 ha) contained in the district. The amount of land outside the highly productive land is about 17,692 ha.

12.2.3 Option 3 – The use of cadastral parcels as the boundary

Building on the definitive areas of highly productive land used in Option 2, Option 3 uses the cadastral boundaries to create a boundary. If a land parcel contained any land which is classified as highly productive then it was included within the proposed zone. The pros and cons of this option are shown in Table 18 below and the area affected is shown on Map 9 in Appendix 2.

Table 18 *The pros and cons for Option 3.*

Pros	Cons
• A definitive boundary. • Minimises the areas that are not classified as highly productive land.	• There could be uncertainty of the exact position of the boundary as it generally does not follow identifiable boundaries such as roads or rivers.

There is a high percentage of land within this option that is land which is not classified as highly productive land (about 44%). This occurs where there are parcels of land that does not contain 100% of highly productive land. In order to reduce the effects of this further analysis was undertaken to exclude parcels that did not have a certain percentage of highly productive land within the parcel. Table 19 below shows the sensitivity of this.

Table 19. *The effects of excluding parcels with varying proportions of highly productive land.*

	Total area (identified parcels) (ha).	**Area of highly productive land captured (ha).**	**Percentage of highly productive land captured from the total productive land identified (61,309 ha).**	**Percentage of highly productive land to total land within the option**
Parcel includes at least some highly productive land (Map 9)	109,784	61,309	100%	56%
Contains parcels with at least 20% highly productive land	79,857	57,209	93	72%
Contains parcels with at least 30% highly productive land (Map 10)	72,529	55,400	91	76%
Contains parcels with at least 40% highly productive land	65,805	53,099	87	81%
Contains parcels with at least 50% highly productive land (Map 11)	58,838	50,078	82	85%
Contains parcels with at least 60% highly productive land	51,232	45,881	75	90%
Contains parcels with at least 70% highly productive land	44,658	41564	68	93%

Table 19 above shows that there was a total of 61,309 ha that was identified as being highly productive land. The total area of the parcels that incorporate all the highly productive land is 109,784 ha. When at least 30% of the parcel had to contain highly productive land, it captured about 55,400 ha from 72,529 ha. This is about 91% of all the highly productive land (55,400 ha divided by 61,309 ha) and the percentage of highly productive land to the total parcel area is about 76%. Appendix 2 contains two further maps for when the percentage of highly productive land is at least 30% and 50% (Maps 10 and 11).

Obviously as the percentage of highly productive land within a parcel increases, the amount of land that is not highly productive land and the overall area of highly productive land reduces accordingly.

12.2.4 Option 4 – Further refinement of boundary

There is a strong case to exclude the area of land to the west of Porangahau due to its location and isolation. Both these factors could arguably prevent it being classified as versatile land. Excluding this land from Option 3 then creates Option 4.

The pros and cons of this option are shown in Table 20 below and the area affected is shown on Map 12 in Appendix 2.

Table 20 *The pros and cons for Option 3.*

Pros	Cons
• A definitive boundary. • Minimises the areas that are not classified as highly productive land. • Excludes land that may be considered of good proximity to services and transport.	• There could be uncertainty of the exact position of the boundary as it generally does not follow identifiable boundaries such as roads or rivers.

The total area of highly productive land contained in Option 4 is 56,906 ha as shown in Table 21 below. The total area of all the land parcels which contain the highly productive land is about 100,171 ha. This means that about 43% includes land other than highly productive land.

Table 21. *The effects of excluding parcels with varying proportions of highly productive land.*

	Total area (identified parcels) (ha).	**Area of highly productive land captured (ha).**	**Percentage of highly productive land captured from the total productive land identified (56,906 ha).**	**Percentage of highly productive land to total land within the option**
Parcel includes at least some highly productive land (Map 12)	100,171	56,906	100%	57%
Contains parcels with at least 20% highly productive land	73,007	53,325	94%	73%
Contains parcels with at least 30% highly productive land (Map 13)	66,490	51,655	91%	78%
Contains parcels with at least 40% highly productive land	60,298	49,488	87%	82%
Contains parcels with at least 50% highly productive land (Map 14)	54,192	46,745	82%	86%
Contains parcels with at least 60% highly productive land	47,449	43,069	76%	91%
Contains parcels with at least 70% highly productive land	41,516	39,138	69%	94%

Table 21 above shows the results of restricting the parcels to those with at least a certain percentage of highly productive land. Like Option 3 as this percentage increases the area of land other than highly productive land reduces significantly. Maps 12 to 14 show the result of these scenarios.

12.3 Creation of a Rural Residential Zone

The creation of a Rural Residential Zone around exiting urban areas for the purpose of smaller lifestyle blocks will give direction to where this land development should occur. It will also reduce fragmentation and reverse sensitivity issues within the other rural zones. The pros and cons for this option are summarised in Table 22 below.

Table 22. *The pros and cons of a Rural Residential Zone.*

Pros	Cons
• Creation of a rural residential zone will act as a buffer assisting in mitigating conflicts - noise etc. Given minimum allotment sizes are correctly set increase land fragmentation issues will not arise. • Review of current Rural Zone regulations will not create increased land fragmentation and its related issues at the Highly Productive Rural Zone boundary	• Loss of a section of versatile land bordering urban centres. • Although not particularly important, there is no discernible separation of land, within the Highly Productive Rural Zone, which is classified as versatile (LUC lass I, II, III and VIIs) to that which isn't.

To be consistent with the existing District Plan the minimum lot size should be retained at 0.4 ha.

12.4 A proposed General Rural Zone

This includes all other land outside the recommended Highly Productive Rural Zone and Rural Residential Zone. To be consistent with the neighbouring Hawkes Bay District Council the minimum lot size should be 20 ha. The minimum lot size is aimed at maintaining the natural character of the rural landscape and its amenity values.

13 GLOSSARY OF TERMS

Land Use Capability (LUC) – "*a systematic arrangement of different kinds of land according to those properties that's determine its capacity for long term sustained production. Capability is used in the sense of suitability for productive use or uses after taking into account the physical limitations of the land." (*Eyles *et al., 2009)*

Soil classification – "the grouping together of soils with similar profiles and properties" (McLaren & Cameron, 1996).

Soil drainage – "loss of water from a soil through subsurface runoff or flow through the soil" (Molloy, 1998).

Soil structure – "refers to the shape, size, and degree of development of the aggradation" (McLaren & Cameron, 1996).

Soil texture – "the particle size distribution of the solid inorganic constituents of the soil" (McLaren & Cameron, 1996).

Soil water holding capacity – "the amount of water which a soil can store for plant growth" (McLaren & Cameron, 1996).

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15 APPENDIX 1: EXTENT OF LUC UNITS & CLASSES IN DISTRICT

Table 23. *Extent of LUC units in District.*

LUC Unit	Area (ha)	LUC Unit	Area (ha)	LUC Unit	Area (ha)
1c 1	5,977.7	**6e 3**	23,650.0	**7e 9+4s 1**	428.0
1w 1	328.4	**6e 4**	468.2	**7e10**	6,206.5
2c 1	853.8	**6e 5**	4,096.8	**7e10+3s 2**	342.1
2s 1	3,700.7	**6e 6**	5,946.4	**7e11**	1,575.8
2w 1	5,332.2	**6e 7**	6,054.9	**7e12**	2,432.0
3e 1	5,612.3	**6e 8**	22,292.2	**7e12+3s 4**	256.0
3e 2	5,600.7	**6e 9**	4,131.7	**7e14**	517.8
3e 3	2,988.3	**6e10**	21,922.3	**7s 1**	1,473.1
3e 3+4e 3	315.2	**6e11**	4,415.4	**7s 2**	416.7
3s 1	12,378.2	**6e11+2s 1**	217.6	**8e 1**	1,546.9
3s 2	23,238.2	**6e12**	12,434.2	**8e 1+3s 2**	570.1
3s 3	1,140.7	**6e13**	16,788.9	**8e 2**	272.7
3s 4	2,666.8	**6e14**	124.7	**8e 3**	804.8
3w 1	10,504.4	**6s 1**	15,200.6	**8e 4**	61.8
3w 2	2,243.6	**6s 1+3e 1**	186.7	**8e 5**	8,771.2
4e 1	6,657.8	**6s 2**	1,792.0	**8e 6**	2,062.8
4e 2	7,742.8	**6s 3**	300.7	**8e 7**	184.6
4e 3	8,222.4	**6s 5**	473.3	**8e 8**	377.5
4e 3+3w 1	426.3	**6w 1**	705.8	**8e 9**	1,290.3
4e 4	215.5	**7e 1**	3,333.1	**lake**	195.0
4e 5	2,323.3	**7e 2**	6,661.8	**river**	3,961.3
4s 1	4,953.9	**7e 3**	599.8	**town**	217.2
4w 1	563.3	**7e 4**	536.4	**Grand Total**	**332,644.5**
5c 1	6,692.1	**7e 6**	7,111.8		
6c 1	2,349.4	**7e 7**	1,222.3		
6e 1	2,188.5	**7e 8**	3,671.9		
6e 2	7,385.6	**7e 9**	1,738.5		

Table 24. *Areas of LUC class*

LUC class	Area (ha)	%	LUC Sub class	Area (ha)	%
1	6,306.1	2%	1w	328.4	0%
			1c	5,977.7	2%
2	9,886.7	3%	2w	5,332.2	2%
			2s	3,700.7	1%
			2c	853.8	0%
3	66,688.5	20%	3e	14,516.5	4%
			3w	12,748.0	4%
			3s	39,423.9	12%
4	31,105.3	9%	4e	25,588.1	8%
			4w	563.3	0%
			4s	4,953.9	1%
5	6,692.1	2%	5c	6,692.1	2%
6	153,126.1	46%	6e	132,117.6	40%
			6w	705.8	0%
			6s	17,953.3	5%
			6c	2,349.4	1%
7	38,523.7	12%	7e	36,633.9	11%
			7s	1,889.9	1%
8	15,942.6	5%	8e	15,942.6	5%
other	4,373.5	1%		4,373.5	1%
Total	332,644.5	100%		332,644.5	100%