

**Correlation of Land Use Capability (LUC) Units into a Single  
LUC Classification for the Horizons Regional Council Area**

PREPARED BY:

Garth Harmsworth<sup>1</sup> and Mike Page<sup>2</sup>

<sup>1</sup>Manaaki Whenua - Landcare Research  
Private Bag 11052  
Palmerston North  
New Zealand

<sup>2</sup>GNS Science  
PO Box 30368  
Lower Hutt 5040

Landcare Research Contract Report: LC0809/082

PREPARED FOR:

Jon Roygard  
Horizons (Manawatu-Whanganui) Regional Council  
Palmerston North  
New Zealand  
DATE: February 2009

---

*Reviewed By:*

*Approved for Release By:*

Ian Lynn  
Senior scientist

Allan Hewitt  
Acting Science Leader

---

© Landcare Research New Zealand Ltd 2009

No part of this work covered by copyright may be reproduced or copied in any form or by any means (graphic, electronic or mechanical, including photocopying, recording, taping, information retrieval systems, or otherwise) without the written permission of the publisher.

## Contents

---

Summary .....	5
1. Introduction .....	6
2. Extended legends showing LUC correlations for the Horizons Regional Council region Tables 1 & 2 .....	9
3. Results .....	57
4. Recommendations .....	60
5. References .....	61
6. Appendices Tables 3–8	

### Figures:

Figure 1 The Horizons (Manawatu–Whanganui) region, showing the regional extent and existing NZLRI map region names and numbers used in this regional LUC correlation.

Figure 2 New Zealand Land Resource Inventory survey regions (showing 'legend' numbers and Region name).

### Tables:

Table 1: LUC correlation of the HRC region by LUC class and relative LUC unit order.

Table 2: The LUC correlation grouped into LUC suites and LUC subsuites for the Horizons Regional Council area.

Table 3: Existing LUC suites and LUC subsuites for the Taranaki–Manawatu NZLRI region (Fletcher JR 1987).

Table 4: Existing LUC suites and component LUC units for the NZLRI Wellington region (Page MJ 1995).

Table 5: Existing LUC suites and LUC units for the NZLRI Southern Hawke’s Bay–Wairarapa region (Noble KE 1985).

Table 6: Existing LUC suites and component LUC units in the Northern Hawke’s Bay region (Page MJ 1988).

Table 7: GIS spreadsheet showing all LUC unit correlations, from North Island correlation tables and the NZLRI database for all NZLRI regions (e.g., 08, 09, 10, etc.), for the HRC region alone.

Table 8: GIS spreadsheet showing all LUC units (and combinations) by frequency and area for each NZLRI region.



## Summary

---

### Project and Client

This project, “Correlation of Land Use Capability (LUC) units” – funded by a FRST medium advice Envirolink project 617-HZLC63 – undertook and completed a correlation of all existing LUC units from the New Zealand Land Resource Inventory (NZLRI) regional LUC classifications – 5 main NZLRI regions – within the Horizons Regional Council region for the Horizons Regional Council (HRC). The work was carried out between 10 October and 24 December 2008.

### Objective

The primary objective was to carry out a LUC correlation of all existing NZLRI LUC units within the HRC region and produce a single classification of HRC LUC units for future use, application, and analysis. A secondary objective was to arrange all LUC units in the single classification by LUC class for further refinement and definition, and then group all existing LUC units into LUC suites and subsuites for validation, checking, and further interpretation.

### Methods

Methods were largely an office exercise, using a large amount of NZLRI data from 5 main NZLRI regional extended legends and regional bulletins within the HRC region, including: Taranaki–Manawatu (10), Wellington (09), Southern Hawke’s Bay–Wairarapa (08), Northern Hawke’s Bay (07), and Bay of Plenty (04), and to a lesser degree Waikato (02). The project also utilised the North Island LUC correlation bulletin, and required extensive field and supplementary knowledge. All LUC unit correlations were then checked and validated to form a single HRC LUC classification and LUC units were arranged according to LUC class, and then grouped into LUC suites and subsuites.

### Results

LUC unit correlations have been completed for the defined Horizons Regional Council area based on correlations across the six separate NZLRI regions, but given the very small area of the sixth region (Waikato), five main regions are given in the tables. The LUC correlation is summarised and presented in tables in this report. The first table lists all component NZLRI LUC units from all five main NZLRI regions arranged by LUC class, the second table lists all existing NZLRI LUC units arranged by LUC suites and subsuite. The results section then presents a summary of these two tables of all existing LUC units, LUC suites and LUC subsuites in the HRC region. The completed single HRC regional classification comprises approximately 282 LUC units based on LUC units from the six separate NZLRI regions, and from these 282 LUC units 15 LUC suites were recognised for the HRC region.

### Conclusions

The lack of a comprehensive regional Land Use Capability (LUC) correlation across the Horizons regional council area has been an obstacle for linking, interpreting, and mapping LUC units across the Horizons region. This 2009 Horizons LUC correlation exercise finally brings together similar and associated LUC units for six New Zealand Land Resource Inventory (NZLRI) regions that were originally classified during national mapping and assessment between 1970 and 1980. This regional correlation will now underpin regional mapping, assessment, and improved definition of LUC for future sustainable land management planning and policy. Regional LUC units can be further defined and rationalised using this correlation process and from methods and changes outlined in the new 3rd edition NZ LUC survey handbook.

## 1. Introduction

---

### Introduction

This project correlated the New Zealand Land Resource Inventory (NZLRI) (NWASCO 1975–79; NWASCA 1986; Fletcher 1987) Land Use Capability (LUC) units mapped in the Horizons Regional Council region into a single regional LUC classification for the Horizons Regional Council (HRC). The work was funded by a FRST medium advice Envirolink project 617-HZLC63 and carried out between 10 October and 24 December 2008.

### Objective

- Correlate the NZLRI Land Use Capability (LUC) units, (SCRCC, 1971), originally mapped across the HRC region in six NZLRI regions, into a single regional LUC classification using the methods of Harmsworth and Page (1993, 1991).
- Establish a hierarchical framework of LUC suites and subsuites for the correlated LUC units recognised within the HRC area.

### Background

The HRC region covers 22 215 km<sup>2</sup> and comprises 8.1% of New Zealand's land area (Fig. 1). It includes a number of districts – in the north-west, part Stratford, Ruapehu, part Waitomo; in the west, Whanganui; central areas of Rangitikei, Manawatu, Palmerston North city, and Horowhenua; in the far north, part Taupo; and in the east, Tararua District.

The HRC region comprises parts of five NZLRI (NWASCO 1975–79; NWASCA 1986) regions: Taranaki–Manawatu (10), Wellington (09), Southern Hawke's Bay–Wairarapa (08), Northern Hawke's Bay (07), and Bay of Plenty (04) (Figure 2). The respective LUC extended legends for each region have unique sets of sequentially numbered LUC units and LUC suites/subsuites recognised in the respective regional areas and the LUC mapping was undertaken over a number of years – across a large part of the HRC region between 1975 and 1979, with more recent updates for the Manawatu and Wellington regions (Page 1995) between 1987 and 1990.

A regional LUC unit correlation was therefore necessary to address inconsistencies in LUC unit data for the HRC region.

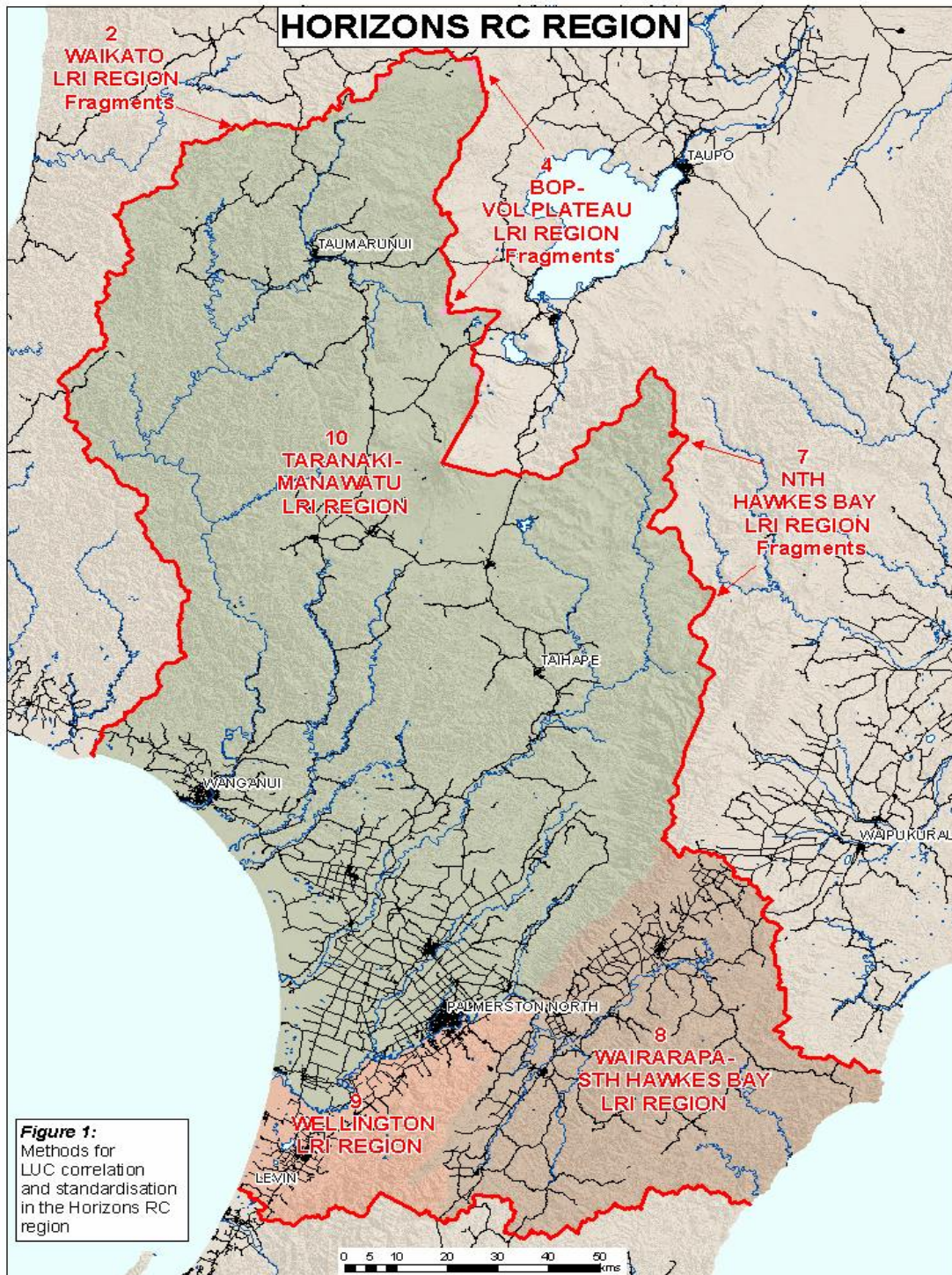
### Methods

The largely office-based correlation exercise used the NZLRI data, including regional LUC classification reports (Blaschke 1985; Noble 1985; Fletcher 1987; Page 1988, 1995), the North Island LUC correlation report (Page 1985), the six component or adjoining NZLRI regional extended legends (NWASCO 1975–79; NWASCA 1986), extensive field knowledge, and other sources of information.

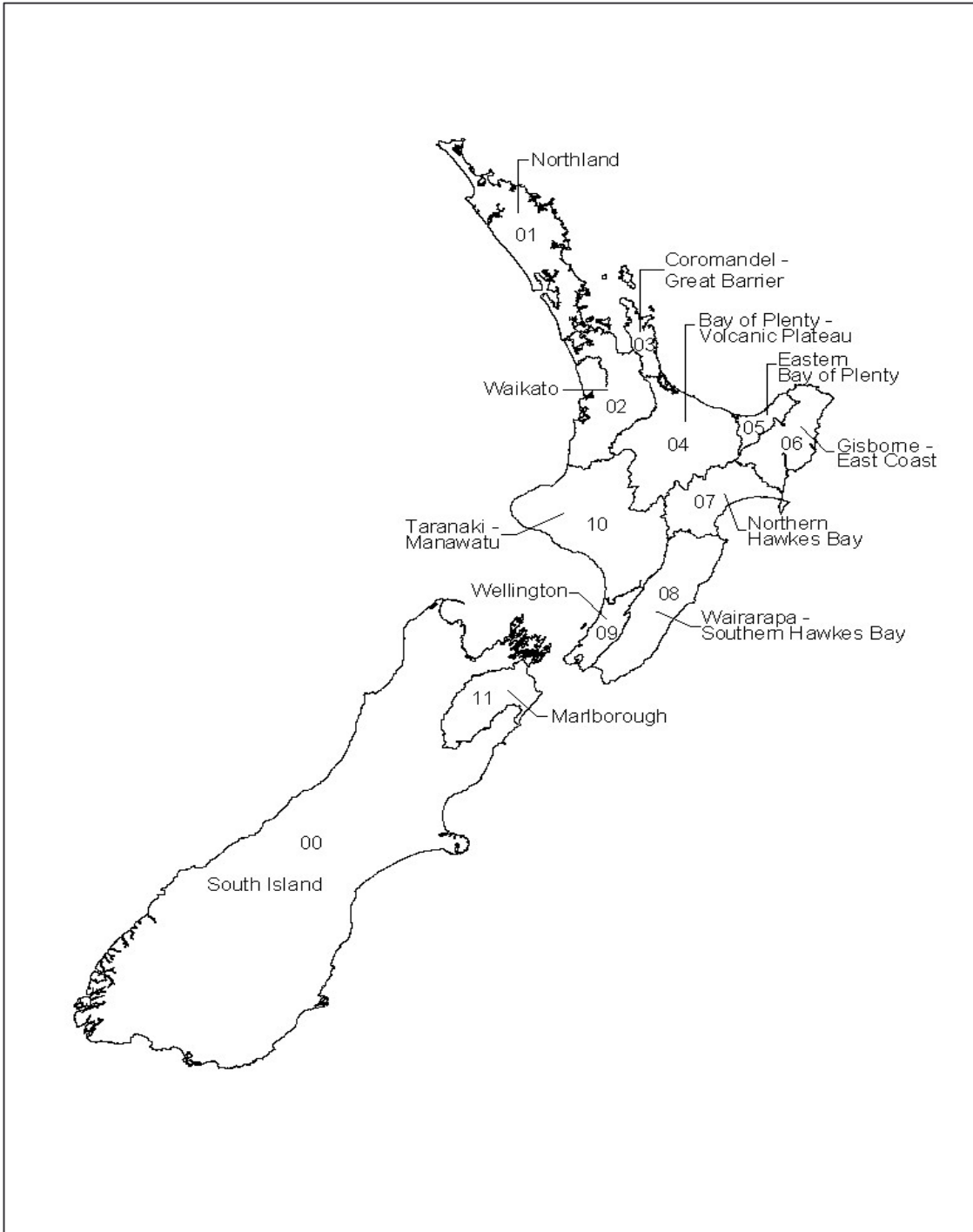
The LUC correlation has been finalised by compiling a single regional LUC classification (providing a new tentative single LUC numbering system for the GIS) for the HRC region and the LUC units organised into LUC suites and LUC sub-suites for checking and validation.

### Results

The following extended legends (Tables 1 & 2) show the 'best fit' correlation for all existing NZLRI LUC units for the HRC region, and provide a new single tentative numbering system for all LUC units from LUC Classes 1 to 8 (based on existing LUC unit numbering and ranking from 5 main NZLRI regions). Table 1 is ordered by LUC class and Table 2 by LUC suite. The original regional LUC legends and GIS data spreadsheets used in this correlation are given in the Appendices.



**Fig. 1** The Horizons (Manawatu–Whanganui) region, showing the regional extent and existing NZLRI map region names and numbers used in this regional LUC correlation



**Fig. 2** New Zealand Land Resource Inventory survey regions (showing 'legend' numbers and region name)

## 2. Extended legends showing LUC correlations for the Horizons Regional Council region

### 2.1 Table 1

Land Use Capability (LUC) correlation by LUC class and relative LUC unit order, for all NZLRI regional LUC units within the HRC region. LUC unit correlations are based on a large amount of New Zealand Land Resource Inventory (NZLRI) data from regional bulletins, the North Island LUC correlation bulletin (Page 1985), extensive field knowledge, and six NZLRI regional extended legends. LUC units are listed in Table 1 for the five main NZLRI regions: Taranaki–Manawatu (10), Wellington (09), Southern Hawke’s Bay–Wairarapa (08), Northern Hawke’s Bay (07), and Bay of Plenty (04). Occasional Waikato (02) LUC units are also given under the BOP column in brackets ( i.e. (2)). New tentative HRC LUC unit numbers are given in the second column for checking and validation.

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 1	HRC 1w1	1w1	1w1	1w1		
	HRC 1w2	1w2				
	HRC 1s1		1s1			
	HRC 1c1		1c1			
	HRC 1c2	1c2				
	HRC 1c3	1c3				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 2	HRC 2e1		2e1			
	HRC 2e2	2e1				
	HRC 2e3	2e2				
	HRC 2w1	2w1				
	HRC 2w2	2w2	2w1	2w1		
	HRC 2w3	2w4	2w2			
	HRC 2s1	2s1	2s1			
	HRC 2s2			2s1		
	HRC 2s3		2s2			
	HRC 2s4	2s4				
	HRC 2s5		2s3			
	HRC 2s6	2s5				
	HRC 2s7	2s2 = 3s (all LRI 2s2 Milson, Marton & Ohakea soils go to 3s)	3s4			
	HRC 2c1	2c1		2c1		
	HRC 2c2		2c1			
	HRC 2c3	2c3				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 3	HRC 3e1	3e1				
	HRC 3e2		3e1			
	HRC 3e3	3e2				
	HRC 3e4	3e3				
	HRC 3e5			3e1		
	HRC 3e6	3e4	3e3			
	HRC 3e7	3e5				
	HRC 3e8			3e3		
	HRC 3e9					3e6
	HRC 3e10	3e6				
	HRC 3e11	3e7				
	HRC 3e12	3e8				
	HRC 3w1	3w1		3w2		
	HRC 3w2	3w2	3w1	3w1		
	HRC 3w3	3w3				
	HRC 3w4	3w4	3w3			
	HRC 3w5		3w2			

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 3	HRC 3s1	3s2	3s2	3s2		
	HRC 3s2		3s1			
	HRC 3s3	3s4				
	HRC 3s4	2s2 (all Milson, Marton, & Ohakea soils are now 3s)	3s4			
	HRC 3s5			3s3		
	HRC 3s6	3s6				
	HRC 3s7			3s4		
	HRC 3c1	3c1				
	HRC 3c2	3c2				
	HRC 3c3		3c1			
	HRC 3c4	3c3				
	HRC 3c5	3c4				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 4	HRC 4e1	4e1				(4e1-2)
	HRC 4e2	4e2				
	HRC 4e3	4e3		4e1		
	HRC 4e4	4e4	4e2			
	HRC 4e5			4e4		
	HRC 4e6	4e5				
	HRC 4e7	4e6				
	HRC 4e8	4e7				
	HRC 4e9			4e3		
	HRC 4e10	4e8				
	HRC 4e11	4e9				
	HRC 4e12	4e10	4e4			
	HRC 4e13					4e6
	HRC 4e14					4e8
	HRC 4e15			4e5		

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 4	HRC 4e16		4e5			
	HRC 4e17					4e9
	HRC 4e18	4e11				4e13
	HRC 4e19	4e12			4e4	
	HRC 4e20	4e13				
	HRC 4e21	4e14				
	HRC 4e22					4e16
	HRC 4e23					4e18

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 4	HRC 4w1	4w1				
	HRC 4w2	4w2		4w1		
	HRC 4w3	4w3				
	HRC 4w4	4w4			4w2	
	HRC 4w5		4w3			
	HRC 4s1	*4s2 (sandy)	4s1	*4s1		
	HRC 4s2	*4s2 (stony)	4s2	*4s1		
	HRC 4s3	4s3				
	HRC 4c1		4c1			
	HRC 4c2	4c1				
	HRC 4c3	4c2				
	HRC 4c4	4c4				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 5	HRC 5s1	5s2				
	HRC 5c1	5c1				
	HRC 5c2			5c1		

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 6	HRC 6e1	6e2	6e1			
	HRC 6e2			6e1		
	HRC 6e3			6e2		
	HRC 6e4			6e3		
	HRC 6e5	6e3		6e7		
	HRC 6e6	6e4		6e8		
	HRC 6e7	6e5				
	HRC 6e8	6e6				
	HRC 6e9	6e7				
	HRC 6e10	6e8				
	HRC 6e11	6e9				
	HRC 6e12	6e10				
	HRC 6e13	6e11				
	HRC 6e14		6e4			
	HRC 6e15			6e4		
	HRC 6e16			6e5		
	HRC 6e17	6e12				

	<b>HRC LUC UNIT NUMBER</b>	<b>NZLRI REGIONS</b>				
		<b>10 TMW</b>	<b>09 WELLINGTON</b>	<b>08 SHBW</b>	<b>07 NHB</b>	<b>04 BOP</b>
Class 6	HRC 6e18					6e9
	HRC 6e19					(6e7-2)
	HRC 6e20					(6e9-2)
	HRC 6e21	6e13				
	HRC 6e22	6e14		*6e9		
	HRC 6e23	6e15				
	HRC 6e24		6e6			
	HRC 6e25		6e8	6e11		
	HRC 6e26					
	HRC 6e27		6e9			
	HRC 6e28		6e10			
	HRC 6e29	6e17				
	HRC 6e30	6e18				
	HRC 6e31	6e19		*6e10		

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 6	HRC 6e32	6e20		*6e10		
	HRC 6e33			*6e10 (bentonite)		
	HRC 6e34			6e12		
	HRC 6e35			6e13		
	HRC 6e36	6e22				
	HRC 6e37	6e23				
	HRC 6e38	6e24	6e5	6e14		
	HRC 6e39	6e26				6e24
	HRC 6e40	6e27			6e16	

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 6	HRC 6w1	6w1				
	HRC 6s1	6s1				(6e1-2)
	HRC 6s2	6s2				
	HRC 6s3			6s1		
	HRC 6s4	6s4	6s4			
	HRC 6s5	6s5				6s2
	HRC 6s6		6s6			
	HRC 6s7			6s2		
	HRC 6s8			6s3		
	HRC 6s9	6s6				
	HRC 6s10		6s5			
	HRC 6s11	6s7	6s7			
	HRC 6s12	6s8				

<b>LUC CLASS</b>	<b>HRC LUC UNIT NUMBER</b>	<b>NZLRI REGIONS</b>				
		<b>10 TMW</b>	<b>09 WELLINGTON</b>	<b>08 SHBW</b>	<b>07 NHB</b>	<b>04 BOP</b>
	HRC 6c1	6c1		6c1		
	HRC 6c2		6c1			
	HRC 6c3			6c2		
	HRC 6c4	6c2				
	HRC 6c5	6c3			6c2	
	HRC 6c6					6c1
	HRC 6c7	6c4				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 7	HRC 7e1	7e1		Part 7e1 (wet)		
	HRC 7e2					(7e1-2)
	HRC 7e3	7e2		Part 7e1 (dry)		
	HRC 7e4	7e3		Part 7e4 (wet)		
	HRC 7e5	7e4 (banded mst)		7e2 (banded mst)		
	HRC 7e6			7e3		
	HRC 7e7	7e5 (sst)		Part 7e4 (sst dry)		
	HRC 7e8	7e6 ( deep earthflow)				
	HRC 7e9		7e1 (Gw)			
	HRC 7e10			7e5 (Gw)		
	HRC 7e11	7e7 (banded mst, zst)			Part 7e2 (wet)	

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 7	HRC 7e12	7e8				7e6
	HRC 7e13	7e9				
	HRC 7e14	7e10 (Gw)	7e2 (Gw, foothills)	Part 7e10 (Gw foothills)		
	HRC 7e15		7e5(Gw)	7e10 (Gw)		
	HRC 7e16	7e11 (hard sst)				
	HRC 7e17			7e11 (Arg)		
	HRC 7e18			7e6 (Arg)		
	HRC 7e19			7e7 (Arg)		
	HRC 7e20	7e12 (deep earthflow)		Part 7e8 (mst, zst earthflow)		
	HRC 7e21	7e13 (cons. sst)				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 7	HRC 7e22	7e14		7e8 (deep earthflow)		(7e4-2)
	HRC 7e23			7e9 (slumps)		
	HRC 7e24			7e12 (zst, mst)		
	HRC 7e25	7e15 (sand)	7e3 (sand)	7e14 (sand)		
	HRC 7e26					(7e6-2)
	HRC 7e27	7e16				
	HRC 7e28	7e17				
	HRC 7e29	7e18				
	HRC 7e30					7e11 (Tp/sst)
	HRC 7e31	7e19				7e12
	HRC 7e32	7e20				
	HRC 7e33				7e12	
	HRC 7e34	7e21				

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 7	HRC 7e35	7e22 (Tephra/ Gw)			7e18	
	HRC 7e36	7e23 (Tertiary rocks)				
	HRC 7e37	7e24 (Tephra)			7e17	
	HRC 7e38	7e25 (Ng)				
	HRC 7e39	7e26 (Tp)				
	HRC 7s1		7s2	7s1 (Gw Tararuas)		
	HRC 7s2			7s2 (bluffs)		
	HRC 7s3	7s1 (ignimb.)				
	HRC 7w1		7w2 (alluvial wet)			
	HRC 7c1	7c1 (Waiouru)				7c1 (Desert rd)
	HRC 7c2		7c1 (Gw, Tararuas)			

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 8	HRC 8e1	8e1 (foredunes)	8e1 (sand, foredunes)	8e4 (sand)		
	HRC 8e2	8e2 (uncons. sst)				
	HRC 8e3	8e3 (hard, cons. Sst, bluffs, etc.)		8e1 (gorges)		
	HRC 8e4			8e2 (cliffs, coastal)		
	HRC 8e5	8e4 (Gw)	8e3 (Gw)	8e5 (Gw)	8e5 (Gw)	8e3 (8e1-2) (Gw)
	HRC 8e6	8e5 (Gw, Kaimanawas)				
	HRC 8e7	8e6 (Tertiary rocks)				
	HRC 8e8	8e7 (Gw)	8e4 (Gw)	8e6 (Gw)	8e6 (Gw)	
	HRC 8e9	8e8 (Gw > treeline)		8e8		8e6
	HRC 8e10				8e11 (extreme wind)	
	HRC 8e11	8e9 (Gw)	8e5	8e9	8e9	8e7

LUC CLASS	HRC LUC UNIT NUMBER	NZLRI REGIONS				
		10 TMW	09 WELLINGTON	08 SHBW	07 NHB	04 BOP
Class 8	HRC 8e12	8e10 (Desert Rd)				8e5
	HRC 8w1	8w1				
	HRC 8c1	8c1		8c1	8e10	8c1

## 2.2 Table 2

HRC LUC units grouped into LUC suites and LUC subsuites for the Horizons Regional Council area, and correlation of regional LUC units for all five NZLRI regions represented in the Horizons Regional Council area: Taranaki–Manawatu (10), Wellington (09), Southern Hawke’s Bay–Wairarapa (08), Northern Hawke’s Bay (07), and Bay of Plenty (04). This also includes – where deemed necessary – reorganising and better describing existing LUC suites or adding new LUC suites and LUC subsuites defined in this correlation study. The new Horizons Regional Council LUC unit numbers are given in column 4.

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
Volcanic ash covered terrains 1. Yellow-brown loams	1a. Waimarino		HRC 2c	2c1				
			HRC 3e	3e5				
			HRC 3w	3w3				
			HRC 3c	3c1				
			HRC 4e	4e6				
			HRC 4c	4c1				
		Includes Limestone	HRC 6c	6c1				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
Volcanic ash covered terrains 1. Yellow-brown loams	1b. King Country		HRC 2s	2s4				
			HRC 3e	3e1				
			HRC 4e	4e1			(4e1-2)	
			HRC 6s	6s1			(7e6-2)	

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
Volcanic ash covered terrains 1. Yellow-brown loams	1c. Inland Plateaux		HRC 4w	4w3				
			HRC 6e	6e22				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION					
				10	09	08	07	04	
				TMW	WELLINGTON	SHBW	NHB	BOP	
Volcanic ash covered terrains 1. Yellow-brown loams	1d. Taranaki		HRC 1c	1c3					
			HRC 1w	1w2					
			HRC 2e	2e1					
			HRC 2c	2c3					
			HRC 3e	3e2					
			HRC 3e	3e6					
			HRC 3c	3c4					
			HRC 4e	4e2					
			HRC 4e	4e7					
			HRC 5c	5c1					
			HRC 6e						(6e1-2)
			HRC 6e	6e6					
			HRC 7e	7e18					
			HRC 7e						(7e1-2)

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
2. Lahars in Taranaki			HRC 3w	3w3				
			HRC 6s	6s6				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
3. Coastal sand country	a) Younger sand dunes (nearer coast)		HRC 3w	3w4	3w3			
			HRC 4e	4e10	4e4			
			HRC 6e	6e24	6e5	6e14		
			HRC 6s	6s4	6s4			
			HRC 6s		6s5			
			HRC 7e	7e15	7e3	7e14		
			HRC 8e	8e1	8e1	8e4		
	b) Older more consolidated sands and dunes - usually more inland		HRC 2s		2s2			
					3e2			
			HRC 6e		6e4			

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
4. Alluvium	4a. Wet (poorly drained) floodplains and low terraces Wide and narrow river valleys		HRC 1w	1w1	1w1	1w1		
			HRC 2w	2w1		2w1		
			HRC 2w	2w2	2w1			
			HRC 2w	2w4 (alluvium)	2w2 (alluvium)			
			HRC 3w	3w1		3w2		
			HRC 3w	3w2	3w1	3w1		
			HRC 4w	4w1				
			HRC 4w	4w2		4w1		
			HRC 7w		7w2			

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
4. Alluvium	4b. Free draining, floodplains and low terraces – includes gravels, and stony areas		HRC 1s		1s1			
			HRC 2s	2s1	2s1	2s1		
			HRC 3s		3s1			
			HRC 3s	3s2		3s2		
			HRC 4s	4s2 (sandy)	4s1	4s1		
			HRC 6s	6s7	6s7			
			HRC 7s		7s2	7s1		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
4. Alluvium	4c. Stony high terraces		HRC 2s		2s3 (stony)			
			HRC 3s	*3s2 (stony)	*3s2 (stony)	*3s2 (stony)		
			HRC 4s	4s2 (stony)	4s2 (stony)	4s1		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
4. Alluvium	4d. Peat (organic soils)		HRC 2w	2w4 (organic soils)	2w2 (organic soils)			
			HRC 3w		3w2 (organic soils)			
			HRC 4w		4w3 (organic soils)			

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
5. Loess (i.e. terraces with Loess, tephric loess, loess with tephra) (e.g., Mo/Us +Gr; Lo/Us+Gr); Mo+Lo/Us +Gr	5a. Low rainfall	800–1150 mm pa Fragipan in soils Gley/mottled soils	HRC 2s	2s2 =	3s4			
			HRC 3e	3e4	3e3			
			HRC 4e	4e4	4e2			
			HRC 6e	6e2	6e1			
			HRC 6e		6e4			
	5b. High rainfall (e.g., near Ruahine ranges, Apiti)	More tephra Deeper soils, no fragipan 1000–1800 mm pa 200–550 m asl	HRC 1c	1c2				
			HRC 2e	2e2				
			HRC 2c	2c1				
			HRC 3e	3e3				
			HRC 3c	3c2				
			HRC 4e	4e3				
			HRC 6c	6c2				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
5. Loess	5c. Eastern SHBW region loess and tephra covered terrace land (e.g., Dannevirke)	Loess terraces with potential for wind erosion, esp. under cultivation 1000–1800 mm pa 200–600 m asl	HRC 2c			2c1		
						3s1		
			HRC 3e			3e1		
			HRC 4e			4e1		
			HRC 6e			6e1		
						6e4		
			HRC 6s			6s1		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
5. Loess	5d. Loess and tephra covered terrace land (Wellington)	Wellington LUC suite 4b 1000–1200 mm pa 10–100 m asl YB earths, YB loam intergrades	HRC 1c		1c1			
			HRC 2e		2e1			
			HRC 2c		2c1			
			HRC 3e		3e1			
			HRC 6e		6e1			

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
6. Taupo airfall tephra	6a. Shallow Taupo airfall tephra		HRC 4e	4e5				
			HRC 5s	5s2				
			HRC 6e	6e9				
			HRC 6s	6s2				
			HRC 6s	6s8				
			HRC 7s	7s1				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
6. Taupo airfall tephra	6b. Deep Taupo airfall tephra		HRC 3e	3e7				
			HRC 3s	3s4				
			HRC 3e					3e6
			HRC 4e	4e9				Part 4e6, 4e8, 4e16
			HRC 4e					4e6
			HRC 4e					4e8
			HRC 4e					4e9 (podz pumice soils)
			HRC 4e					4e16
			HRC 6e	6e18				6e9
			HRC 6s					
			HRC 6s	6s5				6s2
			HRC 7e	7e8				7e6
			HRC 7e					

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
7. Taupo flow tephra and water sorted tephra			HRC 2s	2s5				
			HRC 3e	3e8				
			HRC 3s	3s6				
			HRC 4e	4e11				4e13
			HRC 4e	4e13				
			HRC 4e	4e14				4e18
			HRC 4w	4w4			4w2	
			HRC 4s	4s3				
			HRC 6e	6e26				6e24
			HRC 6w	6w1				
			HRC 7e	7e19				7e12
			HRC 7e	7e26				
			HRC 8e	8e2				
			HRC 8e	8e10				
			HRC 8w	*8w1				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
8. North-east uplands	8a. Shallow Taupo and/or Ngauruhoe tephra		HRC 3c	3c3				
			HRC 4e	4e12			4e4	
			HRC 4c	4c2				
			HRC 6e	6e27			6e16	
			HRC 6c	6c3			6c2	
			HRC 7e	7e21			7e12	
			HRC 7e	7e22			7e18	
			HRC 7e	7e23				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
8. North-east uplands	8b. Deep Taupo and/or Ngauruhoe tephra		HRC 4c	4c4				
			HRC 6c	6c4				6c1
			HRC 7e	7e24			7e17	
			HRC 7e	7e25				
			HRC 7c	7c1				7c1
			HRC 8e	*8e10				8e5

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
9. Mudstone	9a. Jointed mudstone		HRC 3e			3e3		
			HRC 3e			3s3		
			HRC 4e			4e3		
			HRC 6e			6e2		
			HRC 6e			6e3		
			HRC 6e	6e3		6e7		(6e9-2)
			HRC 6e	6e4		6e8		
			HRC 7e	7e1		*7e1 (wet)		
			HRC 7e	7e2		*7e1 (dry)		
			HRC 7e			7e12 (zst/mst gorges)		
			HRC 8e	*8e3				
	9b. Banded mudstone		HRC 6e	6e5				
			HRC 7e	7e7			7e2	
			HRC 8e	*8e3				
			HRC 8e				*8e2 (sea cliffs on Mm, etc.)	

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION					
				10	09	08	07	04	
				TMW	WELLINGTON	SHBW	NHB	BOP	
10. Siltstone	10a. Siltstone		HRC 6e	6e7					
			HRC 6e	6e8					
			HRC 6e	6e10					
			HRC 7e	7e4					
			HRC 7e	7e9					
			HRC 8e	*8e3					
	10b. Urenui siltstone			HRC 7e	7e20				
				HRC 8e	*8e3				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
11. Sandstone	11a. Unconsolidated		HRC 6e	*6e12				
			HRC 6e	*6e14				
			HRC 6e					
			HRC 7e	7e16				
			HRC 8e	*8e2				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
11. Sandstone	11b. Moderately consolidated		HRC 6e	*6e12		6e9		
			HRC 6e	*6e14	6e1	6e9		
			HRC 7e	7e3		Part 7e4 (wet sst)		
			HRC 7e	7e5		Part 7e4 (dry sst)		
			HRC 8e	*8e3				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
11. Sandstone	11c. Moderately consolidated with slump and earthflow erosion		HRC 6e	6e11				
			HRC 7e	7e6				

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
11. Sandstone	11d. Consolidated		HRC 6e	6e13				
			HRC 6e	6e15				
			HRC 6e	6e23				
			HRC 7e	7e11				7e11
			HRC 7e	7e13				
			HRC 8e	*8e3		*8e1		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
11. Sandstone	11e. Hard consolidated		HRC 6e	6e17				
			HRC 6e					(6e7-2)
			HRC 6s			6s2		
			HRC 7e	7e17				
			HRC 8e	*8e3		*8e1		
			HRC 7s			7s2 (bluffs, hard sst)		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
12. Deep-seated earthflow and slump erosion			HRC 4e	4e8				
			HRC 6e	6e19		6e10 (low rainfall, some bentonitic)		
			HRC 6e	6e20		6e10 (high rainfall >1200 mm pa)		
			HRC 7e	7e12		Part 7e8 <1200 mm pa		
			HRC 7e	7e14		Part 7e8 >1200 mm pa		(7e4-2)
			HRC 7e			7e9 (slump erosion, e.g., Dannevirke)		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
13. Greywacke	13a. Greywacke ranges (includes foothills)	Includes greywacke ranges proper and foothills of ranges	HRC 6e	6e16	6e8	6e11		
			HRC 6e		6e10			
			HRC 7e	7e10	7e2	Part 7e10 "foothills"		
			HRC 7e	7e10	7e5	Part 7e10 "uplands"		
			HRC 8e	8e4	8e3	8e5	8e5	8e3 (8e1-2)
			HRC 8e	8e5				
			HRC 8e	8e6				
			HRC 8e	8e7	8e4	8e6	8e6	
			HRC 8e	8e8		8e8		8e6
			HRC 8e	8e9	8e5	8e9	8e9	8e7
			HRC 8c	8c1		8c1	8e10	8c1
			HRC 8e				8e11	

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
13. Greywacke	13b. Upland basins and ridges in the Greywacke ranges	Strongly leached soils and podzolised Y-B earths	HRC 3c		3c1			
			HRC 4e		4e5			
			HRC 4c		4c1			
			HRC 6c		6c1			
			HRC 7c		7c1			

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
13. Greywacke	13c. Greywacke hill country (some coastal included in Wellington region)		HRC 6e		6e6			
			HRC 6s		6s6			
			HRC 6e		6e9 (coastal)			
			HRC 6s			6s3		
			HRC 7e		7e1			
			HRC 7e			7e5		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
14. Limestone			HRC 4e			4e4		
			HRC 5c			5c1		
			HRC 6e			6e5		
			HRC 6c			6c1		
			HRC 6c			6c2		
			HRC 7e			7e3		

LUC SUITE	LUC SUBSUITE	FURTHER DESCRIPTIONS	HTMWRC LUC UNIT NUMBER	LUC UNITS BY NZLRI REGION				
				10	09	08	07	04
				TMW	WELLINGTON	SHBW	NHB	BOP
15. Argillite			HRC 3s			3s4		
			HRC 4e			4e5		
			HRC 6e			6e12		
			HRC 6e			6e13		
			HRC 7e			7e6		
			HRC 7e			7e7		
			HRC 7e			7e11		

### 3. Results

---

This Envirolink project correlated all existing LUC units mapped in the NZLRI, essentially from mapping carried out between 1975–79 and 1987–1990, for the HRC region. The NZLRI is supplemented by many reports given in the reference section and appendices of this report and from the NZLRI database (Landcare Research NZ Ltd, Palmerston North). These correlation data have been analysed and presented as a single regional LUC classification and hierarchical framework of LUC suites and subsuites for the region. The LUC unit correlations for the HRC region were based on LUC data from 6 separate NZLRI regions; 5 main regions in tables 1 & 2 ; Figure 2: Taranaki–Manawatu (10), Wellington (09), Southern Hawke’s Bay–Wairarapa (08), Northern Hawke’s Bay (07), and Bay of Plenty (04), with small LUC polygon areas from the Waikato (02).

The LUC units are presented in 2 main tables showing:

- LUC Classes – LUC Classes 1–8 (section 2.1 Table 1);
- LUC Suites and subsuites – the main physiographic land types and groupings (e.g., fluvial plains, terraces, sand country, hill country, mountainlands) identified in the region (section 2.2 Table 2). Some of these LUC suites are new for the Horizons region (see below).

The completed single HRC regional classification comprises approximately 282 LUC units and 15 LUC suites were recognised. All regional NZLRI LUC legends and GIS spreadsheets used in this correlation project are shown in the Appendices.

In the 2<sup>nd</sup> column of Table 1, a single HRC LUC unit number is given at the beginning of each LUC unit correlation row and these are listed in tentative order. The final single HRC correlation shows the total number of resulting LUC units identified by LUC class and subclass (e, w, s, c) code, giving totals for each LUC Class for the HRC region:

- LUC Class 1 – a total of 8 LUC units identified (w, 4; s,1; c, 3)
- LUC Class 2 – 21 LUC units identified (e, 3; w, 6; s, 8; c, 4)
- LUC Class 3 – 35 LUC units identified (e, 13; w, 8; s, 9; c, 5)
- LUC Class 4 – 45 LUC units identified (e, 29; w, 7; s, 5; c, 4)
- LUC Class 5 – 3 LUC units identified (s, 1; c, 2)
- LUC Class 6 – 76 LUC units identified (e, 50; w, 1; s, 16; c,9)
- LUC Class 7 – 59 LUC Units identified (e, 51; w, 1; s, 4; c,3)
- LUC Class 8 – 35 LUC Units identified (e, 31; w, 1; c, 3)

*LUC suites and LUC subsuites for the HRC region (see section 2.2, Table 2)*

The main LUC suites identified for the HRC region are shown below. The base document used for organising LUC units into LUC suites and LUC subsuites was Fletcher 1987 for the NZLRI Taranaki–Manawatu region which covers a large area (about 75%) within the HRC region. This Taranaki–Manawatu information was supplemented by LUC suite and subsuite information from other NZLRI regions, in particular: Wellington (Page 1995), Northern Hawke’s Bay (Page 1988), and southern Hawke’s Bay–Wairarapa (Noble 1985). This has provided consistency to the existing LUC knowledge for the region based on existing LUC suites and subsuite concepts.

LUC Suites and LUC subsuites for HRC are given below and new LUC suites/subsuites or changes are identified and referenced:

1. Volcanic ash covered terrains with Y-B loams
  - 1a. Waimarino
  - 1b. King country
  - 1c. Inland Plateaux
  - 1d. Taranaki
2. Lahars in Taranaki
3. Coastal sand country
  - Younger dune sands – unstable (near coast); *new*
  - Older dune sands – more consolidated and stable (away from coast); *new*
4. Alluvium
  - 4a. Wet, poorly drained floodplains and low terraces; *new*
  - 4b. Free draining floodplains and low terraces (includes gravels, and stony areas); *new*
  - 4c. Stony high terraces; *new*
  - 4d. Peat; *new*
5. Loess (terraces with loess, tephric loess, loess with tephra)
  - 5a. Low rainfall (800–1150 mm pa)
  - 5b. High rainfall (1000–1800 mm pa) – e.g., near Ruahine ranges, Apiti
  - 5c. Eastern southern Hawke’s Bay region terraces with loess and tephra (e.g., Dannevirke); *new*
  - 5d. Loess and tephra covered terrace land (1000–1200 mm pa, e.g., Wellington); *new*
6. Taupo airfall tephra
  - 6a. Shallow tephra
  - 6b. Deep tephra
7. Taupo flow tephra and water sorted tephra
8. North-east uplands
  - 8a. Shallow Taupo or Ngauruhoe tephra
  - 8b. Deep Taupo or Ngauruhoe tephra
9. Mudstone
  - 9a. Jointed mudstone
  - 9b. Banded mudstone
10. Siltstone
  - 10a. Siltstone
  - 10b. Urenui siltstone
11. Sandstone
  - 11a. Unconsolidated
  - 11b. Moderately consolidated
  - 11c. Moderately consolidated with slump and earthflow erosion
  - 11d. Consolidated sandstone
  - 11e. Hard consolidated
12. Deep seated earthflow and slump erosion
13. Greywacke
  - 13a. Greywacke ranges (includes foothills); *new*
  - 13b. Upland basins and ridges in the Greywacke ranges; *new*
  - 13c. Greywacke hill country (some coastal hill country in the Wellington region); *new*

14. Limestone; *new*

15. Argillite; *new*

It is therefore essential for future mapping, interpretation and analyses that this LUC suite and subsuite conceptual framework and classification are understood and accepted, before HRC LUC units are deleted or added. This new HRC LUC suite and subsuite classification based on 5 main regions can be used to check, refine and validate HRC LUC units in a new single classification.

This LUC correlation exercise will provide a solid platform for regional mapping and GIS analyses and LUC interpretation in the HRC region and can support regional planning and policy goals and monitoring to achieve sustainable land management.

## 4. Recommendations

---

In order to produce consistent GIS mapping and interpretation of LUC across the HRC region, a number of steps are required to complete the GIS correlation LUC database for Horizons Regional Council. These are progressive and include:

- The final LUC unit correlations – from this report – and all associated LUC units need to be checked and agreed to by all parties (i.e. Horizons staff, Landcare Research, GNS), and any anomalies (e.g., outliers, discrepancies) identified and rectified;
- The final HRC region LUC suite and subsuite conceptual framework given should be explored further and any changes made at the suite/subsuite level before proceeding with any LUC unit changes and/or improved LUC definitions.
- All data and information from this report, particularly Tables 1 and 2, need to be structured accordingly into a regional GIS database so that LUC suites and subsuites can be mapped across the whole HRC region and anomalies identified and corrected. This will require a stage II project.
- Once a new Horizons GIS LUC database has been established, and final LUC suites and LUC subsuites agreed, a single consecutive Horizons numbering system for LUC units can be developed, agreed on, and finalised;
- Once the new Horizons LUC numbering is agreed, final LUC unit definitions can be made and LUC suites and land systems for the whole Horizons region can be mapped and used as a regional database for all future sustainable land management projects;
- All LUC correlation tables should be incorporated into the HRC GIS database as part of a stage II project.
- It is recommended that a stage II Envirolink project be carried out (based on this work) to complete this LUC correlation GIS database and map LUC suites and subsuites across the region for checking and validation.
- It is expected that in the next stage II phase the LUC correlation would provide the basis for generating new maps for the whole Horizons region showing LUC suites, subsuites, and land systems (major land types in region) and other key land types (e.g., erosion prone land). A consistent LUC GIS database and mapping exercise would serve as a final check and validation for all LUC unit correlations and provide the basis for a new single LUC unit numbering for HRC.

## 5. References

---

- Blaschke PM 1985. Land use capability classification and land resources of the Bay of Plenty-Volcanic Plateau region: a bulletin to accompany New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous Publication No. 89. 221 p.
- Fletcher JR 1987. Land Use capability classification of the Taranaki-Manawatu region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous publication No. 110. 228 p.
- Harmsworth GR, Page MJ 1991. Correlation and description of Land Use Capability (LUC) units within the Bay of Plenty Regional Council area and eastern catchment boundary area. DSIR Land Resources Contract Report 91/114 (Version 1.0). Prepared for the Bay of Plenty Regional Council. 117 p.
- Harmsworth GR, Page MJ 1993. Correlation of Land Use Capability (LUC) Units into a Single LUC Classification for the Bay of Plenty Regional Council Area: phase two. Landcare Research Contract Report LC9293/65. Prepared for the Bay of Plenty Regional Council, Whakatane, New Zealand. 111 p. Information for GIS database.
- National Water and Soil Conservation Authority (NWASCA) 1986. New Zealand land resource inventory worksheets. 2nd ed. 1: 63 360. Wellington, National Water and Soil Conservation Authority.
- National Water and Soil Conservation Organisation (NWASCO) 1975–79. New Zealand land resource inventory worksheets 1: 63 360. Wellington, National Water and Soil Conservation Organisation.
- Noble KE 1985. Land use capability classification of the Southern Hawke's Bay–Wairarapa region: a bulletin to accompany New Zealand land resource inventory worksheets. Water and Soil Miscellaneous Publication No. 74. 127 p.
- Page MJ 1995. Land Use Capability Classification of the Wellington region: a report to accompany the second edition New Zealand Land resource Inventory. Landcare Research Science Series No. 6. Lincoln, Manaaki Whenua Press. 127 p.
- Page MJ 1985. Correlation of North Island regional land use capability units from the New Zealand Land Resource Inventory. Water and Soil Miscellaneous Publication 75. 110 p.
- Page MJ 1988. Land Use Capability Classification of the Northern Hawke's Bay Region: a bulletin to accompany the New Zealand Land Resource Inventory Worksheets. Water and Soil Miscellaneous Publication No. 109. 208 p.
- Soil Conservation and Rivers Control Council (SCRCC) 1971: Land Use Capability handbook. 2<sup>nd</sup> ed. Wellington, Water and Soil Division, Ministry of Works. 138 p.

## Appendices

**Table 3 Existing LUC suites and LUC subsuites for the Taranaki–Manawatu NZLRI region (Fletcher JR 1987).**

LUC suite/ subsuite	LUC suite/subsuite name	LUC units
1	YELLOW BROWN LOAMS 1a Waimarino 1b King Country 1c Inland Plateaux 1d Taranaki	2c1, 3w3, 3c1, 3e5, 4e6, 4c1, 6c1 2s4, 3e1, 4e1, 6s1 4w3, 6e22 1c1, 1c3, 1w2, 2e1, 2c2, 2c3, 3e2, 3e6, 3c4, 4e2, 4e7, 4c3, 5c1, 6e1, 6e6, 6e25, 6c5, 7e18
2	LAHARS IN TARANAKI	2w3, 2s3, 3w3, 3w5, 3s1, 3s3, 3s5, 4s1, 5s1, 6s3, 6s6
3	COASTAL SAND COUNTRY	3w4, 4e10, 6e24, 6s4, 7e15, 8e1
4	ALLUVIUM 4a Wide floodplains and river valleys 4b Narrow river valleys	1w1, 2w1, 2w2, 2w4, 2s1, 3w1, 3s2, 4s2, 6s7 3w2, 4w1, 4w2
5	LOESS 5a Low rainfall 5b High rainfall	2s2, 3e4, 4e4, 6e2 1c2, 2e2, 2c1, 3e3, 3c2, 4e3, 6c2
6	TAUPO AIRFALL TEPHRA 6a Shallow Taupo airfall tephra 6b Deep Taupo airfall tephra	4e5, 5s2, 6e9, 6s2, 6s8, 7s1 3e7, 3s4, 4e9, 6e18, 6s5, 7e8
7	TAUPO FLOW TEPHRA AND WATER SORTED TEPHRA	2s5, 3e8, 3s6, 4e11, 4e13, 4e14, 4w4, 4s3, 6e26, 6w1, 7e19, 7e26, 8e2, 8e10, 8w1
8	NORTH-EAST UPLANDS 8a Shallow Taupo and/or Ngauruhoe tephra 8b Deep Taupo and/or Ngauruhoe tephra	3c3, 4e12, 4c2, 6e27, 6c3, 7e21, 7e22, 7e23 4c4, 6c4, 7e24, 7e25, 7c1, 8e10
9	MUDSTONE 9a Jointed mudstone 9b Banded mudstone	6e3, 6e4, 7e1, 7e2, 8e3 6e5, 7e7, 8e3
10	SILTSTONE 10a Siltstone 10b Urenui siltstone	6e7, 6e8, 6e10, 7e4, 7e9, 8e3 6e21, 7e20, 8e3

<b>LUC suite/subsuite</b>	<b>LUC suite/subsuite name</b>	<b>LUC units</b>
	<b>SANDSTONE</b>	
11	11a Unconsolidated	6e12, 6e14, 7e16, 8e2
	11b Moderately consolidated	6e12, 6e14, 7e3, 7e5, 8e3
	11c Moderately consolidated with slump and earth-flow erosion	6e11, 7e6
	11d Consolidated	6e13, 6e15, 6e23, 7e11, 7e13, 8e3
	11e Hard consolidated	6e17, 7e17, 8e3
12	<b>DEEP SEATED EARTHFLOW AND SLUMP EROSION</b>	4e8, 6e19, 6e20, 7e12, 7e14
13	<b>MOUNTAINLANDS</b>	6e16, 7e10, 8e4, 8e5, 8e6, 8e7, 8e8, 8e9, 8c1

**Table 4 Existing LUC suites and component LUC units for the NZLRI Wellington region (Page MJ 1995)**

LUC suite number	LUC suite name	LUC subsuite name	Component LUC units
1	Low alluvial plains and terraces	1 a. Soils with wetness limitations.	1w1, 2w1, 3w1, 4w1, 4w2, 7w2
		1 b. Soils with limitations of stoniness and insufficient soil moisture.	1s1, 2s1, 3s1, 4s1, 6s7, 7s2
2	Peat bogs, swamps and basins		2w2, 3w2, 4w3, 6w1, 7w1
3	Medium-height stony alluvial terraces		2s3, 3s2, 4s2, 6s3, 6s7
4	High, dissected, loess-covered terrace-land	4a. Terraces and low hills formed from consolidated, weathered gravels. Soils are yellow-brown earths developed from loess.	3s3, 4e1, 6s1, 6e2
		4b. Dissected terrace-land formed from unconsolidated sands and conglomerate. Soils are intergrades between yellow-brown earths and yellow-brown loams, developed from loess and minor tephra.	1c1, 2e1, 2c1, 3e1, 6e1
		4c. Dissected terrace-land and fans formed from unconsolidated to moderately consolidated sands and conglomerate. Soils are yellow-grey earths or intergrades between yellow-grey earths and yellow-brown earths developed from loess.	3s4, 3e3, 4e2, 6e1
5	Sand country	5a. Young, unstable sand dunes.	6s5, 6e5, 7e3, 8e1
		5b. Interdune sand plains.	3w3, 4e4, 6s4
		5c. Older, slightly consolidated, inland sands, forming stable landforms.	2s2, 3e2, 4e3, 6s2, 6e4
6	Raised marine		6c3, 7s3, 8s1
7	Greywacke hill country	7a. Coastal greywacke hill country exposed to strong salt-laden winds. Soils are intergrades between yellow-grey earths and yellow-brown earths.	6c2, 6e3, 6e9, 7e4, 8e2
		7b. Inland greywacke hill country with annual rainfall <1270 mm. Soils are yellow-brown earths.	6c2, 6s6, 6e6, 7e1, 7s1
		7c. Inland, weathered greywacke hill country with annual rainfall 1400–2000 mm. Soils are strongly leached yellow-brown earths.	6e7, 7e2
8	Greywacke mountainlands and associated foothills	8a. Greywacke foothills with annual rainfall 1270–1780 mm. Soils are strongly leached yellow-brown earths.	3c1, 4e5, 6c1, 6e8, 7e2, 8e3
		8b. Greywacke mountainlands with annual rainfall >1780 mm. Soils are podzolised yellow-brown earths.	4c1, 6e10, 7e5, 7c1, 8e3, 8e4, 8e5

**Table 5 Existing LUC suites and LUC units for the NZLRI Southern Hawke's Bay–Wairarapa Region (Noble KE 1985)**

LUC SUITE			LUC UNITS OCCURRING WITHIN SUITES
Alluvium and peat	..	..	1c1, 1w1, 2w1, 3w1, 3w2, 4w1, 6w1
Gravels	..	..	2s1, 3s2, 4s1, 6s1, 6s4, 7s1
Sand dunes	..	..	6e14, 6s5, 7e14, 8e4
Tephra and loess	..	..	2c1, 3s1, 3e1, 3e2, 4e1, 4e2, 6e1, 6e4, 6e6
Mudstone or fine siltstone	..	..	3s3, 3e3, 4e3, 6e2, 6e3, 6e7, 6e8, 6e10, 7e1, 7e2, 7e8, 7e12
Sandstone or coarse siltstone	..	..	6e9, 6s2, 7e4, 7s2
Limestone	..	..	4e4, 5s1, 5c1, 6e5, 6c1, 6c2, 7e3
Argillite	..	..	3s4, 4e5, 6e12, 6e13, 7e6, 7e7, 7e11, 7e13
Greywacke	..	..	6s3, 6e11, 7e5, 7e10, 8e5, 8e6, 8e7, 8e8, 8e9, 8c1
Miscellaneous	..	..	7e9, 8e1, 8e2, 8e3

**Table 6 Existing LUC suites and component LUC units in the Northern Hawke's Bay region (Page MJ 1988)**

LUC suite number	LUC suite name	LUC subsuite name	Component LUC units
1	Alluvial plains and terraces		1c1, 1w1, 2e1, 2w1, 3w1, 3w2, 4w1, 6w1, 7w1
2	Gravel terraces		3s2, 6s3, 7s1
3	Low lying saline plains		3s4, 6s2
4	Sand dunes		3s5, 4s1, 6e13, 7e13, 8e1
5	Low angle, unstable mudstone terrain		6e9, 6e10, 7e6, 7e10
6.	Jointed mudstone hill country		6e3, 7e1, 8e3
7.	Banded mudstone hill country		6e4, 7e2, 7e11, 8e2, 8e3
8.	Siltstone hill country		6e7, 7e4, 8e3
9.	Sandstone hill country	9a. calcareous	6e8, 7e5
		9b. non-calcareous	6e14, 6s1, 7e8, 7e9, 8e2, 8e3, 8s1
10.	Landforms with a mantle of loess		3s1, 3e1, 4e1, 5c1, 6e2, 6e5, 7e3, 8e2, 8e3
11.	Landforms with a mantle of Taupo airfall tephra	11a. lowland	3s3, 3e3, 4e2, 6e1, 6e6
		11b. upland	4c1, 6e11, 6c3, 7e14, 8e2, 8e5, 8e6, 8e7
12.	Raised marine terraces with a shallow mantle of Waimihia Lapilli overlying more weathered tephra		3e2, 4e2, 6c1
13.	Low hills with a mantle of Taupo flow tephra overlying coarse lapilli		4e3, 6e15, 7e19
14.	Terraces formed from Taupo flow tephra and volcanic alluvium		4s2, 4e5, 7e16, 8e4
15.	Greywacke mountain and hill country with a mantle of Taupo airfall tephra		6e12, 7e7, 7e15, 8e5, 8e6
6.	Uplands and mountainlands with a mantle of highly erodible tephra		4e4, 4w2, 6c2, 6e16, 7e12, 7e17, 7e18, 8e8, 8e9, 8e10, 8e11

**Table 7** GIS spreadsheet showing all LUC unit correlations, from North Island correlation tables and the NZLRI database for all NZLRI regions (e.g., 08, 09, 10 etc.), for just the HRC region (\*denotes original LUC unit split; + moderate correlation; # denotes moderate correlation and LUC unit split)

HRC Region	LUCClass	Lcorr	LEGEND											
			00 LUC	01 LUC	02 LUC	03 LUC	04 LUC	05 LUC	06 LUC	07 LUC	08 LUC	09 LUC	10 LUC	11 LUC
		1c 4										1c 1		
		1c 4+										2e 1		
		1c 5												1c 2
		1c 6												1c 3
		1w 4*									1w 1			
		1w 5										1w 1	1w 1	
		1w 5+										1s 1		
		1w 6												1w 2
		2c 3												2c 1
		2c 4									2c 1	2c 1		
		2c 6												2c 3
		2e 2												2e 1
		2e 8												2e 2
		2s 4												2s 4
		2s 7*									2s 1			
		2s 8												2s 5
		2s 9										2s 3		
		2s 9*									2s 1			
		2s10										2s 1	2s 1	
		2s10+										2s 2		
		2s11												2s 2
		2s11+										3s 4		
		2w 8												2w 1
		2w 9*									2w 1			
		2w10										2w 1	2w 2	
		2w12										2w 2	2w 4	

3c 2				3c 1
3c 3				3c 2
3c 4				3c 3
3c 5				3c 4
3e 2				3e 2
3e 3				3e 1
3e 8			3e 1	
3e 9				3e 3
3e10			3e 1	
3e16				3e 3
3e19				3e 4
3e20				3e 5
3e23			3e 3	
3e25	3e 6			
3e26				3e 6
3e28				3e 7
3s 8			3s 2	3s 2
3s 8+				3s 1
3s10+				
3s18			3s 3	3s 4
3s20				
3s24			3s 4	3s 6
3w 2				3w 1
3w 2*			3w 1	3w 2
3w 2+				3c 1
				4c 1
3w 5*			3w 2	
3w 5+				
3w10				3w 1
3w11				3w 3
3w11+				3w 4
				3w 2
				4w 3

4c 1				4c 1
4c 2				4c 2
4c 4				4c 4
4e 2	4e 1			4e 1
4e 2+				4e 2
4e 7			4e 1	
4e 7+				4e 3
4e12+				4e 5
4e14			4e 2	4e 4
4e16			4e 4	
4e17				4e 6
4e18				4e 7
4e19			4e 3	
4e20				4e 8
4e24				4e10
4e25		4e 6		
4e27		4e 8		
4e27*				4e 9
4e30		4e 9		
4e34			4e 5	
4e35		4e13		4e11
4e39				4e13
4e41			4e 5	
4e42				4e12
4e42+			4e 4	
4e43		4e16		
4e45		4e18		4e14
4s 5			4s 1	4s 1
4s 5+				4s 2
4s12				4s 3
4w 1				4w 1
4w 2			4w 1	4w 2

4w 4				4w 3
4w 7			4w 2	4w 4
5c 2				5c 1
5c 3				5s 2
5s 3			5c 1	6c 2
6c 1				6c 1
6c 2				6e 2
6c 4				
6c 5			6c 1	
6c 6				6c 1
6c 7				6e22
6c 8			6c 2	
6c10			6c 2	
6c10*				6c 3
6c12		6c 1		6c 4
6c14*				6c 3
6e 3	6e 1			6s 1
6e 9			6e 1	
6e10			6e 2	
6e10#	6e 9			
6e11			6e 3	
6e19+				6e 9
6e22			6e 7	6e 3
6e22#	6e 9			
6e23			6e 8	6e 4
6e24				6e 6
6e26				6e 7
6e27				6e 8
6e29				6e 5
6e30				6e10
6e31			6e 5	
6e36			6e 4	

6e37				6e12
6e37#			6e 9	
6e40		6e 9		
6e42				6s 6
6e46	6e 7			
6e51				6e 1
6e51#			6e 9	6e14
6e55+				6e11
6e58+				6e 4
6e59*			6e10	
6e60*			6e10	
6e61				6e19
6e61*			6e10	
6e62				6e20
6e62*			6e10	
6e65*			6e12	
6e66*			6e12	
6e67			6e13	
6e68				6e15
6e69				6e13
6e74				6e23
6e80				6e 6
6e86			6e11	6e 8
				6e 9
6e86+				6e10
6e88				6e17
6e89				6e18
6e90			6e14	6e 5
6e95		6e24		6e24
6e96			6e16	6e26
6s 1+				6e27
6s 2				6s 2
			6s 1	

6s 4				6s 4	6s 4
6s 5		6s 2			6s 5
6s 8				6s 2	
6s11					6s 6
6s12				6s 3	
6s15					6s 7
6s16					6s 5
6s18					6s 8
6w 4*					6w 1
7c 1		7c 1			7c 1
7c 1*			7e17		7e24
7e 1	7e 1				
7e 2					7e 1
7e 2*				7e 1	
7e 3					7e 2
7e 3*				7e 1	
7e 4					7e 7
					7e 9
7e 4*				7e 2	
7e 5					7e 4
7e 5*				7e 2	
7e 6				7e 3	
7e10					7e 3
7e10#				7e 4	
7e11					7e 5
7e11#				7e 4	
7e13+					7e 6
7e19					7e 1
7e21				7e 5	
7e23					7e12
7e23*				7e 8	
7e24	7e 4				7e14

7e24*			7e 8	
7e29				7e13
7e31		7e 6		7e 8
7e34			7e 9	
7e38*				7e11
7e41			7e11	
7e43			7e 6	
7e44			7e 7	
7e46		7e 6		
7e50				7e16
7e52				7e 2
7e52*			7e10	7e 5
7e52+				7c 1
				7e 5
7e55				7e20
7e56			7e12	
7e58			7e14	7e 3
7e60				7e15
7e61		7e12		7e17
7e63		7e11		7e19
7e63*				7e11
7e66				7e23
7e67				7e18
7e71			7e12	7e21
7e72*			7e17	7e24
7e73				7e25
7e74			7e18	7e22
7e75				7e26
7s 1				7s 2
7s 1*			7s 1	
7s 2			7s 2	
7s 3				7s 1

7w 4					7w 2	
8c 1		8c 1		8e10	8c 1	8c 1
8e 1					8e 4	8e 1
8e 2					8e 1	
8e 2*						8e 3
8e 3					8e 2	
8e 3*						8e 3
8e 5+						8e 2
8e 6	8e 1	8e 3		8e 5	8e 5	8e 3
8e 7				8e 6	8e 6	8e 4
8e 8						8e 7
8e 9						8e 5
8e 9*		8e 5				8e10
8e10						8e 6
8e11		8e 6			8e 8	8e 8
8e12				8e11		
8e13		8e 7		8e 9	8e 9	8e 5
8w 2						8e 9
						8w 1

Table 8: GIS spreadsheet showing all LUC units (and combinations) by frequency and area for each NZLRI region

FREQUENCY	REGC_NAME	LEGEND	LUC	AREA (Ha)
2	Horizons Region	02	4e 1	99.00
4	Horizons Region	02	6e 1	300.47
1	Horizons Region	02	6e 7	7.40
4	Horizons Region	02	6e 9	44.27
16	Horizons Region	02	7e 1	140.45
1	Horizons Region	02	7e 4	171.70
1	Horizons Region	02	7e 6	0.04
2	Horizons Region	02	8e 1	14.67
1	Horizons Region	04	3e 6	7.64
9	Horizons Region	04	4e 6	491.21
4	Horizons Region	04	4e 8	49.35
1	Horizons Region	04	4e 9	0.42
8	Horizons Region	04	4e13	89.56
3	Horizons Region	04	4e16	13.97
1	Horizons Region	04	4e18	73.49
1	Horizons Region	04	4e18+6w 2	3.85
5	Horizons Region	04	6c 1	83.16
1	Horizons Region	04	6c 1+7e 6	0.66
8	Horizons Region	04	6e 9	282.28
3	Horizons Region	04	6e24	57.53
21	Horizons Region	04	6s 2	416.96
3	Horizons Region	04	7c 1	88.33
11	Horizons Region	04	7e 6	225.38
3	Horizons Region	04	7e11	53.36
1	Horizons Region	04	7e12	2.04
3	Horizons Region	04	8c 1	11.55
6	Horizons Region	04	8e 3	19.98
5	Horizons Region	04	8e 5	101.98
10	Horizons Region	04	8e 6	293.11
9	Horizons Region	04	8e 7	176.15
4	Horizons Region	07	4e 4	130.49
2	Horizons Region	07	4w 2	51.03
4	Horizons Region	07	6c 2	91.43
3	Horizons Region	07	6e16	45.50
4	Horizons Region	07	7e12	25.81
4	Horizons Region	07	7e17	57.57
1	Horizons Region	07	7e18	2.90
3	Horizons Region	07	8e 5	2.48
1	Horizons Region	07	8e 6	1.33
12	Horizons Region	07	8e 9	97.66
3	Horizons Region	07	8e10	72.12
1	Horizons Region	07	8e11	23.11
2	Horizons Region	08	1w 1	548.70
23	Horizons Region	08	2c 1	3671.04
93	Horizons Region	08	2s 1	17936.94
1	Horizons Region	08	2s 1+7e 4	378.76
37	Horizons Region	08	2w 1	9302.40
50	Horizons Region	08	3e 1	9755.26
19	Horizons Region	08	3e 3	1759.64
1	Horizons Region	08	3s 1+7e 3	695.73
37	Horizons Region	08	3s 2	9861.35
1	Horizons Region	08	3s 2+7e 2	482.64
2	Horizons Region	08	3s 2+7e 4	520.69
27	Horizons Region	08	3s 3	3003.98
1	Horizons Region	08	3s 3+7e 2	292.10
9	Horizons Region	08	3s 4	1035.47

63	Horizons Region	08	3w 1	15183.33
4	Horizons Region	08	3w 1+3s 3	778.60
1	Horizons Region	08	3w 1+7e 2	200.72
15	Horizons Region	08	3w 2	2028.36
1	Horizons Region	08	3w 2+7e 4	86.46
74	Horizons Region	08	4e 1	10110.68
1	Horizons Region	08	4e 1+8e 1	89.80
58	Horizons Region	08	4e 3	6189.20
3	Horizons Region	08	4e 4	228.77
9	Horizons Region	08	4e 5	864.27
8	Horizons Region	08	4s 1	1583.88
1	Horizons Region	08	4s 1+7e 4	418.53
12	Horizons Region	08	4w 1	2480.08
9	Horizons Region	08	5c 1	1373.41
8	Horizons Region	08	6c 1	807.75
29	Horizons Region	08	6c 2	8331.73
100	Horizons Region	08	6e 1	18528.28
125	Horizons Region	08	6e 2	24299.93
47	Horizons Region	08	6e 3	8692.60
1	Horizons Region	08	6e 4	77.14
43	Horizons Region	08	6e 5	7821.18
168	Horizons Region	08	6e 7	38268.49
29	Horizons Region	08	6e 8	6403.79
173	Horizons Region	08	6e 9	34758.38
48	Horizons Region	08	6e10	8729.09
47	Horizons Region	08	6e11	10569.55
56	Horizons Region	08	6e12	9491.79
81	Horizons Region	08	6e13	15798.61
2	Horizons Region	08	6e14	41.84
5	Horizons Region	08	6s 1	1382.12
54	Horizons Region	08	6s 2	5935.87
21	Horizons Region	08	6s 3	4032.16
1	Horizons Region	08	6s 3+6e12	115.68
50	Horizons Region	08	7e 1	9298.63
1	Horizons Region	08	7e 1+7e 8	267.82
104	Horizons Region	08	7e 2	20552.08
1	Horizons Region	08	7e 2+3w 1	443.65
16	Horizons Region	08	7e 3	1963.14
88	Horizons Region	08	7e 4	16557.04
27	Horizons Region	08	7e 5	4839.13
29	Horizons Region	08	7e 6	4814.16
3	Horizons Region	08	7e 6+7e 5	778.16
32	Horizons Region	08	7e 7	6597.51
38	Horizons Region	08	7e 8	4736.08
6	Horizons Region	08	7e 9	2784.64
32	Horizons Region	08	7e10	7979.48
40	Horizons Region	08	7e11	4987.00
17	Horizons Region	08	7e12	2186.34
5	Horizons Region	08	7e14	217.57
4	Horizons Region	08	7s 1	792.13
13	Horizons Region	08	7s 2	2004.34
3	Horizons Region	08	8c 1	69.37
14	Horizons Region	08	8e 1	1643.30
1	Horizons Region	08	8e 1+2w 1	277.25
2	Horizons Region	08	8e 2	210.67
3	Horizons Region	08	8e 4	27.74
24	Horizons Region	08	8e 5	4291.56

12	Horizons Region	08	8e 6	1761.86
5	Horizons Region	08	8e 8	95.69
10	Horizons Region	08	8e 9	177.78
3	Horizons Region	08	town	888.21
12	Horizons Region	09	1c 1	3312.46
3	Horizons Region	09	1c 1+6e 1	475.06
3	Horizons Region	09	1s 1	443.60
2	Horizons Region	09	1s 1+2s 1	295.13
1	Horizons Region	09	1s 1+4s 1	0.09
9	Horizons Region	09	1w 1	903.84
16	Horizons Region	09	2c 1	2199.52
4	Horizons Region	09	2c 1+6e 1	1025.12
6	Horizons Region	09	2e 1	709.88
1	Horizons Region	09	2e 1+6e 1	286.67
10	Horizons Region	09	2s 1	1054.21
1	Horizons Region	09	2s 2	471.15
2	Horizons Region	09	2s 3	139.16
23	Horizons Region	09	2w 1	7498.72
7	Horizons Region	09	2w 2	3678.35
4	Horizons Region	09	3c 1	358.05
6	Horizons Region	09	3e 1	813.11
1	Horizons Region	09	3e 2+2c 1	215.67
26	Horizons Region	09	3e 3	3126.65
1	Horizons Region	09	3e 3+2c 1	229.75
2	Horizons Region	09	3e 3+3s 4	174.07
2	Horizons Region	09	3e 3+6e 1	324.63
2	Horizons Region	09	3s 1	171.78
12	Horizons Region	09	3s 2	2824.36
1	Horizons Region	09	3s 2+2s 1	76.18
45	Horizons Region	09	3s 4	5307.60
1	Horizons Region	09	3s 4+1s 1	65.28
2	Horizons Region	09	3s 4+6e 1	373.51
7	Horizons Region	09	3w 1	507.80
1	Horizons Region	09	3w 1+4e 2	159.04
9	Horizons Region	09	3w 2	1052.77
8	Horizons Region	09	3w 2+6s 5	871.06
18	Horizons Region	09	3w 3	2064.84
1	Horizons Region	09	3w 3+6e 5	75.64
1	Horizons Region	09	3w 3+6s 4	208.59
8	Horizons Region	09	3w 3+6s 5	1766.79
3	Horizons Region	09	4c 1	288.02
17	Horizons Region	09	4e 2	1373.27
2	Horizons Region	09	4e 2+6e 1	523.71
5	Horizons Region	09	4e 4	295.69
2	Horizons Region	09	4e 4+6s 5	220.34
12	Horizons Region	09	4e 5	1198.51
21	Horizons Region	09	4s 1	1789.34
2	Horizons Region	09	4s 2	317.06
3	Horizons Region	09	4w 3	238.96
57	Horizons Region	09	6c 1	5962.08
1	Horizons Region	09	6c 1+6e 6	204.71
21	Horizons Region	09	6e 1	2969.33
1	Horizons Region	09	6e 1+3e 3	376.83
1	Horizons Region	09	6e 1+3s 4	155.07
4	Horizons Region	09	6e 1+4e 2	564.63
2	Horizons Region	09	6e 4	198.94
22	Horizons Region	09	6e 5	2281.55

1	Horizons Region	09	6e 5+3w 2	117.86
2	Horizons Region	09	6e 5+4e 4	232.47
2	Horizons Region	09	6e 5+4w 3	337.14
25	Horizons Region	09	6e 6	3182.98
70	Horizons Region	09	6e 8	10080.28
1	Horizons Region	09	6e 8+6c 1	297.99
6	Horizons Region	09	6e 9	754.48
4	Horizons Region	09	6e10	485.24
5	Horizons Region	09	6s 4	424.66
1	Horizons Region	09	6s 4+7e 3	85.65
4	Horizons Region	09	6s 5	149.83
1	Horizons Region	09	6s 5+6e 5	134.72
12	Horizons Region	09	6s 6	654.24
11	Horizons Region	09	6s 7	390.37
11	Horizons Region	09	7c 1	1092.64
21	Horizons Region	09	7e 1	2840.89
95	Horizons Region	09	7e 2	14426.85
25	Horizons Region	09	7e 3	3390.04
6	Horizons Region	09	7e 3+6s 4	364.72
38	Horizons Region	09	7e 5	5449.90
2	Horizons Region	09	7s 2	192.98
2	Horizons Region	09	7w 2	85.14
11	Horizons Region	09	8e 1	763.96
73	Horizons Region	09	8e 3	17420.45
5	Horizons Region	09	8e 4	1690.86
21	Horizons Region	09	8e 5	4254.00
7	Horizons Region	09	lake	408.55
8	Horizons Region	09	town	1290.08
25	Horizons Region	10	1c 2	11826.52
17	Horizons Region	10	1c 3	4988.05
57	Horizons Region	10	1w 1	6249.66
2	Horizons Region	10	1w 1+4s 2	4043.16
8	Horizons Region	10	1w 2	849.90
37	Horizons Region	10	2c 1	7278.03
12	Horizons Region	10	2c 1+3s 2	1189.40
4	Horizons Region	10	2c 1+4e 3	579.13
1	Horizons Region	10	2c 1+8e 3	127.96
11	Horizons Region	10	2c 3	1028.31
1	Horizons Region	10	2c 3+4e 3	175.20
4	Horizons Region	10	2e 1	410.61
28	Horizons Region	10	2e 2	7340.96
1	Horizons Region	10	2e 2+6e 2	134.59
48	Horizons Region	10	2s 1	6085.27
253	Horizons Region	10	2s 2	54635.73
1	Horizons Region	10	2s 2+3e 4	380.63
1	Horizons Region	10	2s 2+6e14	313.33
1	Horizons Region	10	2s 2+7e 3	632.12
5	Horizons Region	10	2s 4	591.55
11	Horizons Region	10	2s 5	797.15
18	Horizons Region	10	2w 1	1390.34
143	Horizons Region	10	2w 2	37034.13
1	Horizons Region	10	2w 2+7e 6	161.11
2	Horizons Region	10	2w 2+8e 3	297.14
10	Horizons Region	10	2w 4	2388.06
111	Horizons Region	10	3c 1	20091.97
5	Horizons Region	10	3c 1+4e 6	827.82
1	Horizons Region	10	3c 1+6e 6	252.02

51	Horizons Region	10	3c 2	5934.28
13	Horizons Region	10	3c 3	1664.49
5	Horizons Region	10	3c 4	752.18
2	Horizons Region	10	3c 4+6e 6	262.32
14	Horizons Region	10	3e 1	1095.49
3	Horizons Region	10	3e 1+6e 3	283.98
1	Horizons Region	10	3e 2	121.75
33	Horizons Region	10	3e 3	4415.92
100	Horizons Region	10	3e 4	11248.84
2	Horizons Region	10	3e 4+6e 3	233.98
3	Horizons Region	10	3e 4+6e14	225.32
1	Horizons Region	10	3e 4+8e 3	68.59
102	Horizons Region	10	3e 5	9251.56
1	Horizons Region	10	3e 5+8e 3	433.47
1	Horizons Region	10	3e 6	134.34
27	Horizons Region	10	3e 7	4202.26
2	Horizons Region	10	3e 7+6w 1	300.19
9	Horizons Region	10	3e 8	1348.42
2	Horizons Region	10	3e 8+8e 2	539.85
69	Horizons Region	10	3s 2	7682.68
1	Horizons Region	10	3s 2+8e 3	180.54
13	Horizons Region	10	3s 4	1649.26
33	Horizons Region	10	3s 6	5633.17
1	Horizons Region	10	3s 6+4w 1	489.66
2	Horizons Region	10	3s 6+6e26	1304.54
3	Horizons Region	10	3s 6+7e19	834.04
7	Horizons Region	10	3s 6+8e 2	1039.60
17	Horizons Region	10	3w 1	2579.67
78	Horizons Region	10	3w 2	7762.20
1	Horizons Region	10	3w 2+8e 3	474.80
10	Horizons Region	10	3w 3	1029.78
91	Horizons Region	10	3w 4	15459.40
40	Horizons Region	10	3w 4+6e24	6525.11
12	Horizons Region	10	3w 4+7e15	2391.48
34	Horizons Region	10	4c 1	9490.07
1	Horizons Region	10	4c 1+6e 7	209.60
57	Horizons Region	10	4c 2	8607.03
1	Horizons Region	10	4c 2+6e27	208.91
25	Horizons Region	10	4c 4	6604.34
2	Horizons Region	10	4c 4+6w 1	564.22
33	Horizons Region	10	4e 1	2870.64
1	Horizons Region	10	4e 1+6s 1	96.02
1	Horizons Region	10	4e 2	44.87
36	Horizons Region	10	4e 3	4062.94
137	Horizons Region	10	4e 4	11813.06
30	Horizons Region	10	4e 5	2246.61
2	Horizons Region	10	4e 5+6e17	384.02
1	Horizons Region	10	4e 5+6s 2	476.88
139	Horizons Region	10	4e 6	11339.60
1	Horizons Region	10	4e 6+6e 3	203.76
2	Horizons Region	10	4e 6+6e23	184.06
19	Horizons Region	10	4e 7	810.23
37	Horizons Region	10	4e 8	3293.02
1	Horizons Region	10	4e 8+6e20	129.26
1	Horizons Region	10	4e 8+7e 2	234.26
111	Horizons Region	10	4e 9	16103.37
2	Horizons Region	10	4e 9+6s 5	847.30

38	Horizons Region	10	4e10	3649.86
27	Horizons Region	10	4e10+6e24	4651.27
1	Horizons Region	10	4e10+6s 4	103.74
11	Horizons Region	10	4e10+7e15	2698.22
35	Horizons Region	10	4e11	7500.32
61	Horizons Region	10	4e12	8126.94
1	Horizons Region	10	4e12+3c 3	290.71
1	Horizons Region	10	4e12+6c 3	1620.17
2	Horizons Region	10	4e12+6e27	773.07
33	Horizons Region	10	4e13	4728.22
12	Horizons Region	10	4e14	1500.09
1	Horizons Region	10	4e14+6w 1	255.15
49	Horizons Region	10	4s 2	3224.43
4	Horizons Region	10	4s 3	1052.15
24	Horizons Region	10	4w 1	3090.83
1	Horizons Region	10	4w 1+3e 1	309.91
5	Horizons Region	10	4w 2	866.55
16	Horizons Region	10	4w 3	3109.95
12	Horizons Region	10	4w 4	1623.30
4	Horizons Region	10	5c 1	685.23
15	Horizons Region	10	5s 2	1838.17
148	Horizons Region	10	6c 1	18019.24
1	Horizons Region	10	6c 1+3c 1	174.10
1	Horizons Region	10	6c 1+3w 2	184.58
59	Horizons Region	10	6c 2	7999.93
122	Horizons Region	10	6c 3	25905.41
2	Horizons Region	10	6c 3+4e12	748.82
1	Horizons Region	10	6c 3+7e13	172.07
71	Horizons Region	10	6c 4	13333.47
7	Horizons Region	10	6c 4+6e26	2469.19
2	Horizons Region	10	6c 4+6w 1	944.14
1	Horizons Region	10	6c 4+7e 8	31.23
128	Horizons Region	10	6e 2	19921.57
1	Horizons Region	10	6e 2+2s 2	315.15
314	Horizons Region	10	6e 3	47310.53
1	Horizons Region	10	6e 3+3c 4	122.59
3	Horizons Region	10	6e 3+4e 4	357.28
2	Horizons Region	10	6e 3+4e 6	214.16
134	Horizons Region	10	6e 4	24346.36
2	Horizons Region	10	6e 4+4e 4	468.74
177	Horizons Region	10	6e 5	26787.52
28	Horizons Region	10	6e 6	3184.56
1	Horizons Region	10	6e 6+3c 4	420.05
58	Horizons Region	10	6e 7	12732.01
77	Horizons Region	10	6e 8	15994.74
3	Horizons Region	10	6e 9	409.74
143	Horizons Region	10	6e10	26179.74
96	Horizons Region	10	6e11	29459.98
87	Horizons Region	10	6e12	19448.82
1	Horizons Region	10	6e12+4e 3	579.38
51	Horizons Region	10	6e13	11750.56
217	Horizons Region	10	6e14	51727.56
87	Horizons Region	10	6e15	23264.94
12	Horizons Region	10	6e16	1333.77
209	Horizons Region	10	6e17	40302.96
118	Horizons Region	10	6e18	20257.44
2	Horizons Region	10	6e18+4e 9	1247.54

44	Horizons Region	10	6e19	5466.36
142	Horizons Region	10	6e20	22572.96
1	Horizons Region	10	6e20+4e 1	290.35
42	Horizons Region	10	6e22	5639.45
165	Horizons Region	10	6e23	25517.49
59	Horizons Region	10	6e24	5581.49
1	Horizons Region	10	6e24+2w 4	148.08
5	Horizons Region	10	6e24+3w 4	630.68
2	Horizons Region	10	6e24+4e10	166.72
8	Horizons Region	10	6e24+7e15	2439.68
18	Horizons Region	10	6e26	1181.78
103	Horizons Region	10	6e27	24114.87
6	Horizons Region	10	6e27+4c 2	1179.93
2	Horizons Region	10	6e27+4e12	594.26
53	Horizons Region	10	6s 1	5246.59
31	Horizons Region	10	6s 2	4040.58
18	Horizons Region	10	6s 4	1893.75
29	Horizons Region	10	6s 4+7e15	4141.60
122	Horizons Region	10	6s 5	19477.03
1	Horizons Region	10	6s 6	348.73
25	Horizons Region	10	6s 7	2696.81
2	Horizons Region	10	6s 7+7e 9	870.44
19	Horizons Region	10	6s 8	1753.47
1	Horizons Region	10	6s 8+8s 1	90.36
12	Horizons Region	10	6w 1	1294.85
1	Horizons Region	10	6w 1+4e14	290.03
51	Horizons Region	10	7c 1	12628.14
1	Horizons Region	10	7c 1+8w 1	214.25
100	Horizons Region	10	7e 1	24836.20
1	Horizons Region	10	7e 1+8e 3	590.20
92	Horizons Region	10	7e 2	22876.44
36	Horizons Region	10	7e 3	10106.44
55	Horizons Region	10	7e 4	12010.08
2	Horizons Region	10	7e 4+3e 4	150.91
61	Horizons Region	10	7e 5	12957.55
19	Horizons Region	10	7e 6	3436.09
51	Horizons Region	10	7e 7	6988.51
53	Horizons Region	10	7e 8	11087.72
151	Horizons Region	10	7e 9	38051.97
31	Horizons Region	10	7e10	5142.91
647	Horizons Region	10	7e11	182615.64
2	Horizons Region	10	7e11+6e23	1347.77
16	Horizons Region	10	7e12	1460.53
96	Horizons Region	10	7e13	22091.95
1	Horizons Region	10	7e13+8e 3	217.84
14	Horizons Region	10	7e14	1224.62
79	Horizons Region	10	7e15	13453.38
3	Horizons Region	10	7e15+3w 4	345.46
5	Horizons Region	10	7e15+4e10	780.96
1	Horizons Region	10	7e15+6e 4	54.51
4	Horizons Region	10	7e15+6e24	1204.13
3	Horizons Region	10	7e15+6s 4	519.81
47	Horizons Region	10	7e16	14484.67
149	Horizons Region	10	7e17	39426.34
2	Horizons Region	10	7e18	1169.40
13	Horizons Region	10	7e19	1562.86
2	Horizons Region	10	7e20	91.19

42	Horizons Region	10	7e21	8833.28
36	Horizons Region	10	7e22	7073.99
35	Horizons Region	10	7e23	8649.85
39	Horizons Region	10	7e24	10431.52
12	Horizons Region	10	7e25	4538.17
12	Horizons Region	10	7e26	3923.17
9	Horizons Region	10	7s 1	1702.33
61	Horizons Region	10	8c 1	13090.42
10	Horizons Region	10	8e 1	2194.61
26	Horizons Region	10	8e 2	4973.22
2	Horizons Region	10	8e 2+3s 6	193.19
122	Horizons Region	10	8e 3	32175.56
1	Horizons Region	10	8e 3+2c 1	310.73
2	Horizons Region	10	8e 3+2s 1	437.30
2	Horizons Region	10	8e 3+3c 1	374.49
1	Horizons Region	10	8e 3+3e 5	189.77
1	Horizons Region	10	8e 3+3s 2	483.16
1	Horizons Region	10	8e 3+3w 2	234.46
1	Horizons Region	10	8e 3+4e13	203.56
154	Horizons Region	10	8e 4	55358.41
16	Horizons Region	10	8e 5	7360.54
3	Horizons Region	10	8e 6	342.13
30	Horizons Region	10	8e 7	8570.14
165	Horizons Region	10	8e 8	38831.77
59	Horizons Region	10	8e 9	15421.98
19	Horizons Region	10	8e10	4622.61
3	Horizons Region	10	8w 1	248.24
8	Horizons Region	10	lake	174.04
6	Horizons Region	10	rive	3838.73
15	Horizons Region	10	town	9397.18