**You will need to use this for your research assignment but you can’t plagiarise it. In other words you need to think about how this will be useful and where to use this information.**

**What are the natural features of the Tongariro Volcanic Centre?**

Tongariro Volcanic Centre is an example of a large natural landscape. It is situated in the centre of the North Island of New Zealand and stretches from the northern tip of Lake Taupo to Mt Ruapehu in the south. The major elements of the environment’s natural landscape are volcanic in origin. They result from the region’s location over andesite magma chambers on a subducting plate margin. The two plates involved are the oceanic Pacific plate which is being pushed under the continental Indo-Australia plate.

The T.V.C. has characteristics that make it unique including its hills, mountains, plains, glacial valleys, plants, rivers, rocks, soils and climate.

The Tongariro landscape is dominated by the volcanoes that formed it. There are two large andesite volcanoes, Ruapehu (2797m) and Tongariro (1968m) These volcanoes have several vents and have built large irregularly shaped composite cones. Mt Ngauruhoe is a parasitic cone on the southern flank of Mt Tongariro. The high peaks all follow the NE-SW line of Taupo Graben faults with many explosion craters along the line. Some contain lakes such as Rotoponamu or Tama lakes.

Lake Taupo is an example of a caldera after a massive volcanic eruption which tore the Taupo volcano apart about 2000 years ago. The lake is approximately 186 metres deep and is drained by the Waikato River.

North of Lake Rotoaira are three much smaller, older andesite cones, Pihanga, Tihia and Kakamarea.

Hot springs and mud pools are found in the northern part of the region along with the Tokaanu and Ketetahi thermal areas to the south, while materials carried by water, wind or mass movement have built ring plains around the mountains.

The main glacial valley is the U shaped Mangetepopo valley that runs north-west from Mt Ruapehu. It has subsequently been covered by ash from the Taupo eruption and is cut by the Mangetepopo stream which has eroded the ash leaving up to 30 metre high cliffs in the area.

**What are the geographic processes that have shaped the T.V.C. ?**

**Processes that build the Landscape**

1. Volcanism – Volcanism has been the main process that has either built the landscape through the successive eruptions and creation of volcanoes such as Ngaruahoe, Tongariro and Ruapehu or the transformation of the landscape such as the Taupo caldera and resulting lake.

There have been a number of different types of eruptions on each of the mountains including ash eruptions which are the most frequent, fire fountaining and lava (strombolian) eruptions. In addition sills and dykes have been formed predominately on Tongariro while lahars have helped shape Ruapehu rivers.

All of the Central North Island mountains are related in origin. They are also all active, they have built composite cones of andesite lava and tephra, They all lie along the same fault in the Taupo Graben, they are all approximately the same age except Ngauruhoe which is younger but sits on the stump of a much older cone. Because they have been formd by the same volcanic process they form a pattern, lying in an almost straight line across the land.

**Processes that wear the landscape down (denudation)**

1. Fluvial (running water) – the Tongariro region has a high rainfall due to the high volcanoes standing in the way of rain bearing winds from the south – west. Some moisture is also stored as winter snow and reaches the rivers during the warmer spring and summer months.

The impact of running water is greatest at high altitudes where rainfall and snowfall is greatest, slopes are steeper and the ground surfaces tend to be unprotected by vegetation. Volcanic materials on the flanks and cones of the mountains along with the surrounding ring plains are easily eroded. Rivers have cut down swiftly eroding steep-sided channels in unconsolidated ash, tephra and ignimbrite. Lava is harder and more resistant to water erosion however. Waterfalls like the Taranaki Falls develop at the edge of the lava sheet and then slowly erode back leaving a steep walled gully. Tephra bombs and boulders pepper the streams and rivers from eruptions or have been moved down river by floods or lahars. Heavy rain may also cause the mass movement of ash (which becomes greasy when weathered) from waterlogged slopes, forming debris avalanches. (An example of this occurred in 2015 above the dam on the Mangetepopo River) Volcanic eruptions can also deposit material that blocks waterways and upset river flows. During the Taupo eruption, ignimbrite flows dammed rivers west of Ruapehu and created lakes. These lakes have since silted up and now form extensive swamp lands on the Waimarino Plains west of the Chateau.

1. Climatic – The combination of temperature, precipitation, winds and altitude have created a reasonably unique climate at Tongariro. As altitude increases the average temperatures tend to decrease and rainfall or over winter, snowfall, will increase. Winds will be much stronger and more ferocious. Mean temperatures are normally about 4 degrees C less for every 1000 metres. A Ruapehu is over 2700 m above sea level it’s temperatures over winter and spring can approximate those found in Antarctica.

The prevailing winds generally come from the west or south-west so the western slopes of the mountains tend to receive much more rainfall. Southern slopes face away from the sun so they are generally colder and more exposed to southerly winds. These winds erode fine materials from bare, dry surfaces and strip the tops of the mountains of soils that could sustain vegetation. Along with the colder temperatures this creates clear patterns of vegetation stratification on the sides of the volcanoes.

1. Glacial – the work of ice operates in three main ways and is most effective in winter. On the slopes of the mountains ice can cause weathering, mass movement and erosion.

Weathering happens due to freeze and thaw that causes rocks to expand and contract. This eventually causes rocks to crack and split.

Ice needles push through the soil during winter nights, taking small stones and soil particles with them. This can eventually cause mass movement of soil on a slope.

Small glaciers have developed on the flanks of Mount Ruapehu. As the glaciers expand and contract seasonally they form small U shaped valleys on the mountains sides. The largest of these is the Mangetepopo valley to the north-west of Ruapehu.

Overall therefore a host of different processes have operated in the Tongariro Volcanic Centre to produce a very unique and spectacular landscape from the massive caldera that is now Lake Taupo to the volcanoes of Tongariro National Park. This area proves how relief, climate, vegetation and soils interact together.