Level Three Geography 3.1

*Comprehensively analyse how interacting natural processes operate together to shape one feature within your geographic environment.*

*In your analysis:*

* *Integrate comprehensive supporting case study evidence*
* *Integrate illustrated material (relevant map(s) and / or diagram(s)) to support your answer*

**Natural processes operating in your geographic environment**

Wave processes, Aeolian processes

**N.Z. geographic environment where these processes operate**

Muriwai Coastal Geographic Environment (M.C.G.E.)

Muriwai Coastal Geographic Environment (M.C.G.E.) is located on the west coast of the North Island of New Zealand and its coastline meets with the Tasman Sea. It is 40km away from Auckland’s CBD M.C.G.E. stretches from Maori Bay (southern boundary) to Otakamiro stream (Northern boundary) and it includes the Otakamiro headland and Motutara stack. It is 3.1km long. There are a number of different erosional, depositional and transportational processes that operate in M.C.G.E. and have interacted together to create (build up and erode) both its beach and dunes, and headland. These processes include wave processes, aeolian processes and other sub processes like vegetation and chemical processes.

Muriwai Coastal Geographic Environments’ beach and dunes have been created and shaped through the interaction processes of waves, wind and vegetation. The M.C.G.E’s beach and dunes do differ in shape and size during Summer and Winter but the interaction natural processes are operating at different scales and rates. The prevailing south westerly wind has a long fetch of 60km and is usually blowing at around 16km/h (in Summer it is lower than this, in Winter it can be up to 25km/h). The wind transfers a lot of energy into the waves. As the waves approach the shallow foreshore of Muriwai beach they begin to ‘feel the bottom’ and the energy inside them propels the wave upwards resulting in them crashing against the foreshore with 100,000 Joules of kinetic energy. In Summer, waves are constructive because they carry less energy due to anti cyclones and have a stronger swash then backwash. This means they will build up the beach of Muriwai due to the depositing more sediment then eroding away sediment. The constructive waves of M.C.G.E. give the foreshore a gradient of 3-5 degrees. In Winter, waves are destructive because they carry more energy due to cyclone weather/ high winds and will have a stronger backwash then swash. This means that they will erode away more sediment then they deposit. Destructive waves in M.C.G.E. give the foreshore a gradient of 1-3 degrees. Wave processes at M.C.G.E. are different in Summer and Winter. Long shore drift then operates on free floating sediment in a zig-zag movement northwards up the beach until the incline of the beach becomes too great and sediment is deposited on the foreshore.

When the tide is out, the deposited sediment, (which is mainly titanomagnetite but also contains some quartz, silica and feildspar), is then dried by the sun (insolation). In Summer insolation takes place much faster than in Winter because the suns heat is much greater and is not blocked the majority of the time by heavy cloud. Also in Winter it can rain quite a bit and this can prevent the drying processes from taking place. After the sun has dried out the sediment, aeolian processes can then operate on it. The wind must exceed 16km/h for dry sediment to be able to be moved (this happens most of the time in M.C.G.E. as prevailing south westerlies are extremely strong). If sediment is still wet it will stick together and the threshold wind velocity to move it will be much greater. There are three types of aeolian transportational processes that move sediment. These are surface creep, saltation and suspension. Surface creep is the movement of heavier sediment particles across the beaches surface. Saltation is the movement of lighter sediment particles in a hopping motion across the beach. Suspension is the perpetual suspension of the tiniest particles in the air. As the sediment is moved towards the backshore of M.C.G.E. it will come in contact with the dunes. The vegetation growing on the dunes will trap the sediment and this will build up the dunes. Because aeolian transportational processes occur to a smaller degree in Winter due to the sediment being much heavier as it is wetter and sticks together much more, the sand dunes are 5-10m lower in height then they are in Summer. In Winter less sediment is available (deconstructive waves) and sediment is too heavy (wet weather and suns heat) and so less sediment is able to be moved to build up the dunes.

The vegetation sub processes also interact with the dunes to cause spatial variation between the Northern and Southern dunes. The Northern dunes have a type of vegetation called spinifex growing on it. Spinifex is a short bushy plant that grows outwards and so too do its roots, therefore when sediment is deposited on the Northern dunes it tends to spread out because the vegetation here does. This results in these dunes being 3-5 metres in height and having an angle of 10 degrees which is much lower and much less steep then the Southern dunes have a type of vegetation called marram grass growing on it. Marram grass is taller plant that grows upwards whilst its roots grow downwards. When sediment is deposited on the Southern dunes it tends to build upwards because it is trapped in vegetation that is growing upwards. This results in these dunes being 7-8 metres in height and being at an angle of 30 degrees which is much higher and steeper than the Northern dunes.

The natural processes of wave deposition an erosion, aeolian transportation and vegetation growth that are operating in M.C.G.E. have interacted with one another to create the beach and dunes.