Geographical Info Systems

Assignment 3 – Report

Happy Valley Ski Area: Geographical Analysis

Module code : CMPU4032: 2022-23

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1 Assignment Overview

1.1 High Level Description

This document covers the design, implementation, and observations on all parts of the December 2022 CA(3) for the GIS module (TU060 – DS – Year 2).

The geographical focus of this report is on the fictious Happy Valley Ski Area. This document reproduces four maps with the following objectives;

- **Map 1 – Mountain relief and key infrastructure.**
  - Basic guidance for a tourist showing a colour coded view of the ski slopes. Vector layers have been augmented with data files containing piste grade information.
  - The village areas is congested with hotels and car parks so an inset map, at a different scale, is included.
  - Meteorological stations are marked a key landmarks, and their name labels have been emphasised.
  - Other facilities are marked with appropriate colour ***svg*** icons on the map and legend.

- **Map 2 – Estimated snow depth.**
  - Taking the annual average snow depth recorded at each meteorological station, an interpolated estimate of snow fall across the ski region has been determined.

- **Map 3 – Areas at risk of avalanche**
  - Based on the appropriate criteria of terrain slope, aspect, and vegetation, a shaded map has been created to assess avalanche risk.
  - A GIS model was built to classify slope and aspect vectors, and clip the required area based on the map vegetation later categories.
  - The shaded ***BLUE*** areas indicate the mountain locations that present the greatest risk of possible avalanche.

- **Map 4 – Candidate locations for a new meteorological station.**
  - Also based on predefine criteria, a series of vectors have been subjected to a series of *Intersection*, *Union*, and *Difference* operations to isolate candidate locations for a new meteorological station.

2 Maps and Data

2.1 HVSA – Shaded Relief Map

The figure below is a relief map of the Happy Valley Ski Area, showing general elevation and key local tourist infrastructure.

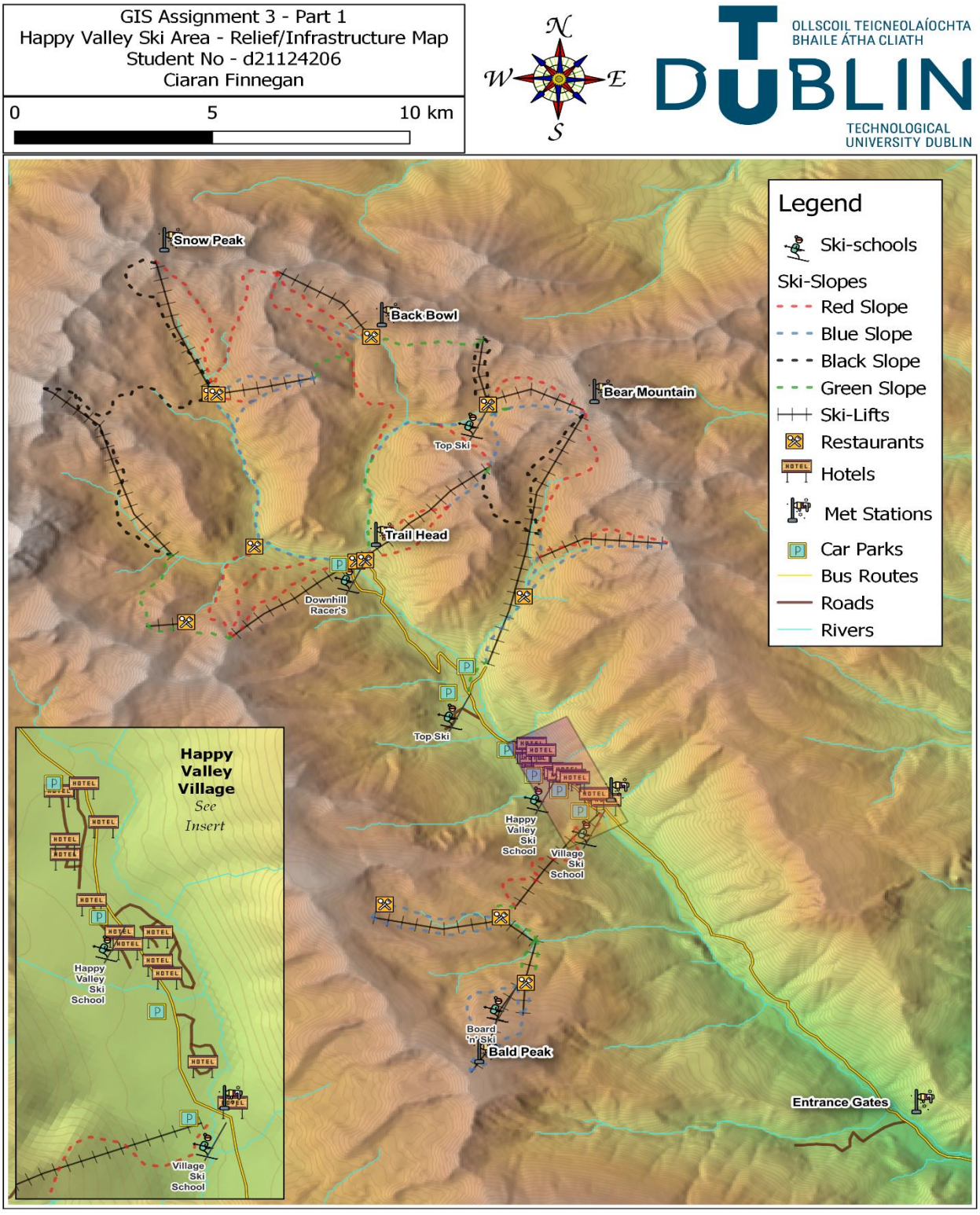

Figure – Happy Valley Ski Area

2.2 HVSA – Area Snow Depth Analysis

The map below shows the range of average snow depth across the Happy Valley Ski Area. The meteorological stations, which provide the measurements for snow fall, are included on the image to provide visual context.

This snowfall map can be compared to the relief map in Section 2.1 to better comprehend the snow depth patterns in the area. The map focus is slightly more on the immediate areas around the stations; hence the scale is slightly different.

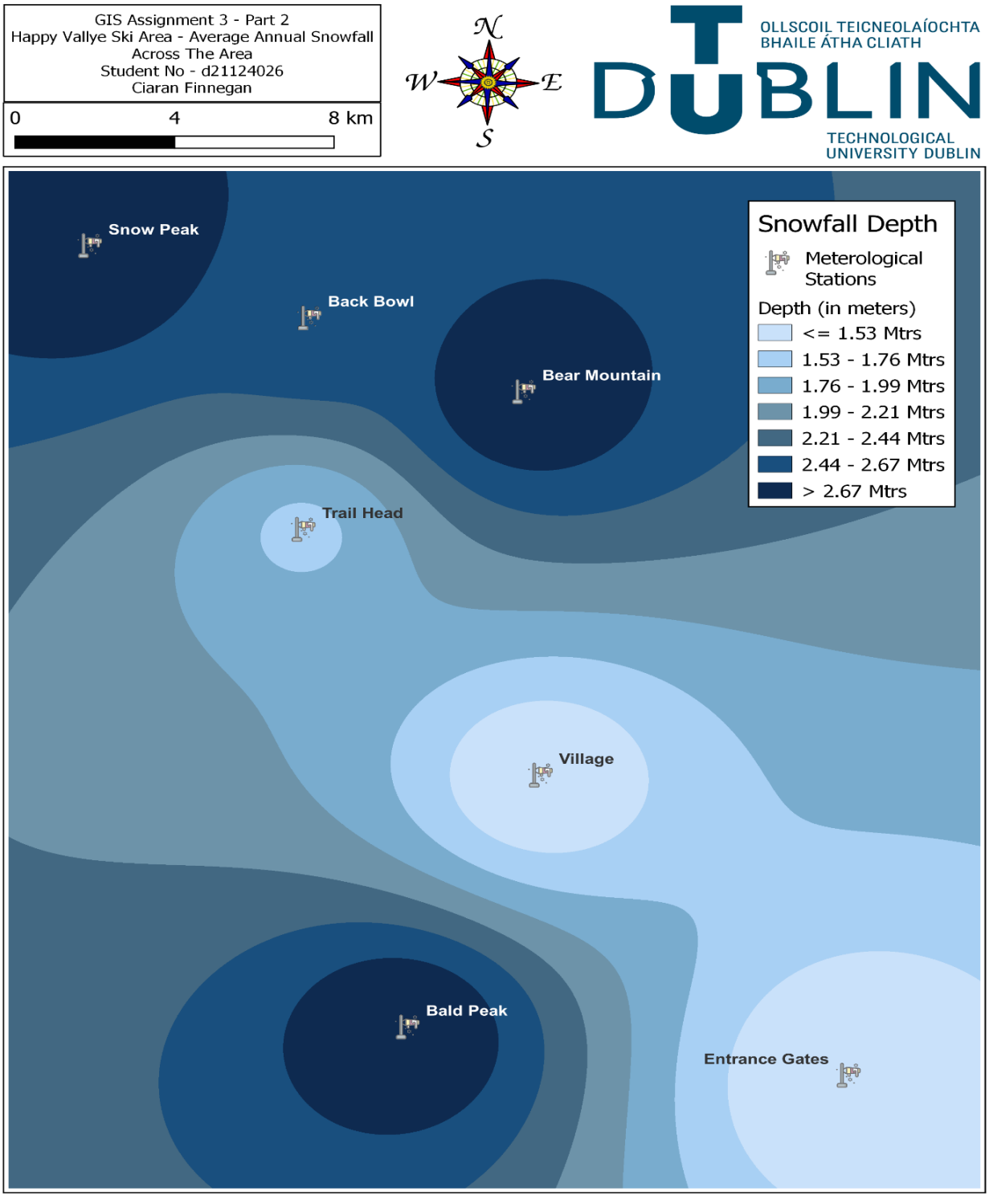

Figure – Mean Annual Snow Depth in Happy Valley Ski Area

2.3 HVSA – Avalanche Risk Analysis

The map below indicates those areas in the Happy Valley Ski Area at greatest risk of potential valance. This is based on the following criteria;

(i) Areas with a slope between 20 and 45 degrees,
(ii) Facing towards the prevailing wind (west in this case)
(iii) Not in forested areas.

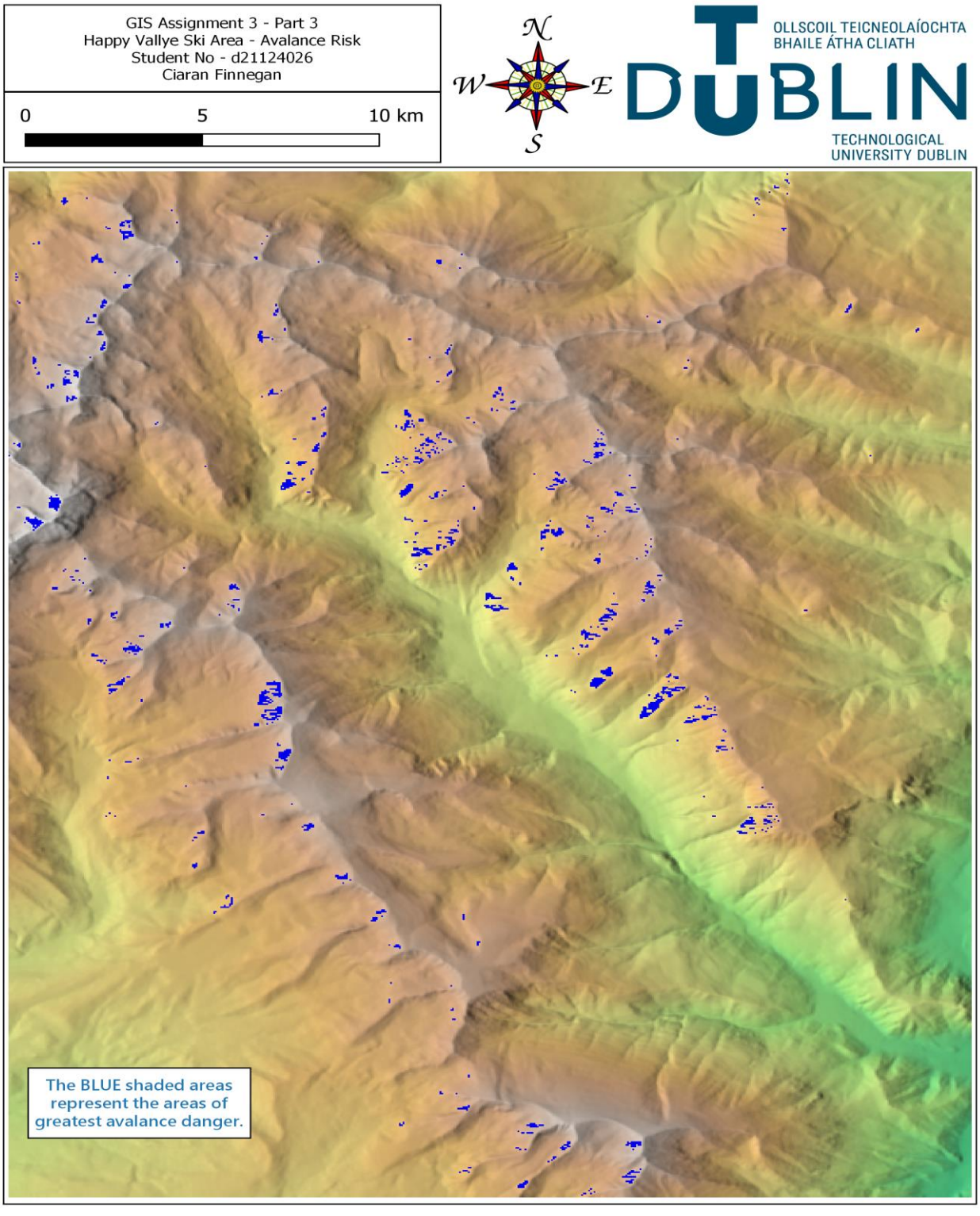

Figure – Avalanche Risk Areas in Happy Valley Ski Area

2.4 HVSA – Potential Meteorological Station Locations

The map below indicates those areas in the Happy Valley Ski Area that are candidate locations for a new Meteorological Station. This is based on the following criteria;

(i) New station must be at least 5Km from an existing met station,
(ii) New station must be within 3Km from any road or piste
(iii) New station must be in non-forested areas.

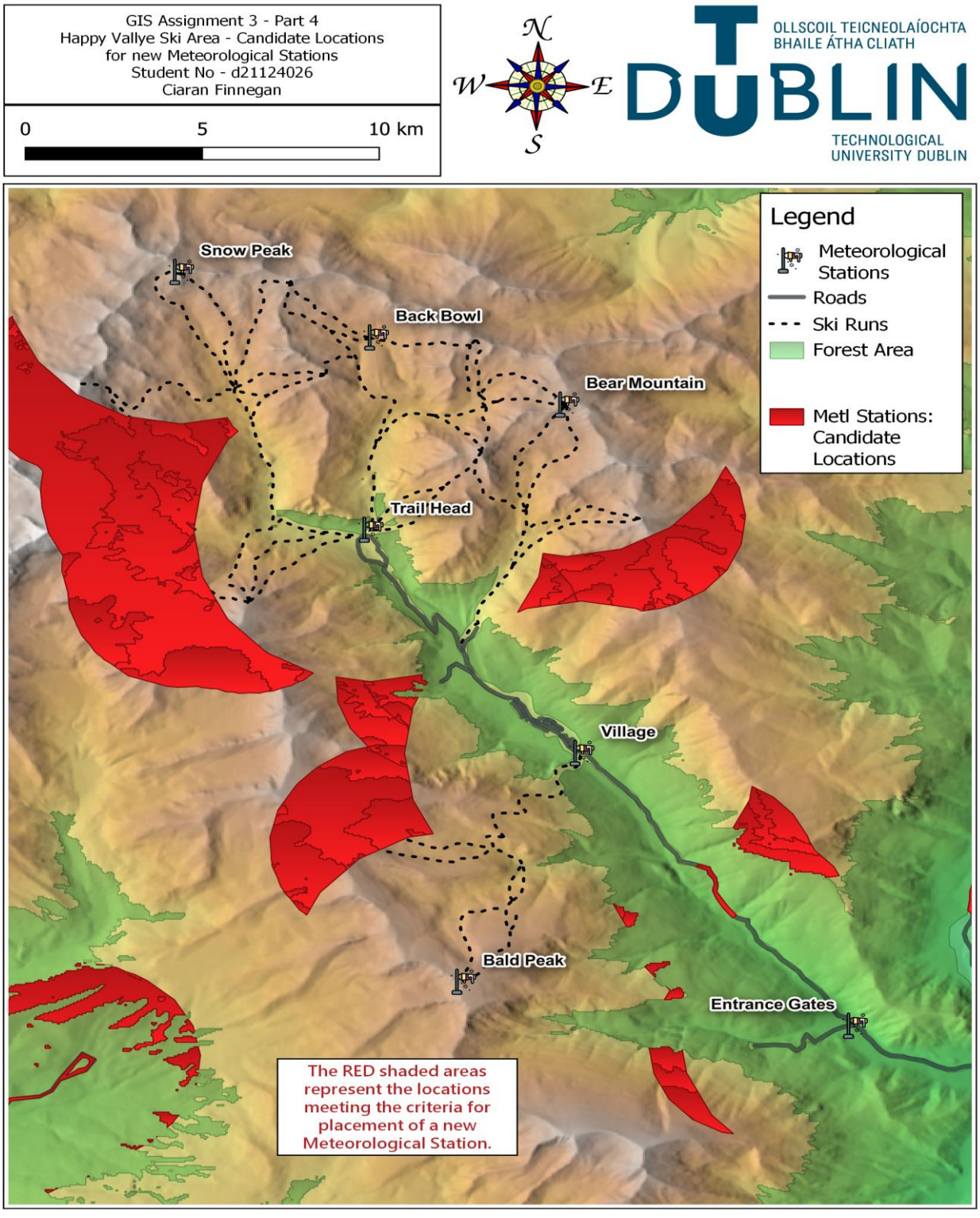

Figure – Candidate Locations for Meteorological Stations in HVSA