**MRes mini project: Task 9:**

Create a document that lists each of the stages involved in generating and summarising the accessibility surface.

Put in a table with headings 'Task', 'R' and 'GEE'. For each task note whether it's possible in R and/or GEE and make notes of packages, functions we're using to undertake the task.

**1. Setup (to do)**

**2. Download/install packages**

Downloads and installs all packages needed to generate and summarise accessibility surface.

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Download/install packages | "sf",  "mapview", "googledrive", "osmdata",  "ggplot2",  "raster",  "gdistance",  "fasterize",  "remotes",  "rgdal",  "stars",  "geojsonio" |  | Executed within R,  Does **not** require GEE |

**3. Download, install, connect to and initialise “rgee” package**

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Download/install “rgee” package |  | “remotes::install\_github  ("r-spatial/rgee")” | Executed within R,  Does **not** require GEE |
| Connect to GEE using “rgee”  (Only need to run once) | “rgee” | “ee\_install()” | Executed within R,  **Performed using GEE** |
| Initialise “rgee” package | “rgee”,  "googledrive" | “ee\_initialize  (drive = TRUE)” | Executed within R,  **Performed using GEE** |

**4. Define area of interest (aoi) and create aoi polygon**

Area of interest defined using ‘WGS84’ projection.

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Define area of interest (aoi) using coordinates (WGS84 projection) |  |  | Executed within R,  Does **not** require GEE |
| Transform aoi into polygon | “rgee” | “ee$Geometry$Polygon()” | Executed within R,  **Performed using GEE** |

**5. Read in Landsat 8 (LS8) Tier 1 dataset and filter by area of interest and collection date**

Not sure how data was accessed

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Read in Landsat 8 (LS8) Tier 1 dataset | “rgee” | “ee$Image  Collection()” | Executed within R,  **Performed using GEE** |
| Filter LS8 data by aoi |  | “ls8$filter  Bounds(aoi)” | Executed within R,  **Performed using GEE** |
| Filter LS8 data by collection date |  | spatialFiltered$  filterDate('2018-06-01', '2018-09-30') | Executed within R,  **Performed using GEE** |

**6. Create and apply a cloud mask to filtered LS8 data**

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Create and apply cloud mask (generate function) |  |  | Executed within R,  **Performed using GEE** |

**7. Calculate median normalised difference vegetation index (NDVI) per pixel and clip to area of interest**

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Calculate median NDVI per pixel |  |  | Executed within R,  **Performed using GEE** |
| Clip to aoi |  | “clip()” | Executed within R,  **Performed using GEE** |

**8. Convert image to raster and download it using Google Drive (drive) or Google Cloud Storage (GCS)**

These data are saved as an image within GEE.

Convert data to raster and download using drive or GCS.

Raster is stored as .tif file in a temporary local folder, which can then be written to our data folder.

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| **Task** | **Package(s)** | **Function(s)** | **R/GEE** |
| Convert data to raster (within GEE) |  | “ee\_as\_raster()” | Executed within R,  **Performed using GEE** |
| Download and store raster (.tif) in local folder |  | “writeRaster” | Executed within R,  **Performed using GEE** |

**9. XYZ**

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| **Task** | **Package(s)** | **Function(s)** | **R** | **R/GEE** |
| Define bounding box (using aoi coordinates) and download OpenStreetMap (OSM) road data |  |  | Executed within R (OSM road data downloaded from OSM) | Does **not** require GEE |