Model of PM2.5, PM10 and NO2 in NSW, Australia, 2005-2018

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## 0.1 Details of all candidate predictor variables

We conducted a targeted literature review to identify potential candidate predictor variables. We then identified datasets from both local collections (e.g. the Australian Government Public Sector Mapping Agency) and international sources (e.g. NASA). The datasets are listed in Table 1. We collected the relevant data in formats that could be combined in a Geographical Information System (GIS) database. All GIS data were extracted for the monitor locations and a grid of points for estimation approximately every 100 metres.

Table 1: GIS data used as predictor variables

| Predictor type | variable\_name | Project ID | Dataset ID | Citation |
| --- | --- | --- | --- | --- |
| Response variable | no2\_annual | Air\_Pollution\_Monitoring\_Stations\_National\_RESTRICTED | CARs\_National\_Air\_Pollution\_Database | Centre for Air pollution, energy and health Research, 2021. National Air Pollution Monitoring Database, derived from regulatory monitor data from NSW DPIE, Vic EPA, Qld DES, SA EPA, WA DEWR, Tas EPA, NT EPA, and ACT Health. Downloaded from the Centre for Air pollution, energy and health Research [accessed YYYY-MM-DD] DOI 10.17605/OSF.IO/JXD98 |
| Response variable | pm25\_annual | Air\_Pollution\_Monitoring\_Stations\_National\_RESTRICTED | CARs\_National\_Air\_Pollution\_Database | Centre for Air pollution, energy and health Research, 2021. National Air Pollution Monitoring Database, derived from regulatory monitor data from NSW DPIE, Vic EPA, Qld DES, SA EPA, WA DEWR, Tas EPA, NT EPA, and ACT Health. Downloaded from the Centre for Air pollution, energy and health Research [accessed YYYY-MM-DD] DOI 10.17605/OSF.IO/JXD98 |
| Response variable | pm10\_annual | Air\_Pollution\_Monitoring\_Stations\_National\_RESTRICTED | CARs\_National\_Air\_Pollution\_Database | Centre for Air pollution, energy and health Research, 2021. National Air Pollution Monitoring Database, derived from regulatory monitor data from NSW DPIE, Vic EPA, Qld DES, SA EPA, WA DEWR, Tas EPA, NT EPA, and ACT Health. Downloaded from the Centre for Air pollution, energy and health Research [accessed YYYY-MM-DD] DOI 10.17605/OSF.IO/JXD98 |
| Satellite-based air pollution estimates | sat\_no2 | Satellite\_OMI\_NO2 | Sat\_OMI\_NO2\_LK\_2005\_2019 | Nickolay A. Krotkov, Lok N. Lamsal, Sergey V. Marchenko, Edward A. Celarier, Eric J.Bucsela, William H. Swartz, Joanna Joiner and the OMI core team (2019), OMI/Aura NO2 Cloud-Screened Total and Tropospheric Column L3 Global Gridded 0.25 degree x 0.25 degree V3, NASA Goddard Space Flight Center, Goddard Earth Sciences Data and Information Services Center (GES DISC), Accessed: mid 2020, 10.5067/Aura/OMI/DATA3007 Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/6237761789> |
| Satellite-based air pollution estimates | sat\_pm25 | Atmospheric\_Composition\_Analysis\_Group | annual\_surface\_pm25\_concentrations\_2005\_2018 | Atmospheric Composition Analysis Group, 2020. Estimated global annual surface fine particulate matter (PM2.5) concentrations for other regions, 2005-2018. Available from <https://sites.wustl.edu/acag/datasets/surface-pm2-5/> [accessed late 2020]. Downloaded from the Centre for Air pollution, energy and health Researchhttps://cloudstor.aarnet.edu.au/plus/f/6237879111 |
| Position and Elevation | pos\_elevation | Digital\_Elevation\_Model\_GA | SRTM\_1sec\_Smooth\_DEM\_National | Gallant, J., Wilson, N., Dowling, T., Read, A., Inskeep, C. 2011. SRTM-derived 1 Second Digital Elevation Models Version 1.0. Record 1. Geoscience Australia, Canberra. <http://pid.geoscience.gov.au/dataset/ga/72759> |
| Position and Elevation | longitude | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Position and Elevation | latitude | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Position and Elevation | lon\_metres | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Position and Elevation | lat\_metres | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Position and Elevation | pos\_distocean | Water\_bodies\_GA | Euclidean\_Distance\_Coastline\_Australia\_2011 | 2011. Euclidean Distance to the Australian Coastline. Geoscience Australia, Canberra. <http://pid.geoscience.gov.au/dataset/ga/71990>. Retrieved from Centre for Air pollution, energy and health Research. <https://cloudstor.aarnet.edu.au/plus/f/> |
| Monitor properties | monitor\_type | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Monitor properties | alt\_name | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Monitor properties | no2\_field\_mon\_ref\_stn | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Monitor properties | pm25\_field\_mon\_ref\_stn | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Monitor properties | pm10\_field\_mon\_ref\_stn | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Monitor properties | pm\_method | Air\_pollution\_modelling\_APMMA | AP\_monitor\_locations | Centre for Air pollution, energy and health Research, 2021. State and Territory government regulatory air pollution monitor locations provided by NSW DPIE, ACT Health, SA EPA, Qld DES, Vic EPA (manually checked to correct for minor discrepancies), combined with field monitor locations from Ogawa Patches and Harvard Impactors at various Sydney GMR regions. |
| Land use | lu\_com\_{buffer} | ABS\_customised\_for\_APMMA | apmma\_abs\_mb | Centre for Air pollution, energy and health Research, 2021. ABS Meshblock data re-coded by for the APMMA GIS air pollution modelling project. Restricted. |
| Land use | lu\_res\_{buffer} | ABS\_customised\_for\_APMMA | apmma\_abs\_mb | Centre for Air pollution, energy and health Research, 2021. ABS Meshblock data re-coded by for the APMMA GIS air pollution modelling project. Restricted. |
| Land use | lu\_open\_{buffer} | ABS\_customised\_for\_APMMA | apmma\_abs\_mb | Centre for Air pollution, energy and health Research, 2021. ABS Meshblock data re-coded by for the APMMA GIS air pollution modelling project. Restricted. |
| Land use | lu\_ind\_{buffer} | ABS\_customised\_for\_APMMA | apmma\_abs\_mb | Centre for Air pollution, energy and health Research, 2021. ABS Meshblock data re-coded by for the APMMA GIS air pollution modelling project. Restricted. |
| Land use | lu\_bldg\_hgt\_avg\_100 | Geoscape | Geoscape Residential land | PSMA, 2019-08-12, Geoscape\_2019, [Data set] Retrieved from CARDAT |
| Land use | lu\_bldg\_foot\_area\_100 | Geoscape | Geoscape Residential land | PSMA, 2019-08-12, Geoscape\_2019, [Data set] Retrieved from CARDAT |
| Land cover | lc\_tree\_cover\_{buffer} | Land\_Cover\_MODIS | tree\_and\_water\_coverage\_2017\_2018 | DiMiceli, C., Carroll, M., Sohlberg, R., Kim, D., Kelly, M., Townshend, J. (2015). MOD44B MODIS/Terra Vegetation Continuous Fields Yearly L3 Global 250m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. Accessed 2021-05-10 from <https://doi.org/10.5067/MODIS/MOD44B.006> (Terra Product ID 250m MOD44B v6 march 2017-march 2018). Available through <https://modis.gsfc.nasa.gov/data/dataprod/mod44.php> |
| Land cover | lc\_park\_{buffer} | ABS\_customised\_for\_APMMA | apmma\_abs\_mb | Centre for Air pollution, energy and health Research, 2021. ABS Meshblock data re-coded by for the APMMA GIS air pollution modelling project. Restricted. |
| Land cover | lc\_water\_modis\_{buffer} | Land\_Cover\_MODIS | tree\_and\_water\_coverage\_2017\_2018 | DiMiceli, C., Carroll, M., Sohlberg, R., Kim, D., Kelly, M., Townshend, J. (2015). MOD44B MODIS/Terra Vegetation Continuous Fields Yearly L3 Global 250m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. Accessed 2021-05-10 from <https://doi.org/10.5067/MODIS/MOD44B.006> (Terra Product ID 250m MOD44B v6 march 2017-march 2018). Available through <https://modis.gsfc.nasa.gov/data/dataprod/mod44.php> |
| Emission sources | em\_minrd\_invdist | Traffic\_Load | Traffic\_Load\_Australia\_2018 | Yuen, C, 2020. Traffic load intensity derived from Zenith 2018 traffic counts and PSMA 2019 road networks. Downloaded from the Centre for Air pollution, health and energy Research <https://cloudstor.aarnet.edu.au/plus/f/5288252817> |
| Emission sources | em\_majrd\_invdist | Traffic\_Load | Traffic\_Load\_Australia\_2018 | Yuen, C, 2020. Traffic load intensity derived from Zenith 2018 traffic counts and PSMA 2019 road networks. Downloaded from the Centre for Air pollution, health and energy Research <https://cloudstor.aarnet.edu.au/plus/f/5288252817> |
| Emission sources | em\_majrd\_length\_{buffer} | Traffic\_Load | Traffic\_Load\_Australia\_2018 | Yuen, C, 2020. Traffic load intensity derived from Zenith 2018 traffic counts and PSMA 2019 road networks. Downloaded from the Centre for Air pollution, health and energy Research <https://cloudstor.aarnet.edu.au/plus/f/5288252817> |
| Emission sources | em\_wood\_heat\_pct | Woodfire\_heaters | household\_woodfire\_heaters\_Australia\_2012 | Knibbs, 2021. Household woodfire heater data, derived from ABS survey data on primary household energy source 2012. Downloaded from the Centre for Air pollution, energy and health research <https://cloudstor.aarnet.edu.au/plus/f/5964272622> |
| Emission sources | em\_burned\_area\_pct\_{buffer} | Fire\_MODIS | NASA\_MODIS\_burnt\_area\_2005\_2019 | Giglio, L., Schroeder, W., Hall, J.V., & Justice, C.O., 2020. Collection 6 MODIS MCD64 Burned Area Product, data derived from NASA MODIS data. Available from <https://modis-fire.umd.edu/index.html>. Downloaded from the Centre for Air pollution, energy, and health Research <https://cloudstor.aarnet.edu.au/plus/f/5534195139> |
| Emission sources | em\_fire\_dens\_fireskm2\_{buffer} | Fire\_MODIS | NASA\_MODIS\_active\_fires\_2016\_2019 | Giglio, L., Schroeder, W., Hall, J.V., & Justice, C.O., 2020. Collection 6 MOD14CMQ and MYD14CMQ monthly active fire climate modeling grid (CMG) data derived from NASA MODIS data 2016-2019. Available from <https://modis-fire.umd.edu/index.html>. Downloaded from the Centre for Air pollution, energy, and health Research <https://cloudstor.aarnet.edu.au/plus/f/5534057407> |
| Emission sources | em\_npi\_{pollutant}*dens\_kgkm2*{buffer} | NPI | NPI\_NOX\_Australia\_2017\_2018 | Department of Environment and Energy, 2021. National Pollutant Inventory point source air-based emissions for PM2.5 Australia 2010-2011. Available from [accessed 2020]. Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5943555217> |
| Emission sources | em\_npi\_{pollutant}*dens\_kgkm2*{buffer} | NPI | NPI\_PM25\_Australia\_2010\_2011 | Department of Environment and Energy, 2021. National Pollutant Inventory point source air-based emissions for PM2.5 Australia 2010-2011. Available from [accessed ]. Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5914470094> |
| Population | pop\_dens\_{buffer} | ABS\_data | ABS1x1km\_Aus\_Pop\_Grid\_2006\_2020 | Australian Bureau of Statistics (2021). Regional Population Growth, Australia, 2006-2020, cat. no. 3218.0 <https://www.abs.gov.au/ausstats/abs@.nsf/mf/3218.0>. Retrieved from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5548003039> |
| Weather | wthr\_maxtmp\_yrly\_avg | AWAP\_GRIDS | AWAP\_GRIDS\_monthly\_temperature\_1986\_2019 | Australian Bureau of Meteorology, Bureau of Rural Sciences, and CSIRO (2021). Australian Water Availability Project (AWAP) Temperature Grid Data aggregated to month 1986-2019. Data retrieved from Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5418224323> |
| Weather | wthr\_meantmp\_yrly\_avg | AWAP\_GRIDS | AWAP\_GRIDS\_monthly\_temperature\_1986\_2019 | Australian Bureau of Meteorology, Bureau of Rural Sciences, and CSIRO (2021). Australian Water Availability Project (AWAP) Temperature Grid Data aggregated to month 1986-2019. Data retrieved from Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5418224323> |
| Weather | wthr\_drt\_count\_months | DROUGHT-AWAP-GRIDS-RESTRICTED | Drought\_and\_APMMA\_locations\_2005\_2019 | Hanigan, I. & Van Buskirk, J. 2021. AWAP SPI and SPEI drought indices and duration at APMMA locations 2005-2019. Data downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5418109235> |
| Weather | wthr\_drt\_max\_length | DROUGHT-AWAP-GRIDS-RESTRICTED | Drought\_and\_APMMA\_locations\_2005\_2019 | Hanigan, I. & Van Buskirk, J. 2021. AWAP SPI and SPEI drought indices and duration at APMMA locations 2005-2019. Data downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5418109235> |
| Weather | wthr\_rain\_yrly\_total | AWAP\_GRIDS | AWAP\_GRIDS\_monthly\_rainfall\_1900\_2020 | Australian Bureau of Meteorology, Bureau of Rural Sciences, and CSIRO (2021). Australian Water Availability Project (AWAP) Rainfall Grid Data aggregated to month 1900-2020. Data retrieved from Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5418165999> |
| Climate | clim\_relhum\_annual | Climate\_and\_weather\_BOM | average\_3pm\_relative\_humidity\_1976\_2005 | Australian Bureau of Meteorology, 2016. Average 9am and 3pm relative humidity Australia 1976-2005. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/relative-humidity/index.jsp> [accessed 2020] Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5545082383> |
| Climate | clim\_rain\_annual | Climate\_and\_weather\_BOM | annual\_mean\_rainfall\_1981\_2010 | Australian Bureau of Meteorology, 2020. Average annual rainfall across Australia.1960-1991. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp> [accessed 2020] Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5547582787> |
| Climate | clim\_avtmp\_annual | Climate\_and\_weather\_BOM | annual\_mean\_daily\_average\_temperature\_1960\_1991 | Australian Bureau of Meteorology, 2016. Average annual daily average temperatures across Australia.1960-1991. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/temperature/index.jsp> [accessed 2020] Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5545465475> |
| Climate | clim\_wind\_annual | Climate\_and\_weather\_BOM | gridded\_annual\_wind\_velocity\_2004\_2008 | Australian Bureau of Meteorology, 2011. Average annual wind velocity distribution across Australia.2004-2008. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/wind-velocity/index.jsp> [accessed 2020] Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5544702519> |
| Climate | clim\_solar\_winter | UVR\_Solar\_BOM | seasonal\_daily\_avg\_solar\_uv\_aust\_1990\_2011 | Australian Bureau of Meteorology, 2019. Average daily solar ultraviolet (UV) Index for summer (Dec-Feb) and winter (Jun-Aug) averaged over the years 1990-2011. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/solar-exposure/index.jsp> [Accessed 2014]. Data downloaded from Centre for Air pollution, energy and health Research.https://cloudstor.aarnet.edu.au/plus/f/5543083979 |
| Climate | clim\_solar\_summer | UVR\_Solar\_BOM | seasonal\_daily\_avg\_solar\_uv\_aust\_1990\_2011 | Australian Bureau of Meteorology, 2019. Average daily solar ultraviolet (UV) Index for summer (Dec-Feb) and winter (Jun-Aug) averaged over the years 1990-2011. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/solar-exposure/index.jsp> [Accessed 2014]. Data downloaded from Centre for Air pollution, energy and health Research.https://cloudstor.aarnet.edu.au/plus/f/5543083979 |
| Climate | clim\_htng\_dg\_days\_annual | Climate\_and\_weather\_BOM | annual\_total\_heating\_degree\_days\_1961\_1990 | Australian Bureau of Meteorology, 2011. Mean monthly and mean annual heating & cooling degree days data (base climatological data sets) 1961-1990. Available from <http://www.bom.gov.au/jsp/ncc/climate_averages/degree-days/index.jsp> [accessed 2020] Downloaded from the Centre for Air pollution, energy and health Research <https://cloudstor.aarnet.edu.au/plus/f/5544600183> |

## 0.2 GIS variable definitions

Table 2: Definitions of predictor variables

| Predictor type | Project ID | variable\_name | Unit | Buffers | Variable\_definition |
| --- | --- | --- | --- | --- | --- |
| Response variable | CARs\_National\_Air\_Pollution\_Database | no2\_annual | NA | NA | NA |
| Response variable | CARs\_National\_Air\_Pollution\_Database | pm25\_annual | NA | NA | NA |
| Response variable | CARs\_National\_Air\_Pollution\_Database | pm10\_annual | NA | NA | NA |
| Satellite-based air pollution estimates | Sat\_OMI\_NO2\_LK\_2005\_2019 | sat\_no2 | molecules x 10^15 / cm^2 |  | Annual Column (COL) NO2 satellite data, resolution of 13 x 24 km (nadir). This variable is the same for each month in the year. More information available here <https://cloudstor.aarnet.edu.au/plus/f/5006639820> |
| Satellite-based air pollution estimates | annual\_surface\_pm25\_concentrations\_2005\_2018 | sat\_pm25 | NA | NA | NA |
| Position and Elevation | SRTM\_1sec\_Smooth\_DEM\_National | pos\_elevation | m |  | Elevation from Digital Elevation Model SRTM-derived |
| Position and Elevation | AP\_monitor\_locations | longitude | NA | NA | NA |
| Position and Elevation | AP\_monitor\_locations | latitude | NA | NA | NA |
| Position and Elevation | AP\_monitor\_locations | lon\_metres | m |  | Hand geocoded government monitoring stations with O3/PM25/NO2/PM10 data. Albers EPSG 3577. |
| Position and Elevation | AP\_monitor\_locations | lat\_metres | m |  | Hand geocoded government monitoring stations with O3/PM25/NO2/PM10 data. Albers EPSG 3577. |
| Position and Elevation | Euclidean\_Distance\_Coastline\_Australia\_2011 | pos\_distocean | km |  | Distance to open ocean in Km |
| Monitor properties | AP\_monitor\_locations | monitor\_type | NA | NA | NA |
| Monitor properties | AP\_monitor\_locations | alt\_name | NA | NA | NA |
| Monitor properties | AP\_monitor\_locations | no2\_field\_mon\_ref\_stn | NA | NA | NA |
| Monitor properties | AP\_monitor\_locations | pm25\_field\_mon\_ref\_stn | NA | NA | NA |
| Monitor properties | AP\_monitor\_locations | pm10\_field\_mon\_ref\_stn | NA | NA | NA |
| Monitor properties | AP\_monitor\_locations | pm\_method | NA | NA | NA |
| Land use | apmma\_abs\_mb | lu\_com\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where ABS 2016 MB category was Commercial or Education or Medical/Hospital |
| Land use | apmma\_abs\_mb | lu\_res\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where ABS 2016 MB category was Residential |
| Land use | apmma\_abs\_mb | lu\_open\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where ABS 2016 MB category was Water, Primary Production or Other |
| Land use | apmma\_abs\_mb | lu\_ind\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where ABS 2016 MB category was industrial. |
| Land use | Geoscape Residential land | lu\_bldg\_hgt\_avg\_100 | m | 100m | Using all buildings in the buffer calculate the mean height in metres. Buildings with a NULL height were assigned the value 0.5m. |
| Land use | Geoscape Residential land | lu\_bldg\_foot\_area\_100 | m^2 | 100m | The total footprint of all buildings that touch the buffer. |
| Land cover | tree\_and\_water\_coverage\_2017\_2018 | lc\_tree\_cover\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | Average % of tree cover coverage of raster values in buffer |
| Land cover | apmma\_abs\_mb | lc\_park\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where ABS 2016 MB category was Parkland |
| Land cover | tree\_and\_water\_coverage\_2017\_2018 | lc\_water\_modis\_{buffer} | % | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | % coverage in buffer where MODIS data shows water |
| Emission sources | Traffic\_Load\_Australia\_2018 | em\_minrd\_invdist | m^-1 |  | Inverse distance to minor road |
| Emission sources | Traffic\_Load\_Australia\_2018 | em\_majrd\_invdist | m^-1 |  | Inverse distance to major road |
| Emission sources | Traffic\_Load\_Australia\_2018 | em\_majrd\_length\_{buffer} | km | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | Road length in buffer (major road), with dual carriageways counting double length. |
| Emission sources | household\_woodfire\_heaters\_Australia\_2012 | em\_wood\_heat\_pct | NA | NA | NA |
| Emission sources | NASA\_MODIS\_burnt\_area\_2005\_2019 | em\_burned\_area\_pct\_{buffer} | NA | NA | NA |
| Emission sources | NASA\_MODIS\_active\_fires\_2016\_2019 | em\_fire\_dens\_fireskm2\_{buffer} | NA | NA | NA |
| Emission sources | NPI\_NOX\_Australia\_2017\_2018 | em\_npi\_{pollutant}*dens\_kgkm2*{buffer} | kg/km^2 | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | Total emission mass (kg) per square km |
| Emission sources | NPI\_PM25\_Australia\_2010\_2011 | em\_npi\_{pollutant}*dens\_kgkm2*{buffer} | kg/km^2 | 50m, 100m, 200m, 300m, 400m, 500m, 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | Total emission mass (kg) per square km |
| Population | ABS1x1km\_Aus\_Pop\_Grid\_2006\_2020 | pop\_dens\_{buffer} | persons/km^2 | 700m, 1000m, 1500m, 2000m, 3000m, 5000m, 10000m | Population density (per square km) in buffer using ABS’s estimated 1x1km population grids. |
| Weather | AWAP\_GRIDS\_monthly\_temperature\_1986\_2019 | wthr\_maxtmp\_yrly\_avg | NA | NA | NA |
| Weather | AWAP\_GRIDS\_monthly\_temperature\_1986\_2019 | wthr\_meantmp\_yrly\_avg | NA | NA | NA |
| Weather | Drought\_and\_APMMA\_locations\_2005\_2019 | wthr\_drt\_count\_months | NA | NA | NA |
| Weather | Drought\_and\_APMMA\_locations\_2005\_2019 | wthr\_drt\_max\_length | NA | NA | NA |
| Weather | AWAP\_GRIDS\_monthly\_rainfall\_1900\_2020 | wthr\_rain\_yrly\_total | NA | NA | NA |
| Climate | average\_3pm\_relative\_humidity\_1976\_2005 | clim\_relhum\_annual | NA | NA | NA |
| Climate | annual\_mean\_rainfall\_1981\_2010 | clim\_rain\_annual | mm |  | Annual mean rainfall (mm), 1960-1991 |
| Climate | annual\_mean\_daily\_average\_temperature\_1960\_1991 | clim\_avtmp\_annual | �C |  | Annual mean daily average temperature (C), 1960-1991. Daily averages taken from the mean of the min and max daily temps, and averaged over the year. |
| Climate | gridded\_annual\_wind\_velocity\_2004\_2008 | clim\_wind\_annual | km/h |  | Annualised, the average of the 12 months. |
| Climate | seasonal\_daily\_avg\_solar\_uv\_aust\_1990\_2011 | clim\_solar\_winter | MJ/m^2 |  | Seasonal (winter) mean daily solar exposure (MJ/m2) |
| Climate | seasonal\_daily\_avg\_solar\_uv\_aust\_1990\_2011 | clim\_solar\_summer | MJ/m^2 |  | Seasonal (summer) mean daily solar exposure (MJ/m2) |
| Climate | annual\_total\_heating\_degree\_days\_1961\_1990 | clim\_htng\_dg\_days\_annual | NA | NA | NA |