# **Roads versus flows in the Great Western Woodlands: surface-water insights into linear infrastructure effects**

Metadata

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This data accompanies the article:

Raiter, K.G., Prober, S.M., Possingham, H.P., Westcott, F., Hobbs, R.J., 2018. Linear infrastructure impacts on landscape hydrology. Journal of Environmental Management. Available at <https://www.sciencedirect.com/science/article/pii/S0301479717310307>.

This is referred to here as ‘paper’ below. Please read the paper for a description of the context, study area, and methods.

**The datasets**

data in csv format:

1. drainage\_crossings.csv
2. erp\_kms.csv (epk refers to erosion and pooling data by km)
3. erosional\_features.csv (es refers to erosional severity or scale

shapefiles:

1. Great Western Woodlands boundary
2. erosion and pooling survey route
3. drainage crossings survey route

**Column explanations and data descriptions**

data in csv format:

**1. drainage\_crossings**

This dataset provides data on the drainage crossings surveyed (i.e. locations where linear infrastructure crosses an ephemeral streamline).

* DX is the unique identifier for each
* veg indicates vegetation type, categorised on-site
* longitude, latitude, altitude – as per GPS recording (accuracy of ~10 m)
* demh: height according to digital elevation model (derived hydrological version 1.0)
* focal DEM
* dip: see paper Appendix 2. height of point relative to the average of the ~100m radius circle around. I.e. a negative value implies that the point is at a dip in the landscape, a positive value implies that it is on a rise.
* wetness: see paper Appendix 2
* slope: see paper Appendix 2. focal median slope dems\_slopepct\_focal300m from DEM-H
* channel: whether or not a channel was visible (Y = channel visible, S=no channel visible but drainage indicated by vegetation)
* drn\_mapped: whether or not the drainage was mapped
* inf: type of linear infrastructure present
* culvert: presence or otherwise of a culvert
* alaveg: Vegetation types - native from ALA - see paper Appendix 2
* grazed: 1 = pastoral tenure; 0 = ungrazed (i.e. not pastoral tenure)
* evap: Evaporation - annual mean Mean annual evaporation (mm) ALA 2010-07 Environmental (gridded) 0.01 degree (~1km). (ml/5km x 5km pixel) CSIRO Ecosystem Sciences <http://spatial.ala.org.au/geonetwork/srv/en/metadata.show?uuid=c3c41b4a-3284-4f0c-a654-79a295777e66>
* runoff: Runoff – average Mean annual runoff (Ml / 5km x 5km pixel) from ALA 2006 megalitres/5x5km/year. Environmental (gridded) 0.01 degree (~1km). Annual runoff has been calculated by summing monthly data from WaterDyn model 18a 1955-2006 produced by the Australian Water Availability Project (AWAP). The mean has been calculated from these annual figures. CSIRO <http://www.csiro.au/awap/>
* aspect: a position facing a particular direction – measured in degrees. Calculated from DEM-H.
* arelief Averaged Topographic Relief.
* t\_relief: topographic relief
* roughness: topographic roughness
* eveg: Enhanced Vegetation Index (2012-03-05)
* ndvi: NDVI Mean
* erodibility, erosivity (rainfall erosivity), clay (clay % from ALA): see paper Appendix 2
* soils: soils – coarse from ALA
* baresoil: see paper Appendix 2. Fractional Cover - Bare Soil (2012-03-05)
* rain: see paper Appendix 2. Precipitation – annual
* waterhold: see paper Appendix 2. Water holding capacity
* geol: see paper Appendix 2. Surface Geology of Australia
* seasonality: see paper Appendix 2. Precipitation - annual seasonality from ALA.
* drn\_desc: a description of the site observed
* impact\_desc: a description of any impacts observed
* flow-direction: notes on direction of flow
* photo\_points: references to any photographs taken at the location
* date: date that drainage crossing was surveyed.
* comment: any other comments
* other\_plan: an indication of any other planning or design features to prevent or address linear infrastructure impacts on surface or near-surface hydrology
* high\_rd: has the road been built up higher than the surrounding landscape, to sit above drainage pathway?
* flatwindrow: an indication of if windrows have been flattened (possibly to reduce hydrologic impacts)
* spdrain: an indication of if there are any spoon drains present at the site (also called mitre drains)
* armoured: an indication of if the road has been rebuilt in that particular location (in general to prevent recurrence of water pooling on the road).
* rddiverted: an indication of if the road has any detours to go around any particularly eroded or boggy (water pooling) areas
* plan: presence (‘1’) or otherwise (‘0’) of road planning or design at the site that indicates an effort to prevent or address linear infrastructure impacts on surface or near-surface hydrology
* impact: presence (‘y’) or otherwise (‘n’) of flow impacts observed (of any type)
* impedance: presence (‘1’) or otherwise (‘0’) of flow impedance observed
* conc: presence (‘1’) or otherwise (‘0’) of flow concentration observed
* divert: presence (‘1’) or otherwise (‘0’) of flow diversion observed
* newchan: presence (‘1’) or otherwise (‘0’) of new channel initiation observed

**2. erp\_kms (erosion and pooling data by km)**

* erp\_id: ID of each 1-km section
* latitude & longitude: coordinates of centre of 1-km section; frame GDA1994
* inf: type of linear infrastructure present
* wetness: topographic wetness index - see paper Appendix 2
* bveg: vegetation type, as per Beard’s vegetation classification - see paper Appendix 2
* demh: height according to digital elevation model (derived hydrological version 1.0)
* focal\_demh: DEMH height averaged by surrounding area for the purpose of calculating dip.
* dip: DEM-H divided by mean neighbourhood DEM-H, calculated using focal Statistics tool in ArcGIS 10.2, using circular neighbourhood calculation with a radius of 3 cells (~100 m). Both DEMH and focal DEM-H extracted using ‘extract multi values to points tool with bilinear interpolation of values from adjacent cells.
* slope - see paper Appendix 2
* no\_eros: number of erosional features in that 1km section
* ersumofscale: sum of the erosion severity index for all of the erosional features found in that 1-km section
* grazed: 1 = pastoral tenure; 0 = ungrazed (i.e. not pastoral tenure)
* pools: number of pooling features in that section
* maintained: an indication of the presence of any maintenance undertaken to prevent or address any erosional or pooling impacts.
* rain: see paper Appendix 2. Precipitation – annual
* waterhold: see paper Appendix 2. Water holding capacity
* clay: see paper Appendix 2. clay percentage in soil.
* erodibility: soil erodibility - see paper Appendix 2
* erosivity: rainfall erosivity - see paper Appendix 2
* baresoil : bare soil percentage - see paper Appendix 2
* ndvi: NDVI Mean - see paper Appendix 2
* alaveg: Vegetation types - native from ALA - see paper Appendix 2

**3. erosional\_features (used for analysing erosional severity)**

* er\_id: unique identifier for each erosional feature
* altitude, longitude, latitude: as per GPS
* ltime: date and time recorded on GPS device
* notes: comments
* inf: same as inf\_type in Appendix 2 of the paper.
* onoffrd: status of being either on-road or off-road (i.e. observed during walking transect through undisturbed vegetation).
* bveg: vegetation type, as per Beard’s vegetation classification - see paper Appendix 2
* slope: - see paper Appendix 2
* wetness: topographic wetness index - see paper Appendix 2
* grazed: 1 = pastoral tenure; 0 = ungrazed (i.e. not pastoral tenure)
* er\_scale: erosional severity scale, see paper section 2.3. entitled Erosion and pooling assessment.
* maintained: an indication of the presence of any maintenance undertaken to prevent or address any erosional or pooling impacts.
* focal\_demh: DEMH height averaged by surrounding area for the purpose of calculating dip.
* demh: height according to digital elevation model (derived hydrological version 1.0)
* dip: DEM-H divided by mean neighbourhood DEM-H, calculated using focal Statistics tool in ArcGIS 10.2, using circular neighbourhood calculation with a radius of 3 cells (~100 m). Both DEMH and focal DEM-H extracted using ‘extract multi values to points tool with bilinear interpolation of values from adjacent cells.
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