

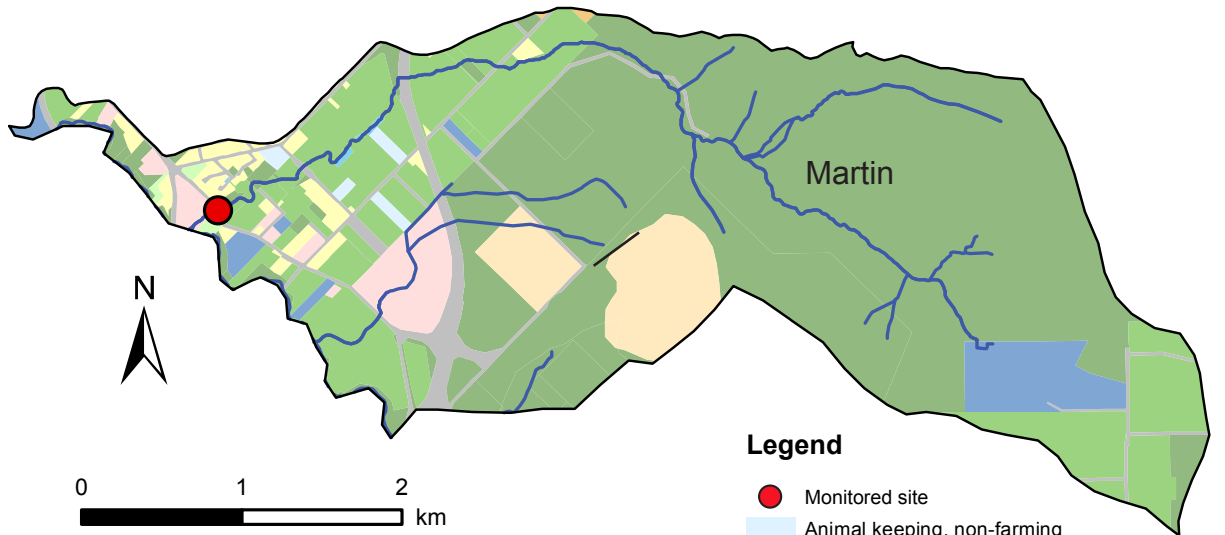
# Ellis Brook

**E**llis Brook is a largely natural, ephemeral system, drying out in summer. It was named after T.T. Ellis, a soldier who was involved in the Pinjarra massacre. Its headwaters are situated on the Darling Scarp from where it flows westwards, towards the Canning River in Gosnells.

Around half the catchment remains uncleared, though the western portion is taken up by lifestyle blocks and urban areas. The eastern edge of the catchment also has lifestyle blocks as well as some horticulture. There is a hardrock quarry on the southern boundary of the catchment as well as a decommissioned quarry in the centre. Ellis Brook Valley is in the central portion of the catchment and is recognised as one of the richest wildflower locations in the Perth Metropolitan area.

Soils types in the western portion of the catchment are red gravels and earths. As the brook flows over the scarp it passes through shallow red and yellow earths. On the coastal plain the soils are predominantly acidic yellow and red sands. These types of soils have better nutrient-retention capacities than the leached sands found further west on the coastal plain.

Water quality is monitored fortnightly at a site near the end the catchment, close to the Gosnells City Council Offices. This site was chosen to estimate the nutrient concentrations leaving the catchment, so the data may not accurately represent nutrient concentrations in upstream tributaries or other streams in the catchment.



Looking down into Barrington Quarry (decommissioned) in July 2015.

- Legend**
- Monitored site
  - Animal keeping, non-farming
  - Offices, commercial & education
  - Waterways & drains
  - Farm
  - Horticulture & plantation
  - Industry & manufacturing
  - Lifestyle block / hobby farm
  - Quarry
  - Recreation
  - Conservation & natural
  - Residential
  - Sewerage
  - Transport
  - Unused, cleared bare soil
  - Viticulture

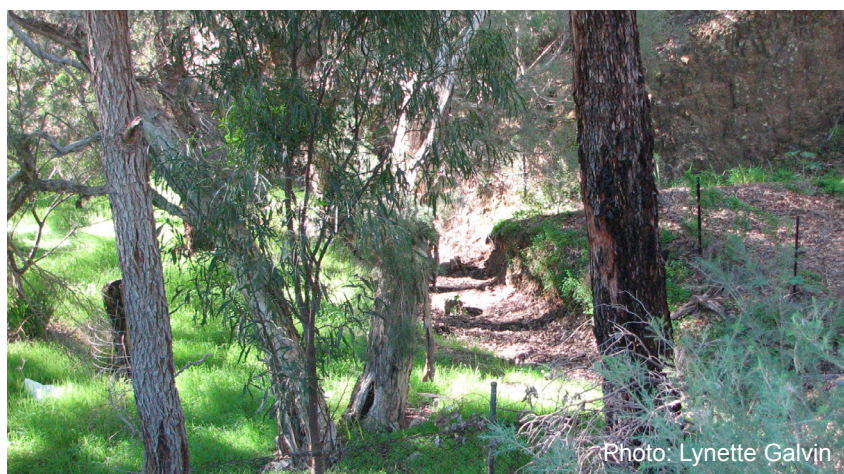


Photo: Lynette Galvin

## Ellis Brook – facts and figures

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	12.0 km <sup>2</sup> (total catchment)
Per cent cleared area (2005)	36% (total catchment)
River flow	Highly seasonal, flows only a few months each year
Main land uses (2005)	Conservation and natural (total catchment)

Ellis Brook near Lewis Road, note the abundance of exotic vegetation growing along the banks, June 2007.

## Nutrient Summary: concentrations, rainfall and targets

Year	Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Annual rainfall (mm)	009225	466.8	703.0	807.8	607.2	503.8	860.8	608.2	782.4	674.4	617.8	715.8
TN median (mg/L)	EBGS01		0.39	0.65			0.45	0.29	0.44	0.39	0.35	0.28
TP median (mg/L)	EBGS01		0.015	0.033			0.019	0.013	0.022	0.019	0.022	0.017

TN short term target = 2.0 mg/L

TN long term target = 1.0 mg/L

TP short term target = 0.2 mg/L

TP long term target = 0.1 mg/L

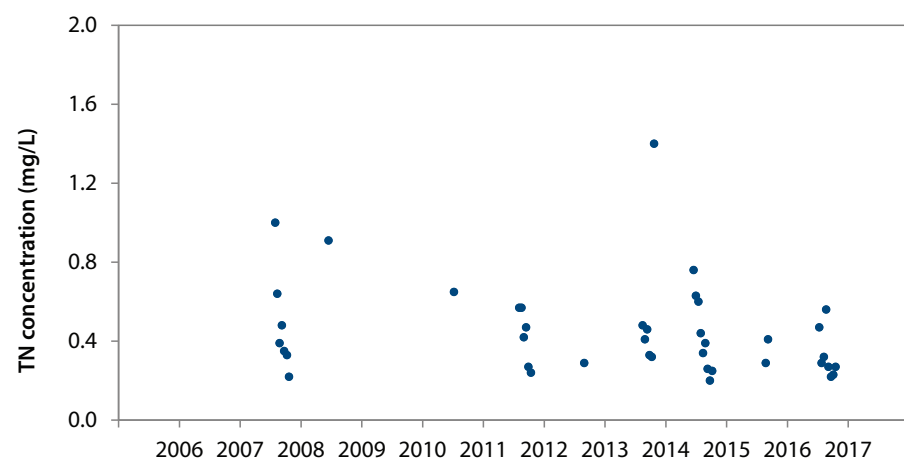
insufficient data to test target    failing both short and long-term target    passing short but failing long-term target    passing both short and long-term target

\* Best estimate using available data.    # Statistical tests that account for the number of samples and large data variability are used for testing against targets on three years of winter data. Thus the annual median value can be above the target even when the site passes the target (or below the target when the site fails).

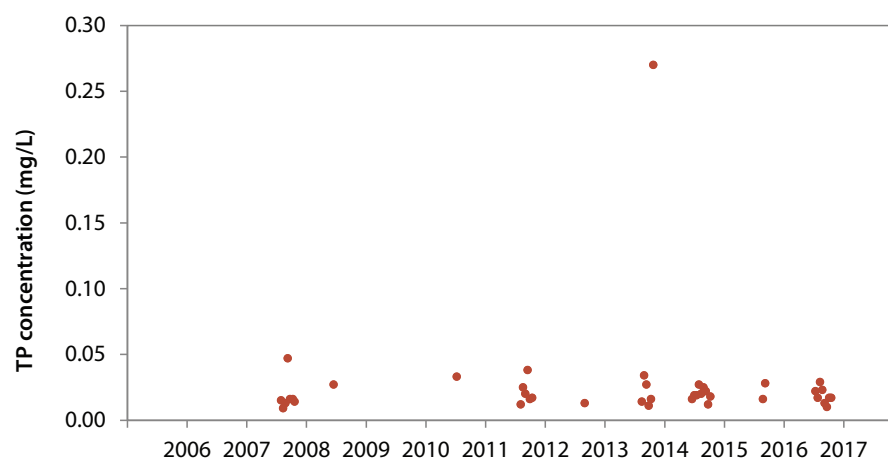


# Changes in nutrient concentrations over time in Ellis Brook

Total nitrogen concentrations over the 2006 to 2016 monitoring period



Total phosphorus concentrations over the 2006 to 2016 monitoring period



## Trend

Total nitrogen (TN) concentrations appear to have decreased since 2011. An emerging decreasing trend of 0.04 mg/L/yr was detected over the 2011–16 period. 2010 and 2012 were dry years and the brook was only flowing on one sampling occasion in each year.

## Target

Ellis Brook has been passing the short- and long-term TN targets since monitoring commenced.



Barrington Quarry (decommissioned), August 2017. Photo: Emma van Looij.

## Trend

Total phosphorus (TP) concentrations remained steady during the reporting period. No trend was detected.

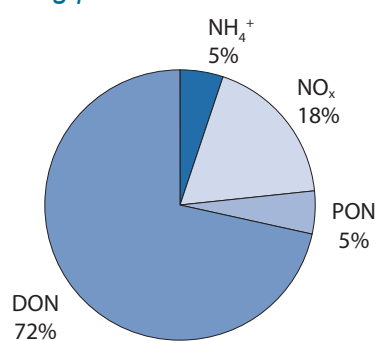
## Target

Ellis Brook has been passing both the short- and long-term TP targets since monitoring commenced.



# Nutrient fractions in Ellis Brook

Average composition of nitrogen (N) in Ellis Brook over the 2012 to 2016 monitoring period



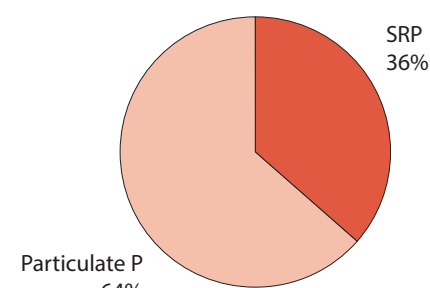
## Nitrogen

More than three-quarters of the nitrogen (N) in Ellis Brook was present as organic N which consists of both dissolved (DON) and particulate (PON) fractions. DON largely comprises organic compounds leached from peaty subsoils and degrading plant and animal matter and is available for uptake by plants, algae and bacteria. PON is composed

of plant and animal debris and needs to be further broken down to become available to plants and algae. The remaining N was present as dissolved inorganic N (DIN, consisting of ammonium – NH<sub>4</sub><sup>+</sup> and N oxides – NO<sub>x</sub>). This form of N is readily available for plant and algal uptake and is most likely sourced from fertilisers used on lifestyle blocks, hobby farms, and urban areas as well as septic tank leachate and animal waste.

There were no flow data for Ellis Brook so loads have not been calculated.

Average composition of phosphorus (P) in Ellis Brook over the 2012 to 2016 monitoring period



## Phosphorus

Nearly two-thirds of the phosphorus (P) in Ellis Brook was in the form of particulate P, which includes sediment-bound forms of P and degrading plant and animal matter. This form of P is not readily available for plant and algal uptake, but some may become available as particles decompose and bound phosphate is released. The remainder of the P was present as soluble reactive phosphorus (SRP) which is derived from fertilisers used in the catchment, animal waste and septic tank leachate. SRP is readily available for plant and algal uptake.

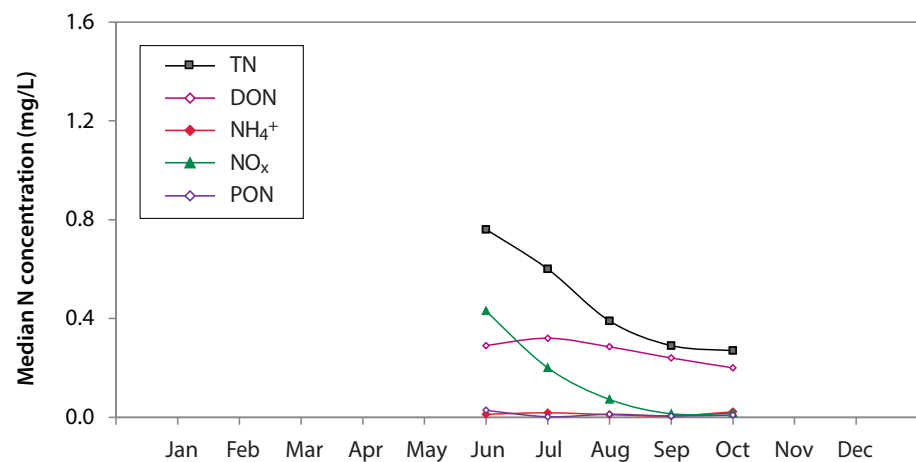
There were no flow data for Ellis Brook so loads have not been calculated.



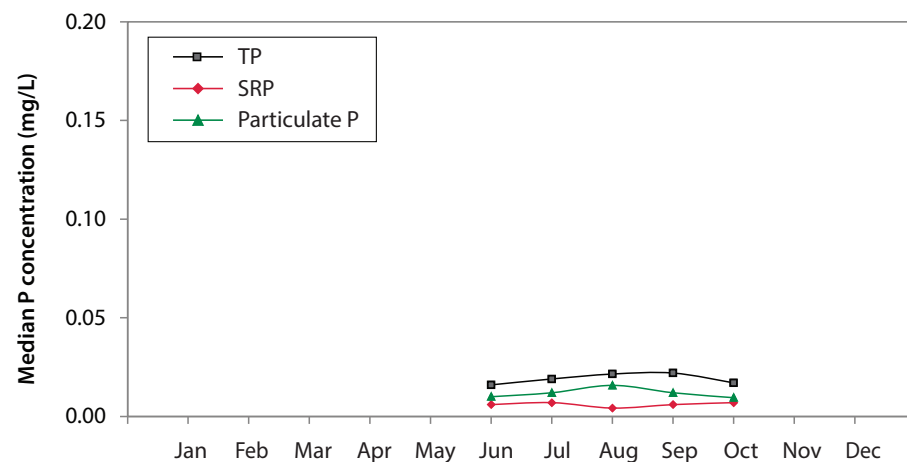


# Seasonal variation in nutrient concentrations in Ellis Brook

*Nitrogen seasonal variation over the 2012 to 2016 monitoring period*



*Phosphorus seasonal variation over the 2012 to 2016 monitoring period*



## Nitrogen

A seasonal pattern is apparent in TN, DON and NO<sub>x</sub>. Concentrations were highest when the brook started to flow and then decrease. This pattern is probably due to comparatively nutrient-rich surface runoff entering the brook after the first rain events of the season. PON and NH<sub>4</sub><sup>+</sup> concentrations did not show a seasonal response, being fairly constant throughout the year. The data in June is from one sampling event

only, in 2014, when the brook was flowing at a time when it is usually dry.

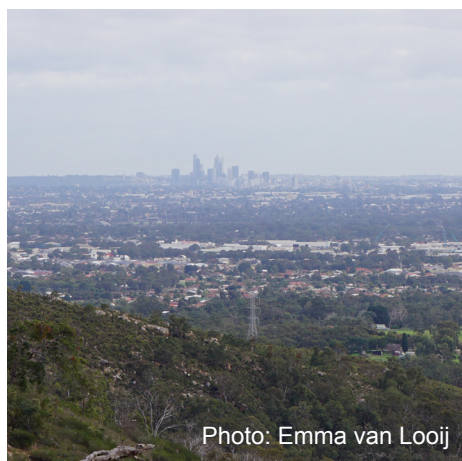


Photo: Emma van Looij

The city of Perth from Ellis Brook Valley, August 2017.

## Phosphorus

TP and Particulate P exhibited a slight seasonal response, increasing during winter before dropping as flows reduce due to decreasing rainfall. SRP remained fairly constant throughout the year. It is likely that all forms of P are entering the brook predominantly through surface and sub-surface runoff.



Photo: Emma van Looij

The Ellis Brook Valley is known for its diversity of wildflowers, August 2017.



Photo: Katherine Bennett



Photo: Emma van Looij



Photo: Emma van Looij

**Photographs of Ellis Brook:** (Top left) The Ellis Brook sampling site, August 2017. (Bottom left) A small pool on Ellis Brook, July 2015. (Right) 60 ft falls in the Ellis Brook valley, August 2016.



# Local nutrient reduction strategies for Ellis Brook

Nutrient reduction strategies being undertaken or recently completed in the Ellis Brook catchment include but are not limited to:

- The Ellis Brook Valley Strategic Management Plan is being drafted for the City of Gosnells and restoration works are being progressed.
- Friends of Ellis Brook Valley completed many successful conservation projects at Ellis Brook Valley Reserve. Regular work days are held to revegetate degraded areas by planting trees and shrubs, conduct erosion control and clean up rubbish and graffiti. The group also advises the council regarding future developments and projects and actively seeks funding for future projects.
- The Department of Biodiversity, Conservation and Attractions (DBCA) Healthy Catchments Program aims to protect the environmental health and community benefit of the Swan Canning river system by improving water quality in the catchments. This is achieved through engaging partners and focusing the effort of local governments, sub-regional groups, the community and other organisations in water quality improvement activities.
- Ongoing sub-regional projects: Coordination and support of community led projects to reduce nutrient inputs into the Canning River in the south sub-region led by the South East Regional Centre for Urban Landcare and funded by DBCA.
- The Phosphorus Awareness Project which aims to assist the community in reducing their nutrient outputs through education, promotion and behaviour change programs.

## Swan Canning water quality improvement plan

The *Swan Canning water quality improvement plan* (SCWQIP) complements the delivery of other major programs and presents a roadmap for reducing nutrient inputs into the river system. It uses sophisticated modelling to identify nutrient sources and provides nutrient-reduction targets for each of the subcatchments

SCWQIP load and concentration targets for Ellis Brook

	Max. acceptable load (t/yr)	Concentration target (mg/L)	% reduction required
TN	0.7	1.0	0%
TP	0.02	0.1	0%

For further information on the SCWQIP contact:  
[rivers.info@dbca.wa.gov.au](mailto:rivers.info@dbca.wa.gov.au)



Dry channel of Ellis Brook, downstream of 60 ft Falls, July 2015

## Summary: Ellis Brook

- Ellis Brook is currently passing both the short- and long-term TN and TP targets.
- Nutrient loads leaving Ellis Brook are currently satisfactory and no nutrient reduction is required to meet the SCWQIP targets.
- Of the 33 sites sampled, Ellis Brook has the lowest median TN concentration and the equal third-lowest median TP concentration.
- There was an emerging decreasing long term trend in TN concentrations.

