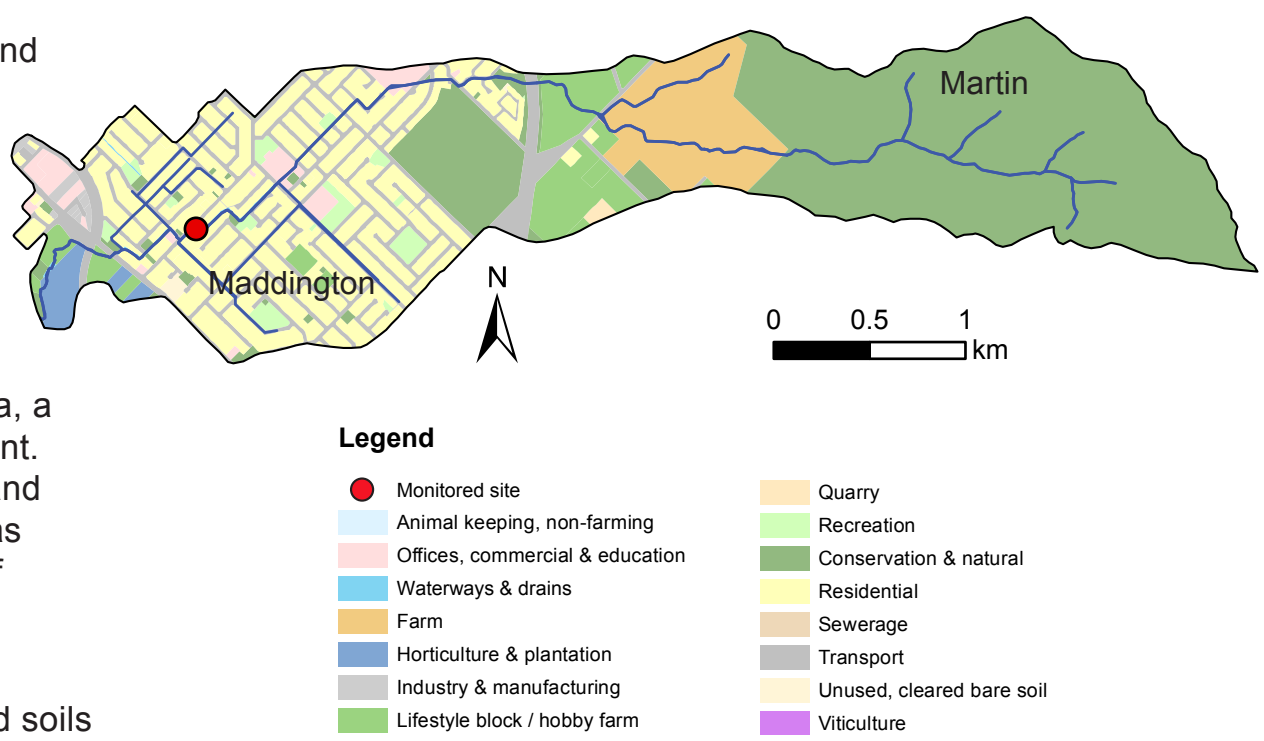
Helm Street Drain

Helm Street Drain has its headwaters in the Darling Scarp, where it is a natural creek, and then flows westwards before its confluence with the Canning River near Albany Highway in Gosnells. It is generally ephemeral, drying for a short period during summer (December to February) though it may flow year round.

The upper portion of the catchment remains uncleared and lies within the Banyowla Regional Park which was named after Banyowla, a Nyungar elder at the time of European settlement. The central section of the catchment has farmland and lifestyle blocks. West of these, the creek has been modified into a drain, including sections of piped and open channels, and the surrounding landuse is predominantly urban.

Helm Street Drain flows through red gravels and soils in the west followed by shallow red and yellow earths as it passes over the scarp. 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 Helm Street in Maddington. This site was chosen to estimate the nutrient concentrations leaving the catchment, so the data may not accurately represent nutrient concentrations in upstream tributaries.



A flow control structure in Helm Street Drain, March 2016.

Helm Street Drain in Maddington, March 2016.

Helm Street Drain – facts and figures

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	6.0 km^2
Per cent cleared area (2005)	57%
River flow	May flow year round but often dries for short periods during summer (December to February)
Major land uses (2005)	Conservation and natural, and residential

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)	SCCIS4		1.80			0.88	0.90	1.00	1.40	1.30	1.60	1.60
TP median (mg/L)	SCCIS4		0.032			0.022	0.033	0.029	0.045	0.030	0.033	0.035

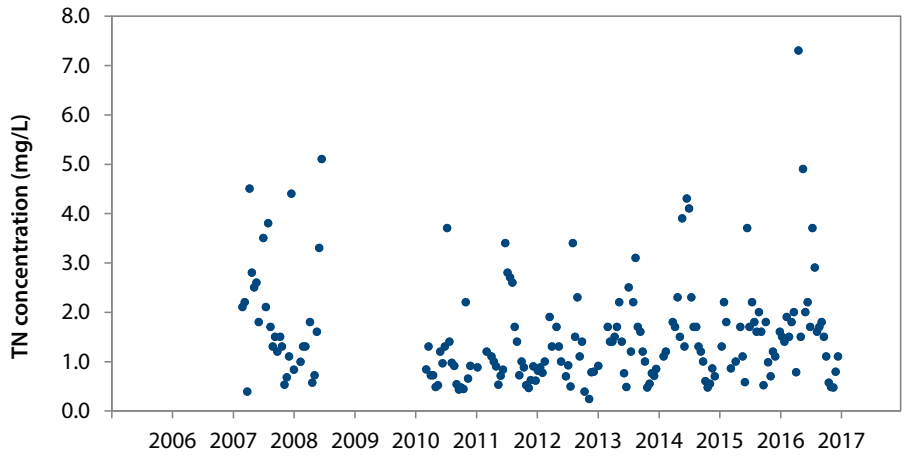
TN short term target = 2.0 mg/L TN long term target = 1.0 mg/L TP short term target = 0.2 mg/L TP long term target = 0.1 mg/L

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

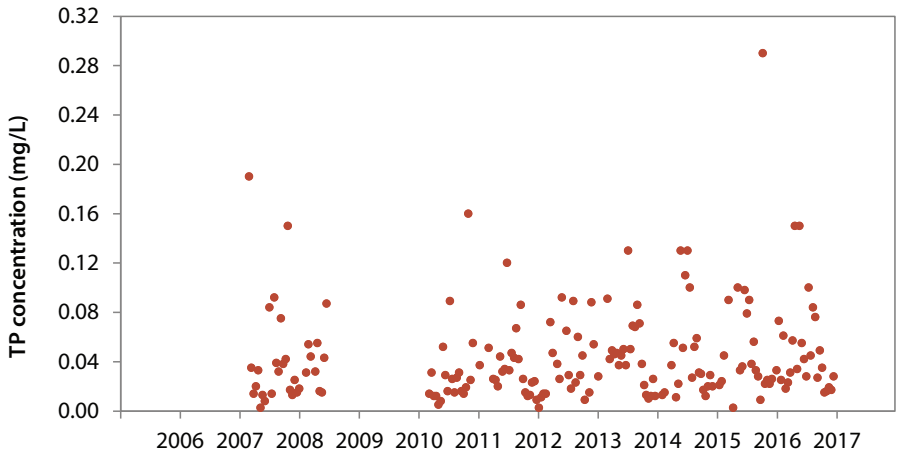
* Best estimate using available data. # Statistical tests that account for the number of samples and large data variability are used for testing against targets on three years of winter data. Thus the annual median value can be above the target even when the site passes the target (or below the target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

Changes in nutrient concentrations over time in Helm Street Drain

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 increased over the 2010–16 period. Trend testing verified this with an increasing trend of 0.1 mg/L/yr being detected over this time frame.

Target

Helm Street Drain has been passing the short-term but failing the long-term TN target since monitoring commenced.

Helm Street Drain downstream of Albany Highway, March 2016. Photo: Emma van Looij.

Trend

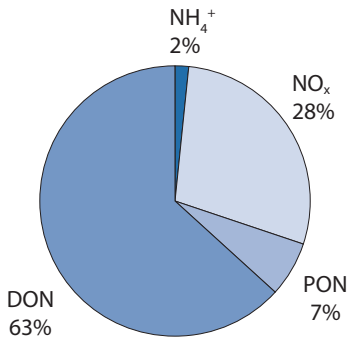
Since 2011, total phosphorus (TP) concentrations appeared relatively stable. There were no trends present in the data

Target

Helm Street Drain has been passing the short- and long-term targets since monitoring commenced.

Nutrient fractions in Helm Street Drain

Average composition of nitrogen (N) in Helm Street Drain over the 2012 to 2016 monitoring period

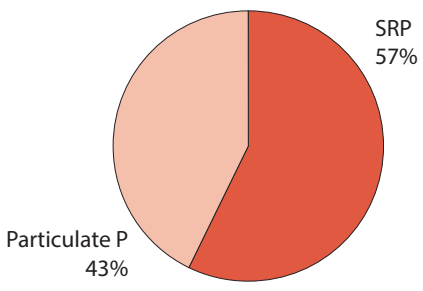


Nitrogen

More than two-thirds of the nitrogen (N) in Helm Street Drain 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_4^+ and N oxides – NO_x). This form of N is readily available for plant and algal uptake and is most likely sourced from fertilisers used in both urban areas and lifestyle blocks/hobby farms, septic tank leachate and animal waste.

There were no flow data for Helm Street Drain so loads have not been calculated.

Average composition of phosphorus (P) in Helm Street Drain over the 2012 to 2016 monitoring period



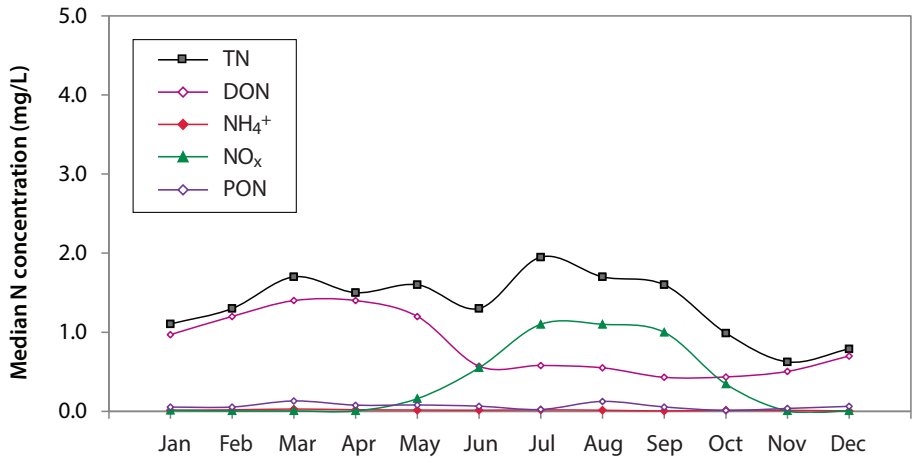
Phosphorus

Just over half of the phosphorus (P) was present as soluble reactive phosphorus (SRP). This form of P is readily available for plant and algal uptake and is derived from animal waste, fertilisers and septic tank leachate. The remainder of the P was present as particulate P which is sourced from organic material and sediment-bound forms of P. Particulate P is not readily available for plant and algal uptake, but may become available over time as particles decompose or bound phosphate is released.

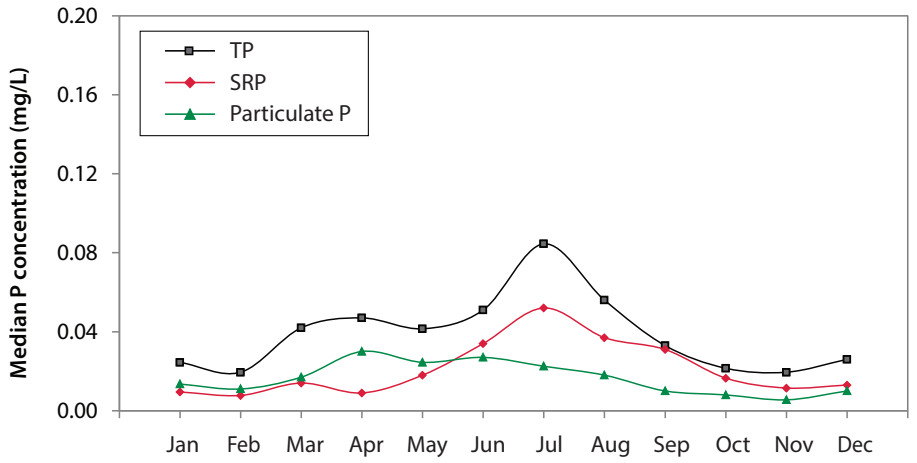
There were no flow data for Helm Street Drain so loads have not been calculated.

Seasonal variation in nutrient concentrations in Helm Street Drain

Nitrogen seasonal variation over the 2012 to 2016 monitoring period



Phosphorus seasonal variation over the 2012 to 2016 monitoring period



Nitrogen

TN and NO_x showed a seasonal pattern, rising with the onset of winter rains and falling again as rainfall eases. This indicates that groundwater, surface and subsurface flows are all contributing N to the drain during the winter months when increased flow flushes N from the soil. Dissolved organic N tended to have higher concentrations in Summer and lower in Spring suggesting that it was mostly entering the drain via groundwater.

Photo: Emma van Looij

Phosphorus

TP and SRP concentrations showed a seasonal response, rising through winter when rainfall and drain flow were highest and falling again in summer. This indicates that P was entering the drain via surface and subsurface runoff as well as in groundwater. The peak in particulate P concentrations in April was most likely due to a first flush effect where the first rains are washing debris into the drain from the surrounding catchment.

Photo: Water Science Branch

Photo: Emma van Looij

Photo: Emma van Looij

Photo: Emma van Looij

Photographs of Helm Street Drain: (Top left) Helm Street Drain sampling site, March 2016. (Bottom left) Helm Street Drain where it is still a natural creekline, dry at the time of this photograph. Note limited riparian vegetation and abundance of grass in creek, March 2016. (Right) Helm Street Main Drain in Gosnells, as it flows under Albany Highway, March 2016.

Local nutrient reduction strategies for Helm Street Drain

Nutrient reduction strategies being undertaken or recently completed in the Helm Street Drain catchment include but are not limited to:

- The Department of Biodiversity, Conservation and Attractions (DBCA) Healthy Catchments Program aims to protect the environmental health and community benefits 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 in the Canning River in the south sub-region led by the South East Regional Centre for Urban Landcare (SERCUL) 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 Helm Street

	Max. acceptable load (t/yr)	Concentration target (mg/L)	% reduction required
TN	0.5	0.75	71%
TP	0.04	0.075	43%

For further information on the SCWQIP contact:
rivers.info@dbca.wa.gov.au

A road drain along Gosnells Rd East in Orange Grove, March 2016. Photo: Emma van Looij.

A drain flowing through Harmony Fields in Maddington, March 2016. Note the algae growing along the edges of the drain. Photo: Emma van Looij.

Summary: Helm Street Drain

- Helm Street Drain is currently passing the short-term target for TN and both the short- and long-term TP targets.
- An increasing short term trend in TN concentrations was detected.
- A 71% reduction in TN and a 43% reduction in TP is required for Helm Street to pass its SCWQIP targets.

www.dwer.wa.gov.au
www.dbca.wa.gov.au

For further information please contact the
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