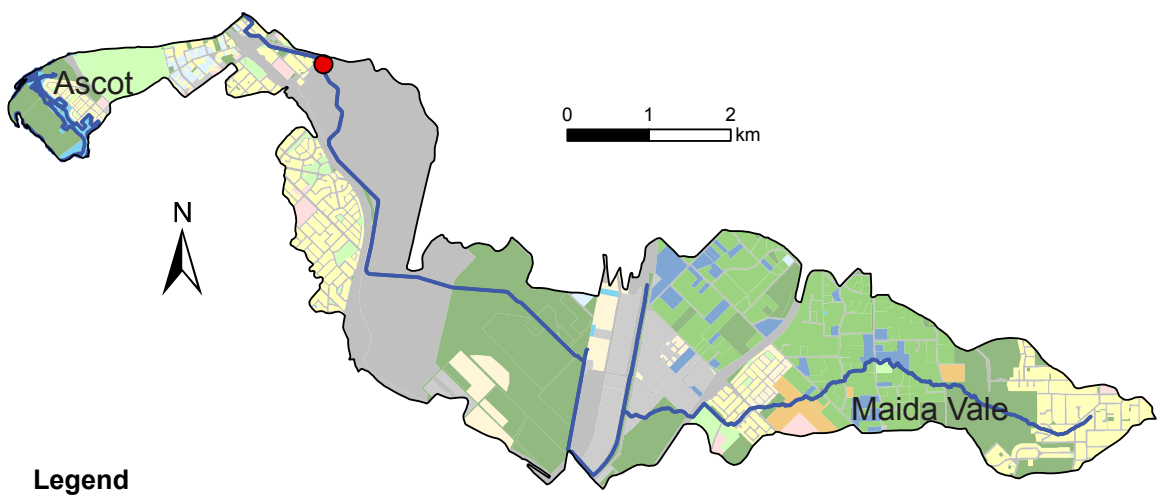
Perth Airport South

Perth Airport South Main Drain is an ephemeral waterway, drying for a short period over summer. The headwaters are in the Darling Scarp where it is a natural waterway called Crumpet Creek. Shortly before it enters the airport it has been converted into a drain. It discharges to the Middle Swan Estuary in Ascot.

European settlers used the land in the catchment for agricultural activities and stock grazing. The site for the airport itself was selected in 1938 on Dunreath golf course. Construction commenced in 1943 though the airport was initially used for military purposes only. Most of the undeveloped land at the airport is technically a wetland and has been categorised as a conservation category wetland. The majority of the airport lies in the Perth Airport North catchment though part of the runways and other infrastructure associated with the airport lies in the Perth Airport South catchment.

There is a mixture of landuse in the catchment including urban, conservation and natural, lifestyle blocks, industry and manufacturing as well as part of the airport itself.

The most common soil types in the catchment are Bassendean Sands and Forrestfield and Guildford soils. In the eastern portion of the catchment there is a small area of red gravels and earths as well as shallow red and yellow earths along the Darling Scarp. Bassendean sands have poor nutrient-retention capabilities so any nutrients applied as fertiliser are quickly transported to groundwater when water is applied.



Crumpet Creek in Maida Vale, March, 2016.

Perth Airport Drain – facts and figures

Water quality is monitored fortnightly near Kanowna Avenue West in Ascot. This site is positioned to indicate what nutrients are leaving the catchment and entering the Middle Swan Estuary, so the data may not represent nutrient concentrations in upstream areas. Prior to August 2016, the site was located just off Second Avenue in Belmont but needed to be moved after access to the original site was cut-off due to the drain being redirected and piped.

Average rainfall (2012–16)	~ 680 mm per year (Perth metro)
Catchment area	24 km^2
Per cent cleared area (2005)	74% (total catchment)
River flow	Flows for most of the year, drying for a short period in summer
Major land uses (2005)	Transport (roads and airport) and conservation and natural (total catchment)

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)	KANAV		0.60			0.79	0.72	0.71	0.67	0.90	1.00	1.10#
TP median (mg/L)	KANAV		0.016			0.021	0.026	0.028	0.027	0.036	0.042	0.054

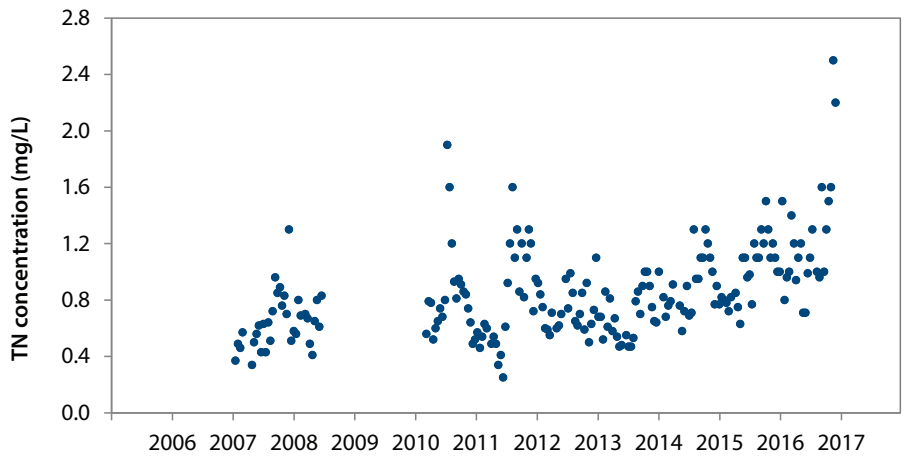
TN short term target = 2.0 mg/L TN long term target = 1.0 mg/L TP short term target = 0.2 mg/L TP long term target = 0.1 mg/L

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

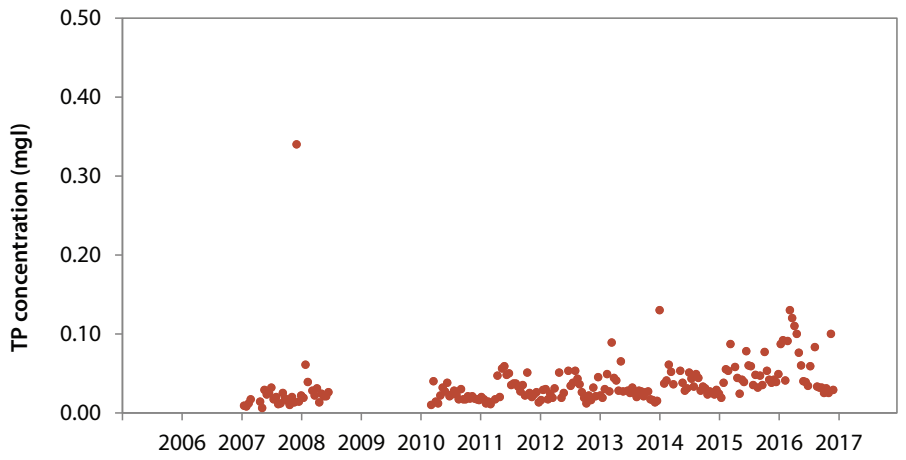
* Best estimate using available data. # Statistical tests that account for the number of samples and large data variability are used for testing against targets on three years of winter data. Thus the annual median value can be above the target even when the site passes the target (or below the target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

Changes in nutrient concentrations over time in Perth Airport 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 increased over the 2010–16 period. This was verified by trend testing which detected both short- (2012–16) and long-term (2010–16) trends of 0.12 mg/L/yr and 0.07 mg/L/yr respectively. The reasons for these trends is unknown.

Target

Perth Airport Drain has been passing the short- and long-term TN targets since monitoring commenced.

Crumpet Creek in Forrestfield, March 2016. Photo: Emma van Looij.

Trend

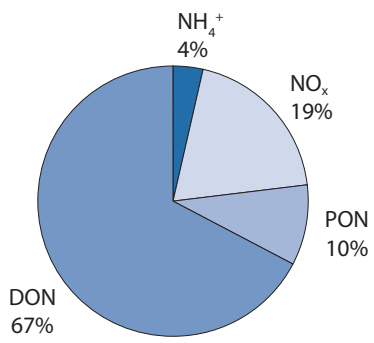
Visually total phosphorus (TP) concentrations appear to have increased over the 2010–16 monitoring period. This was verified by trend testing which detected a small increasing trend of 0.003 mg/L/yr over the same period.

Target

Perth Airport Drain has been passing the short- and long-term TP targets since monitoring commenced.

Nutrient fractions in Perth Airport Drain

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

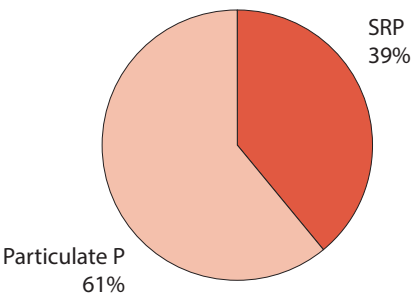


Nitrogen

Just over three-quarters of the nitrogen (N) was present in the form of organic N which consists of dissolved (DON) and particulate (PON) fractions. DON largely comprises organic compounds leached from peaty sub-soils and degrading plant and animal matter. It is available for uptake by plants, algae and bacteria. PON is comprised 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) which are mostly from fertilisers, animal wastes and septic tank leachate. These forms of N are readily available for plant and algal uptake.

There were no flow data for Perth Airport Drain so loads have not been calculated.

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



Phosphorus

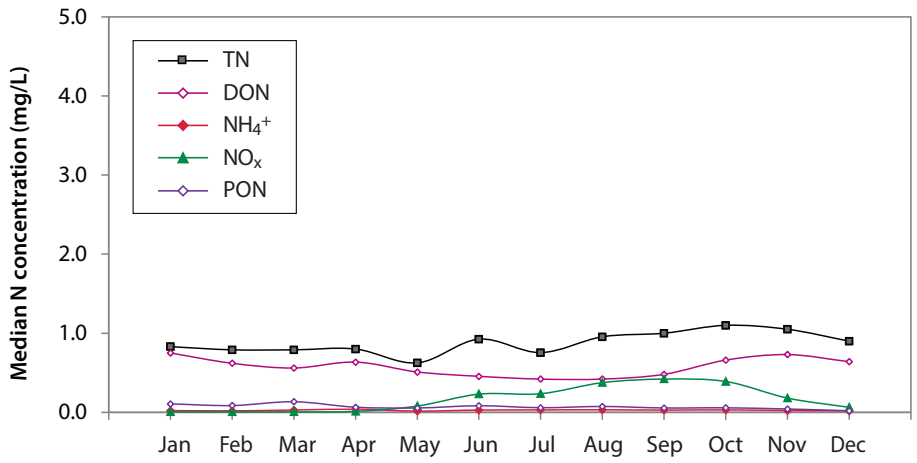
Nearly two-thirds of the phosphorus (P) was present in the form of particulate P which is derived from organic material and sediment-bound forms of P. This form of P is not readily available for use by plants or algae, but may be broken down to available forms over time. The remainder of the P was present as soluble reactive phosphorus (SRP) which is readily available for plant and algal uptake. Likely sources of this kind of P are fertilisers, animal waste and septic tank leachate.

There were no flow data for Perth Airport Drain so loads have not been calculated.

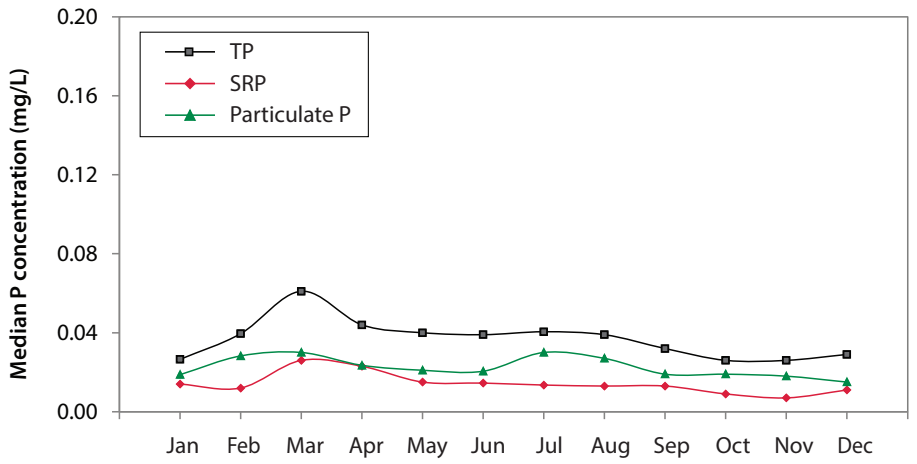
Photo: Emma van Looij

Seasonal variation in nutrient concentrations in Perth Airport Drain

Nitrogen seasonal variation over the 2012 to 2016 monitoring period



Phosphorus seasonal variation over the 2012 to 2016 monitoring period



Nitrogen

NO_x showed a clear seasonal pattern, being highest during the months with the most rainfall and hence flow. This suggests that most of the NO_x is entering the drain via surface and sub-surface flows. DON showed a slight seasonal response, being higher during warmer, drier months, and lower in the wetter months. This suggests that the majority of DON is entering the drain via groundwater. PON and NH_4^+ did not show a clear seasonal response. This indicates that a number of pathways are probably responsible for delivering these forms to the drain including groundwater, surface and sub-surface flows.

Photo: Emma van Looij

Phosphorus

A slight seasonal pattern was apparent in P concentrations. Particulate P concentrations were highest in winter (June to August), linked to increased rainfall and flow. It also peaked in February to March, coinciding with an abundance of macrophytes growing in the drain at the sampling site. SRP also peaked at this time. This relationship suggests that groundwater is contributing SRP to the drain year-round but that it is also coming from surface flows following rainfall. Particulate P is entering the drain year-round from surface flows as well as from instream sources such as macrophytes and algae (the drain often has dense stands of macrophytes present).

Photo: Emma van Looij

Photo: Frances Miller

Photo: Frances Miller

Photo: Frances Miller

Photographs of Perth Airport South: (Top left) Looking downstream from the original Perth Airport South sampling site, August 2016. (Bottom left) Looking downstream of the re-directed drain near the original sampling site. It was as part of these works that access to the original site was cut off, August 2016. (Right) The new sampling site on Perth Airport Main Drain, June 2016.

Local nutrient reduction strategies for Perth Airport South

Nutrient reduction strategies being undertaken or recently completed in the Perth Airport South catchment include but are not limited to:

- The Perth Airport Environment Strategy which was a five-year action plan implemented from 2009–14 and included actions directed towards maintaining and protecting the quality of soil and water within the airport estate; identifying degraded sites and facilitating their remediation, and minimising the potential for adverse impact to groundwater and ecological water flows from the airport and tenant activities.
- Improved management of Ascot Racecourse Lakes to improve water quality flowing to the Swan River.
- Department of Biodiversity, Conservation and Attractions (DBCA) Riverbank Program which has funded numerous projects across two key foreshore sites in the Perth Airport South catchment. Projects have included construction of erosion control treatments such as rock revetment and bioengineering as well as restoration techniques using weed control and revegetation. Examples include projects at Ascot Racecourse and the Esplanade, Redcliffe.
- The DBCA's 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.
- 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 Perth Airport South

	Max. acceptable load (t/yr)	Concentration target (mg/L)	% reduction required
TN	1.1	1.0	0%
TP	0.17	0.1	0%

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

Photo: Emma van Looij

Summary: Perth Airport South

- Both short- and long-term increasing trends in TN concentrations and a long-term increasing trend in TP concentrations were detected.
- Perth Airport South is currently passing both the short- and long-term TN and TP targets.
- Of the 33 sites sampled, Perth Airport South has one of the lowest proportions of N present as bioavailable DIN.
- The TN and TP loads from the Perth Airport South catchment are currently considered to be acceptable and no load reduction is required to meet the SCWQIP targets.

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

For further information please contact the
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