The Perth Airport North main drain (also known as Limestone Creek) has its headwaters in the Darling Scarp where it is known as Poison Gully Creek. This is the largest waterway in the Perth Airport North catchment though there are other, smaller, drains which also discharge to the Swan River Estuary.

Both Munday Swamp and Poison Gully Creek have been deemed highly significant to contemporary Nyungars and there are numerous archeological sites in the area.

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. In 2002 to 2003, Poison Gully Creek was diverted around the Poison Gully wetlands and around Munday Swamp. At the same time, a large new drain was constructed to drain water from the airport, directly into Limestone Creek.

Landuse in the upper half of the catchment is mostly urban, while the lower half consists of bushland and a large portion of the airport, including the terminals.

The most common soil type in the catchment is leached sands, associated with the Bassendean Zone. In the eastern portion of the catchment there is a small area of hard acidic yellow soils containing ironstone gravels. Bassendean sands have poor nutrient-retention capabilities so any nutrients applied as fertiliser are quickly transported to groundwater when water is applied.

Water quality is monitored in Limestone Creek, where it passes under the Great Eastern Highway Bypass in South Guildford. This site was chosen to give an indication of the nutrients leaving the catchment and discharging into the Swan River Estuary. It does not represent nutrients in upstream areas or in other drains in the catchment.

Nutrient Summary: concentrations, rainfall and targets

<table>
<thead>
<tr>
<th>Year</th>
<th>Site</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual rainfall (mm)</td>
<td>009225</td>
<td>703.0</td>
<td>807.8</td>
<td>607.2</td>
<td>503.8</td>
<td>860.8</td>
<td>608.2</td>
<td>782.4</td>
<td>674.4</td>
</tr>
<tr>
<td>TN median (mg/L)</td>
<td>SCCIS12</td>
<td>0.74</td>
<td>0.57</td>
<td>0.78</td>
<td>0.66</td>
<td>0.65</td>
<td>0.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP median (mg/L)</td>
<td>SCCIS12</td>
<td>0.024</td>
<td>0.026</td>
<td>0.034</td>
<td>0.030</td>
<td>0.034</td>
<td>0.035</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

* 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).
**Trend:**
There appears to have been a step change (increase) in total nitrogen (TN) concentrations in mid 2011. The reason for this change is unknown. Since 2012, TN concentrations appear to be slowly decreasing again. Due to the presence of the step change it was not possible to calculate trends over the 2010–14 time period.

**Target:**
Limestone Creek is currently passing both the short- and the long-term TN targets.

**Trend:**
Total phosphorus (TP) concentrations appear to have increased slightly over the 2010–14 time period. This was also evident in the trend analysis which detected a small emerging increasing trend of 0.002 mg/L/yr.

**Target:**
Limestone Creek is currently passing both the short- and the long-term TP targets.

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**Nutrient fractions in Limestone Creek**

**Nitrogen**

Three-quarters of the nitrogen (N) is 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 composed of plant and animal debris and needs to be further broken down to become available to plants and algae. The remaining N is present as dissolved inorganic N (DIN, consisting of ammonium – $\text{NH}_4^+$ and N oxides – $\text{NO}_x$) which is mostly from fertilisers, animal wastes and septic tank leachate. These forms of N are readily available for plant and algal uptake.

**Phosphorus**

More than three-quarters of the phosphorus (P) is present as particulate P, commonly associated with soil erosion and suspended sediments in the water column (this site is often very turbid) as well as in the form of algae. Plants and algae do not readily absorb particulate P, however some of it will become available over time as particles decompose or release bound phosphate. The remainder of the P is present as highly bioavailable soluble reactive phosphorus (SRP). Likely sources of SRP include animal waste and fertiliser. SRP is readily used by plants and algae.
Seasonal variation in nutrient concentrations in Limestone Creek

Nitrogen seasonal variation over the 2010 to 2014 monitoring period

Nitrogen

NO$_3$ showed a clear seasonal pattern, being highest during the high rainfall and hence high flow months. This suggests that most of the NO$_3$ is entering the creek via surface and sub-surface flows. The other forms of N did not show a clear seasonal response. This indicates that a number of pathways are probably responsible for delivering DON, PON and NH$_4^+$ to the brook including groundwater, surface and sub-surface flows.


Photographs of Perth Airport North: Nutrient report 2014

Phosphorus seasonal variation over the 2010 to 2014 monitoring period

Phosphorus

A slight seasonal pattern is apparent in SRP concentrations. The peak concentrations occur in September. This suggests that SRP is entering the brook via surface and sub-surface flows, driven by rainfall. Particulate P is present year round, indicating that it is probably entering the brook via a variety of pathways such as groundwater and surface and sub-surface flows, as well as being present in the brook in the form of algae.


Photographs of Perth Airport North: Nutrient report 2014
Local nutrient reduction strategies for Perth Airport North

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

- 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.

- Riverbank has funded numerous projects across three key foreshore sites in the Perth Airport North 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 such as Garvey Park and Loder Way.

- The 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 a ‘catchment to coast’ approach and by engaging in partnerships that focus 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 Swan River in the south sub-region led by the South East Regional Centre for Urban Landcare (SERCUL) and funded by the Department of Parks and Wildlife.

- Phosphorus Awareness Project 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.

<table>
<thead>
<tr>
<th>SCWQIP load and concentration targets for Perth Airport North</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. acceptable load (t/yr)</td>
</tr>
<tr>
<td>TN 1.3</td>
</tr>
<tr>
<td>TP 0.21</td>
</tr>
</tbody>
</table>

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

Summary: Perth Airport North

- TN and TP concentrations in Limestone Creek are currently passing both the short- and long-term targets.
- A small emerging increasing trend in TP concentrations of 0.002 mg/L/yr was detected in Limestone Creek.
- Of the 12 catchments in this series of nutrient reports, Limestone Creek had the second lowest median TN concentration.
- Limestone Creek had the lowest percentage of P as SRP and the fourth lowest percentage of N as DIN of the 12 catchments in this series of nutrient reports.
- TP loads are currently acceptable and the Perth Airport North catchment is passing its SCWQIP TP target.
- A 34 percent reduction in TN is required for Perth Airport North to pass the SCWQIP TN target.