The Maylands catchment consists of more than ten drains which discharge into the Swan River Estuary. The drains are almost entirely closed pipes with only very small sections of open drain present.

The catchment consists of three suburbs, Mt Lawley, Inglewood and Maylands, with small portions of other suburbs also within its boundaries. Prior to the establishment of the Swan River Colony, the area was occupied by the Yabbaru Bibbulman Nyungar people. In the early 1800s, Mount Lawley was the first of these suburbs to be settled with Inglewood and Maylands settled around 1830.

Historical landuse in the catchment included agriculture, residential, clay pits for brick and tile making as well as being the location of Perth’s main airport until the 1960s when it moved to its current site. To facilitate development significant drainage works have occurred throughout the catchment to lower groundwater levels and drain lakes.

The catchment is predominantly urban though there are two golf courses present as well as regionally significant bushland at Baigup Reserve which contains some of the last remaining bushland on the Swan River Estuary.

Leached sands (both Bassendean and Spearwood Zone) are the most common soil type with an area of neutral red and yellow earths along the Swan River. Leached sands have poor nutrient-retention capabilities so any nutrients applied as fertiliser will rapidly leach into groundwater after water is applied.

Water quality is monitored at the outlet of the Maylands Main Drain to the Swan River Estuary near the Maylands Yacht Club. Because the site is so close to the estuary it is only possible to sample when the flow from the drain is sufficient to remove any estuarine backflow. This means that while the drain appears to flow year-round it can only be sampled during winter, when drain flows are high. The site is positioned to indicate nutrient concentrations leaving the catchment and flowing into the Swan River Estuary, so the data may not represent nutrient concentrations in upstream areas, or in other drains in the catchment.

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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>MIMDOUT</td>
<td>1.20</td>
<td>1.00</td>
<td>1.20</td>
<td>0.98*</td>
<td>0.023</td>
<td>0.015</td>
<td>0.017</td>
<td>0.014</td>
</tr>
<tr>
<td>TP median (mg/L)</td>
<td>MIMDOUT</td>
<td>0.023</td>
<td>0.015</td>
<td>0.017</td>
<td>0.014</td>
<td></td>
<td></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).
Changes in nutrient concentrations over time in Maylands Main Drain

**Trend:**
Total nitrogen (TN) concentrations appear to be decreasing over the 2011 to 2014 reporting period. As there was insufficient data available with which to calculate trends it is not possible to determine if the observed decrease is statistically significant.

**Target:**
Maylands Main Drain is currently passing the short- but failing the long-term TN target.

Nutrient fractions in Maylands Main Drain

**Nitrogen**

More than half of the nitrogen (N) present is in the form of dissolved inorganic N (DIN, consisting of ammonium – NH₄⁺ and N oxides – NOₓ). This form of N is readily available for plant and algal uptake. It is mostly derived from fertilisers used on parks and gardens and animal waste. Organic N makes up the remainder of the N present and consists of both dissolved (DON) and particulate (PON) fractions. DON largely comprises 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.

**Phosphorus**

Half of the phosphorus (P) is present as soluble reactive phosphorus (SRP). This form of P is readily available for plant and algal uptake and is derived from fertilisers and animal wastes. The other half of the P is present as particulate P. This form of P is derived from organic material, algae and sediment-bound forms of P. It is not readily available for plant and algal uptake, but may become available over time as particles decompose or bound phosphate is released.
Seasonal variation in nutrient concentrations in Maylands Main Drain

**Nitrogen seasonal variation over the 2011 to 2014 monitoring period**

Nitrogen

There was a seasonal pattern in NO\textsubscript{x}, with concentrations being highest in September. This is probably caused by increased rainfall over the winter months flushing NO\textsubscript{x} into the drain via surface flows. Most of the drain is piped and does not connect directly to surrounding groundwater. The median concentrations shown in January to March and July to August are calculated from very few data points. While the drain flows during this time period (and during April to June), the water levels are low. The proximity of the sampling site to the Swan River Estuary means that estuarine water tends to flow into the drain during low flows making it impossible to sample drain water at these times. As the drain is a closed pipe it is not possible to shift the sampling site further upstream, away from the estuarine influence.

**Phosphorus seasonal variation over the 2011 to 2014 monitoring period**

Phosphorus

Both soluble reactive phosphorus (SRP) and particulate P showed a seasonal response with SRP peaking earlier than particulate P. As the drain is mostly piped and has little connection to groundwater the P must be entering the drain via surface runoff, triggered by rainfall. As mentioned under nitrogen, on the left, the median P values shown in January to March and July to August are calculated from very few data points and, while the drain is usually flowing year round the sampling sites proximity to the Swan River Estuary means it can only be sampled when drain flow is relatively high.

**Photographs of Maylands catchment:**

(Top left) Revegetation along Walters Brook in Banks Reserve, August 2015. (Bottom left) Walters Brook, same location as top left photograph, prior to revegetation works, November 2005. (Right) The Maylands Main Drain sampling site (sampled at the drain entering the Swan River to the left of the boardwalk in this photograph), April 2015.
Local nutrient reduction strategies for Maylands

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

- The restoration of Walter’s Brook located within Banks Reserve on the Swan River foreshore. The project was completed in May 2014 and included stabilisation of banks, reducing the turfed area and increasing native vegetation around the brook aimed at improving the quality of water entering the river.
- Riverbank has funded numerous projects across three key foreshore sites in the Maylands catchment. Projects have included construction of erosion control treatments such as a rock revetment and bioengineering as well as restoration techniques using weed control and revegetation. Examples include projects at Tranby Reserve and Bath Street.
- 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 in the Swan River in the north sub-region funded by the Department of Parks and Wildlife.
- The 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.

SCWQIP load and concentration targets for Maylands MD

<table>
<thead>
<tr>
<th></th>
<th>Max. acceptable load (t/yr)</th>
<th>Concentration target (mg/L)</th>
<th>% reduction required</th>
</tr>
</thead>
<tbody>
<tr>
<td>TN</td>
<td>5.1</td>
<td>0.5</td>
<td>53%</td>
</tr>
<tr>
<td>TP</td>
<td>0.3</td>
<td>0.05</td>
<td>0%</td>
</tr>
</tbody>
</table>

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

Summary: Maylands

- TN concentrations are currently passing the short- but failing the long-term targets.
- TP concentrations are passing both the short- and long-term targets.
- Maylands Main Drain had the lowest median TP concentration of the 12 catchments included in this series of nutrient reports.
- Of the 12 catchments included in this series of nutrient reports, Maylands Main Drain had the second highest percentage of N present as bioavailable DIN.
- A 53 percent reduction in TN is needed for Maylands Main Drain to pass the SCWQIP TN target. The TP load is currently acceptable and no reduction is required.