Stormwater Harvesting in the Burnt Bridge Creek Catchment

COUNCIL NAME
Manly Council

WEB ADDRESS
www.manly.nsw.gov.au

SIZE
14.5 square kilometres

POPULATION
44,232

Overview

Manly Council is undertaking two stormwater harvesting projects in the Burnt Creek Catchment at Balgowlah Golf Course and LM Graham Reserve. The overall objective of the project is to integrate water savings with environmental improvement.

This project has constructed a large stormwater harvesting dam at Balgowlah Golf Course. Dam storage of 4ML allows for approximately 60ML per year of captured stormwater to be used for irrigation. The dam and the underground Gross Pollution Trap (GPT) treats 100% of the stormwater flowing through the golf course. A second stormwater harvesting system is currently being designed at LM Graham Reserve in Manly. This will supply an estimated 6.7ML of water per year for irrigation of playing fields.

Background

The Burnt Bridge Creek Catchment is extremely urbanised and flows to Manly Lagoon, which has been rated one of the most polluted water bodies in Australia. Stormwater pollution from the impervious urban areas is one of the main reasons for the degradation. The Catchment extends across both Manly Council and Warringah Council areas, making it challenging for environmental management. Using harvested stormwater for irrigation saves potable water and reduces water costs for Council. It has the benefit of capturing stormwater pollution, which reduces pollution loads in the receiving waterways. Stormwater flows during heavy rain are also a major issue as they erode creek banks and deposit sediment in pools. In general, stormwater harvesting creates a more natural, localised water cycle, which benefits the local environment and local community.

The Balgowlah Golf Club is an ideal location for stormwater harvesting because the storage dam can double as a water trap / feature on the course. The club has a high demand for water to irrigate the greens and fairways and already had pumps and piping installed. There is a large stormwater pipe running through the course, which conveys water from the upstream catchment through the golf course to Burnt Bridge Creek. As part of the project, water from the pipe is directed to the online stormwater harvesting dam.

The LM Graham stormwater harvesting design process is timed to coincide with the LM Graham Reserve Masterplan Implementation. The water will be used for irrigation of the two soccer fields / cricket oval and surrounds. It is planned to promote water sensitive urban design in the community through sustainable water use.

Implementation

The construction of the Balgowlah Golf Course Stormwater Harvesting Dam was completed in 2013. The project involved the following:

- Discussions with stakeholders, including the Golf Club, internal Council working groups, NSW Environmental Trust (funding body), NSW Office of Water and Manly Lagoon Catchment Coordinating Committee;
- Construction of a 4ML pond/dam with a maximum nominal water depth of 2.5m;
- Installation of a gross pollutant trap in Balgowlah oval upstream of Balgowlah Golf Course;
- Excavation and shaping of approximately 6,600m^3 of cut material including soil and rocks. The soil was reused onsite;

REFERENCES

www.manly.nsw.gov.au/environment/parks-reserves/burnt-bridge-creek/

- Creation of an overland flow path to the pond, replacing a dilapidated culvert with a new culvert that runs under the fairway;
- Installation of a plastic membrane and rock boulder edges;
- Construction of a large downstream rock spillway;
- UV treatment system for disinfection of the stormwater before irrigation;
- New pump system to direct water from the pond to the treatment system prior to irrigating the course; and
- Converting the existing dam in Burnt Bridge Creek where the Golf Course previously extracted water from to a sediment basin with formal access for maintenance.

The sediment basin is regularly cleaned out. As such pollutant loads into Manly Lagoon are reduced. Following the success of the Balgowlah Golf Course Stormwater Harvesting Dam, LM Graham Reserve has become the next focus of stormwater harvesting efforts in the Burnt Bridge Creek Catchment. A feasibility assessment and designs have been developed for the site. Meetings have been held with internal working groups, including Council's engineer, parks manager, community engagement officer, natural resource manager, catchment officers and contracted stormwater consultants.

Outcomes

Initially assessment of the Balgowlah Golf Course Stormwater Harvesting Dam shows that it is on track to save 50ML of water per year. The Golf Course no longer extracts water from Burnt Bridge Creek for irrigation. Creek water can now remain as environmental flows, which re-creates the natural creek conditions and helps preserve the remnant ecosystems. The weir structure in the creek previously used by the Golf Course to hold water for harvesting has been modified to include access for sediment removal. Balgowlah Golf Course was able to stay open for the entire construction phase.

The success of the Balgowlah Golf Course Stormwater Harvesting Dam has been continued with the preparation of the LM Graham Stormwater Harvesting Design. Designs have been prepared which will save 6.7ML of water per year, including potable water and groundwater. Groundwater has been heavily used in the area, therefore reducing the reliance on the aquifer will have significant environmental benefits on the aquifer and downstream groundwater dependant ecosystems. Overall, the key benefit of both projects is the environmental improvement, more so than saving money for Council. This means it will create lasting ecological improvements for Burnt Bridge Creek and downstream Manly Lagoon.

Key Learnings

The Golf Course has very steep terrain and a large upstream catchment, which meant that there are strong stormwater flows and high forces on the culvert, spillway and banks. Erosion of the spillway was overcome be creating a wide spillway covered with sandstone boulders to slow the water flow. The boulders had the added benefit of a naturalised appearance and potential habitat for flora and fauna.

Construction of the dam, while keeping the nine-hole golf course open, made the project very challenging. Access roads had to be created alongside an active fairway to allow truck access between the nearest street and the dam. Fairways had to be closed while excavated soil was spread and reused as fill onsite to reduce costs. This allowed the course to maintain an income and maintain high membership numbers during the construction stage

The development of the LM Graham Reserve Masterplan created the opportunity to integrate a stormwater harvesting system into the reserve to reduce potable water usage and reliance on groundwater. The opportunity also created new challenges with integrating the system with the masterplan, which involved utilising 100% of the reserve for community uses including, basketball, tennis, soccer, cricket, dog exercise areas, squash walls and spectator mounding. The design includes a large underground storage structurally capable of bearing the weight of large trucks, as to not impact the park uses.

Water base flows in the stormwater pipe were measured prior to the feasibility stage. The base flows were observed to be far more unpredictable than initially thought. As a result, the designs shifted from a base flow reliant system to a wet weather supply and storage system. This creates the benefit that higher volumes of stormwater will be able to be treated, providing greater environmental benefit. It also highlighted the success of the initial designs, where they were flexible to a level where they could be changed without any additional cost to Council.

Contact

Name: Patrick Stuart
Position: Catchments Officer
Phone: 02 9976 1606
Email: patrick.stuart@manly.nsw.gov.au

This project was the 2014 Division B winner of the Water Conservation category at the LGNSW Excellence in the Environment Awards.