

**9.2 Technical Services****9.2.1 Physical Removal of Algae - Lake Brearley**

<b>Location:</b>	<b>Lake Brearley</b>
<b>Reporting Branch:</b>	<b>Sustainable Environment</b>
<b>Responsible Directorate:</b>	<b>Works and Infrastructure</b>
<b>Refer:</b>	<b>Item 12.1.5: OCM 28.04.15</b>
	<b>Item 12.5: OCM 15.04.16</b>
	<b>Item 8.2.2: CTFCS 22.03.17</b>
	<b>Item 9.2: OCM 24.01.18</b>

**CR CATHERINE EHRHARDT DECLARED AN IMPARTIAL INTEREST**

*In accordance with Regulation 11 of the Local Government (Rules of Conduct) Regulations 2007, Cr Catherine Ehrhardt declared an impartial interest in this item as she volunteers with the Friends of Maylands Lakes. Cr Ehrhardt remained in the room for voting on this item.*

**EXECUTIVE SUMMARY****Application:**

For Council to consider an appropriate service level to manage the odour and decreased amenity due to the accumulation of vegetation and algae in the southern corners of Lake Brearley.

**Key Issues:**

- Water quality issues at Maylands Lakes (Brearley, Bunga and Brickworks) have led to persistent occurrence of algae blooms. This year has seen particular problem blooms in Lake Brearley.
- The City is implementing a number of long term management options identified in the Maylands Options Management report prepared by an independent environmental engineering consultant, Essential Environmental (Urbaqua)
- The City has allocated \$1,125,000 in the 2018-19 financial year for the management of the Maylands Lakes.
- The City has received a number of odour and amenity complaints from residents who live adjacent to the southern end of Lake Brearley due to the accumulation of vegetation and algae in the problematic lake topography.
- The existing service level to remove this vegetation is scheduled at least once a year and has already been undertaken.
- Approximately \$1,800 is required if treatment is undertaken on a programmed basis. The cost will be greater if treatment is undertaken once or twice a year due to the expected additional material that would need to be removed.

**BACKGROUND**

Lake Bungana and Lake Brearley were constructed into a man-made lake as part of the residential development of the area in the late 1990's.

The Maylands Lakes are described as constructed lakes which refer to a constructed water body that has a large amount of open water for the purpose of amenity or recreation. Constructed lakes are well documented to experience water quality problems such as eutrophication which drives algal blooms. Constructed wetlands (such as Eric Singleton Bird Sanctuary) are the contemporary and recommended approach for the construction of wetlands or water bodies.

Water quality issues at the Maylands Lakes (Brickworks, Lakes Bungana and Brearley) have led to the occurrence of persistent algae blooms in the lakes and community concern over the issue. Due to the specialist nature of the works, in 2016, an independent environmental engineering company, Essential Environmental, were engaged to prepare a report which reviewed the monitoring results and identified a coordinated approach using short term and long term solutions to address the poor water quality and algal blooms at the lakes as follows:

SHORT-TERM MANAGEMENT	LONG-TERM MANAGEMENT
<ul style="list-style-type: none"> <li>• Revegetation program.</li> <li>• Physical removal of algae (<i>if blooms still present at the end of 2016 winter period</i>).</li> <li>• Installation of bat boxes.</li> <li>• Application of Phoslock (<i>a clay that binds phosphorus</i>).</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed design and project management.</li> <li>• Dredging of Lake Bungana and Lake Brearley (<i>including detailed bathymetric survey</i>).</li> <li>• Installation of solar submersible pumps.</li> <li>• Modification of lake shape.</li> <li>• Community education.</li> <li>• Installation of floating wetlands.</li> </ul>
<b>\$300K</b>	<b>\$3M</b>

The cost of the works was identified to be substantial and not likely to be able to be implemented in one financial year, and, as such, officers worked with the Friends of Maylands Lakes to identify the most critical actions which could be staged over the 2017-18 and 2018-19 financial year.

In 2017-2018 the following works were delivered within a budgeted amount of \$404,000:

- Installation of two gross pollutant traps;
- 160m<sup>2</sup> of floating wetlands;
- Phoslock installation;
- Relevant surveys; and
- Revegetation (the planting component is occurring over winter 2018).

In 2018-19 the City has allocated \$1,125,000 (\$125,000 of which will be transferred to the reserve account for works in 2019-20) and a further \$125,000 is proposed in the 2019-20 financial year to install/undertake identified long term management actions being:

- Dredging;
- Phoslock application;
- Floating wetlands; and
- Solar pumps.

Actions that were identified in the management plan that have yet to be funded include:

- A community engagement program to reduce point source nutrients from the catchment into the lakes (\$10,000);
- Modification of the lake shape or other works to change the physical characteristic of lake corners (\$200,000 - \$500,000);
- Further installation of floating wetlands (\$500,000 - \$1M); and
- Retrofitting the stormwater catchment through water sensitive urban design (uncosted).

It has also been noted that the active Cormorant population at Lake Brearley is increasing and likely to be contributing a significant nutrient load to the lake. Officers are currently investigating with other State Government agencies what management options may be available to respond to this nutrient source.

The City is receiving a number of odour and amenity complaints from residents who live adjacent to the lake; this is caused by the accumulation of vegetation and algae in the southern corners of Lake Brearley as indicated on the diagram.



As an initial response, the City's Parks and Gardens officers tried unsuccessfully to remove the material. Due to the specialised nature of the works, the City contracted an environmental contractor to remove three tonnes of the material in June. As can be seen below, this initially removed the offending material, however, it was noted that due to the physical features of the lakes and current algal bloom; further organic material aggregated in the lake corners within two weeks.

2 June 2018- Prior to removal



3 June 2018- Immediately after removal



Whilst the City is undertaking a comprehensive works program to improve the water quality in the lake, this program will take some time and residents who live adjacent to these aggregation corners have expressed a very strong desire for the City to provide a solution to the problem immediately.

Considering the investigations undertaken to date and in discussion with other metropolitan Councils and State Government bodies, it is evident that there is not a quick fix to resolve the eutrophication issues identified with this lake. The long term management options identified by Essential Environmental are in keeping with industry practice and the most likely options to achieve better water quality outcomes for the lake.

The short term management approach, to manually clean or scoop the material out of the lake, is currently budgeted for once a year from the current operating budget for the lakes.

The estimated cost to undertake a more frequent service of the lake, as a response to residents' complaints, is estimated as follows:

FREQUENCY	ESTIMATE (ANNUALLY)
Four cleaning events a month	\$134,000
Twice a month cleaning	\$67,000
Once a month cleaning	\$33,500
1-2 cleaning events per year	\$7,000

## CONSULTATION

This item has been developed to respond to complaints raised by community members that live adjacent to the lakes. It is understood that the residents would like to see an immediate fix to the issue and for the outcome to be no odour or no decreased amenity to the lake. The residents have been advised that officers would present a report to Council on the matter.

Officers have also discussed the issue with the Friends of Maylands Lakes. The community have identified that there is a need for more regular works to occur. The group is concerned, however, that the use of the existing allocated funds may leave a shortfall within the capital works budget to undertake the already identified improvement works in the second half of this financial year.

## ANALYSIS

It is difficult to forecast the required cleaning of the lake to meet the community expectations for the amenity of the lakes, whilst the longer term management options are undertaken.

It noted that the City has received requests from companies that sell bioremediation products to purchase their product to temporarily resolve the algae problems. The cost of undertaking the initial treatment and works for the product suggested could be up to \$250,000. The City has received limited information of the certainty of the effectiveness of the products from the companies and in discussion with other agencies it appears that this is an uncertain technology.

In addition, the product is described as requiring an ongoing application regime and it is believed that it does not represent a long term solution to the environmental health of the lake. Notwithstanding this, officers will continue to research and be receptive to alternative water quality solutions which can demonstrate evidence based outcomes to the effectiveness and safety of the product.

## OPTIONS

The following options are available to Council:

OPTION	BENEFIT	RISK
1. Undertake treatment to the lakes once a month.  <i>Estimated Cost: \$33,500</i>	<ul style="list-style-type: none"> <li>Active method to reduce the most pressing concerns of the residents</li> </ul>	<ul style="list-style-type: none"> <li>Will reduce level of funding available for programmed works.</li> </ul>

OPTION		BENEFIT	RISK
			<ul style="list-style-type: none"> <li>Approximately half of the time aggregated material will be in the corners, however, this would be less than the option of no treatment.</li> </ul>
2.	Undertake treatment 1 -2 time per year as operating budgets allow  <b>Estimated Cost: \$7,000</b>	<ul style="list-style-type: none"> <li>No further financial allocation required.</li> <li>Accommodated within existing operating budget.</li> </ul>	<ul style="list-style-type: none"> <li>Does not meet concerned residents' expectations</li> <li>Expected continued odour and visual amenity concerns.</li> <li>Cost of officer time responding to community concerns.</li> </ul>
3.	Undertake treatment four times a month.  <b>Estimated Cost: \$134,000</b>	<ul style="list-style-type: none"> <li>Active method to reduce the most pressing concerns of the residents. Essentially weekly removal of material</li> </ul>	<ul style="list-style-type: none"> <li>Will reduce level of funding available for programmed works.</li> </ul>
4.	Undertake treatment twice a month.  <b>Estimated Cost: \$67,000</b>	<ul style="list-style-type: none"> <li>Higher level of concerned resident satisfaction.</li> <li>Active method to reduce the most pressing concerns of the residents</li> </ul>	<ul style="list-style-type: none"> <li>Will reduce level of funding available for programmed works.</li> </ul>
5.	Consider the matter as part of the mid-year budget review.  <b>Estimated Cost: To be determined.</b>	<ul style="list-style-type: none"> <li>May be an opportunity to pay for the works with budget savings identified midyear.</li> </ul>	<ul style="list-style-type: none"> <li>No further treatment would occur until February.</li> <li>Concerned residents will be dissatisfied.</li> </ul>

## CONCLUSION

It should be noted the City has been contacted by a number of Councils which are experiencing similar challenges with eutrophication within their water bodies. This issue is not limited to the City and it appears through discussing the matter with these Councils that the solutions to lake eutrophication issues are often required to be unique to the lake, expensive, take significant time to implement and have varied degrees of success.

It should be noted that in the Perth context, the City is considered a leader in local government for this environmental challenge and has demonstrated success in the water quality space in programs such as the Bayswater Brook Action Plan and the restoration of lakes such as Gobba Lake, Swan Lake and the award winning Eric Singleton Bird Sanctuary.

The purpose of this report is to identify short term service level options for Lake Brearley while the long term management options are implemented.

It is difficult at this stage to identify the level of algae removal required in this lake. It is likely that the twice monthly cleaning regime would be required to meet the expectations of residents that live directly opposite the lake. The concern, however, is that this is an unbudgeted cost.

When considering a balance across the unbudgeted cost and expectation of the community, Option 1 is recommended, which is to undertake monthly vegetation removal at the identified sites. The estimated cost of \$33,500 would be sourced from the existing Maylands Lakes Capital Works budget.

The cost of the major Capital Works activity (dredging) was estimated at \$1M in the Essential Environmental Management plan. Due to the unique nature of these works, it is difficult to predict whether the current level of funding is sufficient or will have some surplus. The actual cost needs to market tested through the City's procurement processes. If there is a shortfall in the cost of the actual Capital Works as a result of the tender price received or the additional algae removal works this financial matter could be addressed by the following:

- Considered in the mid-term budget review;
- Draft 2019-20 financial year; or
- Utilisation of funds proposed to be transferred to reserve this year (\$125,000).

## FINANCIAL IMPLICATIONS

The following financial implications are applicable:

**Item 1:** Maylands Lakes

**Asset Category:** Other **Source of Funds:** Municipal

**LTFP Impacts:** Some of the Maylands Lakes Management Options are included in the LTFP

**Notes:** By undertaking these works this financial year, there would be an expectation that this would be an ongoing service.

ITEM NO.	CAPITAL / UPFRONT COSTS (\$)	ONGOING COSTS (\$) ANNUAL		INCOME (\$)	ASSET LIFE (YEARS)	WHOLE OF LIFE COSTS (\$)	CURRENT BUDGET (\$)
		MATERIALS & CONTRACT	STAFFING				
1	\$33,500	\$33,500	\$1,000	-	50 years	Ongoing	\$1M

## STRATEGIC LINK

In accordance with the City of Bayswater Strategic Community Plan 2017-2027, the following applies:

Theme: Our Natural Environment  
 Aspiration: A green and sustainable environment.  
 Outcome N1: Natural environment and biodiversity which are conserved and protected.  
 Outcome N2: A resilient community that responds to sustainability challenges.

Theme: Our Built Environment  
 Aspiration: A quality and connected built environment.  
 Outcome B1: Appealing streetscapes.  
 Outcome B3: Quality built environment.

## COUNCIL POLICY AND LEGISLATIVE IMPLICATIONS

Not applicable.

## VOTING REQUIREMENTS

Simple Majority Required.

## ATTACHMENTS

Not applicable.

**COMMITTEE RESOLUTION**  
**(OFFICER'S RECOMMENDATION)**

**That Council:**

- 1. Supports the increased service level of manually removing vegetation and algae in the identified problem areas of Lake Brearley once a month and the funding be sourced from the existing Maylands Lakes Capital Works budget.**
- 2. Advises affected residents and the Friends of Maylands Lakes of the increased service level to the Maylands Lakes.**

**CR CATHERINE EHRHARDT MOVED, CR ELLI PETERSEN-PIK SECONDED**

**CARRIED UNANIMOUSLY: 10/0**