Boothbay Region Water District

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Jonathan Ziegra,
General Manager

19 October 2016

Alan Bellows, Chairman
Boothbay Planning Board
1011 Wiscasset Road
Boothbay, Maine 04537

Dear Mr. Bellows:

The Boothbay Region Water District (BRWD) offers the following comments on the proposed Coastal Maine Botanical Garden (CMBG) – Phase 1 Expansion. Our comments relate to fire protection concerns and those portions of the project that fall within the Knickerbocker Lake watershed and specifically, to our interest in maintaining water quality of the Boothbay Region's public water supply.

Public Fire Protection/Life Safety Concerns

As depicted in the plans and specifications the proposed project will build out a water distribution system within the confines of the property owned by CMBG, being fed from two on-site wells of varying quality and production capability. The infrastructure proposed, although appearing adequate to meet fire protection needs will not meet the minimum standard for prolonged firefighting activities in a life safety emergency. The region's fire chiefs believe an expansion of a world-class facility such as the CMBG, and the increased volume in customer base that this project will inevitably promote, need adequate and sustained fire protection. The only alternative available for this project to maintain sustained fire protection flows is attachment to the high pressure distribution grid of the BRWD via 12" water main.

The BRWD is actively working on behalf of the CMBG and the town of Boothbay to secure funding, either through subsidized loans or outright community development grant opportunities. The scope of work to accomplish this need is outlined in enclosure 1 which will begin with water main renewal adjacent to Chapel Street in Boothbay and terminate at the entrance of the CMBG. Regardless of what funding may be secured for this effort, because of the size, scope and impact of this project both the BRWD and the region's fire chiefs believe that the CMBG must be compelled by the town to bring adequate fire protection to the site via an extension of BRWD infrastructure.

Knickerbocker Lake status

Based on available water quality data Maine Department of Environmental Protection (DEP) has concluded that Knickerbocker Lake has been adversely affected by non-point source pollution from human development. Based on Maine Volunteer Lake Monitoring Program data, DEP has

categorized Knickerbocker Lake's water quality as below average. Knickerbocker Lake currently meets state water quality standards, but is listed in Chapter 502 of the Maine Stormwater Law as "Most at Risk from New Development" and on Maine's NPS Priority Watersheds List. Knickerbocker Lake was placed on these lists because it was identified by DEP as being particularly sensitive to eutrophication based on current water quality, potential for internal recycling of phosphorus, volume or flushing rate, and projected growth rate in the watershed.

As noted above and in the CMBG application, Knickerbocker Lake is a phosphorus-sensitive lake and our sampling data reflect that. BRWD water quality sampling data for Knickerbocker Lake indicate higher than average levels of both total phosphorus (TP) and chlorophyll a (indicative of algae levels) in recent years. For 2010-2015 sample years, Knickerbocker Lake TP levels averaged 15.1 ppb (Table 1). Scott Williams of the Maine Volunteer Lake Monitoring Program has told us that levels of total phosphorus above 15 parts per billion (ppb) are considered a cause for concern for algae blooms.

Chlorophyll a and total phosphorus levels observed in Knickerbocker Lake in recent years are on average in the medium productivity range, but they are on the high end of that range. Additionally, anoxic conditions in the bottom waters of Knickerbocker Lake each summer favor recycling of phosphorus from bottom sediments into the water column. BRWD sampling this summer showed 2 times higher levels of TP in bottom water during anoxic conditions. Phosphorus recycling from bottom sediments provides an internal source of phosphorus loading that increases a lake's sensitivity to watershed TP inputs. All of these data indicate that any significant increase in phosphorus loading to Knickerbocker Lake is a serious cause for concern.

<u>CMBG proposal</u>

The CMBG proposal will double its development footprint and may increase site visitors by three times. The proposal will convert forested areas within the Knickerbocker Lake watershed into 850 parking spaces and a number of new buildings. Roads will be paved and development will extend into an undeveloped portion of the watershed.

The application states that this proposal consists of the "initial improvements of the Phase 1 Master Plan." To adequately understand the project's likely effects on the watershed – and reasonable alternatives – the entire Phase 1 project should be outlined. Similarly, throughout the application, the specific acres affected relative to land cover types should be enumerated. All plans and drawings should include a clear delineation of the break between Knickerbocker Lake and Back River watershed (see specific comments attached).

The project projects an increase in phosphorus export into Knickerbocker Lake of 1.71 lb/year. Although this may appear to be small, lakes, such as Knickerbocker, are extremely sensitive to phosphorus and parts per billion increases in water TP levels are the difference between algae blooms and no algae blooms.

The application notes that the projected phosphorus export is below the DEP calculated "allowable" value, but the DEP threshold is not a meaningful value. The DEP budget is supposed to predict how much additional phosphorus loading a lake could accept without risking a perceivable change in a lake's water quality. It then distributes this additional allowable phosphorus load amongst anticipated new development sources in the watershed on a per acre basis. In reality, since there

are inadequate lake specific data to accurately calculate this value, DEP assigns a series of key values in the calculation. These 'guesstimates' undermine the value of the calculations and the entire process. DEP also concludes within its analysis that only 196 acres of the watershed will be developed, which is another unsupported value. If this guess is low, it increases the per acre allowable phosphorus level for all watershed development projects.

Finally, in this instance, our concern for phosphorus inputs is heightened since all project flows from the CMBG development within the Knickerbocker Lake watershed enter Little Knickerbocker Lake, a 32-acre embayment whose only exchange with the main body of Knickerbocker Lake (roughly 76 acres) is through two semi-blocked channels.

We appreciate that the applicant has included a number of low impact techniques to address anticipated stormwater impacts. However, we recommend the following areas be considered to reduce impacts to Knickerbocker Lake from the conversion of forested cover, increase in impervious cover and increased phosphorus loading.

1) Relocate new structures outside of Knickerbocker Lake watershed. Opportunities to locate new buildings that will convert forest cover to impervious cover should be re-evaluated.
    a. Specifically, locating the new greenhouse at the Kulp Horticulture Center between Botanical Gardens Road and the existing building would take the structure out of the watershed and keep it within the existing subarea.
    b. The proposed new horticultural center/administrative buildings/overflow parking complex at R4-23 to the north of Gaecklin Road borders an extensive wetland complex. Could CMBG locate these facilities (or some portion of them) on R4-26 (adjacent to R4-23 and outside of the watershed? If not, why not?

2) Reduce parking or relocate parking outside of watershed.
    a. The vast majority (850 spaces) of the proposed new parking will displace Knickerbocker Lake watershed forest cover and is proximal to a significant wetland complex.
    b. Parking need is based on a 10 year projected number of visits of 350,000 visitors. Since the project will be constructed in phases, parking should be phased in as well so parking keeps up with need rather than outperforms need.
    c. CMBG proposes permeable parking, which from a watershed standpoint is superior to paved, but is there any long-term commitment to this? Permeable parking as proposed requires more maintenance. Will we see a plan to replace permeable with paved at a later date or is there some enforceable commitment to keep permeable areas permeable. Note shift in buffers and plan to pave gravel drive.
    d. Relocate parking within the existing development footprint or within the Back River watershed.

3. To mitigate phosphorus inputs and offset forest cover losses, CMBG should follow up on previous commitment to place a significant portion of their remaining undeveloped Knickerbocker Lake watershed property into a conservation easement.

4. The applicant's runoff analysis, which predicts the efficiency of the various stormwater BMPs (pre and post-development peak flow rates), is a key part of this proposal. So that we may better understand how well these types of predictions match reality, we recommend that the applicant continue to monitor the study points during significant storm events for the next five years and report the data annually to the planning board.

Attached are additional specific questions on the application. We appreciate your consideration of these comments and recommendations.

Sincerely,

Jonathan E. Ziegra
General Manager

Table 1. Comparison of average water quality observations for Adams Pond and Knickerbocker Lake (TP & Chla 2001-2015; Secchi 2010-2015) with all Maine VLMP lakes' mean values). (BRWD lake sampling data)

	Chla	TP	Secchi
Adams Pond	5.1 ppb	12.1 ppb	5.6 m
Knickerbocker Lake	6.4 ppb	15.1 ppb	4.8 m
VLMP Mean	5.5 ppb	12 ppb	4.8 m

Table 2. General levels of productivity for Maine lakes based on chlorophyll a, total phosphorus and Secchi depth and generalized conditions of different trophic states (from Colby College Great Pond report).

Level of Productivity	**Transparency Secchi(m)**	**Total Phosphorus (ppb)**	**Chlorophyll a (ppb)**
Low	>7.0	<6	<2
Medium	4.0 – 7.0	6 – 20	2 – 7.0
High	<4.0	>20	>7.0