

Phase II Storm Water Pond Investigation

Conducted: Fall 2011

Contributors: Walter Eschinger, Keith Spicer, Lambros Tterlikkis, Joan McGowan, Emily Zielke, Marty Zielke, Donna Tterlikkis

Purpose: In the Spring of 2011 during a site visit for Phase II's Sarasota County Neighbor Grant application for its' Entrances, Rob Wright, Neighborhood Environmental Stewardship Team (NEST) Program Coordinator for Sarasota County, noted that the bank of our storm water pond had receded/dropped some 6 to 8 feet. This information spurred the Phase II Grounds Committee to initiate an investigation into the history behind the pond, to determine if Mr. Wright's assumption was correct, and to establish a course of corrective action.

Investigation:

1. The Grounds Committee began by reviewing the historical documents and photos housed in the Bird Bay Library. Two photos from 1988 were found of the storm water pond (Fig 1). These photos indicated that at that time, there appeared to be a gentle slope from the land into the water. Likewise it was determined from the photo that the distance from the decks on the back of Building 29 to the water was greater than the distance in 2011(Fig 2). So it appears that Mr. Wright may be correct. This information was presented at a Phase II meeting.
2. The Grounds committee questioned the connectivity of Phase II's storm water pond and the other storm water ponds located within Bird Bay Village. Discussions with Management and other residents indicated that all of the ponds flowed into each other, with Phase II's pond being the last recipient of water before flowing out into Curry Creek. How these ponds were actually interconnected was unknown since the Management Office did not have any copies of the original blueprints of the ponds. The Grounds Committee contacted the City of Venice Engineering Department. Through the help of Cathy Dubre, in the City Engineering Department, archived files were found of the proposed storm water ponds for Bird Bay Village Phase I, II, V, VI, and Waterside from 1979. A complete set of these plans were obtained by the Management office.

From these blueprints, it was determined that Phase II's storm water pond:

- Was constructed around 1979
- Its size was approximately 2.3 acres
- The projected height of the pond at mean low and high water was provide via Datum points and could be used today to determine whether the ponds height in relation to its original height has changed. A current survey would be

needed. No data or cross section of the ponds original structure was provided. Thus there is no record of the original depth of the Storm water pond.

- The pond does not appear to be directly connected to the other Storm Water ponds within Bird Bay.
- There is a direct overflow culvert located on the North East corner of the pond which flows into Curry Creek.
- There are 4 inlet culverts (two single and two double culverts) located on the north, west, southwest and south east sides of the pond. The blueprints provided a proposed path of water flow from Phase II property located along Bird Bay Drive and Bird Bay Way.

3. Through consults with professionals and independent research, the Grounds Committee determined Phase II's storm water pond was a retention pond built prior to the implementation of regulations prorogated by the Florida Department of Environmental Protection and the Southwest Florida Water Management District. The ramification of this means that Phase II's pond is not governed by any rules or regulations and that it is strictly up to the Phase and Association to manage the pond responsibly. Based on the assumption that the pond is composed of typical soil species for this area, the belief is that the original banks of the pond were structured with a 1 to 4 slope (meaning for each 4 feet of vertical distance, the horizontal distance dropped by 1 foot). This slope would have followed from the bank into the pond. Since the current conditions are an 18" to 24" drop off from the bank to the pond floor adjacent to the bank, this substantiates that 6 to 8 feet of soil has disappeared (amount needed to re-establish the 1 to 4 slope). This again supports the remarks by Mr. Wright. Consults with the following professional were conducted:

- a. Russ Hoffman, owner of Beautiful Ponds specializing in Lake, wetland and preserve management; recognized consultant of Sarasota County NEST.
- b. David Franks, Bay Engineering, Tampa, FL – Professional Engineer
- c. Rob Wright, Sarasota County Environmental Services, Neighborhood Environmental Stewardship Team (NEST) Program Coordinator.

Conversations with these experts determined that over time several events have occurred in the pond which resulted in the movement of soil. These events were:

- Bank Erosion - Occurs only when water flowing down a steep bank removes (erodes) soil from the bank. This was evident from the 15 downspouts which extend to some degree along the backside of Building 29.

- Bank Scour – This is the result of wave action which is generated by the fountain and wind. Please note: the fountain is a valuable resource in reducing the rate of algae growth and thus needed.
 - Bank Settlement – This phenomenon is due to the long-term settlement of super-saturated sandy soils that form the banks of the pond. Once the sandy soil of a pond bank becomes super-saturated, the soil becomes quick (as in “quicksand”) and literally flows like a thick liquid to the lower area in the middle of the pond. The professionals consulted all concluded that this one event probably resulted in the majority of soil movement.¹
4. The Grounds Committee determined that a depth Study of the pond would provide valuable information about the pond for the present and for future maintenance. From research, storm water ponds should have the accumulated soil removed generally every 10 to 20 years. When this is done, depends on the depth of the accumulated sediment. When the pond depth is reduced by greater than 25% of the original design depth, sediment should be removed. In the case of Phase II’s pond, the original depth is unknown. To establish a benchmark for future use, the committee using a Kayak and a sonic depth sounder established a depth map for the pond (Fig 3). It was determined the deepest section of the pond was near and around the current fountain location – 12 feet. A littoral shelf was present around the entire circumference of the pond with a depth of approximately 2 feet below water surface at the bank rim extending out to 4 feet deep some 6-7 feet from the bank. From this point, there appears to be a very steep slope downward towards the deeper part of the pond. The inlet culverts all appeared clear except for the dual culvert located in the southwest corner of the pond. Here both inlets were more than half silted closed. Management was notified and the City of Venice was contacted to investigate. Per the email communiqué (Fig 4), the City of Venice will video scope the drain to determine the degree of siltation and will clean. The additional culverts all had clearly identified head walls with a concrete floor extending in front of the culvert and appeared in good shape.
5. To address how the existing bank could be stabilized along the back of Building 29, the committee investigated several forms of bank stabilization technologies. These included the installation of:
- a. Rip-rap zones
 - b. Wooden Retaining walls
 - c. Corrugated Retaining walls
 - d. Littoral Plantings
 - e. Geo-Tubing and or Geo-matting.

¹ Soil Loss Along Lake Banks, Article provided by Russ Hoffman, Beautiful Ponds

Site visits were made to the following locations at which identified individuals were interviewed as to their experiences with the different modes of bank stabilization methods. These included:

- a. Ross Allard, Waterford
- b. Jessica Douglas, Plantation Golf and Country Club
- c. Barbara-Jean Thomas, Venice Golf and Country Club
- d. Harold Baar, The Inlets
- e. Jerry Bishop, All Florida Services
- f. Phil Phillips, Tangerine Woods

Summary of these visits:

- a. Ross Allard, Waterford – Waterford has 16 lakes all which have experienced some degree of erosion over the years. At the current time, Waterford has used wooden retaining walls along some of their golf course ponds. They implemented a planting project of aquatic plants which has met with limited success. Ponds observed by Bird Bay volunteers still indicated eroded, steep sides followed by bare areas of pond bottom, a mixture of aquatic plants then the water. While the plants provide a more natural look to this urban structure as well as providing a reduction of nutrient load in the water, this method alone did not seem to provide the immediate and “permanent” stabilization that would be applicable to our project.
- b. Jessica Douglas, Plantation Golf and Country Club – Plantation has some 50 lakes within its property bounds. Many have begun to exhibit similar erosion patterns which are encroaching on many of the surrounding homes. Plantation has used wooden retaining walls, rip-rap, and geo-cloth. Currently they are in a multi-year project of the installation of Geo-tubing, which has proven to provide good results at the least expense. They have been working with Erosion Barrier Installations (EBI) and had only positive words about the company. Here we were able to physically see the bags being installed and could also stand on the filled bag. It was like standing on concrete. In the current installation, they ran into a problem where they did not have enough lake bed sediment to fill the tubes. They were going to truck in sand.
- c. Barbara-Jean Thomas, Venice Golf and Country Club – This is a beautiful property and Ms. Thomas was one of the most helpful individuals we interviewed. Venice Golf Club has 26 lakes which are all constructed after 1984 and are thus regulated. They have implemented wooden bulkheads as well as concrete bulkheads but found the wooden ones would break over time plus they had to be power washed and painted. The concrete heads also required yearly maintenance. The cost of these systems was approximately 3 times that of the Geo-tubing. Venice Golf Club also had implemented areas of rip-rap.

They found that the walls were unsteady, had to be treated for weeds on a constant basis and also attracted rats. They are in year 3 of a 5 year project to stabilize the pond banks. While they have used Anchor Marine in the past, they have been using EBI and also had nothing but positive words to say about the company and employees. The Geo-tube allowed them to regain 4-6 feet of land back and comes with a 20 – 25 year warranty. They also ran out of pond sediment to fill the tubes and provided information on a vendor that will deliver a truck load of sand at \$200 per load. Since their lakes are regulated, they are required to plant the littoral zone. All of their lakes were very esthetically pleasing.

- d. Harold Baar, The Inlets – Here they have one large lake with homes surrounding the lake. One home experienced a foundation crack because of subsurface erosion (actually souring). The owner put in a very expensive corrugated retaining wall. In another location, an owner installed a wooden retaining wall which had not been maintained and was not pleasant to view. In another location they installed rip-rap, but again stated they had problems with stability and weeds. This past summer the association agreed to take responsibility of the maintenance of the lake and installed the first 100 feet of geotubing. The cost was \$5,500 in which 3 bags were installed. They used EBI however they installed and sub-contracted out the sod installation. They used St. Augustine grass. They are going to continue 100 feet at a time. We were impressed with the finished product and the firmness of the repaired area.
- e. Jerry Bishop, All Florida Services – This was a telephone interview. Mr. Bishop is a property manager that cares for over 20 associations. Within 3 of these associations, he has overseen the installation of Geo-tubing in 8 lakes. He has used American Shoreline Restoration (ASR) and had only pleasant words to say about the company and employees. When asked about the use of aquatic plants, he indicated Cedar Creek Association is where they had incorporated plants.
- f. Phil Phillips, Tangerine Woods – The association located in Englewood has three ponds. They have installed 4500 feet of Geo-tubing. The first pond that we viewed was not very appealing. The water was low, plus they had chosen to use Bahia grass as their sod. From the pictures, the tubing was exposed. When viewing the third lake, this was very appealing. The water was clear; sides sloped gently and were sod in St. Augustine grass. ASR had provided the Geo-tubing services at \$35 - \$37 per linear foot. They praised the company and employees stating ASR does not use divers as does EBI and other companies. When questioned about the addition of

aquatic plants to their lakes, they said it had been considered but they chose not to add them. This was based on the advice of a neighboring association which has not had a good experience with the plants that they were required to install since the pond was regulated. Note: This association went through a difficult transition from their developer.

In summary from these visits our investigation determined:

- Mr. Rob Wrights' estimate of the amount of soil lost over time was probable.
- Geo-tubing is the most cost effective, somewhat permanent (20 plus years) means to stabilize the bank.
- We should expect to recover about 4-6 feet of bank and have a more normal (1 to 4 foot) slope to the pond bank.
- The installation produces a very esthetically looking product.
- Either EBI or ASR is a great company who will provide good service at a fair price.

It is the recommendation of this group to install geo-tubing around the bank of Phase II's pond at least in the vicinity of Building 29. While the installation and stabilization for this section is considered immediate, the Phase may want to consider the stabilization of the rest of the banks of the pond in the future. The committee recommends that small areas such as around the head walls of the inlet culverts be planted with aquatic and semi-aquatic plants to evaluate their usefulness in stabilization of the existing bank and their esthetic appeal. This has actually all ready begun in the summer of 2011. A no-mow-zone approximately 2-3 feet in width was established around the entire pond. The "Fuzzy Rim" was noticed to all of the unit owners around the pond. The theory behind this rim or increase height of grass is that grass roots are directly related to their blade length. If the roots are longer, they will be able to hold more soil and thus help stabilize the bank. In addition, the increase grass height also helps to decrease the amount of nutrients i.e. nitrogen and phosphorous, that may enter the pond via overland runoff. Likewise, by not mowing up to the water's edge, the amount of grass clippings (organic matter) is also reduced lowering the nutrient load in the pond.

Algae growth in the pond is currently the main thrust of our lake maintenance program. Algae growth is directly related to the amount of nutrients entering the system coming from fertilizer run off, pesticide runoff, and animal feces (Dog and wild animals). In the past, Pond Maintenance Contractors have sprayed the pond as needed from the banks to control the algae break outs. It should be noted that the chemical used is an algaecide composed of copper. Copper is strongly bioaccumulated meaning while the amount of copper which remains in the water column is small to none, the amount which is bound in the soil will continue to increase over time. Based on a United States Environmental Protection Agency

memorandum dated October 24, 2005 on Copper²: “At sites where copper is continuously applied, it will accumulate in the soil, although the degree of bioavailability is uncertain, and will vary dependent on site conditions. Concentrations of 60 – 100 ppm Cu are potentially harmful to soil invertebrates, terrestrial plants, and soil microorganisms. Based on modeling, potentially harmful concentrations may be reached within 2-20 years, depending on site conditions, applications rates, and frequency of application.”

Since the implementation of the “Fuzzy Rim” and the continual degradation of the banks, significant damage was inflicted on the grass rim from this spraying. As of December 2011, the contractor has been instructed to only spot spray from a boat from within the pond. Likewise, given our ponds location to Curry Creek, we need to reduce the application of any chemicals which are not absolutely required. Thus the pond maintenance contractor has been instructed to limit the application of copper and implement the addition of a blue dye into the water. Blue dyes are non-toxic dyes which simply reduce the blue wavelengths (wave length needed for photosynthesis) which are available to algae. Without this light, the plants are unable to grow.

Along the lines of algae control, it has long been thought that the addition of a fountain will increase the oxygen concentration in the water and thus decrease the amount of algae growth. In reality, fountains add only a small amount of oxygen to the pond where the water falls back into the pond. It is a localized effect, effecting no more than five feet from the falling water. Aerators or bubblers are better devices to add oxygen to the pond. These devices function by “turning” the water over. Aerators are typically placed near the pond bottom. The bubbles released create a current that brings oxygen poor water found near the pond floor is forced to the surface where it can be oxygenated. By increasing the dissolved oxygen concentration in the pond, aerobic bacteria out compete the anaerobic (undesirable) algae.³ The grounds committee noted the use of aerators used at several of the site visits. It is our recommendation that Phase II consider the addition of 2 to 3 aerators in the pond if the current course of algae control is not considered satisfactory.

In conclusion the Grounds Committee recommendations:

- Use Geo-tubing for the stabilization of the pond bank behind Building 29. If other implemented methods as previously mentioned are not adequate to slow the rate of erosion, then geo-tubing should be installed around the rest of the pond;
- Keep and possibly increase the size of the no mow zone;
- Add small areas of aquatic plants and assess;
- Continue the use of blue dye for algae control;

² United State Environmental Protection Agency, Washington, D.C., Office of Prevention, Pesticide and Toxic Substances, Memorandum, October 24, 2005, Error Corrections for the Ecological Risk Assessment for Re-Registration of Copper sulfate

³ Aerators, Fountains & Lake Oxygen, Article provided by Russ Hoffman, Beautiful Ponds

- Install aerators if current algae control is unsatisfactory.
- Implement a yearly water quality testing program to evaluate the health of the pond and thus the water being released into Curry Creek.



Fig 1 - Phase II Pond as seen in 1988



Fig 2 - Phase II Pond as seen in 2011

Fig 4. Email Communiqué

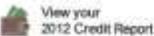
erlikkis - Yahoo! Mail http://us.mg4.mail.yahoo.com/neo/launch?.rand=26p6ag1j111et

Hi, Donna Sign Out Options Help Make Y! My Homepage Mail

Search Search Mail

WHAT'S NEW **INBOX (31)** **CONTACTS** **Fw: BIRD BAY STOR...**

[Compose Message](#) | [Delete](#) | [Reply](#) | [Forward](#) | [Spam](#) | [Print](#)

 **Fw: BIRD BAY STORMWATER INVESTIGATION** Hide Details

FROM: Bird Bay Management Wednesday, December 21, 2011 10:16 AM
TO: Donna Terlikkis

FYI

- Charlene Gineo
- Birdbay Management
- 941-485-2663

----- Original Message ----- **From:** "William Ward" <ward@ci.venice.fl.us>
To: "Charlene Gineo" <management@birdbayofvenice.com>; "Harry Holder" <HHOLDER@ci.venice.fl.us>; "Kathleen Weeder" <KWEEDEN@ci.venice.fl.us>
Cc: "Bobby Hirter" <BHIRTTER@ci.venice.fl.us>; "Cathy Dubre" <CDUBRE@ci.venice.fl.us>; "Joe Zanni" <JZANN@ci.venice.fl.us>; "Valerie Raney" <VRANEY@ci.venice.fl.us>
Sent: Tuesday, December 20, 2011 3:50 PM
Subject: BIRD BAY STORMWATER INVESTIGATION

Storm water Investigation Report for Bird Bay Management (attached)
20 December 2011
Engineering/Stormwater Department / Drwg 114-12-D
W. Ward

Reported Problem: Headwall A7 of twin 14x23 inch elliptical concrete pipes are obstructed by sand and debris by approximately 50% at their outfall into a private lake/water retention area within the Bird Bay Village. The twin pipes drain the storm water runoff generated by Bird Bay Drive West curb inlets A6 and A5. Bird Bay Drive West is a City of Venice Street with an 80' ROW. The twin conveyances originate at storm water junction structure A4 which was without sand. A depression proximate to conveyance run may be an indicator of a breach in either or both of the elliptical pipes in its run to A7.

Recommend Action: Video the 14x23 inch ECPs from storm water structure A4 (has lid) to ascertain pipe integrity. If a breach (es) is (are) discovered, then its location can be determined as to whether it is on private or public property. If pipe(s) are breached, it may necessitate excavation and location is essential. If the problem is other than breach and can be made more serviceable by cleaning, that, too, can be ascertained as result of videoing.

City of Venice, Florida
William L. Ward
Engineering/Stormwater Technician
Office: 941.486.2626, ext. 25008
Mobile: 941.270.1479
Email: ward@ci.venice.fl.us
Public Service with P.R.I.D.E.

1 Attached files | 668KB

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Waterford – Main Pond



Waterford Golf Course Pond



Waterford – Back Pond





Plantation – Geo-tubing being filled. Note bag is staked to the shore. The first bag has a protective covering on the face to prevent damage from the sun and fish fins.



Plantation – Filled tubing – Note the firmness of the tube when filled.



Plantation – Finished bank – Note line in grass: below is where the Geo-tubing was installed. Over time the line will disappear.



Venice Golf and Country Club – Finished Bank where Geo-tubing installed.



Venice Golf and Country Club – Finished Bank where Geo-tubing installed.





The Inlets – Corrugated retaining Wall



The Inlets – Area of Rip-Rap.



The Inlets – Area of wooden retaining wall and current state of erosion.



The Inlets – Finished bank after Geo-tubing installed. Note in the above picture the amount of bank recovered by the installation of the Geo-tubing.



Tangerine Woods – Front Lake planted with Bahia grass and with a low lake level. Downspout drains and tubing can be seen.



Tangerine Woods – Close up of tubing exposed due to low lake levels.



Tangerine Woods – Third Lake – Finished Bank after Geo-tubing installed.