Investigative Report on ELW Master Drainage for the Community Association

Introduction

Pursuant to an Agreement executed with the East Lake Woodlands Community Association through its' Property Manager, Jamie Soderland of Management and Associates, EMK Consultants of Florida, Inc. (EMK) initiated an investigative field inspection of the master drainage ways, channels, structures, and other similar drainage facilities that were constructed over the past 40 years for the intended purpose of collecting and conveying storm water drainage for the East Lake Woodlands Community (Community). These facilities were visually inspected to ascertain their currently existing condition, and to ascertain their ability to perform their intended function to collect and convey drainage runoff resulting from rainfall runoff from the individual subdivisions, development areas, golf courses, collector roads and contributory offsite areas, across and through the constructed Community, and to direct such runoff to the receiving bodies of Brooker Creek to the north, and Moccasin Creek to the south.

The drainage facilities that were inspected were designed and constructed beginning in the mid 1970's, coincidental with the initial development of the Community, which included, the South Golf Course, the Single Family area known as East Lake Woodlands Unit One, and the initial phases of the Collector Roadways known as Woodlands Parkway and East Lake Woodlands Parkway. The Community has been continuously designed, permitted and developed since that time, with the last phases of development and construction occurring in the northern parts of the Community in the late 1990's. The roadways and drainage facilities that were constructed were designed and permitted for anticipated major rainfall events which would result in the 10 and 25 year historic flood events. The home improvements and living areas were designed to be elevated above the flood waters resulting from a 100 year flood event. Obviously, the drainage systems that were designed and constructed presumed that the drainage facilities would be maintained close to their originally designed and constructed condition, to insure that they would function unimpeded and at full design capacity. The purpose of the Investigation was to ascertain in what condition the drainage facilities currently exist, and if their current condition would likely meet the designed and constructed intent for these facilities to collect and convey storm water runoff to the receiving bodies.

Although there has not been a rainfall event resulting in a named 10 or 25 year historic flood event, save for some significant rainfall events that resulted in lesser flood events in 1979 and 1984, the Community has not, by and large, experienced any reported significant flooding of improved areas. However, in August of 2015, significant rainfall was experienced in the general area of the Community, resulting in reported flooding issues in other Communities near East Lake Woodlands. However, only relatively minor flooding of certain roadways and drainage improvements was experienced in specific parts of the East Lake Woodlands Community. To better learn of the cause of this minor flooding, field inspections of these specific areas was

performed by EMK, under authorization of the Community Association. From these inspections, a report entitled *Preliminary Report on Specific Drainage Issues at East Lake Woodlands*, was prepared in September 2015 summarizing the findings of these inspections. It was observed during these inspections that rather significant maintenance, repair, and restoration of specific drainage facilities servicing the inspected areas, was necessary to restore the drainage facilities to their likely originally intended function. It was further determined during these inspections, that little-to-no maintenance had been performed on the drainage facilities serving these specific areas, since their original construction. Typically, drainage structures have a useful life of 25 to 50 years, provided they are properly maintained. However, ditches, swales, structures and drainage ways are required to be regularly and routinely maintained to insure their original grades and flow capacities.

The majority of the roadway and drainage facilities that were constructed for the Community was originally intended to be, and remains, privately owned and maintained. Responsibility for the maintenance of these facilities falls upon a combination of the various Individual Community Associations, the Owner(s) of the Golf Courses, and the overall Community Association, depending upon the particular location of the roadway and/or drainage improvements, and who is benefited by their proper function. To the best of our knowledge, no specific budgets or maintenance programs were apparently put in place by any of these entities for the maintenance, repair, and eventual replacement of the drainage facilities. To allow for public access of these drainage facilities during emergency situations, and to allow access for maintenance of these drainage facilities across private properties, drainage easements were dedicated and recorded in the public records of Pinellas County.

It was determined during this investigation and the one previously performed by EMK referenced above, that significant maintenance, repair and replacement improvements have been, and are now necessary, to restore the drainage facilities closer to their originally intended function. In all likelihood, these repairs and maintenance improvements, due to their locations and accessibility, will likely involve a significant cost.

Scope of Investigation

Prior to preparing the scope and proposal of the Investigation, EMK representatives met with Jamie Soderland of Management and Associates, and Jack Picker and Jeff Fosbrook of the ELW Community Association to discuss their needs, and to determine the specific intent and scope of the Investigation. It was determined that since the Community Association was paying for the Investigation, the Investigation would be limited to, and focus only on, the Master Drainage Ways and Structures, rather than on any specific subdivision or development parcels.

The limits of the Investigation are as identified in the enclosed ***Master Drainage Exhibit***. Specific Drainage Ways or Channels depicted on the Exhibit, were assigned a name identifier solely for purposes of this Report, and are not intended to replicate any prior or future references to Drainage Ways or Channels identified on previous reports by others. Similarly, drainage structures were also assigned a name identifier for the purposes of identification in this Report, and are located as shown on the enclosed Exhibit.

The Drainage Ways, or Channels, consist of a series of interconnected structures, pipes, ditches, retention ponds, and other similar drainage facilities, that form drainage "patterns" across the Community, collecting and conveying storm water runoff from improved areas to the outfall discharge points of either Brooker Creek or Moccasin Creek. The Structures consist of inlets, headwalls, weirs, ditches, swales, mitered end sections, and other such structures, that serve as inflow or outflow devices, and interconnect underground storm water piping, along a given Channel. This Report is organized according to specific Channels and the structures along that Channel. Generally, Channels 1FL, 2FL, 1BC, 2BC & 3BC, NGC, MF, and NOF discharge to the north to Brooker Creek Outfall. Channels 2AB, 1SU, 2SU, WL, C, WSP and SOF discharge to the south to Moccasin Creek Outfall. Channels 1AB, 2AB, CT and EL discharge to both Brooker Creek and Moccasin Creek Outfalls. This report is organized and grouped based upon those discharge outfalls.

CHANNEL 2BC

Channel 2BC is a very significant Drainage Way because the channel collects and conveys the storm water from a very large improved area, including all or portions of the Turtle Creek subdivisions, in addition to the Pinnacle, Diamond Crest, and portions of Muirfield, Avenel, and Warwick Hills Developments. Also, North Golf Course Holes 7 through 12, a portion of Hole 13, and runoff and drainage from the East Lake Woodlands Parkway, all depend on this Channel for their collection and conveyance of drainage discharge to the outfall of Brooker Creek. Our Investigation discovered a number of drainage maintenance needs along this Channel that are significantly impacting and/or impeding the Drainage Way.

The most downstream drainage structure for the Channel prior to connection and outfall into Brooker Creek, is the existing ditch along the north side of North Golf Hole Number 8. Its' function as an adequate conveyor of drainage is impeded by the presence of fallen tree limbs and branches, which are partially and significantly blocking the intended flow. This ditch system needs to be cleaned and restored to its's original condition prior to a worsening of its' condition, and further blockage of the ditch conveyance system.

Additionally, Structure 2BC-4, which is located immediately upstream at North Golf Hole number 9 tee, and according to archived master plans which we found for the East Lake Woodlands Community improvements (Archived Plans), was originally constructed as the most downstream discharge control structure (weir) for Channel 2BC, with twin 42 inch pipe outfalling into the ditch on the north side of Golf Hole Number 8. The structure appears to no longer exist as a weir structure (see photo), and it appears that one of the 42 inch pipes is either partially or totally blocked by sediment and vegatation. As this weir was designed and intended to convey drainage from all the improved areas mentioned above, this structure and pipe system needs to be repaired/replaced to its' originally constructed condition. Additionally, this structure controls the normal water levels in the retention ponds located on North Golf Holes 9, 10 and 11. It appears that the water levels in these retention ponds currently exist more than a half of a foot below their normal design elevations. Although this is not necessarily a significant drainage concern, lower-than-intended water levels in the retention ponds are both aesthetically unpleasing, and more importantly, are subject to substantial lake bank erosion problems, which ultimately could be a source of sediment blockage of the Channel and/or structures.

Proceeding upstream, Structure 2BC-3, which was originally also constructed as a weir structure, interconnects the retention ponds located on North Golf Holes 9 and 10 with double 36" RCP, appears to be damaged and needs to be restored as previously constructed. Proceeding upstream to the retention pond located on the north side of North Golf Hole 11, again the water level in the retention pond appears to be existing at an elevation approximately a half of a foot lower than intended, very likely due to the failures of control structures 2BC-4 and 2BC-3. This low water level condition again increases the likelihood of retention pond bank

erosion previously mentioned. Structure 2BC-2, which is a mitered end metal or aluminum pipe on the end of a pipe inflow, and appears to convey drainage from a portion of East Lake Woodlands Parkway, is partially exposed which again indicates that the water level in the retention pond is likely existing at an elevation lower than its designed intent. The pipe, at least at the discharge end, needs to be replaced, and the water levels in the retention ponds should be restored to their originally intended elevation by repair/replacement of Structures 2BC-3 and 2BC-4.

Proceeding upstream to Structure 2BC-1, supposedly constructed in the northerly end of the retention pond located immediately east of Diamond Crest, was not found during our Investigation. We are assuming that it exists, but due to the presence of heavy vegetation existing on the lake bank and surrounding area in the vicinity of the Structure, we were unable to access and were prevented from inspecting the structure. According to information shown on Archived Plans, Structure 2BC-1 is supposedly a weir structure, with a 30 inch pipe connecting to the retention pond located on the north side of North Golf Hole Number 11, at the tee area. The area needs to be cleared and the weir examined and possibly maintained, and access to the structure should be continuously allowed.

Finally, proceeding to the most upstream structure on Channel 2BC, which is the Retention Pond located at North Golf Hole 13 green area, it is obvious that a large amount of sediment has gathered in the pond at the discharge point toward the Diamond Crest subdivision. This unsightly sediment is potentially blocking the 24 inch outfall pipe which conveys this outfall under Golf Hole Number 13, , and is in need of removal.

Structure 2BC-1, arrow points to location where plans show structure to be.

Structure 2BC-2

Structure 2BC-3

Structure 2BC-4

View downstream of Structure 2BC-4

CHANNELS 3BC AND MF

Channel 3BC conveys the storm water flow collected in Channel MF, conveying storm water discharge which is predominately outfalled from the large conservation area located west of North Golf Course Hole 12, and north of North Golf Course Hole 13. Channel MF conveys drainage runoff from this area, discharges it across East Lake Woodlands Parkway through structures 3BC-1 and MF-1 via twin 36 inch pipes, and then continues into Channel 3BC. Channel 3BC exists through the riverine system located in the Conservation Area located between Turtle Creeks Three and Four, and then ultimately directs storm water outfall discharges into Brooker Creek via downstream twin 36 inch pipes located under Turtle Creek Trail. We learned from our inspection that these pipes were recently cleaned and maintained, apparently as a result of a report recommendation that EMK performed for the Turtle Creek HOA, entitled *Report on Investigation of Drainage Improvements at East Lake Woodlands Turtle Creek Units Three and Four*. However Structures 3BC-1 and MF-1, which convey the drainage outfall for Channel MF, under East Lake Woodlands Parkway, are in need of substantial cleaning and maintenance, as both structures are barely visible, caused by an intense accumulation of invasive vegetation and sediment.

Structure 3BC-1

Structure MF-1

CHANNEL 1FL

Channel 1FL conveys storm water from a significant amount of the Development Parcels, and a rather large offsite contribution (one of two total) from the Forest Lakes Community immediately east of East Lake Woodlands. On-site Development Parcels which rely on this Channel for drainage conveyance include Greenhaven Units 2, 3 and 4, small portions of Aberdeen Units One and Two, and North Golf Course Holes 2, 3, and 4. Starting at the most upstream structure and proceeding downstream, Structure 1FL-1, which was constructed as a straight concrete wall, was intended to serve as a control weir to regulate inflows from the off-site Forest Lakes Community. The weir has been eroded (breached) to a point where the inflow from the offsite facility is by-passing the intended weir control structure, likely allowing more flows to come on site from the Forest Lakes Community than what was originally intended. This breach needs to be properly repaired to restore the design intent.

Directly downstream is Structure 38; a concrete headwall with twin 53" x 34" elliptical discharge pipes, conveying the drainage inflow from Forrest Lakes and transporting it downstream through Channel 1FL. The aforementioned structure, when visibly inspected, showed that it was filled with, and partially blocked by, sediment, vegetative debris, and eroded rip rap sand bags, which is impeding the drainage flow into the pipes. This structure needs to be cleaned and maintained to allow its' originally intended function.

Continuing downstream of 1FL we encountered additional matters impacting, or potentially impacting, the intended unimpeded drainage flow through the Community. At Structure 1FL-3, a fenced tennis court has been constructed by a private residence over the existing drainage easement for 1FL. This appears to be located on an improved Aberdeen subdivision lot located at 1283 Greybrooke Place. The significance of this is that the recorded drainage easement for Channel 1FL, contains an underground 48 inch pipe, with interconnecting drainage structures in the form of Grate Inlets. The presence of the fenced tennis court certainly will inhibit, or possibly prohibit, access to these structures and pipe systems for maintenance purposes either now or in the future, when such is necessary. Immediately downstream, at Structure 1FL-4, which is a concrete slotted inlet, and discharges collected drainage flow from the drainage easement and Channel 1FL into a retention pond located at North Golf Hole Number 3 tee area. This structure appears to have some residential landscaping covering a good portion of it, likely planted by the occupant of 1276 Greybrooke Place. To maintain the intent of the Structure, this landscaping needs to be removed, as it is obstructing flow out of the structure.

Continuing downstream, Structure 1FL-5, which is the outfall for the retention pond at Golf Hole 3 tee, and for the continuation of 1FL drainage, is being partially blocked by sediments and vegetative growth that has apparently accumulated over the years. Additionally, the existing ditch on the west side of North Golf Hole 3 from the tee to the green, has substantial amounts of vegetated growth and sediment, likely blocking its' intended drainage flow capacity. This ditch needs to be cleaned and restored to its' original grades from the tee to the green.

Continuing downstream adjacent to North Golf Hole 3 Green, is structure 1FL-6, which was originally constructed as a v-shaped horizontal metal weir, and has now completely disintegrated. It is apparent that someone made an attempt to restore this weir as a sand bag and concrete weir. It appears that this sand bag and concrete weir, likely not constructed at the intended design elevation, is being breached by erosion around the structure, and is not serving its' originally designed intent. This weir needs to be restored to the original design elevation and size.

At generally the same location immediately downstream, according to the Archived Plans, twin 36 inch pipes are supposed to exist, conveying drainage in the Channel across the cart path just past Golf Hole 3 Green. Neither of these pipes were visible during our inspection, due to accumulated sediment. This area needs to be cleaned of the sediment to uncover the pipes, and insure they are free from blockage. On the north side of the cart path crossing, the discharge end of the 36 inch pipes are barely visible, again obscured and partially blocked by vegetative growth and sediment. Obviously, to insure proper function of the Channel this area needs to be cleaned of the vegetative growth and sediment accumulation.

Proceeding downstream to Structures 1FL-7 and 1FL-8, which convey collected Channel drainage under the cart path just west of Golf Hole 16 Green, cleaning of existing vegetative growth and accumulated sediment around the structures is necessary.

The remainder of the Channel, to its' intersection with Channel 2FL, is predominately a riverine system through a Conservation Area, and appears to be functioning as intended.

Structure 1FL-1, arrow showing breached wall.

Structure 1FL-2

Structure 1FL-3

Structure 1FL-4

Structure 1FL-6

Structure 1FL-7

View downstream of structure 1FL-5

View downstream of structure 1FL-6

View downstream of structure 1FL-3, arrows shows tennis court drainage easement intrusion

View downstream of structure 1FL-5

Channel 2FL

Channel 2FL is primarily a riverine system that conveys substantial offsite drainage inflow from the adjacent Forest Lakes Community, in addition to portions of East Lake Woodlands Parkway and from the Muirfield Subdivision. Additionally, portions of Golf Holes 13 and 14 utilize Channel 2FL for their drainage conveyance.

Stucture 2FL-1 is a triple box culvert that conveys primarily the offsite drainage from the Forest Lakes Community under East Lake Woodlands Parkway to the riverine drainage system of Channel 2FL. Both the Structure and the riverine system seem to be functioning as intended.

Structure 2FL-1

View downstream of Structure 2FL-1

Channel NGC

Channel NGC is formed at the point where Channels 1FL and 2FL intersect. It receives the flows from both of these Channels, and transports these and additional flows from the Cross Pointe Subdivision, and North Golf Holes 4, 5, and 6. The Channel collects and transports these drainage flows through a riverine system in the Conservation Area north of North Golf Hole 5 and south of North Golf Hole 6. The Channel then crosses Woodlands Boulevard at Structure S-7, before continuing to its' intersection with Channel NOF, and ultimate discharge into Brooker Creek.

Starting at the upstream point, flows are added to the Channel from the Cross Pointe Subdivision via Structures NGC-1 and NGC-2, which carry the outflow from the Conservation Area east of the Subdivision, and under the cart path just past the Green for Golf Hole 4, via twin 36 inch pipes. Structure NGC-2 is in need of repair as the rip rap headwall is separating and is degrading in integrity. The balance of Channel NGC is, as previously stated, a riverine system; appearing to be functioning adequately, save for Structure NGC-3, which is a triple box culvert structure. The northerly-most box culvert has heavy vegetative growth around it, potentially blocking its' function, and needs to be cleaned.

Structure NGC-2

Structure NGC-2

Structure NGC-3

Channel NOF

Channel NOF begins at Structure NOF-1, located at Nursery Road. It conveys drainage to the north from Channel EL, ultimately to Brooker Creek.

Structure NOF-1, which is a large concrete box weir with triple 48 inch pipe discharges, is in need of substantial repair or replacement. The weir structure itself is breaking apart, and the triple 48 inch pipe which conveys storm water discharge from the Structure under Nursery Road is separated from the concrete box weir structure. This is allowing the weir structure to be by-passed, and the pipes to collect sediment from erosion around the structure. The pipes need to be repaired or replaced, and sediment that has collected around them needs to be removed, both at Structure NOF-1, and at the discharge end of the pipe across Nursery Road.

The balance of Channel NOF is primarily a riverine system that flows through the easterly portion of the Deerpath Subdivision before discharging under a triple box culvert crossing Woodlands Boulevard. Both the riverine system and the triple box culvert appear to be properly functioning.

Structure NOF-1

Structure NOF-1, arrows show pipes separation from concrete weir.

Structure NOF-1, arrows show separation between concrete weir and structure.

CHANNEL 1AB

Channel 1AB is a short channel intended to be a discharge ditch for conveying outfalls from a large portion of the Aberdeen Subdivision, Golf Hole 17, and portions of Woodlands Boulevard.

Channel 1AB is nearly totally blocked with vegetation and accumulated sediment. This blockage has already likely caused a failure in the underdrain system located in the retention pond that collects and stores storm water drainage before discharging into the Channel, and ultimately into Channel EL. This underdrain failure is resultant from higher-than-intended elevations in the lake (approximately 1.5 feet), due to the significant blockage in the Channel 1AB (ditch) outfall. The Channel contains an abundant amount of invasive vegetated growth which greatly impedes the discharge flows from the Aberdeen retention pond, North Golf Hole 17, and Woodlands Boulevard. The outfall ditch needs to be substantially cleaned so that the system can perform as designed, and to prevent the ditch flows from becoming completely blocked. Also, at the very westerly end of Channel 1AB, near its' intersection and outfall into Channel EL, it appears that a Preserve Subdivision resident, with a street address of 1276 Preservation Way, is constructing a dock directly over the drainage outfall and drainage easement. This dock, if not removed, will likely inhibit the proper cleaning, and necessary regular maintenance, of the Channel outfall ditch.

Structure 1AB-1

View downstream of structure 1AB-1

View downstream of structure 1AB-1

View of AB-1 discharge downstream of structure 1AB-1

Channel 2AB

Channel 2AB provides drainage outfall for portions of the Aberdeen Subdivision, Heatherwood Condominiums, St. Andrews Condominiums, portions of Woodlands Boulevard and East Lake Woodlands Parkway, North Golf Holes 2 and 17, and the Silverthorne Subdivision.

Channel 2AB commences at the retention pond located in the Heatherwood Condominium development. A concrete weir, structure 2AB-1, controls the outflow from the retention pond, and pipes convey the outfall from the weir southwardly across East Lake Woodlands Parkway, through Silverthorne, and into the retention pond system located north of North Golf Hole 1.

The Channel and its' structures appear to be functioning as intended. It is worth noting however, that the underdrain in the Heatherwood Condominium retention pond is disconnected from the concrete weir outfall, and located on the bottom of the retention pond lake bank, and not functioning as intended.

Structure 2AB-1

CHANNEL EL

Channel EL serves the single family area commonly known as East Lake Woodlands Unit One, and a small subdivision located at the end of Lesley Lane. Additionally it serves as the drainage outfall for South Golf Holes 1 through 9, North Golf Hole 18, Cross Creek Subdivision, a portion of Stonebriar Subdivision, and The Preserve Subdivision, and East Lake Woodlands Parkway.

Starting at the most upstream point of the Channel, a narrow ditch system exists that conveys the drainage runoff starting at Arbor Lane, collecting runoff from Palmdale Court, and continuing behind and on the westerly side of the lots on Ivy Terrace and Fernbrook Court. The Channel has accumulated sediment and vegetation partially blocking its' drainage flow capacity. The sediment and vegetation needs to be cleaned, and the Channel restored to its' original grades to insure adequate flow capacity.

Further downstream, a concrete weir structure, Structure EL-1, is partially blocked by debris, and has a grate inlet top missing from the Structure. This should be cleaned out of all existing debris inside of the structure, and have a grate reinstalled.

Proceeding further downstream, Structure EL-2, again a concrete weir structure, appears to have been modified from its' original design. Part of the structure appears to be missing, preventing the weir from controlling the normal water elevation in the upstream lakes. Again, this is not necessarily of concern from a drainage standpoint, but the lower lake levels again are aesthetically unpleasing, and allow for lake bank erosion of the upstream retention ponds, and are a sediment source which could limit the capacity of downstream drainage facilities. This sediment source is noted in the downstream retention pond immediately across Forest Park Road. Both the concrete weir and the sediment in the downstream retention pond should be restored as originally intended.

Structure EL-1

Inside Structure EL-1

Structure EL-2

View downstream of structure EL-2

View of channel EL near Palmdale Drive

View of channel EL near Palmdale Drive

View of channel EL near Palmdale Drive

CHANNEL CT

Channel CT collects and conveys the drainage outfalls from the Cypress Estates Condominium, Woodlake Run Condominium Developments, portions of South Golf Hole 1 as well as from the Commercial Area located west of Sunflower Drive, and portions of Woodlands Parkway. Drainage from these areas is collected and conveyed by Channel CT across South Golf Hole 1, and to its' discharge into Channel EL.

The Channel is in need of cleaning of accumulated sediments and vegetation near structures CT-1, CT-2 and CT-3, and a sizeable sediment accumulation in the retention pond north of South Golf Hole 1, all of which need to be removed and the original grades restored.

Structure CT-2

Structure CT-3

View downstream of structure CT-2

Spoil embankment directly downstream of structure CT-4

Channel SOF

Channel SOF begins at the concrete weir structure located at North Golf Hole 1 tee area. It conveys outfalls collected primarily from the southern portion of the Community, and directs the discharge ultimately under SR 584. Essentially, all development and Golf Holes south of the Florida Power R/W, portions of ELW Parkway, flows from Channels 1AB, El, 2AB, C, 1WL, and 2WL, all discharge into, and depend upon, Channel SOF for their outfall.

Channel SOF has sediment accumulated in it immediately downstream of Structure SOF-1. This sediment needs to be removed from the Channel to allow its' intended function.

Additionally, at Structure SOF-2, which is the most downstream structure before discharge into Moccasin Creek, it appears that substantial modifications have been made to the structure, most likely for purposes of maintaining a higher water level in the retention pond system that is the primary conveyance system for Channel SOF. From the Archived Plans, it was determined that the desired normal water level in the retention ponds located north of Structure SOF-2, was 2.79. The existing water elevation that was observed during our investigation was more than 1.5 feet higher than this elevation. The original design water elevation at Structure SOF-2 was maintained by original construction of a slotted concrete weir structure. It appears that the slots of the structure, which were two rectangular openings in the weir designed to sustain the normal retention pond water level at a given elevation, have been modified to eliminate them. This likely was done, for purposes of raising the water level in the retention pond, most probably during the drier seasons of the year. In their place, two small pvc pipes (approximately 4 inches in diameter), were installed, and the slots were concreted to eliminate them, and hence, their function. During our investigation, both of these pvc pipes had plugs in them, totally preventing any flow from them. The net result of this modification from a drainage prospective is that storm water flows will be retained, rather than discharged, at higher elevations in the retention pond system functioning as Channel SOF, and these storm water flows will not begin to flow to the Moccasin Creek Outfall until the water levels reach the top of the weir, which is 18 inches higher than the slots. This obviously was not the original design intent, and could impact resultant flood elevations in upstream impacted areas during significant rainfall events. From a drainage prospective, this is not recommended, and this structure should be modified to function in accordance with the original design.

View downstream of structure SOF-1

Structure SOF-2

Channel WL

Channel WL serves the developments of Hunter's Trail, Pinewinds, Woods Landing, and Worthington. It also provides drainage relief for portions of Sunflower Drive and South Golf Hole 11.

Channel WL begins at a concrete weir serving as a control Structure WL-1 in the pond south of Woods Landing Way and continues through Pinewinds and Worthington Development areas, prior to discharging into Channel SOF across South Golf Hole 10.. Channel WL serves Woods Landing, Hunter's Trail, Pinewinds, Worthington, portions of South Golf Hole 10 and 11, and portions of Sunflower Drive.

The concrete weir Structure WL-1 is the outfall structure of the Woods Landing retention pond and appears not to be in its' original condition, as its' grate is missing and at least one wall of the structure is gone. This is of a safety concern, and allows the water level of the retention pond to exist at an elevation lower than intended, which was found to be approximately a half of a foot during our investigation. This weir needs to be repaired and restored to its original design.

Further downstream, structure WL-2, is the outfall for the retention pond south of Worthington, and on the north side of South Golf Hole 11 needs to be repaired. The grease baffle has been breached and water enters the Mitered End Section discharge at a lower elevation than designed.

Continuing downstream on Channel WL, at Structure WL-3, is a stone riprap weir, which serves as the outfall structure for Channel discharge into Channel SOF. Immediately upstream of the Structure, the drainage ditch leading up to the Structure is partially blocked with sediment and other debris that need to be cleared. Additionally, the inside of the aforementioned weir, needs to be cleaned of the vegetative and riprap debris that have settled inside of the weir. Flows from the structure cross Golf Hole 10 via twin 36" pipes underneath the Golf Course, prior to discharge into Channel SOF. The headwall, structure WL-4, and discharge ditch of these pipes is partially blocked with sediments that have accumulated, which needs to be cleared and maintained to insure unimpeded outfall flow.

Structure WL-1

Structure WL-4

Channel WL looking upstream of structure WL-3

Channel 2SU

Channel 2SU is a relatively short channel that conveys offsite inflow (one of two) from the adjacent Lockheed Martin site to the south and east of the Community, and conveys it across South Golf Hole 12, and through the Kings Mill Subdivision via a ditch/pipe system that ultimately discharges into a Conservation Area west of Kingsmill, and ultimately into Channel SOF. In addition to the offsite flows, the Channel conveys drainage from a portion of Sunflower Drive, portions of South Golf Holes 11 and 12, and the majority of the Kingsmill Subdivision.

The Channel begins at Structure 2SU-1, a headwall and pipe outfall located just east of Kingsmill at Sunflower Drive. Structure 2SU-1 was observed to be almost totally buried under sediments and vegetation which greatly restrict its' intended discharge. The headwall needs to be cleared of its obstructions .The discharge from the headwall then flows into a ditch/pipe system which conveys Channel drainage under South Golf Hole 12. The ditch is also in need of clearing, as upon visual inspection it was filled with what seemed to be sawed tree limbs and overgrown vegetation that would greatly impede flow conveyance. Further downstream on the discharge end of the ditch, headwalls on both ends of the pipe under the Golf Course, identified as Structure 2SU-2 and 2SU-3, also need to be cleared and cleaned.

Structure 2SU-1

View downstream of Structure 2SU-1

View downstream of structure 2SU-2

Channel 1SU

Channel 1SU also conveys offsite Lockheed Martin flows, and flows from Cluster Homes Unit 5. The Channel starts as a north-south ditch system running parallel to Sunflower Drive, east of Cluster Homes Unit 5, and then continues through an underground pipe system located on the southeasterly corner of Cluster 5, before discharging under SR 584. The channel and structures were visually inspected and appeared be to functioning unimpeded.

Structure 1SU-1

Structure 1SU-2

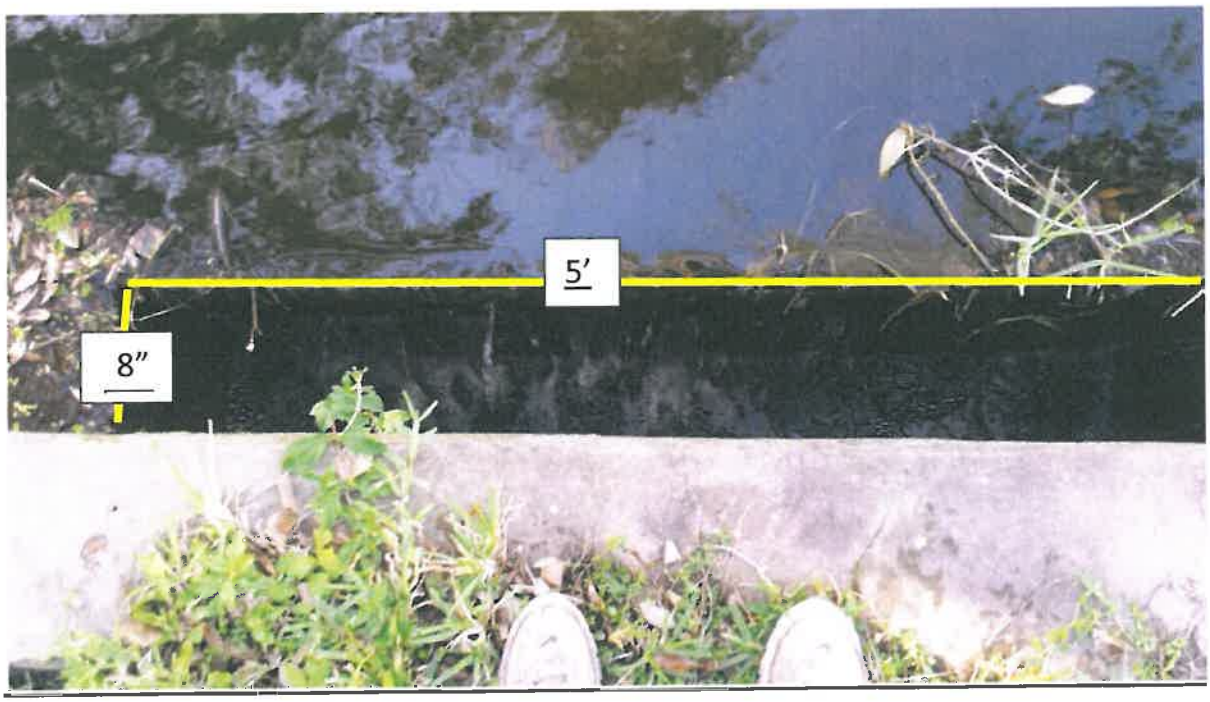
Channel C

Channel C serves as the discharge channel for Condominiums 1 through 8, The Meadows Condominium, and Lake Estates. The Channel begins at the retention pond located in the center of these developments, and discharges under Eastlake Woodlands Parkway via a 36 inch pipe Structure C-1, and then continues in a ditch system across South Golf Hole 17 to its' downstream intersection with Channel SOF, and subsequent discharge into Channel SOF, just east of South Woodlands Drive.

The ditch system directly upstream of structure C-1 is in need of cleaning of accumulated sediment to insure unimpeded flow from the retention pond to downstream receiving bodies.

Additionally, Structure C-2, which was originally designed as a headwall with a 36 inch pipe conveying Channel outfall under South Woodlands Drive and into Channel SOF, appears to have been modified. The modification to the structure is the addition of an eight inch by 5 foot aluminum or steel weir, to the headwall structure. From a drainage prospective, this added weir structure as constructed greatly reduces the storm water discharge capacity of Structure C-2, which would have significant negative impacts on the intended discharge of this Channel. This structure needs to be reconstructed to permit the same storm water flow capacity as the 36 inch pipe.

Additionally, immediately downstream of Structure C-2, an accumulation of sediment was observed in the Channel, which needs to be removed and cleaned.



Structure C-1 Weir Dimensions

Structure C-1

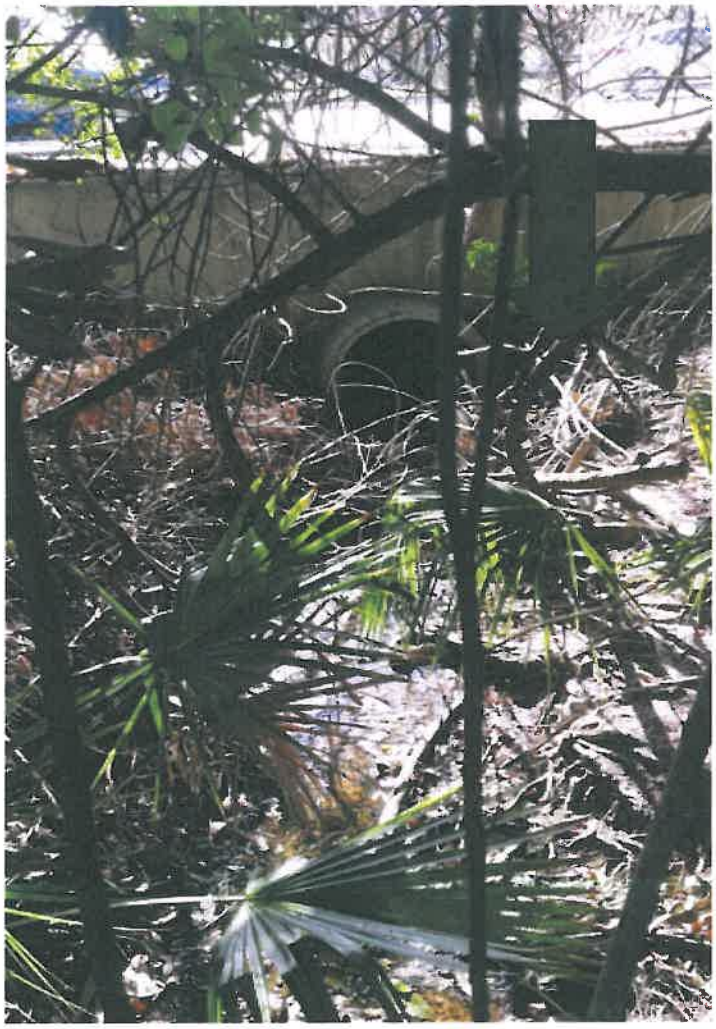
View upstream of structure C-1

Channel WSP

Channel WSP carries offsite flows from Woodlands Plaza Shopping Center via a ditch running parallel to S.R. 584, and through an underground pipe system through Cluster Homes Unit 4, both ultimately conveying the outfall to Moccasin Creek. In addition to the offsite flows, Channel WSP provides drainage outfall for South Golf Holes 15 and 16, and portions of Cluster Homes Unit 4.

The discharge immediately downstream of Structure WSP-1, which is a headwall for the discharge pipe under S.R. 584, is partially obstructed by invasive vegetative growth, and needs to be maintained.

At Structure WSP-2, a grate inlet located within Cluster 4, the grates on top of the inlet appear to be upside down. The inlet needs to have its grates flipped to the correct side.



Structure WSP-1, arrow indicates vegetative flow impediments

Structure WSP-2, grate on the wrong way

Summary

In summary, the investigation determined that the existing condition of the master drainage system was as one might expect for drainage improvements that had been installed over the past 40 years with little to no maintenance done. Invasive vegetation, sediment accumulation, erosion, partial and total structure failure, modifications made by others, and similar matters described above, all were observed, which would likely cause the master drainage system to not perform as was originally intended, and subject all or parts of the Community to damages from flooding after significant rainfall events. All of these matters should be of upmost concern, and need to be addressed prior to the occurrence of anticipated historic storm events resulting in flooding.

Despite these matters, the East Lake Woodlands Community has fortunately, as of the date of this investigation, avoided damages typically caused by flood events. Other nearby Communities have not been so fortunate, as last August rainfall events caused reported significant damage to those Communities. However, the reader of this report should understand that the Tampa Bay area has been spared of major storm events since the original construction of the Community. Historical rainfall data tells us that this circumstance is not likely to continue. In short, Florida in general, and Tampa Bay specifically, are surely due for the occurrence of major rainfall events. If the Community's master drainage system is not soon brought back to its original design and constructed intent, significant flooding of streets and home sites should be expected when such occurs.

It is unfortunate that apparently, no budgets or escrowed funds have been reserved for the necessary repairs and maintenance issues now needed. However, the costs that must be incurred pale in comparison to the property and personal damages that would result with a flood event.

This report has intended to report those observed matters needing attention, and to insure that the master drainage system has been restored to function as originally intended. To that end, it is important to stress that all of the repairs/replacements mentioned in this report need to be accomplished in the very near future. However, as a part of our scope of services, we were tasked to prioritize the work efforts. To respond to that task, we have prepared the following priority list, but again emphasize that all of the improvements mentioned in this report are now needed, and certainly prior to, any major rainfall events.

Priorities

In order of determining the most critical matters, we are using a criteria of the development areas that are most impacted, or areas most likely to experience the most immediate and significant damages caused by high water levels and flooding, if repairs/maintenance are not performed in the Channels servicing their drainage needs.

- Greenhaven Unit One, as previously reported (see *Preliminary Report on Specific Drainage Issues at East Lake Woodlands*, September 2015)
- Channel 1AB
- Channel 2BC
- Channel 1FL
- Channel NOF
- Channel SOF
- Channel EL
- Channel WL
- Channel 2SU
- Channel C
- Channel 3BC
- Channel NGC
- Channel CT
- Channel WSP
- Channel MF
- Channel 2AB
- Channel 2FL
- Channel 1SU

400' 200' 0' 400'
SCALE: 1" = 400'

BROOKER CREEK OUTFALL

BROOKER CREEK

TO LAKE TARPON

TURTLE CREEK SUBD UNIT TWO

TURTLE CREEK SUBD UNIT ONE

TURTLE CREEK UNIT THREE

TURTLE CREEK UNIT FOUR

NATURAL AREA CONSERVATION AND DRAINAGE EASEMENT

CONSERVATION AND DRAINAGE AREA EASEMENT

WETLAND AREA

PINNACLE

WARWICK HILLS

CONSERVATION AREA EASEMENT

MUIRFIELD

WETLAND UNITS (TYP.)

DIAMOND CREST

EFFLUENT LAKE

LAKE

3BC

3BC-1

2BC

2BC-1

2BC-2

2BC-3

2BC-4

MF

MF-1

NGC

NGC-1

NGC-2

NGC-3

NOF

NOF-1

NOF-2

2FL

2FL-1

1FL

1FL-1

1FL-2

1FL-3

1FL-4

1FL-5

1FL-6

1FL-7

1FL-8

1AB

1AB-1

2AB

2AB-1

EL

EL-1

EL-2

CT

CT-1

CT-2

CT-3

C

C-1

C-2

WL

WL-1

WL-2

WL-3

WL-4

SOF

SOF-1

SOF-2

WSP

WSP-1

WSP-2

2SU

2SU-1

2SU-2

2SU-3

1SU

1SU-1

1SU-2

FORREST LAKE COMMUNITY

LOCKHEED MARTIN

WOODLANDS SHOPPING PLAZA

MOCCASIN CREEK OUTFALL

FLORIDA POWER RIGHT-OF-WAY

FLORIDA POWER RIGHT-OF-WAY

EAST LAKE ROAD

WOODLANDS PARKWAY

WOODLANDS BOULEVARD

EASTLAKE WOODLANDS PARKWAY

TAMPA ROAD

EAST LAKE WOODLANDS UNIT ONE

QUAIL FOREST CLUSTER HOMES UNIT ONE-A

QUAIL FOREST CLUSTER HOMES UNIT ONE-B

DEERPATH UNIT ONE

PROPOSED SUBDIVISION

CYPRESS ESTATES CONDOMINIUM UNIT TWO

CYPRESS ESTATES CONDOMINIUM UNIT ONE

CYPRESS ESTATES CONDOMINIUM UNIT THREE

LAKE CYPRESS

WOODLAKE RUN CONDOMINIUM UNIT ONE

WOODLAKE RUN CONDOMINIUM UNIT THREE

WOODLAKE RUN CONDOMINIUM UNIT TWO

REC. PARCEL

SALES OFFICE/ TENNIS COURTS

CLUB HOUSE

COMMERCIAL AREA

LAKE ESTATES PATIO HOMES

ELW CONDOMINIUM UNIT SEVEN

ELW CONDOMINIUM UNIT TWO

ELW CONDOMINIUM UNIT FOUR

ELW CONDOMINIUM UNIT THREE

ELW CONDOMINIUM UNIT FIVE

ELW CONDOMINIUM UNIT SIX

THE MEADOWS CONDOMINIUM UNIT TWO

THE MEADOWS CONDOMINIUM UNIT ONE

CLUSTER HOMES UNIT TWO

CLUSTER HOMES UNIT ONE

CLUSTER HOMES UNIT THREE

CLUSTER HOMES UNIT FOUR-A

CLUSTER HOMES UNITS FOUR-B, C & D

CLUSTER HOMES UNIT FIVE

PATIO HOMES UNIT ONE - EAST

PATIO HOMES UNIT ONE-WEST

PATIO HOMES UNIT ONE-A EAST

WOODRIDGE GREEN TOWNHOMES UNIT FOUR

WOODRIDGE GREEN TOWNHOMES UNIT THREE

WOODRIDGE GREEN TOWNHOMES UNIT TWO

WOODRIDGE GREEN TOWNHOMES UNIT ONE

KINGSMILL

LAKESHORE VISTA

ST. ANDREWS UNIT ONE PARCEL 2

HEATHERWOOD CONDOMINIUM UNIT ONE

HUNTERS CROSSING

GREENHAVEN UNIT ONE

GREENHAVEN UNIT TWO

GREENHAVEN UNIT THREE

GREENHAVEN UNIT FOUR

ABERDEEN UNIT ONE

ABERDEEN UNIT TWO

ABERDEEN UNIT THREE

ABERDEEN UNIT FOUR

WOODS LANDING TOWNHOMES UNIT ONE

PINEWINDS CLUSTER HOMES UNIT ONE-A

PINEWINDS CLUSTER HOMES UNIT ONE-B

HUNTERS TRAIL

CREEKSIDE

ENCLAVE

ELW PARCEL N

ELW PARCEL L

ISLEWORTH

CROSS POINTE

STONEBRIAR

CROSS CREEK

ABERDEEN UNIT ONE

LAUREL OAKS

THE PRESERVE

ELW INVESTIGATIVE REPORT
MASTER DRAINAGE EXHIBIT

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