

# SW Clay Township Annexation Master Drainage Plan Follow-Up Report

Prepared For:



City of Carmel  
Engineering Department

**July 27, 2012**

Prepared By:



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## Section 1: Introduction

### *Purpose and Scope / Content*

The following report is to serve as a supplement to the Southwest Clay Township Annexation Master Drainage Plan for the City of Carmel. The Master Drainage Plan identified all of the subdivisions within the SW Clay annexation territory, evaluated the existing drainage system within each subdivision, and provided a categorized recommendation of priority for the drainage improvements, if needed, for each subdivision. Refer to Table 2: Annexation Territory Subdivision Summary for a complete list of subdivisions within the annexation area and the respective recommended priority of subdivision drainage improvements. Also indicated within the Master Drainage Plan, was the timeline for the implementation of the recommended corrective drainage measures as set forth by the SW Clay annexation agreement (see Table 1: Project Priority Summary). The following supplemental report will verify that all existing drainage complaints within the 1<sup>st</sup> level priority subdivisions have been addressed; will provide detailed information on the drainage improvements projects that have been completed within the SW Clay annexation territory; and will discuss further drainage improvements projects that are planned with the SW Clay annexation territory. This supplemental report will also summarize drainage complaints from the second and third level priority projects, and outline an action plan and timeline for drainage improvements within these subdivisions.

<b>Table 1: Project Priority Summary</b>		
<b>First Level Priority Projects</b> (Completion Date - July 27, 2012)	<b>Second Level Priority Projects</b> (Completion Date - July 27, 2014)	<b>Third Level Priority Projects</b> (Completion Date - July 27, 2014)
<b>Larkspur Phase I</b>	<b>Bentley Plat</b>	<b>Deerfield</b>
<b>Walnut Creek Woods</b>	<b>Brandywine</b>	<b>Greentree Country Club Estates</b>
<b>Kings Mill</b>	<b>North Augusta</b>	<b>Queens Manor</b>
<b>Bridlebourne</b>	<b>Spring Run Estates</b>	<b>Sutton Place</b>
<b>Windemere</b>	<b>Town at Weston Place</b>	
<b>Crooked Stick Estates</b>		
<b>Crooked Stick West</b>		

**Table 2: Annexation Territory Subdivision Summary**

<b>Subdivision</b>	<b>No Drainage Improvements Recommended</b>	<b>First Level Priority</b>	<b>Second Level Priority</b>	<b>Third Level Priority</b>
Annally Downs	√			
Ashbrook	√			
Bella Terra	√			
Bentley Plat			√	
Bramblewood	√			
Brandywine			√	
Bridlebourne		√		
Camden Walk	√			
Cass Estates	√			
Cedar Point	√			
Chateaux de Moulin	√			
Coppergate	√			
Crooked Stick Estates		√		
Crooked Stick West		√		
Deerfield				√
English Oaks	√			
Estancia	√			
Genung	√			
Green Tree Country Club Estates				√
Huntersfield	√			
Huntington Chase	√			
Kings Mill		√		
Kosene	√			
Lacoma Estates	√			
Larkspur Phase I		√		
Laurel Ridge	√			
Laurelwood	√			
Mayflower Park	√			
McCracken Bourdillon Estate	√			
Meridian Suburban	√			
North American Park	√			

<b>Subdivision</b>	<b>No Drainage Improvements Recommended</b>	<b>First Level Priority</b>	<b>Second Level Priority</b>	<b>Third Level Priority</b>
North Augusta			√	
Pikes Spring Mill Heights	√			
Pine Lake Estates	√			
Queens Manor				√
Sanders Estates	√			
Shelbourne Green	√			
Spring Arbor	√			
Spring Mill Place	√			
Spring Run Estates			√	
Springwood	√			
Summer Lakes	√			
Sun Mundy One Two Three	√			
Sutton Place				√
The Park at Weston Place	√			
Town at Weston Place			√	
Treesdale	√			
Village at Weston Place	√			
Walnut Creek Woods		√		
West Carmel Center	√			
West Carmel Market Place	√			
Weston Park	√			
Weston Park Northwestern	√			
Weston Ridge	√			
Williams Mill	√			
Windemere		√		
Windsor Grove	√			
Winterwood	√			
Wood Haven	√			

## **Section 2: Subdivision Drainage Complaint Review (1<sup>st</sup> Level)**

The following section will include all drainage complaints that were recorded by the Hamilton County Surveyors' Office for each subdivision listed as a first level priority project within the Southwest Clay Township Annexation (SCTA) Master Drainage Plan. This section will also summarize the recommended drainage improvements, if any, for each first level priority subdivision, and provide any corresponding cost estimates. Lastly, an explanation for the action taken, or reason there was no action taken, to address each drainage complaint with the subdivisions will be given. In regards to the resolution of each drainage complaint, if the recorded drainage complaint indicated that the Hamilton County Surveyors Office had responded to the complaint with a work order to remedy the issue, and no further complaints had been filed for the same issue, the complaint is considered to have been 'resolved'. If the cause of the complaint was determined to be created due to construction by the homeowner / neighboring parcel, resulting from construction activities by the developer, or failure of the homeowner's private system, the complaint is considered 'private – no action,' and will not be considered as an issue requiring any drainage improvements.

### ***Larkspur – Phase I***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Larkspur – Phase I subdivision revealed an adequate drainage system in good working condition. However, the Hamilton County Surveyors' Office provided a few drainage complaints / work orders for the subdivision, and indicated that drainage issues occur during heavy rain events due to the elevation of the water levels in the northern Bridlebourne detention pond affecting the positive outlet of the subdivision. Refer to Appendix A for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page A-1, there were only two drainage complaints in which no drainage improvements or action was completed. All other drainage complaints were improved with work orders, and no further complaints for these issues were filed. Of the two drainage complaints that resulted in no action necessary, one of the complaints was determined to be a private issue, and therefore, is out of the scope of drainage improvements within this project. The other complaint (DC-2003-00482) was investigated by the Hamilton County Surveyors' Office and it is believed that the issue is caused by both the peak water elevation in the northern Bridlebourne detention pond, and insufficient capacity in the outfall pipe from the Larkspur detention pond to the northern Bridlebourne detention pond. The construction plans being developed for the Bridlebourne subdivision that are further discussed later in this section will address both issues. Therefore, corrective action on the remaining drainage problems within the Larkspur – Phase I subdivision is currently underway, and after completion there will be no further actions recommended.

## ***Walnut Creek Woods***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Walnut Creek Woods subdivision revealed an aged drainage system in fair working condition. The existing storm sewer appears to consist of old block inlet structures that may allow infiltration. The Hamilton County Surveyors' Office provided multiple drainage complaints / work orders for the subdivision, and indicated that occasional drainage issues occur within the cul-de-sac and subdivision streets during heavy rain events, which is believed to be due to periodic blocking of the outlet pipe from the subdivision. During multiple visual site evaluations, it was discovered that, even in dry conditions, the outlet structure of the northern detention pond was always active. This suggests a possible detention storage capacity issue within the detention ponds. If there is a detention storage capacity issue, this could contribute to the aforementioned flooding that has been experienced within the subdivision's cul-de-sac and streets. Refer to Appendix B for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page B-1, action has been taken on all of the recorded drainage complaints except for one (DC-2009-00016). A site visit was completed for this issue by the Hamilton County Surveyors' Office; however, there were no ponding/drainage issues apparent during the site visit, and no additional complaints have been filed for this issue. Therefore, it has been concluded that complaints generated from this neighborhood have been resolved, and no further action is required for this issue. In regards to the possible detention storage capacity issues, interviews of the impacted parcel owners were completed during the process of determining a possible course of action. Refer to Appendix B-64 for a copy of the Walnut Creek Woods drainage report that further investigates the storage capacity issue. As can be seen within the report, it was determined that the current residents did not believe there to be any drainage issues within the subdivision. The only drainage complaint that was noted during the investigation was a temporary, localized flooding issue that occurred approximately 6 years ago. Outside of this issue, all other issues are considered to be minor, and are typically due to lack of maintenance or obstruction of the pond outlets. It has been determined that these issues have been resolved with routine maintenance efforts, and therefore, the residents would be opposed to any construction projects impacting private property within the subdivision. Therefore, corrective action on drainage problems within the Walnut Creek Woods subdivision is considered to be complete, and no further action is recommended at this time.

## ***Kings Mill***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Kings Mill subdivision revealed an adequate drainage system with a detention facility in good working condition. The Hamilton County Surveyors' Office provided multiple drainage complaints / work orders for the subdivision, and indicated that the major drainage issue is rear yard flooding at the west side of the subdivision due to periodic clogging at the end section of the bypass system for offsite flow through the development. Refer to Appendix C for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page C-1, action has been taken on all of the recorded drainage complaints that are considered not to be private resident or homeowner association responsibility. A site visit was completed to re-visit the drainage complaint concerning the clogging of the bypass system end section (DC-2002-00180). The site visit was completed during a heavy flow period; however, no drainage issues were identified during the site visit. Also, conversations took place with the current resident of the adjoining parcel, and it was indicated by the resident that they have not experienced any drainage issues in regards to the bypass system. Refer to Appendix C-71 for a copy of the Kings Mill drainage report that further investigates the bypass system drainage issue, and provides a recommendation for the action required to improve this issue. As can be seen within the report, due to the current Bridlebourne drainage improvements project and testimony from the current resident indicating that there are no drainage issues associated with the bypass system, it is recommended that no action is to be taken at this time. Therefore, corrective action on drainage problems within the Kings Mill subdivision is considered to be complete, and no further action is recommended at this time.

### ***Bridlebourne***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Bridlebourne subdivision revealed several miscellaneous areas of water ponding within the streets during heavy rain events due to possible pavement subgrade failure, and thus, affecting drainage conveyance to existing inlets. The Hamilton County Surveyors' Office provided several drainage complaints / work orders for the subdivision, and indicated that the major drainage issue is believed to be the closeness in elevation of the peak 100-year flood elevation to the existing finished floor and street elevations. As discussed above, it is also believed that the major drainage concern for the Larkspur – Phase I subdivision is also caused by the staged storage elevations of the Bridlebourne detention ponds. Refer to Appendix D for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page D-1, action has been taken on all of the recorded drainage complaints that are considered not to be private resident or homeowner association responsibility. It was indicated by the Hamilton County Surveyors' Office that they have been investigating the detention system concerns within the development, and a proposed improvement plan has been created. The proposed plan will include lowering the elevation of the peak 100-year storm storage of the northern detention pond, as well as, completing outlet work downstream of the southern detention pond. Construction plans for the proposed drainage improvements to the Bridlebourne subdivision are currently being developed for the Hamilton County Surveyors' Office. Overall, the proposed Bridlebourne improvements will include expansion of the northern detention pond storage area north of the existing pond, correction of the existing emergency spillway and pond outfall, and up-sizing the existing pipe from the Larkspur – Phase I detention pond to the northern Bridlebourne pond. It has been indicated by the City of Carmel that the proposed improvements will likely be constructed in the spring of 2013. The completion of the project was delayed considerably in order to allow intensive neighborhood involvement in determining the final fix. Therefore, corrective action on drainage problems within the Bridlebourne subdivision is currently underway, and after completion there will be no further actions recommended.

## **Windemere**

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Windemere subdivision revealed an adequate drainage system in fair working condition. The Hamilton County Surveyors' Office provided multiple drainage complaints / work orders for the subdivision, and indicated that the major drainage issues are due to blocking of the development's outlet structure, insufficient pipe and grate capacity of the outlet structure on the south side of 106<sup>th</sup> Street, and a block wall being located within the pond's emergency spillway. Refer to Appendix E for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page E-1, action has been taken on all of the recorded drainage complaints that are considered not to be private resident or homeowner association responsibility. A site visit was completed to further investigate the concern of the detention outlet system becoming periodically clogged. It was observed that work has previously been completed on the grate of the outlet structure, as additional open area has been provided by cutting larger openings into the casting. Clogging of the outlet structure grate is considered to be a private maintenance issue, and outside the scope of drainage correction by the City of Carmel. It was also determined that there are concerns that the pipe capacity of the existing 106<sup>th</sup> Street twin culverts and inlet's grate capacity is insufficient to convey the Windemere drainage in flood events. It is believed that these insufficient capacities have caused previous overtopping events of 106<sup>th</sup> Street. To improve these issues, a proposed improvement plan was designed and construction was completed in April 2011. A new culvert with increased capacity was installed across 106<sup>th</sup> Street to address the pipe capacity issue, the existing outlet structure was removed and end sections were installed to resolve the grate capacity issue, and riprap was installed for surface stabilization and to prevent erosion by the high flows that are conveyed from the Windemere detention pond in large rain events. Refer to the enclosed plans within Appendix E for a copy of the proposed drainage improvements plans for the Windemere development. Through site investigations and coordination with the Hamilton County Surveyors' Office it was determined that the Windemere HOA has already removed a portion of the existing block wall to provide conveyance of the pond's emergency spillway. Therefore, corrective action on drainage problems within the Windemere subdivision is considered to be complete, and no further action is recommended at this time.

Since the completion of the aforementioned 106<sup>th</sup> Street culvert upsizing project, the Windemere HOA has provided additional comments concerning critical storm storage elevations within the large, northern detention pond. According to a resident within the subdivision, the emergency spillway is frequently active and water elevations within the pond have periodically approached the existing top of bank elevation and rear yards at the northeast corner of the pond. Investigation of this issue is currently being completed by the City of Carmel Engineering Department. Coordination with the Windemere HOA and the Hamilton County Surveyors' Office will be ongoing as the investigation progresses.

## ***Crooked Stick Estates***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Crooked Stick Estates subdivision revealed an adequate drainage system with several areas of miscellaneous ponding. The Hamilton County Surveyors' Office provided two recorded drainage complaints for the subdivision, and indicated that the majority of the drainage issues that have been noticed or investigated are caused by erosion control issues. The surveyor's office also indicated that there were previous complaints of pipe failures along the west side of Ditch Road, south of Crooked Stick Lane. And finally, the surveyor's office had also indicated that they have completed plans for drainage improvements along Prestwick Lane and Prestwick Circle to resolve drainage issues related to critical pond elevations during heavy rain events. The proposed design includes the installation of a new outlet system to redirect the outfall from the existing detention pond to the north. Currently, the existing pond has two (2) submerged outlet pipes that cause the pond to back up during rain events. As the surface level in the pond increases, water is backed up into the upstream storm sewer system and side yard swales. Discharging the outfall to the north to Clay Creek allows improved discharge, and will lower the flood elevations within the pond, and therefore, improves the backing up of water into the upstream storm sewer and side yard swales. The Hamilton County Surveyor's Office and the City of Carmel Engineering Department indicated that the plans had received approval, and funds for the project were set in place, when resident remonstrations placed the project on hold. The resident at 1514 Prestwick Circle filed suit against the Hamilton County Drainage Board, and the result was that the designed improvements will not be implemented. As an alternative, the Hamilton County Surveyors' Office is currently purposing to install a pump to re-route the outfall north. Christopher B. Burke Engineering is investigating this alternative, and will be compiling a feasibility report and cost estimate for the proposed project.

Refer to Appendix F for copies of the recorded drainage complaints, and a summary of the complaints and actions taken, or reasons that no actions were taken. As can be seen on the attached summary spreadsheet, page F-1, it has been determined that the recorded drainage complaints are either private resident / HOA issues, or issues that have been investigated and no additional complaints have been filed. Therefore, in regards to recorded drainage complaints, all issues should be considered private resident or homeowner association responsibility, and no additional actions on these issues are necessary. Subsequent drainage evaluations were completed following rain events, and it was determined that the miscellaneous ponding concerns indicated above are minor, isolated issues that do not create significant safety concerns. Therefore, corrective action on drainage problems within the Crooked Stick Estates subdivision, with the exception of any efforts that the Hamilton County Surveyors' Office may determine necessary, is considered to be complete and no further action is recommended at this time.

## ***Crooked Stick West***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Crooked Stick West subdivision revealed a drainage system with several issues. It was noted that there was an area of ponding at the intersection of Towne Road and Firestone Lane, and there were a few culverts in deteriorating condition. The Hamilton County Surveyors' Office provided several drainage complaints / work orders for the subdivision, and indicated that the majority of drainage

issues and complaints are due to erosion control issues. They also indicated that there have been issues with the culvert crossing Greenbrier Drive east of Towne Road. Refer to Appendix G for copies of the recorded drainage complaints and work orders, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page G-1, action has been taken, or will be taken, on all complaints that are not considered private / erosion issues. The visual evaluation of the subdivision identified that the Greenbrier Drive culvert crossing was in poor condition, and has caused the reported path sinkholes and pavement failures. To fix the sinkholes / failures and improve the drainage within the subdivision, the Greenbrier Drive culvert replacement project was designed and constructed in May 2011. Refer to the enclosed plans within Appendix G for a copy of the proposed culvert replacement plans for Greenbrier Drive. A site visit was completed to further investigate the inlet structure / pipe concerns on Burning Tree Lane as documented in the recorded drainage complaints (DC-2006-00359 / DC-2006-00388), and the flooding concern at the intersection of Towne Road and Firestone Lane. It was observed that both curb inlet structures appeared to be old, block constructed, "dog-house" structures in poor condition. The pipes have fairly small openings cut into the top of the pipes to convey the drainage collected by the curb inlets, and the area of these openings may be easily obstructed by leaves, grass clippings, and other debris. It was also determined that the existing inlet grates have minimal open areas that can also be easily blocked / obstructed. It is anticipated that the recorded ponding issues can be fixed by the removal and replacement of these curb inlet structures, along with the street crossing pipe to the downstream manhole, and new castings with increased open areas being installed on the new curb inlets. It was also observed that the area of ponding within the curb line on the north side of Firestone Lane at Towne Road is believed to be due to previous asphalt overlays. It is anticipated that this area can be corrected by surface milling the existing asphalt pavement, and resurfacing this area to achieve positive drainage. It has been determined that both of these issues are classified as maintenance issues that will be corrected by ongoing maintenance efforts by either the City of Carmel or Hamilton County street / highway departments. Therefore, corrective action on drainage problems within the Crooked Stick West subdivision is considered to be complete, and no further action is recommended at this time.

## **Section 3: Subdivision Drainage Complaint Review (2<sup>nd</sup>/3<sup>rd</sup> Level)**

The following section will include all drainage complaints that were recorded by the Hamilton County Surveyors' Office for each subdivision listed as a second or third level priority project within the Southwest Clay Township Annexation (SCTA) Master Drainage Plan. This section will also summarize the recommended drainage improvements, if any, for each second and third level priority subdivision, and provide any corresponding cost estimates. Lastly, an explanation for the action taken, or reason there was no action taken, to address each drainage complaint with the subdivisions will be given. In regards to the resolution of each drainage complaint, if the recorded drainage complaint indicated that the Hamilton County Surveyors Office had responded to the complaint with a work order to remedy the issue, and no further complaints had been filed for the same issue, the complaint is considered to have been 'resolved'. If the cause of the complaint was determined to be created due to construction by the homeowner / neighboring parcel, poor construction by the developer, or failure of the homeowner's private system, the complaint is considered 'private – no action,' and will not be considered as an issue requiring any drainage improvements.

### ***Bentley Plat***

As discussed within the SCTA Master Drainage Plan, the Bentley Plat subdivision is a minor subdivision with a drainage system consisting of sheet flow, swales and pipe culverts. It was noted within the report that the visual evaluation of the subdivision's drainage system revealed only one drainage concern, a small amount of standing water at the north side of the subdivision. After further investigation of the issue and conversations with the Hamilton County Surveyor's Office, it was discovered that this area of standing water is actually located along the north property line of the northern adjoiner. Therefore, it has been discovered that the issue is located on private property, outside of the Bentley Plat subdivision. The surveyor's office indicated that there are no drainage complaints on file for the subdivision, and that any known drainage issues within the subdivision have been corrected. The surveyor's office also indicated that the Bentley Plat property is a single property owner that was only platted as a subdivision to split off a single lot. The lot split was intended to allow for the development of one additional single-family lot; however, this currently has not been completed. Further, due to the size and nature of the subdivision platting, it was exempt from any drainage improvements during the approval process.

It is indicated in the SCTA Master Drainage Plan that the scope of all corrective actions evaluated and recommended within this project shall be limited to existing subdivisions and thoroughfares in the annexation territory. It is out of the scope of the SCTA Master Drainage Plan to complete drainage improvements on private property outside of platted subdivisions that will solely benefit one property owner. Therefore, as the only drainage issue that is noted within the SCTA Master Drainage Plan for the Bentley Plat subdivision is located outside of any subdivision, and improvements in this area would solely benefit one private property owner, this issue is determined to be outside of the scope of the required drainage corrections by the SW

Clay annexation agreement. Consequently, no corrective actions are recommended to be completed for the Bentley Plat subdivision.

### ***Brandywine***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Brandywine subdivision revealed multiple areas of minor water ponding within the street curb lines, which appears to be caused by multiple overlays affecting the conveyance of stormwater within the curb lines. The visual evaluation also revealed a larger issue of significant siltation of the culverts at Shelborne Court and Shelborne Road, greatly reducing the capacity of the existing pipes. The Hamilton County Surveyors' Office provided several drainage complaints for the subdivision, and indicated that overall drainage improvements for the subdivision have been designed. Phase 1 improvements have been implemented; however, Phase 2 improvements are currently designed and ready to be constructed, but on hold due to a concern over the funding for the project. It was also indicated by the surveyor's office that all recorded drainage complaints were filed prior to the implementation of the Phase 1 improvements, and no new complaints have been filed since the completion. Refer to Appendix H for copies of the recorded drainage complaints, and a summary of the complaints and actions taken, or reasons that no actions were taken.

As can be seen on the attached summary spreadsheet, page H-1, at the time all of the drainage complaints were filed, the subdivision was considered a non-regulated subdivision and all complaints were classified as private issues. However, the proposed improvements designed by Hamilton County, included in Appendix H, are anticipated to directly provide corrective action for all recorded drainage complaints, except the latest complaint (DC-2003-00131). The proposed improvements including: ditch dredging and re-grading, subsurface drainage repair and upsizing, and new storm pipe and structures are expected to improve all other recorded drainage issues. The drainage complaint (DC-2003-00131) concerns the blockage of the homeowner's private geothermal line, and while the proposed improvements that are adjacent to the property will improve the subsurface drainage system that appears to accept the private line, it is expected that the private homeowner has completed, or will need to complete, additional work on the private side of the line to improve the issue. As indicated by the Hamilton County Surveyor's Office, no additional drainage complaints have been filed since Phase 1 of the improvements was completed. In regards to the visual issues noted in the SCTA Master Drainage Plan, the proposed improvements also includes the installation of new drive culverts under Shelborne Court at Shelborne Road and downstream swale improvements, improving the most significant drainage issue revealed during the visual evaluation of the subdivision. Also, after a subsequent drainage evaluation following a rain event, it was determined that the minor water ponding concerns indicated above are isolated issues that do not create significant safety concerns, and in turn, do not require any correction actions. Therefore, the remaining drainage improvements to be completed within the Brandywine subdivision prior to the July 27, 2014 2<sup>nd</sup>/3<sup>rd</sup> level priority deadline includes only the designed Phase 2 improvements.

## ***North Augusta***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the North Augusta mixed use development revealed an aged, inadequate drainage system in overall poor working condition. It was indicated within the SCTA Master Drainage Plan that visual evidence of silted in and collapsed pipe culverts, rusted CMP culverts, broken headwalls, pipe issues cause by minimal pipe cover, poorly graded swales, unmaintained swales, and failing pavement subgrade was encountered during the site visits. The Hamilton County Surveyors' Office provided drainage complaints for the subdivision. Refer to Appendix I for copies of the recorded drainage complaints, and a summary of the complaints and actions taken, or reasons that no actions were taken. The surveyor's office also indicated that recently completed projects (Commerce Drive road project and regulated drain installation at north boundary of subdivision) have helped to improve drainage outlets for the subdivision. As the subdivision is aged, and some of the existing houses are declining, redevelopment is beginning to occur.

As can be seen on the attached summary spreadsheet, page I-1, there were only three drainage complaints in which no drainage improvements or action was completed by Hamilton County. The other drainage complaints were improved by construction projects, and no further complaints for these issues were filed. All three of the drainage complaints that resulted in no action necessary by the Hamilton County Surveyor's Office were determined to be private issues, and therefore, are out of the scope of drainage improvements within this project. It is also identified in the summary spreadsheet that one of the private issues (DC-2002-00036) was improved by the adjoining developer that created the issue. No further complaints for the private issues have been filed. Therefore, in regards to existing drainage complaints that were filed for the North Augusta subdivision, all necessary actions have been taken on these issues and no further actions will be required to be completed prior to the July 27, 2014 2<sup>nd</sup> level priority completion date. However, due to the deteriorating condition of the subdivision's drainage infrastructure, it is recommended that further drainage investigation be completed on the overall condition of the infrastructure prior to the July 27, 2014 deadline. Dependent upon the findings of the additional evaluation, drainage improvement efforts for the subdivision may be recommended. Plans and cost estimates will be completed if necessary when the additional drainage evaluation is concluded.

## ***Townes at Weston Pointe***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Townes at Weston Pointe subdivision revealed miscellaneous areas of water ponding within the intersection of Lemongrass Drive and Much Marcle Drive during heavy rain events, and areas of standing water in the swales behind the condos facing Lemongrass Drive and Much Marcle Drive. The Hamilton County Surveyors' Office provided one drainage complaint for the subdivision, and indicated that the only known drainage issue is standing water in the rear yard areas behind the condos. Review of the subdivision development plan revealed that the swales were designed to be graded at a 1.0% minimum slope with no underdrain pipe. While this is in accordance with Hamilton County standards, it is anticipated that the swales were constructed below the indicated minimum slope; therefore, reducing flow capacity and velocity, and causing sediment accumulation and standing water in the swales. Refer to Appendix J for a copy of the recorded

drainage complaints, and a summary of the complaint and action taken, or reasons that no action was taken.

As can be seen on the attached summary spreadsheet, page J-1, no action has been taken on the recorded drainage complaint. There are no regulated drains within the limits of the swales; therefore, the complaint was classified as a private issue with no action necessary by the Hamilton County Surveyor's Office. Although it appears that the cause of drainage issue may be due to construction and lack of maintenance on the existing swales, it is anticipated that the installation of the subsurface drainage (SSD) at the bottom of the swales and cleaning of the swales would improve the standing water issue. Utility exploration and topographic survey would be required to determine the feasibility of the SSD installation. In regards to the issue of ponding water at the intersection of Lemongrass Drive and Much Marcle Drive, after further investigation, and due to no complaints being filed by the residents, it is considered that the issue does not present a safety concern to motorists, and therefore, it is recommended that there is no action necessary on this issue. It is recommended that further drainage investigation be completed on the rear yard ponding issue prior to the July 27, 2014 2<sup>nd</sup> level priority deadline. Dependent upon the findings of the topographic survey and utility exploration, detailed drainage improvement efforts for the subdivision will be recommended. Plans and cost estimates will be completed, if necessary, when the additional drainage evaluation is concluded. Any proposed drainage improvements should be implemented by the July 27, 2014 deadline.

### ***Deerfield***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Deerfield subdivision revealed an aged storm sewer system with several miscellaneous drainage issues. The drainage issues that were visible included the following: several areas of minimal standing water within streets due to asphalt overlays; areas of erosion in side yard swales; and standing water at the northwest corner of Culpepper Drive and Deerfield Circle due to sedimentation blocking flow to a yard inlet. In review of these issues, the erosion control concerns and the standing water at the intersection of Culpepper Drive and Deerfield Circle are both considered to be private erosion control / maintenance issues, and therefore, not requiring any drainage improvements to be completed. Further, the areas of minimal standing water within the subdivision streets due to existing overlays are determined to be minor, isolated issues that do not create a safety issue; consequently, this issue is out of the scope of the project, and will not require any drainage improvements. The Hamilton County Surveyors' Office provided multiple drainage complaints for the subdivision, and indicated that they reconstructed / updated the subdivision's storm sewer system with a regulated drain in 1986. Refer to Appendix K for a copy of the recorded drainage complaints, and a summary of the complaint and action taken, or reasons that no action was taken.

As can be seen on the attached summary spreadsheet, page K-1, action has been taken on all of the recorded drainage complaints that were determined to be the responsibility of Hamilton County. The corrective actions for the drainage complaints that indicate "No Apparent Issue – No Action" consisted of site visits by the Hamilton County Surveyor's Office that uncovered no drainage issues, and no further complaints have been submitted for these areas. Work orders were issued for the complaints that indicate "Resolved – No Action," and no further complaints

have been submitted for these areas. The drainage issue at 9660 Deerfield Mall (DC-2002-00297) that was determined to be a private issue was due to the drainage issue being an existing condition. The complaint was in regards to stormwater discharging to the property from a culvert crossing 96<sup>th</sup> Street. During a phone conversation with the homeowner at the time that the complaint was filed, it was indicated that it would be the private homeowner's responsibility to re-grade the area of concern and accept flow from the upstream area. It is required by the City of Carmel stormwater ordinance that any stormwater discharge from an upstream watershed across a parcel must be maintained. Therefore, this issue is considered a private property / HOA issue, and in turn, is outside of the scope of the annexation agreement. In addition, on two subsequent drainage evaluations following rain events, it was determined that while there was debris at the outlet of the 96<sup>th</sup> Street culvert crossing and minimal slope across the rear yard swale of 9660 Deerfield Mall, there was no standing water or flooding concerns within the rear yard. Therefore, it should be considered that action has been taken on all necessary known drainage complaints within the Deerfield subdivision, and no further actions are recommended to be completed prior to the July 27, 2014 2<sup>nd</sup>/3<sup>rd</sup> level priority completion date as part of this supplemental report.

### ***Green Tree Country Club Estates***

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Green Tree Country Club Estates subdivision visibly revealed an aged storm sewer system with only one minor drainage issue. This drainage issue consisted of water ponding within the gutter and a portion of the travel lane of Greentree Drive. In the area of concern, Greentree Drive has very minimal longitudinal slope causing water to flow slowly to the existing inlets and eventually pond partially into the travel lanes. During the time of the visual inspection, one travel lane with sufficient width that was clear of ponding was noticed, so this area does not appear to cause a significant safety concern. However, in heavier rain events a greater concern could be created. The Hamilton County Surveyors' Office indicated that there are no recorded drainage complaints on file for the Green Tree subdivision. However, due to the age of the subdivision, and known miscellaneous drainage issues, drainage improvement plans have been created for the subdivision. The proposed project includes new storm sewer pipe, structures and swales on the north side of 96<sup>th</sup> Street across the frontage of the subdivision, new swales throughout the subdivision, and a new subsurface drainage system throughout the subdivision. It was also stated by the surveyor's office that the installation of the proposed improvements was placed on hold due to the preliminary cost estimates.

Review of the proposed Greentree drainage improvement plans revealed that work is currently planned within the portion of Greentree Drive in which standing water was encountered during the visual evaluation of the subdivision. The work along Greentree Drive includes the installation of subsurface drainage under the existing curb line. It is anticipated that the required replacement of new curb along Greentree Drive will provide improved flow within the curb lines of Greentree Drive, and therefore, improve the issue of standing water within Greentree Drive. Refer to a copy of the proposed drainage improvements plan in Appendix L.

Also, as the annexation of Southwest Clay Township by the City of Carmel is now complete, the City of Carmel is to receive all of the subdivision drainage complaints within the township. To

date, the City of Carmel has only received one recorded complaint. Refer to Appendix L for a copy of the complaint. The complaint is concerning a ponding issue at 9728 Sycamore Road in the Green Tree Country Club Estates subdivision. This area is outside of the limits of the previously designed drainage improvements included in Appendix L. A copy of the full report that contains findings from the drainage investigation, proposed drainage improvements, evaluations of the proposed actions, and a recommendation of a proposed action plan with an associated cost estimate is also included in Appendix L. As discussed within the attached report, the Southwest Clay Township Annexation Agreement and the SCTA Master Drainage Plan does not include this issue as an area that requires action / improvements prior to the July 27, 2012 deadline. However, due to the nature of the issue and the possible impacts to adjoining parcels, the City of Carmel has already initiated preliminary investigations and coordination with the homeowners. As indicated within the report, additional topographic survey is required prior to the final decision on proposed drainage correction for the Sycamore Road issue. It is anticipated that the proposed improvement plan will include the installation of additional asphalt pavement to drain the existing low area at the end of Sycamore Drive.

As the Greentree subdivision has been indicated as a 3<sup>rd</sup> level priority subdivision, the implementation of the previously designed drainage improvements should be completed prior to the July 27, 2014 2<sup>nd</sup>/3<sup>rd</sup> level priority completion date. The City of Carmel Sycamore Road complaint was not included within the original SCTA Master Drainage Plan, and is not required to be completed prior to the July 27, 2014 deadline. After all of the proposed Greentree drainage improvements indicated within this report are implemented, corrective action on all drainage problems within the Greentree subdivision will be considered to be complete, and no further action will be recommended.

### ***Queens Manor***

As discussed within the SCTA Master Drainage Plan, the Queens Manor subdivision employs sheet flow, roadside swales and drive culverts to convey stormwater discharge. Visual evaluation of the subdivision revealed areas of standing water within the roadside swales throughout the development. It is anticipated that these areas of standing water are caused by damaged / blocked subsurface drainage system, poor ditch grading, accumulation of sediment within the flowlines of the swales, or a combination of these factors. The Hamilton County Surveyors' Office provided multiple drainage complaints for the subdivision. The surveyor's office indicated that they have completed multiple maintenance efforts and repairs on the subsurface drainage system, and have also previously removed sediment from a portion of the roadside swales within the subdivision. They also stated that additional subsurface drainage repairs were planned for the subdivision and would be completed as weather and site conditions permit. Refer to Appendix M for a copy of the recorded drainage complaints, and a summary of the complaint and action taken, or reasons that no action was taken.

As can be seen on the attached summary spreadsheet, page M-1, action has been taken on all of the recorded drainage complaints that are considered not to be private resident or homeowner association responsibility. The drainage complaint, in which no action was taken (DC-2003-00456), was considered to be a private / developer issue as the standing water was created by driveway construction that was not permitted through Hamilton County, as required. As

indicated on the summary, although no additional action was taken at the time of the complaint, subsequent action was completed in this area due to follow up complaints at the same address. All other complaints were addressed by work orders, or private developer response, and are considered to be resolved. As indicated in follow up conversations with the Hamilton County Surveyor's Office, the additional subsurface drainage repairs were completed in March and September of 2009, and additional work completed in March and April of 2011. These repairs included investigating and repairing / unblocking the subsurface drains at 10755 Royal Drive, and 11033 Queens Way Circle. Therefore, in regards to the recorded drainage complaints that were filed for the Queens Manor subdivision, all necessary actions have been taken on these issues and no further actions will be required to be completed prior to the July 27, 2014 2<sup>nd</sup>/3<sup>rd</sup> level priority completion date. Also, a subsequent drainage evaluation was completed following a rain event, and it was determined that the areas of water ponding within the roadside drainage swales are minor and contained within the flow line of the roadside swales, and are only present for a short period of time. It is anticipated that the subsurface drain repairs completed by Hamilton County have improved the situation, and no further corrective actions are required.

### **Sutton Place**

As discussed within the SCTA Master Drainage Plan, visual evaluation of the Sutton Place subdivision revealed an adequate drainage system in good working condition. It was indicated within the SCTA Master Drainage Plan that the visual evaluation of the subdivision's drainage system revealed only one drainage issue. During the site visit, an area of ponding was encountered on the asphalt path adjacent to Towne Road. While this is an isolated issue, the asphalt path along Towne Road is a heavily used pedestrian path; therefore, it is recommended to improve this ponding issue for the safety and interest of the pedestrian traffic. The Hamilton County Surveyors' Office provided multiple drainage complaints for the subdivision. Refer to Appendix N for a copy of the recorded drainage complaints, and a summary of the complaint and action taken, or reasons that no action was taken.

As can be seen on the attached summary spreadsheet, page N-1, action has been taken on all of the recorded drainage complaints that are considered not to be private resident or homeowner association responsibility. The drainage complaints, in which no action was taken (DC-2004-00147 and 2004-00346), were both considered to be private / developer pond maintenance issues. All other complaints were either addressed by work orders, or determined that the storm sewer was operating correctly, and no action was required. A site visit was completed to further investigate the path ponding issue along Towne Road that was encountered during the visual evaluation of the subdivision's drainage system. It appears that the ponding issue is due to the elevated dirt grade next to the asphalt path at the existing inlet trapping stormwater discharge on the path. It is recommended to mill and resurface 1-inch of HMA Surface on the path, and re-grade and sod between the path and the inlet. Refer to Appendix N for an exhibit detailing the proposed improvements and associated cost estimate. As all necessary actions have been completed in regards to the surveyor's office drainage complaints, after the installation of the recommended path ponding improvements, it should be considered that no further actions will be required prior to the July 27, 2014 2<sup>nd</sup>/3<sup>rd</sup> level priority completion date as part of this supplemental report.

## Section 4: Summary

The following tables provide a summary of the information included above for each of the subdivisions indicated as a 1<sup>st</sup>, 2<sup>nd</sup>, or 3<sup>rd</sup> level priority project for drainage improvements within the SCTA Master Drainage Plan. The tables indicate if drainage improvements have been completed within the subdivision, if further corrective actions are required within the subdivision, and the deadline for the completion of all improvements within the subdivision.

<b>1<sup>st</sup> Level Priority Projects (Completion Date – July 27, 2012)</b>		
<b>Subdivision Name</b>	<b>Action Completed</b>	<b>Further Action Required</b>
<b>Larkspur - Phase I</b>	Investigated Designed	No - Monitor effects of Bridlebourne improvements
<b>Walnut Creek Woods</b>	Investigated	No
<b>Kings Mill</b>	Investigated	No - Monitor effects of Bridlebourne improvements
<b>Bridlebourne</b>	Investigated Designed	Yes – Construction of improvements
<b>Windemere</b>	Investigated Designed Constructed	No – With exception to any possible further efforts determined necessary through ongoing pond issue investigation.
<b>Crooked Stick Estates</b>	Investigated Designed	No – With exception to any HCSO efforts that they may determine to be necessary
<b>Crooked Stick West</b>	Investigated Designed Constructed	No – With exception to ongoing maintenance issues.

**Table 3: 1<sup>st</sup> Level Priority Projects Summary**

<b>2<sup>nd</sup> Level Priority Projects (Completion Date – July 27, 2014)</b>		
<b>Subdivision Name</b>	<b>Action Completed</b>	<b>Further Action Required</b>
<b>Bentley Plat</b>	Investigated	No
<b>Brandywine</b>	Investigated Designed Constructed	Yes – Construction of Phase 2 improvements
<b>North Augusta</b>	Investigated	Yes – Further investigation and possible design
<b>Town at Weston Place</b>	Investigated	Yes – Further investigation and possible design

**Table 4: 2<sup>nd</sup> Level Priority Projects Summary**

<b>3<sup>rd</sup> Level Priority Projects (Completion Date – July 27, 2014)</b>		
<b>Subdivision Name</b>	<b>Action Completed</b>	<b>Further Action Required</b>
<b>Deerfield</b>	Investigated	No
<b>Greentree Country Club Estates</b>	Investigated Designed	Yes – Construction of improvements
<b>Queens Manor</b>	Investigated	No
<b>Sutton Place</b>	Investigated Designed	Yes – Construction of Improvements

**Table 5: 3<sup>rd</sup> Level Priority Projects Summary**