TOWN COUNCIL MINUTES

REGULAR MEETING **June 15, 2020 @ 6:00 p.m.**

The Kure Beach Town Council held its regular meeting on Monday, June 15, 2020 at 6:00 p.m. The Town Attorney was absent and there was a quorum of Council members present.

COUNCIL MEMBERS PRESENT
Mayor Craig Bloszinsky
MPT David Heglar
Commissioner Joseph Whitley
Commissioner John Ellen
Commissioner Allen Oliver

COUNCIL MEMBERS ABSENT

STAFF PRESENT
Town Clerk – Mandy Sanders
Building Inspector – John Batson
Recreation Director – Nikki Keely
Financial Officer – Arlen Copenhaver
Deputy Town Clerk – Beth Chase
Police Chief – Mike Bowden
Fire Chief – Ed Kennedy
Public Works Director – Jimmy Mesimer

Mayor Bloszinsky called the meeting to order at 6:00 p.m. and Commissioner Ellen gave the invocation and Pledge of Allegiance.

APPROVAL OF CONSENT AGENDA ITEMS

1. Approve the monthly report and invoice for the consulting contract in the amount of $6,914 with Nancy Avery
2. Approve the request to Nancy Avery for reimbursement in the amount of $285.87 for UPS shipping and copies of the MOTSU survey for the three request to MOTSU and CORPS Real Estate Division
3. Approve the Bike/Ped Committee's purpose "to assist the Town Council of Kure Beach in the planning, funding, development and implementation of facilities and programs that will result in the increased safety and use of bicycle and pedestrian travel as a significant and beneficial mode of transportation and recreation, embracing innovation and being environmentally and socially responsible."
4. Accept Lisa Leppo resignation from the Community Center Committee
5. Approve Budget Amendment 20-11 totaling $15,000 for additional fuel tank costs
6. Approve Budget Amendment 20-12 totaling $20,000 for October 2019 recycling increase
7. Approve Budget Amendment 20-13 totaling $15,000 for fire truck maintenance and other costs
8. Approve Budget Amendment 20-14 totaling $6,795 for purchase of a golf cart for Town operations

9. Approve Budget Amendment 20-15 totaling $22,896 for surveillance cameras in the downtown area and grant proceeds
10. Approve Budget Amendment 20-16 totaling $15,000 for additional legal fees relating to the Planning and Zoning Commission
11. Approve Budget Amendment 20-17 totaling $11,500 for building repairs at the Town Hall facility
12. Approve the proposed text amendment to Chapter 6 (Criminal Code) Article 2 (Miscellaneous Offenses) Section 70 (Possession of Weapons to include Handguns Prohibited on Town Property)
13. Minutes:
    - May 18, 2020 Regular

MOTION- MPT Heglar made a motion to excuse Town Attorney Canoutas from the Council meeting
SECOND- Commissioner Whitley
VOTE- Unanimous

MOTION- Commissioner Oliver made a motion to approve the consent agenda as presented
SECOND- Commissioner Ellen
VOTE- Unanimous

ADOPTION OF THE AGENDA

MOTION- MPT Heglar made a motion to adopt the agenda as presented
SECOND- Commissioner Ellen
VOTE- Unanimous

DISCUSSION AND CONSIDERATION OF PERSONS TO ADDRESS COUNCIL
None.

DISCUSSION AND CONSIDERATION OF COMMITTEE BUSINESS

1. Marketing Committee
   Debbie Elliott stated:
   - Presenting tonight the marketing budget for FY20-21
   - The Budget this year is cut dramatically from years prior due to COVID-19 and ROT
   - Advertising and Media fund is being reduced by 35% for Kure Beach
   - Marketing Committee is doing a unified media campaign this coming year with other local municipalities

- Public Relations and Content Development portion of budget has been reduced from $25,200 to $14,345 as part of efforts to create the 10% contingency and holdback
- Requesting the Town Council to approve the Marketing Committee to receive the $10,855 funds from the Contingency and holdback fund to use towards the Public Relations and Content Development fund

Commissioner Whitley stated if there is a second wave of COVID-19 in the next few months the funds will not be used so he feels the next fiscal year the funds should be held back.

MOTION- Commissioner Ellen made a motion to approve the budget for the Marketing Committee, with an additional $10,855 from the Contingency fund to use towards the Public Relations and Content Development fund
SECOND- Commissioner Oliver
VOTE- (3-2 Vote) Mayor Bloszinsky, Commissioner Ellen, Commissioner Oliver For, MPT Heglar, Commissioner Whitley Against

2. Planning & Zoning Commission (P&Z)

Proposed text amendment to Chapter 15 (Zoning) Article 40 (Signs) Section 40 (Exceptions)

MOTION- MPT Heglar made a motion to approve the proposed text amendment to Chapter 15 (Zoning) Article 40 (Signs) Section 40 (Exceptions)
SECOND Commissioner Ellen
VOTE- Unanimous

Proposed text amendment to Chapter 15 (Zoning) Article 02 (In General) Section 10 (Definitions)
Proposed text amendment to Chapter 15 (Zoning) Article 36 (Supplemental District Regulations) Section 10 (Control of Yards/Setbacks)

Building Inspector Batson stated:

- Several requests over the year for ADA ramps
- Almost all the requests have encroached on the Town setbacks
- Brought this issue before the P&Z Commission and the P&Z Attorney Eldridge drafted a proposed text amendment
- The proposed text amendment allows disability ramps in the setbacks to be an exception with a signed, notarized agreement to be reviewed by the Town Attorney

MOTION- MPT Heglar made a motion to schedule a public hearing on July 20, 2020 at 5:30 p.m. for the proposed text amendment to Chapter 15 (Zoning) Article 02 (In General) Section 10 (Definitions) and proposed text amendment to Chapter 15 (Zoning) Article 36 (Supplemental District Regulations) Section 10 (Control of Yards/Setbacks)
SECOND- Commissioner Ellen
VOTE- Unanimous

3. Historical Preservation Commission (HPC)

Chairman Galbraith stated based on the suggestions received from the NC Department of Natural and Cultural Resources the HPC is proposing to hire an architect to assist with the Historical report.

DISCUSSION AND CONSIDERATION OF DEPARTMENT HEAD BUSINESS

1. Administration
   - Proposed amendment to the Committee Policy

Town Clerk Sanders stated the Administrative department made the revisions recommended by the Town Council at the May meeting. The new policy states that the Board of Adjustment may only serve on one board and that Planning & Zoning Commission may serve on HPC and the Land Use Committee.

MOTION- MPT Heglar made a motion to approve the amendment to the Committee Policy as presented
SECOND- Commissioner Whitley
VOTE- Unanimous

2. Building Inspections Department

Building Inspector Batson commented the ramp at beach access 1004.5 should be completed within the next 30 days.

3. Finance Department
   - Adoption of the FY20-21 Proposed Budget Ordinance and Fee Schedule

Finance Officer Copenhaver stated:

- Budget Ordinance and Fee Schedule included in the agenda packet have been updated to include the following changes:
- Increase in Streets and Sanitation budget in the amount of $2,000 for COVID-19 related cleaning

- Received 3% increase from Waste Management starting on July 1st
- Unemployment Insurance increased due to unemployment claims related to COVID-19 from previous employees
- Reduction in Debt Service in the amount of $2,150 for the Town Fuel Tank
- Decrease in the Governing Body fund in the amount of $3,625 due to two concerts being canceled through the Chamber of Commerce
- Sales tax decreased by $100,000 due to more information received related to COVID-19
- Community Center Committee BBQ was canceled so decreased revenue by $3,000
- Town Council needs to approve the Capital Project for the Beach Access 1004.5 as the project wont be completed till the next fiscal year that allows the project to be completed over multiple fiscal years

MOTION- MPT Heglar made a motion to approve the FY20-21 Proposed Budget Ordinance and Fee Schedule
SECOND- Commissioner Whitley
VOTE- Unanimous

MOTION- Commissioner Oliver made a motion to adopt the Capital Project Beach Access 1004.5 and the Budget amendment 20-18
SECOND- MPT Heglar
VOTE- Unanimous

4. Public Works Department
Resolution R19-05 Adopting Local Water Supply Plan

MOTION- MPT Heglar made a motion to approve Resolution R19-05 Local Water Supply Plan
SECOND- Commissioner Whitley
VOTE- Unanimous

DISCUSSION AND CONSIDERATION OF OLD BUSINESS

1. Stormwater update

MPT Heglar stated:

- Town Council was copied on an email sent out to all HOA's that own active stormwater pond permits in Town
- In the report received by the State Auditor it is now a requirement for municipalities to audit and oversee permits in the Town boundaries
- Recommendation made and approved by the Town Council was to create a Stormwater Oversight Committee with each HOA stormwater pond permit owner to have a member on the Committee

- LDSI report has been received and Town Council is reviewing
- Need to add LDSI report to the July agenda for discussion

MOTION- MPT Heglar made a motion to reinstate the Stormwater Oversight Committee
SECOND- Commissioner Whitley
VOTE-Unanimous

2. Proposed amendments to Articles I, V, IX X and XI of the Personnel Policy for consideration

Town Clerk Sanders stated:

- Received recommended changes to the personal policy for Town Council to discuss
- On Page 12 of the policy Section 4 requesting to change disciplinary suspension from 3 days to 5 days
- Also include a section that an employee is not available for a promotion after a suspension from 6 months to a year

Mayor Bloszinsky stated he thinks it should be left up to the individual department head regarding a promotion.

MOTION- MPT Heglar made a motion to approve the proposed amendments to Articles I, V, IX X and XI of the Personnel Policy with the amendment of disciplinary suspension from 3 to 5 days
SECOND- Commissioner Whitley
VOTE- Unanimous

MOTION- MPT Heglar to approve Resolution R-07 Adopting Proposed Amendments to the Personnel Policy
SECOND- Commissioner Whitley
VOTE- Unanimous

DISCUSSION AND CONSIDERATION OF NEW BUSINESS

1. Carolina Beach/Kure Beach Sewer Authority adoption of rates

MPT Heglar stated:

- Commissioner Whitley, Finance Officer Copenhaver and himself met with Carolina Beach to review the rates
- The Committee meets once a year to review the audit of spendings to reset the rates for the next fiscal year

- Once the Sewer Authority sets the rates the Town Council needs to adopt the new rates for the next fiscal year

MOTION- MPT Heglar made a motion to approve the Carolina Beach/Kure Beach Sewer Authority rates
SECOND- Commissioner Ellen
VOTE- Unanimous

2. Additional Golf Cart parking

Commissioner Whitley stated he was approached by several citizens to request additional golf cart parking on G Avenue. Also, could add additional spaces at other public beach accesses throughout Town.

Mayor Bloszinsky stated is there enough room for a vehicle to back out of the spots with the additional golf cart parking?

MPT Heglar stated vehicles did park there originally and not sure why the Town eliminated the parking. He will propose a layout to bring back to the July meeting for additional parking throughout Town.

CONSENUS- MPT Heglar and Public Works Director Mesimer to bring a layout to the July Council meeting of additional Golf cart parking throughout Town

3. ADA Transition Plan

Nancy Avery stated the ADA Transition Plan will require Town Council to advertise and receive public comments over a period of time and the plan also needs to be sent out to the disability research center in Town.

MOTION- Commissioner Oliver made a motion to receive public comments till July 20, 2020 at 5:00 p.m.
SECOND- Commissioner Whitley
VOTE- Unanimous

COMMISSIONER ITEMS

Commissioner Ellen stated:

- The MPO Committee met and drafted a memo to support the NC department of Transportation policy to restrict moped use on roads than allow vehicles to go more than 45 mph

- MPO discovered that 300 million dollars for excess transportation funds was available within the State so drafted a letter requesting to release some of those funds to WMPO
- MPO Committee is recommending electric scooters to be controlled by local municipalities
- Kure Beach has received a donation from a resident to hold a free concert to use at a future date and asks Recreation Director Keely to get into contact with the individual to set up an event

Commissioner Oliver stated the Pedestrian Committee will be looking into mopeds further in the future.

CLOSED SESSION

ADJOURNMENT

MOTION- MPT Heglar made a motion to adjourn the meeting at 7:52 p.m.
SECOND- Commissioner Oliver
VOTE- Unanimous

ATTEST:

Mandy Sanders, Town Clerk

Craig Bloszinsky, Mayor

NOTE: These are action minutes reflecting items considered and actions taken by Council. These minutes are not a transcript of the meeting. A recording of the meeting is available on the town's website under government>council.

Stormwater Study Area 'B'

Town of Kure Beach

April 8, 2020

Custom Solutions | Proven Results | Next Door

LDSI

TOWN OF KURE BEACH · NORTH CAROLINA ·

NORTH CAROLINA PROFESSIONAL SEAL 038624 2020-04-30 ENGINEER JONATHAN D. HINKLE

DocuSigned by:
Jonathan Hinkle
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LDSI, Inc. | Kinston, NC
1308 HWY 258 N
Kinston, NC 28504
910.663.4123

April 8, 2020

Mr. Jimmy Mesimer
Public Works Manager
Town of Kure Beach
815 New Bridge Street
Jacksonville, NC 28541

Subject: Stormwater Study – Area 'B'

Dear Mr. Mesimer and Members of Town Council:

LDSI, Inc. (LDSI) is ecstatic to have the opportunity to provide our findings to develop a strategy and analysis of the town's drainage infrastructure which was of concern following the reports to Town Council after Hurricane Florence. While we do not design for Hurricane level storm events, it is important to evaluate and assess infrastructure resiliency following natural disasters. Opportunities like this fuel the passion of our expert engineers, surveyors, planners, and biologists, and projects like this are the foundation of our company. LDSI has a personal interest as many of our team members were also directly impacted by the hurricane and has enjoyed the opportunity to assist the Town in its recovery efforts.

We thank you again for the opportunity to present our findings, analyses, and ideas to make these projects successful for the Town of Kure Beach, its stakeholders, its landowners, and partners.

Sincerely,

Jonathan Hinkle

Jonathan D. Hinkle, PE
LDSI, Inc.

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A. Executive Summary

LDSI was hired by the Town of Kure Beach to survey the existing stormwater infrastructure present within Area A and Area B. The surveyed data was compiled into an online GIS database for the Town to use and add to their records. LDSI was also hired to conduct an analysis of the stormwater drainage network present within Area B. This was done to analyze deficiencies within the network that could lead to improper function or failure of the network. The analysis was completed through in-depth modeling of the existing network under multiple simulated storm conditions. It was found that there are multiple sections of the network that inhibit performance or that cause tailwater effects to upstream portions of the network. Additionally, large portions of the network are inhibited due to sediment gathering within the drainage infrastructure.

B. Background

LDSI, Inc was contracted to collect infrastructure data on Area A (Exhibit A) and Area B (Exhibit B) as well as analyze the watersheds within Area B as seen on the attached booklet (Exhibit B). The engineering team has created advanced stormwater routing models to determine where probable flooding locations are located throughout Area B. Calibration of these models has included adjustment of the soil infiltration rates to account for the rapidly infiltrating sand at Kure beach. On site watershed mapping was done for Area B to supplement the ground elevation data gathered from LiDAR as well as to account for the multiple new or different structures present since the time of LiDAR data collection. This data was digitized so that it could be effectively entered into the stormwater model. This data was then utilized by the stormwater model to determine runoff volumes to each point within the stormwater infrastructure.

B.1 Project Assumptions

As stated at the proposal meeting in the fall of 2019, the Town did not want camera inspections of the pipes nor was that the intent of the LDSI proposal. LDSI would concentrate on and be limited to specific portions of the pipe network in which the Town had received comments from residents that their property had experienced some standing stormwater/flooding/ponding. Portions of the network within Area B that drained to locations outside of Area B were excluded from the modeling phase of the project. After a walk through the networks LDSI noticed several drainage networks that were "clogged" at various levels with sediment, standing water, detrital material, and other debris. Within the modeling phase of the project, LDSI analyzed the maximum performance of the network by modeling it in an unobstructed condition. LDSI made attempts to find the pipe inverts within the analyzed drainage infrastructure, and for the pipes which had accumulated debris, LDSI developed a formula to calculate the inverts based on the surveyed elevation on top of the debris and the percentage of the pipe obstruction. This was calibrated on approximately 25% of the pipes within the study area. (See survey section C for further information).

Additionally, adjustments to the infiltration capacity were made to the hydrologic model based on professional experience, coastal sand dune information, as well as multiple conversations with Town staff. LDSI adjusted the curve number (CN) and rational coefficient (C) values to allow for increased infiltration into the deep sand within the project area. (See hydrology section D for further information).

LDSI obtained climate data from the North Carolina State Climate Office and ran statistical analysis to determine the difference between current published precipitation data and the rainfall events experienced over the last couple of years through 2016. This data does not include Hurricane Matthew and Florence. Granted no engineer would recommend designing to the service level of a Hurricane Matthew, but the statistical analysis of these systems can affect the magnitude of the lower intensity storms if they are occurring on a more frequent basis. In other words, if there is one Hurricane Matthew, statistically it is considered an outlier; however, when you start seeing multiple hurricanes it becomes difficult to statistically prove that it is an outlier. After obtaining the data and performing the analysis LDSI did notice a slight increase in the precipitation depth and intensity from the current NOAA Atlas 14 data, for lower return period storms (see hydrology section D).

C. Survey Efforts

LDSI completed the surveying phase of the project for both Areas A and B. The information gathered includes coordinates, elevations, ground cover, photos, and dimensions of structures, as well as coordinates, dimensions, materials used, % clogged. This information has been digitized into a GIS format that will be transferred to the town for their own records and use. Cross sections for the ditches were collected and used during the modeling phase of the project but this information will not be included within the online GIS database. The GIS database is formatted as a map with pipes and structures superimposed on top of the map imagery. Pipes and structures can be clicked on to reveal their information and a link to a photo taken at their location. During the contract period, LDSI staff noted a large sediment fluctuation within the project area. LDSI noticed that structures that were impacted with sand and debris would have differing amounts the next week depending on the intensity of the storm events and the flushing or influx of sediment into the drainage network.

D. Hydrology

Historic rainfall data for Kure Beach was determined via NOAA's Atlas 14 tool. This rainfall data was used to generate an Intensity Duration Frequency (IDF) chart (Figure B) that would govern the storms simulated within the hydrologic model. The IDF chart was input into the model to simulate a variety of conditions ranging from a 2-yr storm to a 25-yr storm in order to assess the performance of the existing drainage network. Watersheds were individually delineated for each catchment leading into the stormwater system so that a comprehensive analysis could be conducted of each section of the network. As a part of the analysis, rainfall area, percent impervious surface, composite time of concentration, and type of surface flow experienced during a storm event were determined for model inputs. These values were used when calibrating the stormwater model to determine at which points during a storm event any given section of the pipe network would be under maximum load. Determining the maximum load that the network might experience during a storm allows deficiencies in the network to be predicted and analyzed. This also allows for any tailwater effects that might be caused upstream of that section to be determined. The ponds within the network were modeled as interconnected surface water bodies so that the wholistic effects of storage, stormwater attenuation, flood routing, and tailwater could be analyzed. The available maximum volume of the ponds was determined using LiDAR data as well as cross sections and supplemental information recorded by the survey team.

When analyzing the hydrologic conditions of Area B, it was necessary to account for the sandy, rapidly draining soils that are present near Kure Beach. These soils allow for very high stormwater infiltration rates which prevent a significant portion of the stormwater from ever entering the drainage infrastructure. While runoff still occurs during large storm events, it is important to realize that surface flow does not mean that infiltration is not occurring. This means that any stormwater that passes over local soils prior to entering the drainage network will have a portion infiltrated into the soils, thus reducing the amount of water that must be routed through the drainage network. The runoff from the catchments during a storm event was simulated for each individual catchment using the modified rational method. The modified rational method differs from the traditional rational method in that the duration of the storm event can be easily adjusted to calibrate the model. The modified rational method is an advantageous option for hydrologic calculations because it can simulate scenarios where the drainage network is under peak loading.

LDSI performed data validation for the IDF numbers provided by NOAA's Atlas 14 tool prior to implementing them. This was done to account for the changes in coastal storm intensity and frequency over the past few years. After performing an in-depth statistical analysis of rainfall values gathered from site's near Kure Beach, it was determined that an increase in storm intensity has not been accounted for in low-duration, high-recurrence storm events. However, these increases were minor and did not warrant changes in the design criteria or evaluation of the current drainage network. Consequently, the current Atlas 14 values were used in the creation of the IDF.

KURE BEACH						
	Recurrence Intervals					
Duration	2	5	10	25	50	100
1 hour	No Increase	No Increase	No Increase	No Increase	No Increase	No Increase
2 hour	No Increase	No Increase	No Increase	No Increase	No Increase	No Increase
3 hour	No Increase	No Increase	No Increase	No Increase	No Increase	No Increase
6 hour			No Increase	No Increase	No Increase	No Increase
12 hour				No Increase	No Increase	No Increase
24 hour						No Increase

Figure A: The Results of a Revised Statistical Analysis of Current Rainfall Data

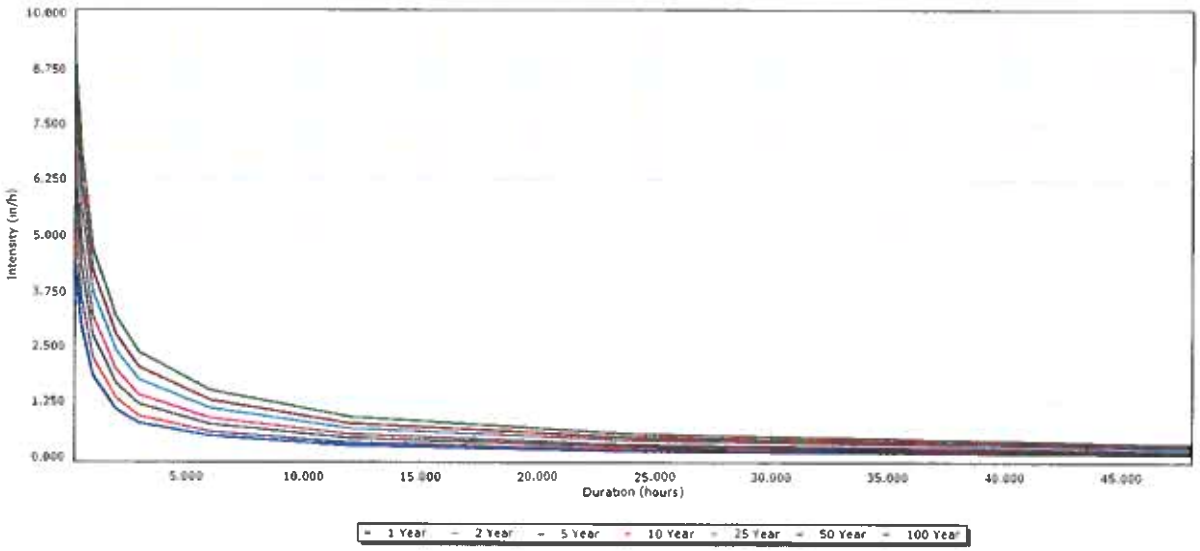

Figure B: The IDF Curve Used to Generate Storm Events within the H&H Model

E. Hydraulics

The rainfall runoff data generated by the simulated storms and watershed parameters was input to the model so that the existing network's hydraulic properties could be analyzed. These properties included Hydraulic Grade Line (HGL), Water Surface Elevation (WSE), maximum flow, and maximum velocity. It was found that there are multiple choke points or restrictions within the existing drainage network. This means that there are multiple locations where downstream pipes are smaller than their upstream pipes. Transitioning from a pipe of a larger diameter to one of a smaller diameter severely restricts the quantity of water that can pass through and results in increased tailwater upstream of that pipe. Additionally, there are junction choke points where multiple pipes all lead into a single pipe that is not capable of adequately handling the volume of water that is provided. These have the same effect of reducing the quantity of water that can pass through and increasing the upstream tailwater. In addition to these choke points, there are several pipe runs throughout the network that are installed at a reverse grade. Water flowing through these sections of pipe must travel "uphill" in order to pass through them which is typical of systems in the flat tidal sections of NC's coastal plain. These sections of pipe require a larger head (driving force) for water to flow through them. This increases the tailwater effects on upstream pipes while reducing flow and increasing the likelihood of surface ponding. The stormwater drainage system at Kure Beach is gravity driven so any pipe runs set on a reverse grade inhibit the functionality of the network, and at low volume levels can even result in reverse flow. Several sedimentation restrictions have also been identified within the existing network including multiple clogs and blockages. It was also noted that there is a high level of sediment flux within the network, meaning that sediment washes into the pipes and a portion of that also washes out at the end of the pipes or settles within the ponds. There were multiple severe blockages due to sedimentation, including several surface exposed pipes that became partially or completely filled with soil. Sedimentation reduces the flow capacity within the pipe network by limiting the available area for water to flow through. Additionally, sedimentation will also reduce storage capacity and stormwater attenuation capability of the ponds within the drainage network.

The hydraulic properties of the drainage network were analyzed using CivilStorm. Civilstorm was selected for modeling the existing system at Kure Beach because it accurately models the tailwater effects of ponded surfaces through its Interconnected Pond Modeling (ICPM) functionalities. This feature was key in analyzing the impacts that storm events had on the entirety of Area B rather than attempting to analyze one catchment at a time. Using Civilstorm also allowed the same simulation to be run with different recurrence interval storms to see how the existing drainage network would respond to each one. This was used to analyze the network for pipe surcharging (a condition that occurs when the water level within a structure is higher than the top of the pipe) and determine which portions of the network are most at risk or are causing the most issues.

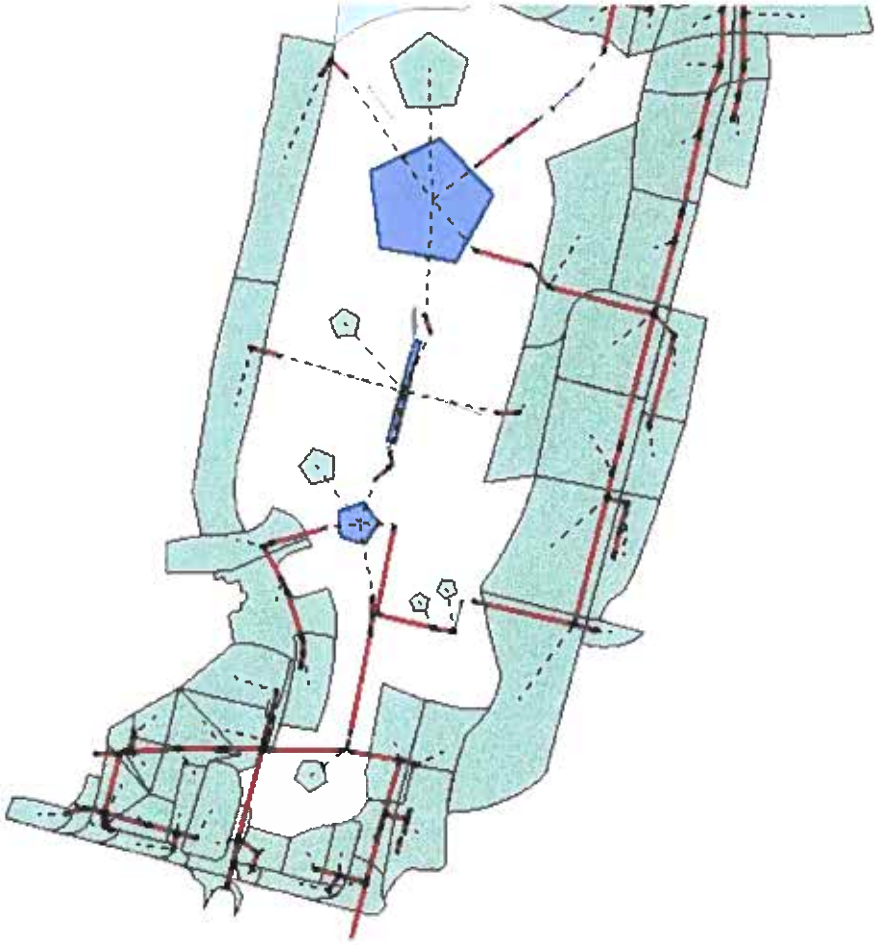

Figure C: A Plan View of the H&H Model Created in CivilStorm

F. Summary of Findings

After analyzing the H&H model, LDSI found that multiple pipes operate under surcharged conditions during storm events at recurrence intervals as low as 2 years. The more intense, higher recurrence interval storms caused more pipes to operate under surcharged conditions as seen in Figure D (note that each recurrence interval includes all pipes from the previous intervals). A surcharged pipe condition is a sign that the pipes in place are likely undersized or are inhibited in some way. This could include pipes being installed at a reverse grade, choke/throttle points within the pipe network, or an excess of pipes being drained through a single outlet.

ADDITIONAL PIPES SURCHARGING BY RECURRENCE INTERVAL			
2-yr	5-yr	10-yr	25-yr
PI-406	PI-596	PI-593	PI-622
PI-405		PI-563	PI-629
PI-404		PI-569	PI-572
PI-602		PI-588	PI-571
PI-565		PI-576	PI-556
PI-507		PI-582	PI-589
PI-409		CO-16	PI-592
PI-597			PI-578
PI-594			CO-15
PI-595			
PI-598			
PI-603			
PI-583			
PI-564			
PI-528			
PI-573			
CO-3			
CO-4			
CO-5			

Figure D: List of Recurrence Levels Where Pipes Become Surcharged

LDSI's team identified five specific throttle points that are causing restrictions to performance within the drainage network. As seen in Figure E, the inlet box at the corner of K Ave & N 5th Ave has a 15" pipe and an 18" pipe leading into it with only a 12" pipe leading out. However, the H&H model does not show this specific run of pipes as being surcharged at any point within a 25-year storm event. It is likely that the 15" pipe section running into it is larger than it needs to be for the watershed that it is draining. Additionally, the 18" pipe leading into the structure is only a 12" pipe at the other end. This indicates that either the pipe changes diameters at some point along this run, or there are additional pipes feeding into the 18" pipe. Without performing a camera inspection, it was not possible to determine so when modeling the system, the pipe run was treated as a single pipe. The 12" end of the pipe is located in one of the "homemade" style inlet boxes as seen in Figure N.

Figure E: A Choke Point By the Intersection of K Ave & N 5th Ave

The next choke point of concern is behind the fire station on K Ave as seen in Figure F. The point is located upstream of the outlet for the drainage network. A 48" pipe and an 8" pipe feed into a 30" pipe. That 30" pipe has an additional 18" pipe run into it prior to discharging. This configuration significantly reduces the ability of the 48" pipe and under full conditions would cause significant tailwater interferences. However, the H&H model revealed that the interconnected pond network allows for a great deal of stormwater storage and significantly attenuates the volume of water that must be discharged from the network at any given time. The model showed that this junction also does not operate under a surcharged condition during a 25-year storm event. When analyzing severe "worst case" storm events, it was found that the existing network will use the ponds to attenuate stormwater and relieve pressure that would have otherwise been on the lower run of the network. This is advantageous in that it means the configuration shown in Figure X is functional within the current network. However, it poses a potential problem in that a large storm event would cause flooding within the ponded areas prior to reaching the system's maximum outflow capacity.

Figure F: A Choke Point Behind the Fire Station on K Ave

A throttle point, as seen in Figure G, was found on the West side of N 4th Ave in between L Ave & M Ave. This throttle point consisted of an 18" pipe running into a 12" pipe and then into a 15" pipe. This reduction in capcity significantly inhibits the performance of the drainage network. The H&H model revealed that this pipe run, along with portions upstream of it, operate under surcharged conditions during a 2-year storm event.

Figure G: A Throttle Point Along N 4th Ave Between L Ave & M Ave

A significant choke point was identified between N 5th Ave and Settler's Ln as seen in Figure H. Two 24" pipes below a ditch and an additional 24" pipe all run into a single 30" pipe. The capacity of the three 24" pipes far exceeds the capacity of a single 30" pipe. However, it was found that the quantity of water routed through the two 24" pipes is significantly attenuated by the pond network that it drains. Because the upstream ponds store such a large volume of water and only drain through the two 24" pipes, the outflow is throttled by an inlet boundary condition. Due to this, the choke point identified in Figure H does not cause any surcharging within a 25-year storm event.

Figure H: A Choke Point Between N 5th Ave and Settler's Ln

The final significant choke point found during the analysis is located at the intersection of M Ave and N 5th Ave as seen in Figure I. Two 15" pipes along with a 12" pipe feed into a single 18" pipe. The H&H model reveled that during a 25-year storm event the quanitiy of water passing through these pipes is not enough to cause a surcharge condition.

Figure I: A Choke Point at the Intersection of M Ave and N 4th Ave

LDSI's model shows that surface ponding should occur in storm events as low as a 2-yr recurrance interval as seen in Figure J. Surface ponding at a 2-yr recurrance interval likely occurs at DI- 6050 which is located at the the downstream end of the ditch at the corner of L Ave and N 5th Ave. This is due to the fact that the network is configured so that water flows from a channel into a drop inlet with a shallow box. With the level of blockage within the pipe leading to the ditch along with the nature of the configuration, it is likely that ponding that occurs here is insignificant and should be field verified during a storm event. The next overflow does not occur until a 10-yr storm event at DI-6058. This is the structure previously mentioned as a throttle point where an 18" pipe is reduced to a 12" pipe. It is likely that surface ponding reported in this location is indeed valid and will occur during a 10-yr or greater storm. The final overflowing catchbasin shown within the H&H model is structure 9999. Structure 9999 is located West of Settler's Ln near the intersection of 5th Ave, this was the primary point in Area B reported to have surface water ponding issues. LDSI's field crew observed standing water after a storm event that was not draining properly into the "yard style" inlet. This is due primarily to depressions in the surface of the road that allows for slow drainage and slow evaporating storage. The H&H model revealed that during a 25-yr storm event this inlet should experience overtopping meaning that the capacity of the structure will be exceeded by the storm water.

RECURRANCE INTERVALS FOR CATCHBASIN OVERFLOW			
2-yr	5-yr	10-yr	25-yr
DI- 6050		DI- 6058	9999

Figure J: Recurrance intervals for catchbasin overflow

Figure K: Dual Grate Outlet Drain for Pond Network

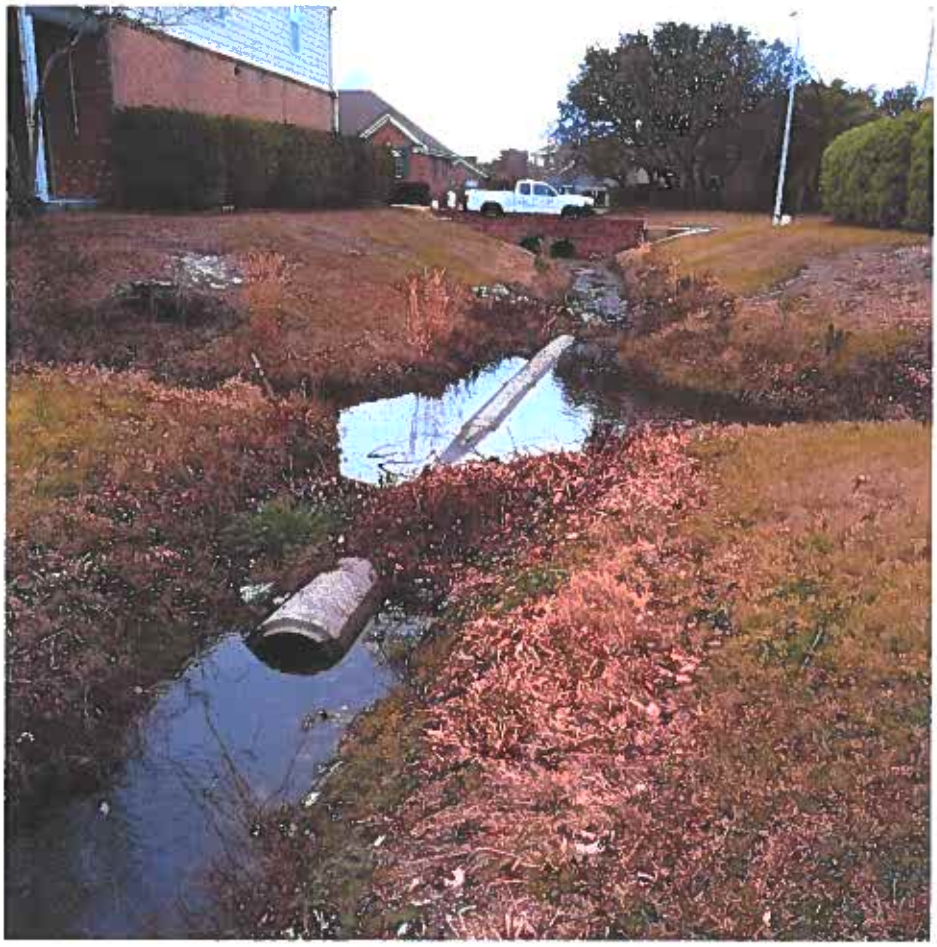

Figure L: 18" Pipe Within Ditch Connecting the Ponds

Figure M: Obstructed Inlet Grate

Figure N: "Homemade" Yard Inlet

G. Conclusions and Town Hall Meeting Responses

The primary throttle points within the drainage network for Area B have been identified and documented. These include points where multiple pipes or structures lead to a single pipe or structure that is incapable of handling the flow provided as well as points where pipes suddenly decrease in size and flow capacity. Multiple pipes have been identified as having a reverse grade. However, most of these pipes are downstream of the ponds and the flow that they will be handling is significantly attenuated by the ponds. This means that the primary issue caused by the reverse grades downstream of the ponds is sediment accumulation.

Turning downspouts so that stormwater runs over pervious surfaces could significantly reduce the load placed on the drainage network. Although it may not be obvious, even when water is flowing over the top of a pervious surface such as grass, a portion of that water is being infiltrated into the soil and will never reach the drainage network. The infiltration rate lessens over the course of a storm event as the soil becomes saturated with water, but infiltration still occurs. Preventing a "short circuit" from rooftops into the drainage network could have significant impacts on the function of the stormwater infrastructure while also providing water quality benefits. The soils present within Area B would be especially effective in reducing the load on the drainage system and providing water quality benefits because of their high infiltration rate. Sandy dunes have been found to have infiltration rates higher than 200 in/hr in some locations. A coastal town such as Kure Beach would potentially see a much larger impact than an area in Raleigh where the soil infiltration rates are typically 0.5 – 2.0 in/hr.

Finally, the stormwater infrastructure within Area A has been surveyed and uploaded to the GIS database but has not been analyzed for its effectiveness.

Recommended Next Steps

LDSI recommends the following next steps to further analyze the concerns of the Town Council and residents of Kure Beach:

- Analyze the sediment storage capacity of the ponds within the drainage network
- Perform an alternatives analysis for Area B
- Perform an analysis of the existing drainage network (and alternatives) in Area A
- Perform an ordinance audit and assess options to lower the drainage volume and network demand
- Remove the 18" pipe seen in Figure L
- Perform vacuum maintenance on the existing drainage network to remove sediment
- Replace the 12" pipe seen in Figure G
- Perform micro-grading near Structure 9999 to ensure drainage and prevent surface ponding

Exhibit A

(Area 'A' Maps)