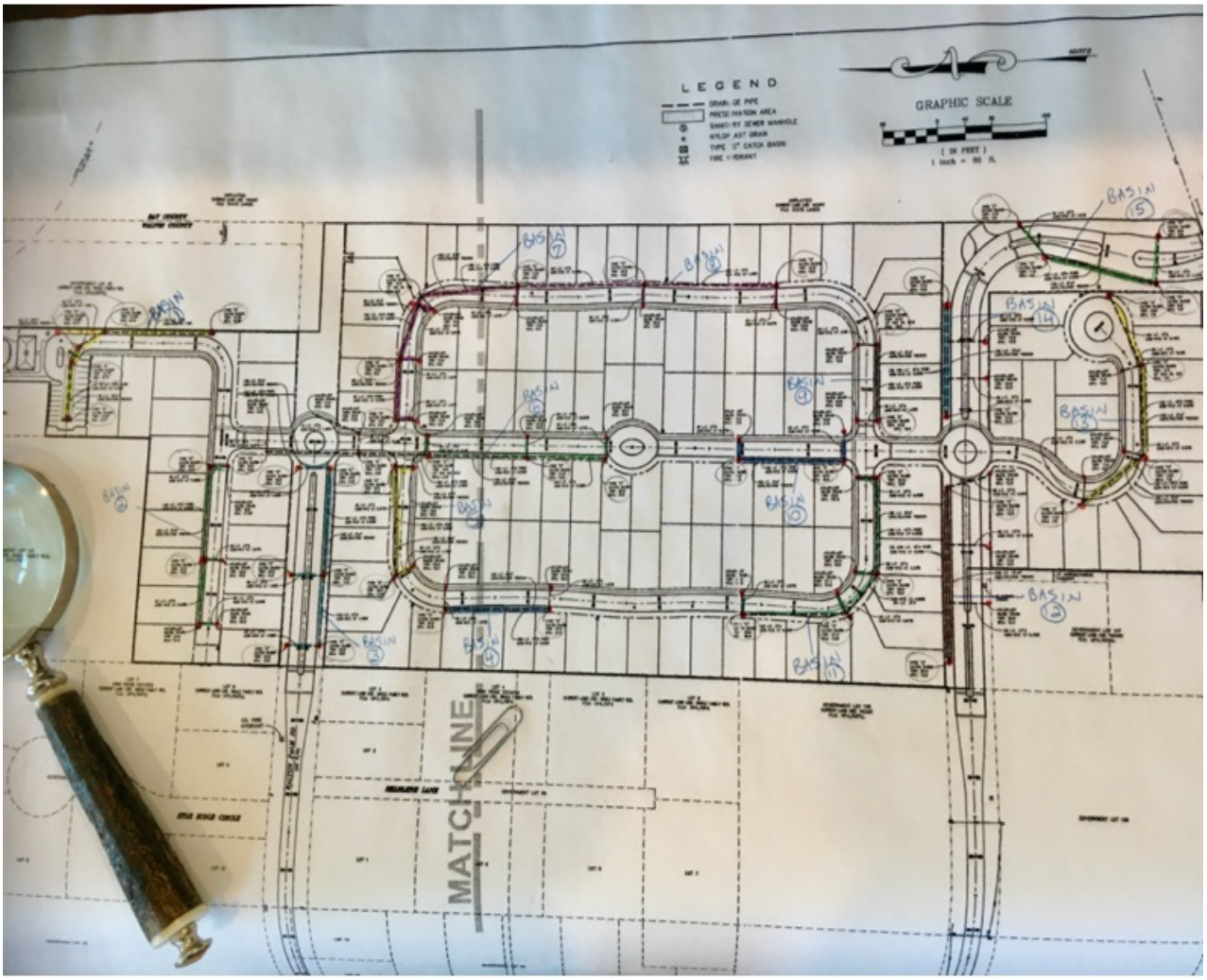
Report by S.D. McCarty – Grande Pointe ARC
08.12.2022

2022 Stormwater Drainage Assessment

This STORMWATER REPORT explains how the Grande Pointe stormwater drainage system operates and addresses stormwater runoff issues at two low-lying areas of the neighborhood. The areas are the northeast corner of Grande Pointe Circle (zone 7) which is at approximately eleven feet (11') above sea level, and the cul-de-sac at Grande Pointe Drive South (zone 13) also approximately eleven feet (11') above sea level. All engineering research was conducted by board member Jon Greco during his 2020/2021 term as HOA President, and the drainage information in this report follows those findings.

I. UNDERSTANDING OUR STORMWATER DRAINAGE SYSTEM

The Grande Pointe stormwater system was designed in 2004 and engineered to attenuate stormwater runoff associated with up to twenty-five (25) year storm events. Many owners may not be familiar with how our system operates as stormwater systems and grading practices in Florida are different than other parts of the country. It is counterintuitive to many owners of homes on piling foundations, for instance, that they are required to direct stormwater runoff under their homes—not away from it. And, for homes on slab foundations, the depressions in the side and rear yards are actually engineered basins for individual lot stormwater retention – they are not to be disturbed as they are intended to capture runoff from the roof, the side yards, and the rear yard. This lot stormwater runoff is not intended to make its way to the street or to the basin drains and exfiltration trenches, illustrated below.



The neighborhood stormwater system above consists of seventeen (17) self-contained exfiltration trenches intended to capture driveway and street stormwater runoff through large rectangular drains on one side of the road and smaller circular drains on the other. These drains are visible along the front 8-feet of some lots and adjacent to the street, and the captured stormwater percolates into the sand in the trenches as it moves through large perforated pipe. It is a self-contained network, and we are not interconnected to any city or county system. So, it is up to the association to operate and maintain it.

FLOOD HISTORY

Here are photos from Hurricane Sally which slowly paralleled our coast September 16th, 2020 dumping over sixteen inches (16”) of rain in seventy-two (72) hours. Stormwater entered the garage of one home.

According to the two engineering firms that we met with, the rainfall from Hurricane Sally exceeded the 25-year storm design threshold of our common area storm system and was closer to a 100-year event.

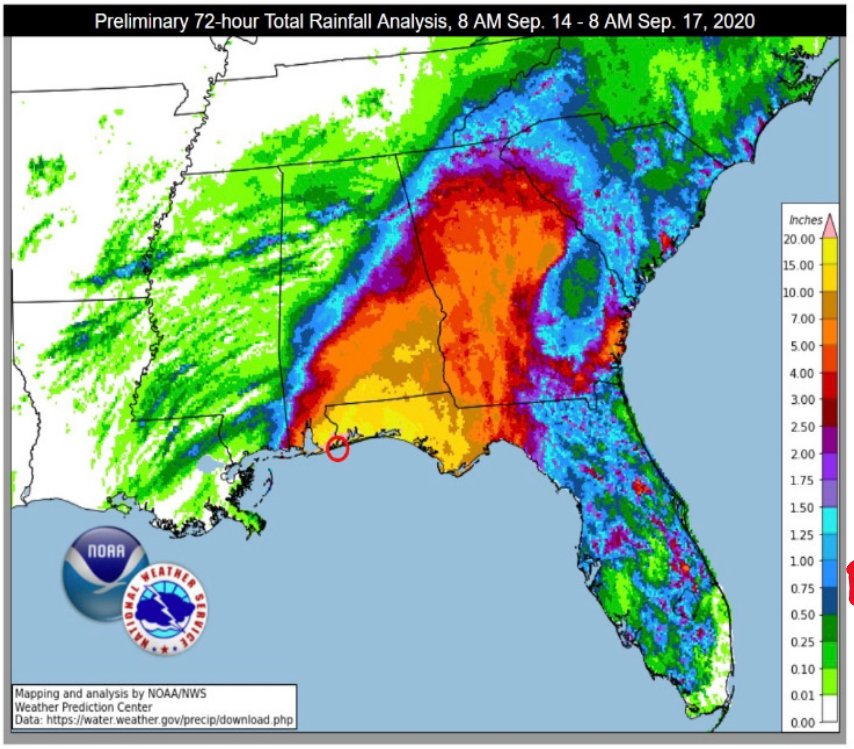
The following data from the National Weather Service for Inlet Beach supports that conclusion.

hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=fl

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.535** (0.444-0.648)	**0.622** (0.516-0.754)	**0.761** (0.629-0.925)	**0.872** (0.716-1.07)	**1.02** (0.802-1.28)	**1.13** (0.867-1.44)	**1.23** (0.912-1.61)	**1.33** (0.943-1.80)	**1.46** (0.991-2.03)	**1.55** (1.03-2.20)
10-min	**0.783** (0.651-0.949)	**0.911** (0.756-1.11)	**1.11** (0.921-1.35)	**1.28** (1.05-1.56)	**1.49** (1.17-1.87)	**1.65** (1.27-2.10)	**1.80** (1.34-2.36)	**1.95** (1.38-2.63)	**2.14** (1.45-2.97)	**2.28** (1.50-3.23)
15-min	**0.955** (0.793-1.16)	**1.11** (0.922-1.35)	**1.36** (1.12-1.65)	**1.56** (1.28-1.90)	**1.82** (1.43-2.28)	**2.01** (1.55-2.56)	**2.20** (1.63-2.88)	**2.38** (1.68-3.21)	**2.61** (1.77-3.62)	**2.78** (1.83-3.94)
30-min	**1.44** (1.19-1.74)	**1.68** (1.39-2.03)	**2.06** (1.71-2.51)	**2.37** (1.95-2.90)	**2.78** (2.19-3.48)	**3.08** (2.37-3.92)	**3.37** (2.49-4.40)	**3.64** (2.58-4.91)	**4.00** (2.71-5.54)	**4.25** (2.81-6.02)
60-min	**2.01** (1.67-2.43)	**2.30** (1.91-2.79)	**2.78** (2.30-3.38)	**3.19** (2.62-3.89)	**3.75** (2.97-4.73)	**4.19** (3.23-5.37)	**4.63** (3.44-6.09)	**5.09** (3.61-6.89)	**5.70** (3.87-7.95)	**6.16** (4.07-8.74)
2-hr	**2.58** (2.16-3.11)	**2.92** (2.44-3.52)	**3.50** (2.91-4.22)	**4.00** (3.30-4.85)	**4.72** (3.77-5.94)	**5.30** (4.12-6.77)	**5.90** (4.42-7.73)	**6.53** (4.67-8.81)	**7.40** (5.07-10.3)	**8.08** (5.38-11.4)
3-hr	**2.98** (2.50-3.57)	**3.33** (2.79-3.99)	**3.95** (3.30-4.75)	**4.52** (3.75-5.46)	**5.37** (4.33-6.78)	**6.08** (4.76-7.77)	**6.84** (5.16-8.97)	**7.66** (5.51-10.3)	**8.82** (6.08-12.2)	**9.75** (6.51-13.7)
6-hr	**3.59** (3.02-4.26)	**4.02** (3.38-4.78)	**4.81** (4.04-5.74)	**5.56** (4.64-6.67)	**6.72** (5.46-8.47)	**7.71** (6.09-9.84)	**8.79** (6.68-11.5)	**9.98** (7.25-13.4)	**11.7** (8.13-16.2)	**13.1** (8.80-18.3)
12-hr	**4.08** (3.46-4.82)	**4.68** (3.97-5.54)	**5.79** (4.89-6.86)	**6.82** (5.72-8.12)	**8.41** (6.88-10.5)	**9.76** (7.76-12.4)	**11.2** (8.59-14.6)	**12.8** (9.38-17.2)	**15.1** (10.6-20.8)	**17.0** (11.5-23.6)
24-hr	**4.64** (3.96-5.44)	**5.43** (4.63-6.38)	**6.88** (5.84-8.10)	**8.23** (6.94-9.73)	**10.3** (8.47-12.8)	**12.0** (9.63-15.2)	**14.0** (10.7-18.0)	**16.0** (11.8-21.3)	**19.0** (13.4-26.0)	**21.5** (14.6-29.5)
2-day	**5.41** (4.64-6.29)	**6.32** (5.42-7.36)	**8.01** (6.85-9.37)	**9.62** (8.17-11.3)	**12.1** (10.1-15.1)	**14.3** (11.5-17.9)	**16.6** (12.9-21.4)	**19.2** (14.2-25.4)	**23.0** (16.3-31.2)	**26.0** (17.8-35.6)
3-day	**5.88** (5.07-6.82)	**6.83** (5.88-7.92)	**8.62** (7.39-10.0)	**10.3** (8.81-12.1)	**13.0** (10.9-16.2)	**15.4** (12.5-19.3)	**18.0** (14.0-23.1)	**20.8** (15.5-27.5)	**25.0** (17.8-33.9)	**28.4** (19.6-38.7)
4-day	**6.23** (5.38-7.20)	**7.20** (6.22-8.33)	**9.05** (7.78-10.5)	**10.8** (9.26-12.6)	**13.6** (11.4-16.9)	**16.1** (13.1-20.1)	**18.9** (14.7-24.1)	**21.8** (16.3-28.7)	**26.2** (18.7-35.4)	**29.8** (20.6-40.5)
7-day	**7.06** (6.13-8.12)	**8.11** (7.03-9.33)	**10.1** (8.72-11.6)	**12.0** (10.3-13.9)	**14.9** (12.6-18.3)	**17.5** (14.3-21.7)	**20.3** (16.0-25.9)	**23.5** (17.6-30.7)	**28.0** (20.1-37.6)	**31.7** (22.0-42.9)

Hurricane Sally Preliminary Rainfall Totals through 8 am EDT, Thursday, September 17, 2020



Select higher rainfall totals from Alabama and Florida*

Location	Amount	Time/Date
...Alabama...		
Orange Beach	29.99 in	0616 AM 09/17
Gasque	18.68 in	0653 AM 09/16
Pollard 2.4 N	18.48 in	0800 AM 09/17
Summerdale 2.7 WNW	15.79 in	0800 AM 09/17
Brewton	14.27 in	0100 AM 09/17
Red Level 0.3 SW	13.36 in	0800 AM 09/17
Loxley 3.5 SSE	13.24 in	0800 AM 09/17
Falco 5.3 NE	12.66 in	0246 PM 09/16
Silverhill 2.8 W	12.08 in	0445 PM 09/16
Dixon	12.06 in	0718 PM 09/16
Daphne 4.9 SE	11.96 in	0800 AM 09/17
Point Clear 0.6 SW	11.83 in	0800 AM 09/17
Fairhope 1.5 WSW	11.55 in	0700 AM 09/17
Montrose 1.9 SE	11.40 in	0315 PM 09/16
Geneva	11.25 in	0800 AM 09/17
Spanish Fort 2.2 SW	10.50 in	0915 AM 09/17
Enterprise 3.8 ESE	10.23 in	0800 AM 09/17
Baker Hill 3.9 SW	8.76 in	0618 AM 09/17
Bessemer	7.88 in	0113 PM 09/16
Montgomery 12.9 S	5.73 in	0600 AM 09/17
Dothan	5.29 in	0853 AM 09/17
...Florida...		
Pensacola	24.80 in	0724 AM 09/16
Santa Rosa Beach	17.65 in	0857 AM 09/17
[illegible]	[illegible] in	0800 AM 09/17
Panama City Beach 0.3 SW	16.72 in	0800 AM 09/17
Miramar Beach 9.5 ESE	16.56 in	0800 AM 09/17
[illegible]	[illegible] in	0800 AM 09/17
De Funiak Springs 4.1 NNW	15.60 in	0800 AM 09/17
Crestview	15.34 in	0735 PM 09/16
Navarre 2.1 WNW	14.98 in	0800 AM 09/17
Nicebille 3.6 SE	14.77 in	0800 AM 09/17
Ft Walton Beach	13.70 in	0628 AM 09/17

*Courtesy of CoCoRaHS & Public Information Statements & Local Storm Reports from NWS Mobile, Birmingham, & Tallahassee

There was a second significant flooding of zones 7 and 13 in 2021 when a 23-year record for rainfall was broken. Stormwater approached closely to a home but did not cause damage. Even lesser storms—short interval rains of a couple inches—cause the street in zone 7 to back up, although the street generally drains in an hour if the 12 x 12 drain is not covered with debris.

In taking measurements and monitoring the basin capacity and discharge during different storm events in 2022, we have some indication of basin recovery times and drainage patterns. It appears that street flooding generally drains shortly after each downpour -- those two major storms excepted. The systems at zone 7 and zone 13 attenuated the stormwater runoff during this year's heaviest rain which was a nine-inch (9") April rain that occurred over 3 days *(a 5-year storm*)—the streets backed up with each downpour, then drained within a few hours—no homes were threatened and the basins recovered to their prior levels within 72 hours of the rain stopping. The basins and trenches appear, since being cleaned, to be working to a good degree of efficiency, although they have not since been tested with a 25-year storm event.

II. **HOA EXPENDITURES**

The last two years, the HOA has spent over $20,000 on stormwater drainage. There have been minor improvements to remediate the flooding and street backups including $10,000 spent September, 2020 to pump stormwater from the street during hurricane Sally . . . which helped to a degree, but eventually all of the water worked its way back as there was nowhere to effectively pump it. The HOA spent another $5,500 and added a 12" x 12" drain at the low spot on the street in 2020 on Grande Pointe Circle / Zone 7 which assists with standing water in that low spot, but debris has to be manually removed periodically for it to function.

In late 2021, the HOA hired Churchwell Pipeline Services to do a system cleanout on both Grande Pointe Circle and Grande Pointe Drive South for $2,750. In 2022, the HOA hired a landscape crew to crawl into the basins and dig up accumulated sand and sediment in six (6) basins including the two flood prone areas for $2,400. Churchwell flushed and vacuumed out Zone 7 a second time on July 11, 2022 for $1,250 when the water table was at its lowest. We will need to budget at least $5,000 per year for cleaning.

For advice, our 2021 HOA President met with two engineering firms who made recommendations to redirect some of the stormwater runoff that makes its way to the low areas. As part of that effort, the ARC Design Guidelines were changed to emphasize stormwater plans for new homes which are now required to landscape an in-yard and driveway drainage swale at the front of each lot to redirect front-yard and driveway runoff to the closest drainage basin. New

homes must also install a strip of sod between the street and the home to capture sand working its way to the street. The drainage swales will provide limited benefit initially as only about 35 lots will be graded that way, but it will be easier later on if we decide to construct and interconnect more drainage swales in the trouble/high-runoff areas. New homes where the lot steeply grades to the street and the roof pitches to the street may be required to install gutters or an alternate stormwater solution to capture roof runoff.

III. CONCLUSIONS

While there have only been two storms in recent history to drop enough rain to threaten homes, both areas back up frequently – Zone 7, especially. In our 2004 Stormwater Plan, our CCR's , and in our development order, there are no instructions on how lots were supposed to be graded other than the basins under the home. But it seems to make sense to grade the fronts of yards and driveways to direct water to the drainage basins which are located off the road and lower than the street level. Otherwise, the driveway runoff makes it to the street bypassing the drain for that zone—some of it flowing all the way to the low-elevation areas. The concept of a drainage swale at the front of each lot and driveway is supported by several existing driveways in the neighborhood that have these basin drains in them—the drains are lower than the street level – so a drainage swale is created. It is possible that more water than was calculated into the design of our system is making it from individual lots to these low-lying areas during intense rain events.

IV. ENGINEERING RECOMMENDATIONS TO REDIRECT STORMWATER RUNOFF

The only way to assist with the flooding in these trouble areas is to capture and redirect some of the stormwater runoff from other drainage zones before it makes it to zones 7 and 13. A quick summary of the proposals:

1. **HORIZONS ENGINEERING**
    a. Regrade select inlet basins and resod in areas contributing to the flooding
    b. Install vehicular traffic speed bumps the full length of the road to capture and direct runoff to drainage inlets at key spots in the neighborhood (or) Install drainage swales at the front of all lots currently shedding runoff to the affected areas between the street and the lot – including driveways

2. **CARROLL ENGINEERING**
    a. Install Trench Drains across streets at strategic locations to capture street runoff currently making its way to zones 7 & 13, and redirect it to other drainage zones.

Jon Greco spent time with two civil engineers who walked the property. The Horizons Engineering recommendation goes the furthest to mitigate stormwater from lots and driveways, but the cost of regrading individual lots and driveways is cost prohibitive as half the lots in Grande Pointe could be affected. The use of speedbumps throughout the community to direct road water to other zones before it makes its way to the low-lying areas would not be met with much enthusiasm by owners, either. The Carrol Engineering recommendation is more practical (trench drains instead of speed bumps).

V. DRAINAGE SYSTEM PROPOSAL

Phase I of the recommendation is already underway and should be completed in 2023.

Phase I

1. Schedule annual cleaning of system in trouble areas for November/December which seems to be the time the water table is generally lowest (This is the HOA's responsibility).
2. Re-grade and sod the areas around approximately twenty-five (25) of the system basin drains in strategic areas. Use sod for the basins rather than concrete for aesthetic purposes, but primarily to capture sand and debris (per our 2004 Stormwater Management Plan). Add irrigation where possible, do curb-cuts for some, do catch-basins for a few. Give both functional and aesthetic consideration.
3. Continue taking storm and basin recovery measurements.

Phase II – If it is determined by the association that additional drainage modifications are in order, proceed with phase II. Since Zone 7 is the more critical of the two trouble areas, install the first trench drain there.

4. Hire an engineer to design three (3) trench drains and locations
5. Install the first trench drain in zone 6 (Grande Pointe Drive) capturing water from that zone before it gets to zone 7
6. Continue taking rain measurements and monitoring the basins for recovery times. Determine if the trench drain provides enough assistance to merit two more.

Phase III – If the first trench drain is effective, and the association determines that additional drainage modifications are required , proceed with phase III.

7. Install a trench drain in zone 5 (west portion of Grande Pointe Circle) capturing water from that zone before it gets to zone 7
8. Install a trench drain at the north end of zone 13 on Grande Pointe Drive South directing water to zone 12
9. Continue to take rain measurements and monitor the basins for recovery times

Other Considerations if the association determines that more drainage modifications are desirable:

10. Construct drainage swales at 'select lots' currently shedding runoff to the affected areas. There will be approximately 35 homes built in 2022 and after with drainage swales at the street, and those can be strategically interconnected in the future for maximum effect.
11. Start inspecting individual lot stormwater basins – under-the-home and in-the-yard to ensure that they are being maintained.

VI. FINANCIAL CONSIDERATIONS

Phase I

- Estimate* $800 per basin to regrade, sod, and irrigate * 25 basins = $20,000
  (Cost per basin may be less depending on number of curb-cuts and secondary catch-basins)

Phase 2

- Estimate* $4,000 for a civil engineer to design and recommend locations for 3 trench drains
- Estimate* $15,000 per trench drain* 1 = $15,000

Total = $19,000

Phase 3

- Estimate* $15,000 per trench drain* 2 = $30,000

Estimated* Grande Total: $69,000 ($448/lot)

**Rough estimate (get formal bids)*

VII. IMPLEMENTATION CHALLENGES

I) FUNDING

i) We have no reserves for this work. Stormwater System infrastructure was omitted from the 2018 Grande Pointe Reserve Study.

II) HOA VOLUNTEER BANDWIDTH

i) This project is outside the 'business-as-usual' scope of a management company community manager. Phases II and III of this project would require a small group of volunteers to work with an engineer to locate and help design the trench drains, oversee the bids, meet with and inspect contractor work, be responsible for the project, and report periodically to the board. Someone will have to take ongoing basin measurements and track stormwater amounts. Perhaps some owners in the affected areas may want to get involved once they understand the issues affecting their areas.