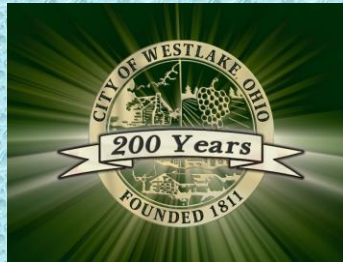


COMMITTEE MEETING

7-14-15

ROBERT P. KELLY, P.E.
DIRECTOR OF ENGINEERING
CITY OF WESTLAKE
440-617-4145



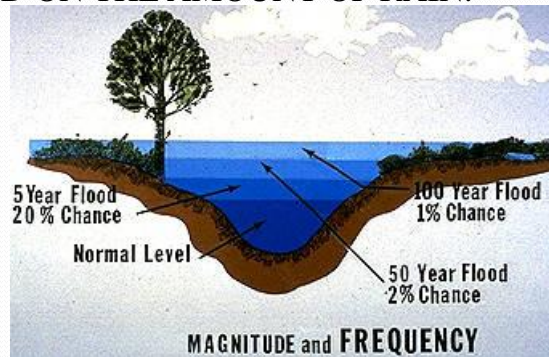
DRAINAGE ISSUES

- FLOOD PLAINS
- BASEMENT FLOODING
- YARD DRAINAGE
- ROADSIDE DITCH
- PRIVATE STORM MAINS



WHAT IS A FLOOD PLAIN

- THE AREA ADJACENT TO CHANNEL OR DRAINAGE STRUCTURE THAT IS SUBJECT TO FLOODING. THE AMOUNT OF FLOODING IS BASED ON THE AMOUNT OF RAIN.



FLOOD PLAIN

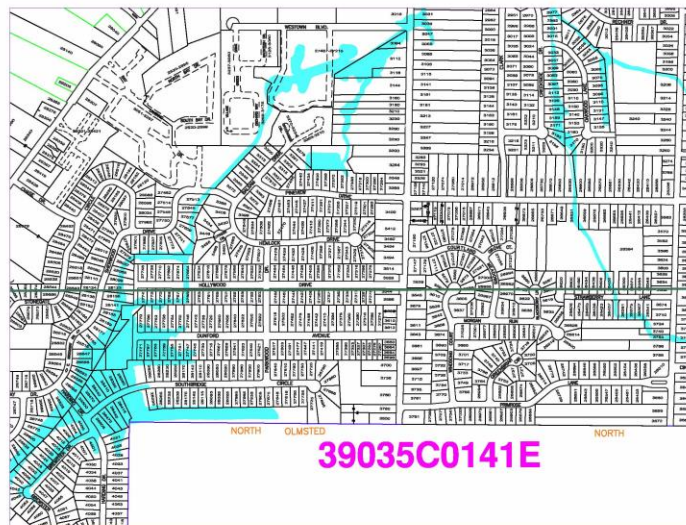
- 1.) The term “**100-year flood**” is a term often used to describe a flood that has a 1% chance of occurring in any year.
- 2.) Phrase could be misleading, and often causes people to believe these floods happen every 100 years on average.
- 3.) The truth is, these floods can happen quite close together, or not for long stretches of time, but the risk of such floods remains constant from year to year.

STORM AND SANITARY SEWERS

- SEPARATE SYSTEMS
- 124 MILES OF STORM
- 142 MILES OF SANITARY
- SEPTIC TANK CONVERSIONS



2010 FEMA FLOOD PLAIN MAP

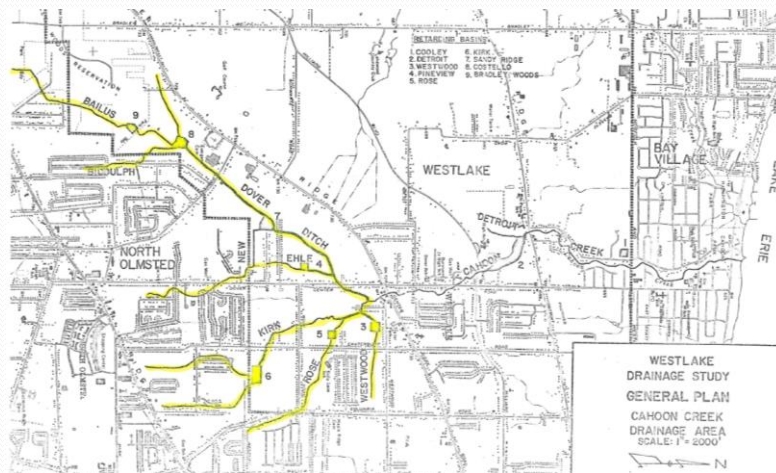


R.E. WARNER STUDY

- PETER ZWICK, P.E. (R.E. WARNER)
- HYDRAULIC ANALYSIS OF THE FOLLOWING BASINS BEING EXPANDED IN ACCORDANCE WITH THE WOODRUFF REPORT
 - ROSE
 - KIRK
 - COSTELLO
 - BIDDULPH
 - WESTWOOD
- STUDY WILL DETERMINE HOW MUCH THE FLOOD HIGH WATER ELEVATION CAN BE LOWERED WHEN ALL THE ABOVE BASINS ARE EXPANDED.
- PROBABLE CONSTRUCTION COST WILL BE DETERMINED.

REWARNER
& ASSOCIATES Inc.

CAHOON CREEK



— R.E. WARNER STUDY AREA

R.E. WARNER STUDY

- CREATE HYDRAULIC MODEL
 - F.E.M.A. NEVER HAD
 - F.E.M.A. INTERPOLATED THE DATA
- CALIBRATE MODEL
- ANALYSIS BASINS
- PERFORM BENEFIT COST ANALYSIS
- REVIEW DRAFT OF RESULTS
- THIRD PARTY REVIEW BY F.E.M.A.
- ISSUE REPORT



ROSE

- NEW BASIN
- CITY OWNED PROPERTY
- ENVIRONMENTAL STUDY
 - POSSIBLE HARDWOOD WETLAND



KIRK (WOODPATH)

- EX. BASIN COULD BE EXPANDED
- CITY OWNED PROPERTY
- WETLAND MIX COULD BE USED FOR AESTHETICS-NATURE PRESERVE



COSTELLO (BRETTON WOODS)

- POSSIBLE EXPANSION BEHIND THE CEMETERY
- POSSIBLE EXPANSION ALONG CROCKER



WESTWOOD (SOUTHWOOD)

- POSSIBLE EXPANSION TO THE EAST

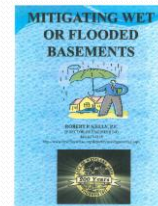


BASEMENT FLOODING

- WATER INFILTRATION INTO BASEMENT IS UNACCEPTABLE
- IF PROPER MITIGATING TECHNIQUES ARE UTILIZED YOUR BASEMENT SHOULD BE DRY REGARDLESS OF WHAT HAPPENS ON THE CITY SIDE.
- KEY IS TO FIND OUT HOW WATER INFILTRATION IS OCCURRING AND TO USE THE PROPER TECHNIQUES

EDUCATION

- EDUCATION IS KEY TO PROPER FLOOD MITIGATION
- USING THE PROPER TECHNIQUES IS CRITICAL
- THE CITY HAS PROFESSIONAL EXPERTS TO MAKE SURE YOU SPEND YOUR HARD EARNED MONEY WISELY
- OTHER CITIES ARE ADOPTING WETLAKE'S POLICY ON EDUCATION AS OUR FIRST LINE OF DEFENSE



DYE TESTING

- SINGLE FAMILY RESIDENTS
- SERVICE DEPARTMENT LOCATES - CLEANOUTS
- DEPARTMENT OF ENGINEERING SCHEDULES APPT
- SIMULATE A RAIN EVENT BY PLACING DYE AT VARIOUS DOWNSPOUTS
- CCTV STORM CONNECTION
- RECOMMENDATIONS GIVEN

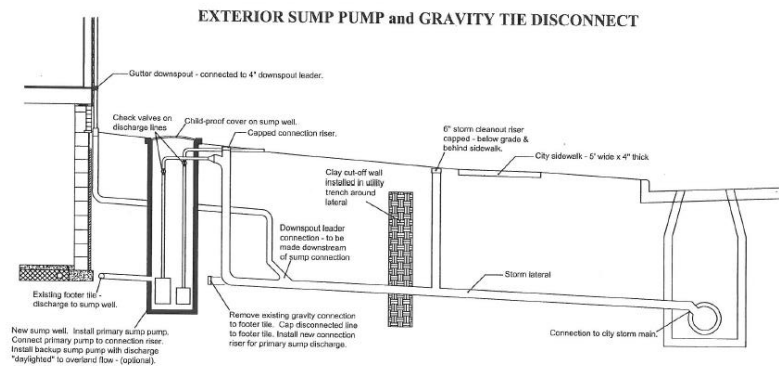


DYE TESTS	
2011	300
2012	330
2013	196
2014	232
2015	70

GRAVITY TIE

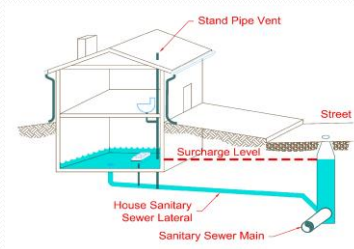
- STORM MAIN IS IN SURCHARGE CONDITION DURING MAJOR RAIN EVENTS
- WATER MIGRATES UP THE STORM CONNECTION
- WATER FLOODS THE BASEMENT
 - FOUNDATION DRAIN
 - FLOOR DRAIN (IF CONNECTED TO STORM)
- SOLUTION
 - DISCONNECT GRAVITY TIE AND INSTALL SUMP PUMP

GRAVITY TIE DISCONNECT



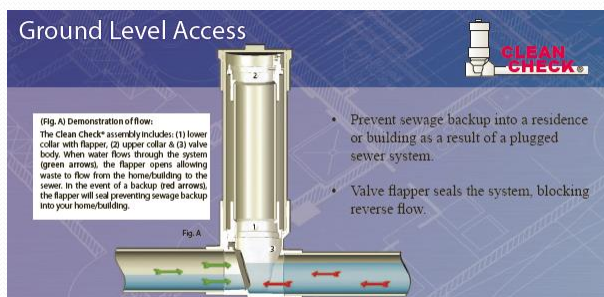
SANITARY SEWER BACK-UP

- RESULTS FROM THE SANITARY SEWER BEING SURCHARGED DUE TO FLOODED STREETS
- WATER FROM THE SANITARY SEWER BACKS UP THRU THE CONNECTION AND FLOODS THE BASEMENT
- SOLUTION
 - INSTALL A BACKWATER VALVE



EXTERNAL BACKWATER VALVE

- BENEFITS
 - FLAPPER ACCESSED THRU RISER, MANHOLE NOT REQUIRED
 - PIPES UNDER THE HOUSE ARE NOT SUBJECTED TO PRESSURE



FLOOD PROOF YOUR HOUSE

- VERIFY ALL EXTERIOR PLUMBING IS IN GOOD WORKING ORDER
 - FOUNDATION DRAIN SYSTEM
 - DOWNSPOUT LEADERS
 - STORM CONNECTION
- MAINTAIN POSITIVE DRAINAGE AWAY FROM HOUSE
- PROTECT YOUR HOUSE FROM SANITARY BACK-UP, IF YOUR AREA IS IN FLOOD PLAIN.
- HAVE ADEQUATE PUMPING CAPACITY FROM SUMP PUMP.



REAR YARD DRAINAGE

- WESTLAKE IS FLAT
- REAR YARD SWALES ARE BLOCKED BY LANDSCAPING
- MANY LOTS ARE SHAPED LIKE A BOWL
- YARD DRAINS REQUIRE MAINTENANCE
- MANY LOTS WERE BUILT WITHOUT DRAINAGE



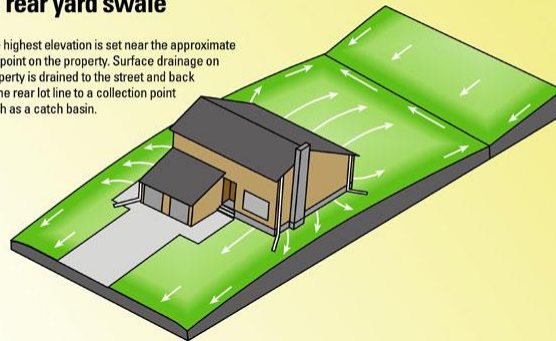
REAR YARD DRAINAGE

- HOMES WITH NO EASEMENTS
 - RIPARIAN WATER RIGHTS ALLOW NEIGHBORS TO DRAIN FREELY THRU THE PROPERTY- “LAY OF THE LAND”
 - MANY PARCELS DO NOT HAVE SWALES CONSTRUCTED SO WATER COLLECTED IN THE YARDS LIKE A BOWL
- HOMES WITH DRAINAGE EASEMENTS
 - ESTABLISHED TO PROVIDE DRAINAGE RIGHTS TO ALLOW NEIGHBORS TO DRAIN TO A COMMON INLET
 - PROHIBITS STRUCTURES TO BE BUILT IN EASEMENTS
- NEW HOME CONSTRUCTION
 - AT LEAST ONE YARD DRAIN INSTALLED ON THE LOT
 - ADJACENT PARCELS NOT DRAINING THRU THE LOT

HOME WITH EASEMENT

Example of Split Drainage to rear yard swale

The highest elevation is set near the approximate midpoint on the property. Surface drainage on property is drained to the street and back to the rear lot line to a collection point such as a catch basin.



SWALE ISSUES

- ENCROACHMENTS WITHIN SWALE
 - SHED OR OTHER STRUCTURES BUILT IN EASEMENT.
 - LANDSCAPING BEDS
 - LANDSCAPING DEBRIS
- OVER TIME
 - SWALES BECOME NON-EXISTENT DUE TO NO MAINTENANCE
- YARD REGRADING
 - SWALES ARE REMOVED



SWALE SOLUTION

- COOPERATION WITH NEIGHBORS IS KEY
- ENGINEERING DEPT. CAN INSPECT AND MAKE RECOMMENDATIONS
- REMOVE OBSTRUCTIONS
 - STRUCTURES
 - FENCES
 - LANDSCAPING
 - DEBRIS
- REESTABLISH SWALES WITH GRADING
 - PERMIT REQUIRED
- PIPE IN SWALES WITH INLETS
 - COULD BE MULTIPLE PROPERTIES
 - CITY COULD HELP WITH PLAN
 - PERMIT REQUIRED

ROADSIDE DITCH

- NEED TO BE CLEANED ON REGULAR BASIS
 - OWNER RESPONSIBLE
 - COULD BE DIFFICULT WITH STEEP SLOPES
- SOLUTION
 - CAN BE FILLED IN ENCLOSED WITH PIPE
 - PERMIT REQUIRED
 - SOFT SWALE IS INSTALLED WITH AN INLET



PRIVATE STORM MAINS

- VARIOUS STORM MAINS EXIST OUTSIDE OF THE ROW
- OWNERS ARE RESPONSIBLE FOR MAINTENANCE
- COOPERATION AMONG ALL PROPERTY OWNERS IS KEY AND SHOULD ALL SHARE COSTS
- AREAS
 - DOVER-SOUTH OF DOVER DITCH
 - CANTERBURY-SOUTH OF WESTWOOD
 - COLUMBIA-SOUTH OF CENTER RIDGE
- SOLUTION
 - REPAIR OR REPLACE PRIVATE STORM

FUTURE PLANS

- DYE TESTING
- CONTINUE WITH EDUCATING THE PUBLIC ON MITIGATION PRACTICES
- MANHOLE REHABILITATION CONTINUES ON ALL PROJECTS
- REVIEW CITY WIDE FLOW METERING AND IMPLEMENT REHABILITATION PROGRAMS
- REVIEW DOVER CENTER TRUNK LINE FOR I/I TESTING
- MAINLINE CHEMICAL GROUT PROJECT
 - BERKELEY ESTATES
 - CANTERBURY MANOR

CITY PROGRAMS IN PLACE

- REAR YARD DRAINAGE (NO EASEMENTS)
 - INVESTIGATE → RECOMMENDATION HOW TO DRAIN
- REAR YARD SWALES
 - INVESTIGATE → ISSUE LETTER TO ALL PARTIES TO FIX
- PRIVATE STORM MAIN
 - INVESTIGATE → RECOMMENDATION HOW TO REPAIR
- SANITARY SURCHARGE
 - DYE TEST → RECOMMENDATION TO INSTALL BACKWATER VALVE
- GRAVITY TIE
 - DYE TEST → RECOMMEND DISCONNECT AND INSTALL SUMP PUMP

SERVICE DEPARTMENT

- MAJOR DITCH INSPECTION
 - YEARLY
 - AFTER MAJOR RAIN EVENTS
 - DEBRIS REMOVED ON NEEDED BASIS
- RETENTION BASINS
 - CITY OWNED-ROUTINE BASIS
 - PRIVATE- INSPECTION PROGRAM IS BEING DEVELOPED
- SANITARY/STORM MAINS
 - ALL MAINS ARE CLEANED ON A REVOLVING BASIS
 - TELEVISED WHEN NEEDED AND VIDEO WILL BE ARCHIVED IN OUR GIS



SERVICE DEPARTMENT

DESCRIPTION	2010	2011	2012	2013	2014
Service Dept work orders logged, total	6246	7715	6934	6734	8027
Miles of sanitary and storm sewers flushed	23.97	12.2	22.24	26.15	17.57
Residential tees located (sanitary & storm)	375	672	491	391	718
Miles of storm and sanitary mains filmed	4.35	6.78	9.53	10.12	9.65
Hours logged sweeping streets	579	557	667	832	826
Tons debris from street sweeping annually			280	428	361

THE END

- QUESTIONS OR COMMENTS

