

# **Hillside Heights Watershed Study**

**City of Fitchburg  
Dane County, WI**

**Project No. 7729002**

September 2009

Prepared by:

MSA Professional Services, Inc.  
2901 International Lane, Suite 300  
Madison, WI 53704

Phone: (608) 242-7779

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## **I. INTRODUCTION**

In May and June of 2008 the City of Fitchburg received approximately 11.4 inches of rain. This rain fell in eight distinct events over the course of 52 days and while some events had very high intensity, they delivered comparatively small rainfall depths. In general the City of Fitchburg's stormwater system had capacity to collect and convey stormwater runoff without problem. However, in the Hillside Heights neighborhood there is an existing stormwater pond located at the bottom of a land-locked watershed that experienced higher levels of water than normal. There was no damage reported to existing homes, however, there was flooding of several yards and loss of access to a public park reported. The high pond elevation lasted for weeks following the high-water occurrence.

This report investigates the watershed tributary to the Hillside Heights pond and evaluates several alternative construction projects that would prevent, or at least reduce future nuisance high water occurrences at this location.

**Figure 1** identifies the location of the Hillside Heights neighborhood and the watershed draining to the Hillside Heights Pond.

### **A. Study Area**

**Figure 1** illustrates the limits of the study area. The study area was determined by examination of topographic and infrastructure maps provided by the City of Fitchburg. The study area is 276 acres in size and is centered at the intersection of South Fish Hatchery Road and Irish Lane.

### **B. Hydrologic Modeling**

The computer model XP-SWMM was used to simulate flooding resulting from rainfall events experienced in the neighborhood. XP-SWMM is a fully-dynamic hydrologic and hydraulic computer model.

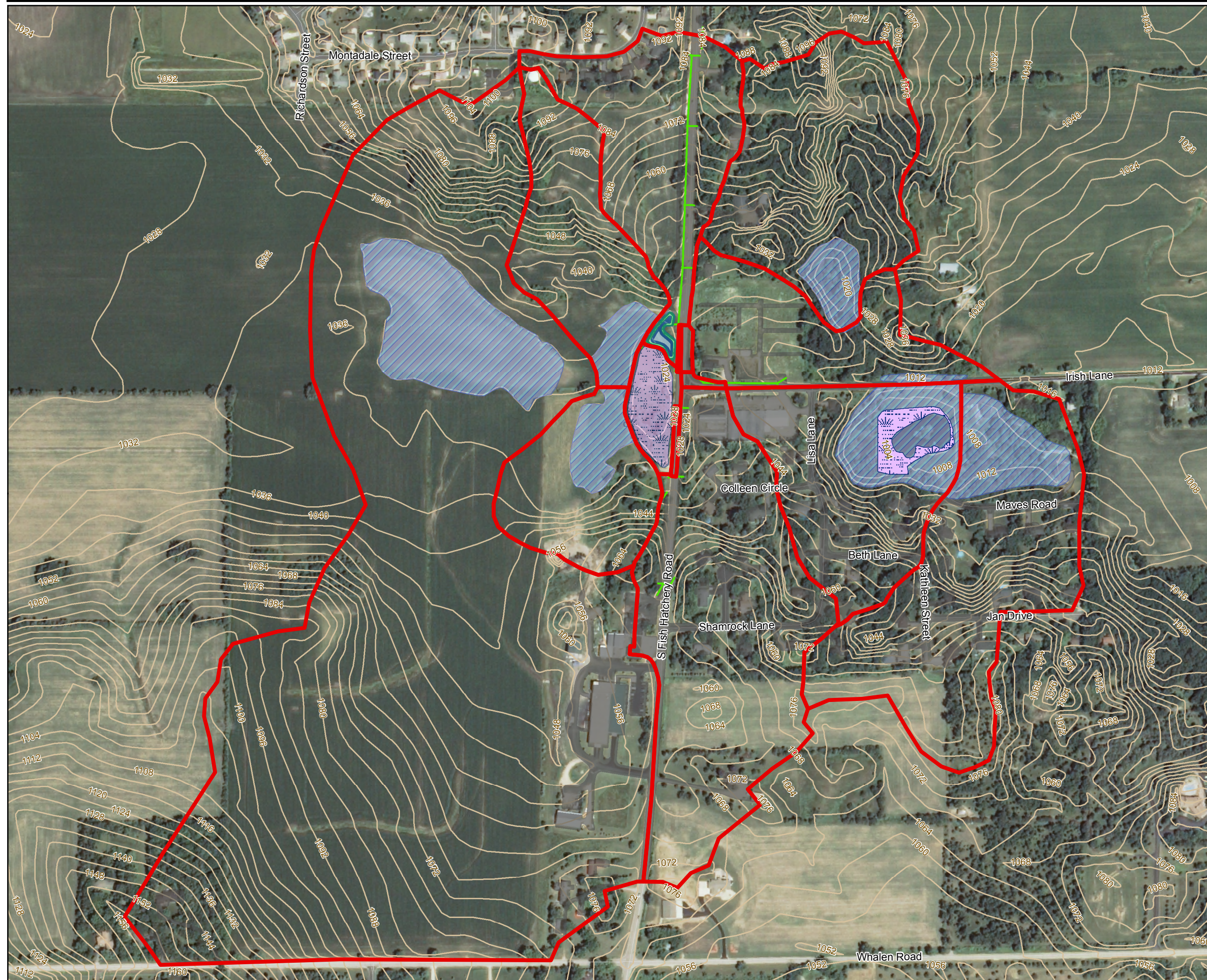
Primary watershed surface runoff characteristics such as drainage area, impervious percentage, soil texture, land slope, and subcatchment width were developed using GIS data provided by the City of Fitchburg. Drainage areas are shown on **Figure 1** and were determined through interpretation of topographic maps and drainage infrastructure maps. **Figure 2** illustrates the amount of impervious area within the study limits. Impervious area was determined using aerial photography.

Secondary runoff data including Infiltration data, was developed according to the soil textures indicated in the Dane County Soil Atlas and the direction provided by WDNR Conservation Practice Standard 1002. **Figure 3** illustrates the soil textures within the study area. **Table 1**, below identifies infiltration rates according to soil texture. Infiltration rates

# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 1 Fish Hatchery Road Study Area Map



### Legend

- Watersheds
- Impervious Areas
- Proposed Forebay
- Existing Depressions
- Existing Wetland
- Proposed Storm Sewer
- Roads
- 4-ft contours



Feet



Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

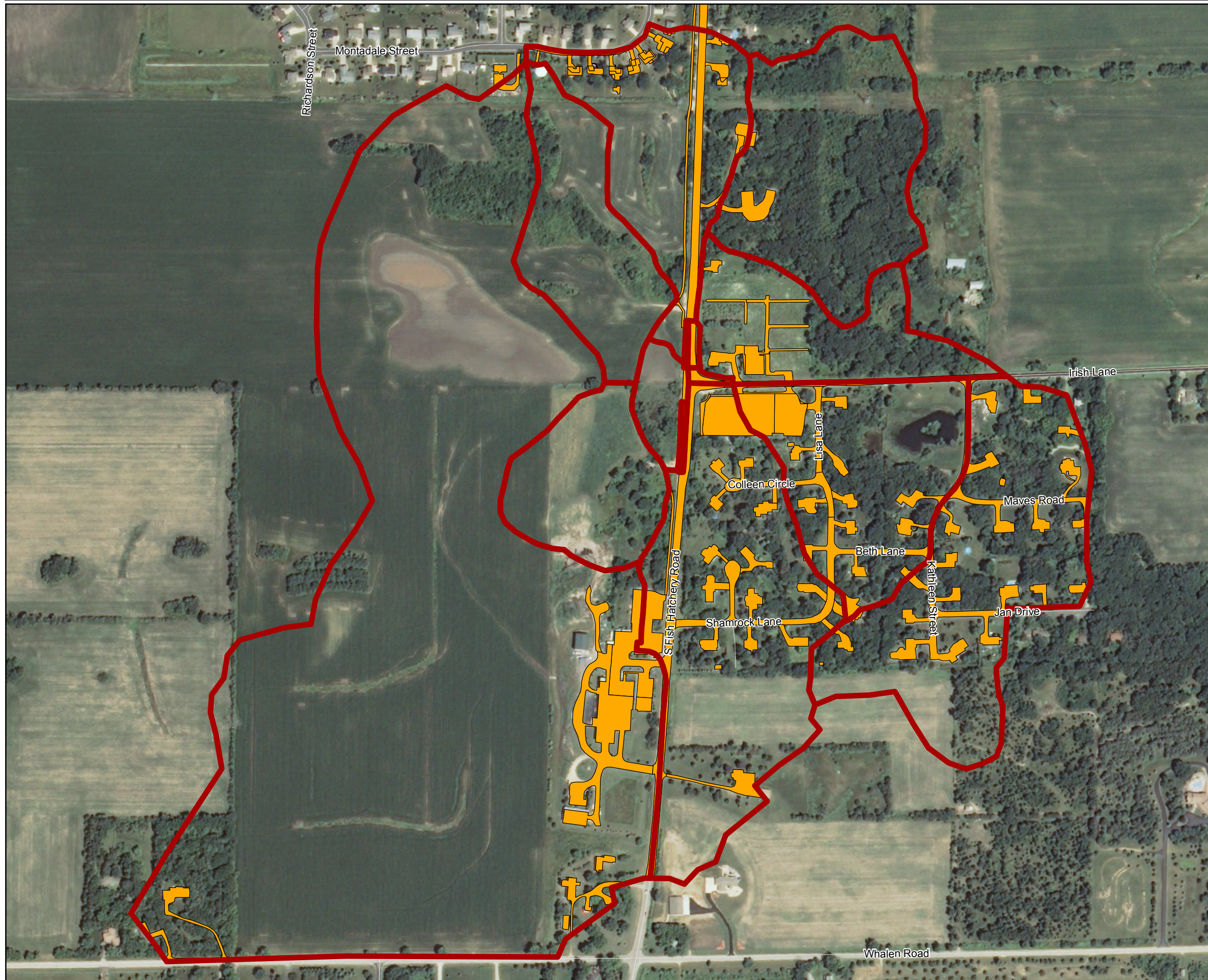
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# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 2 Impervious Areas



### Legend

-  Watersheds
-  Impervious Areas
-  Roads



Feet



Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

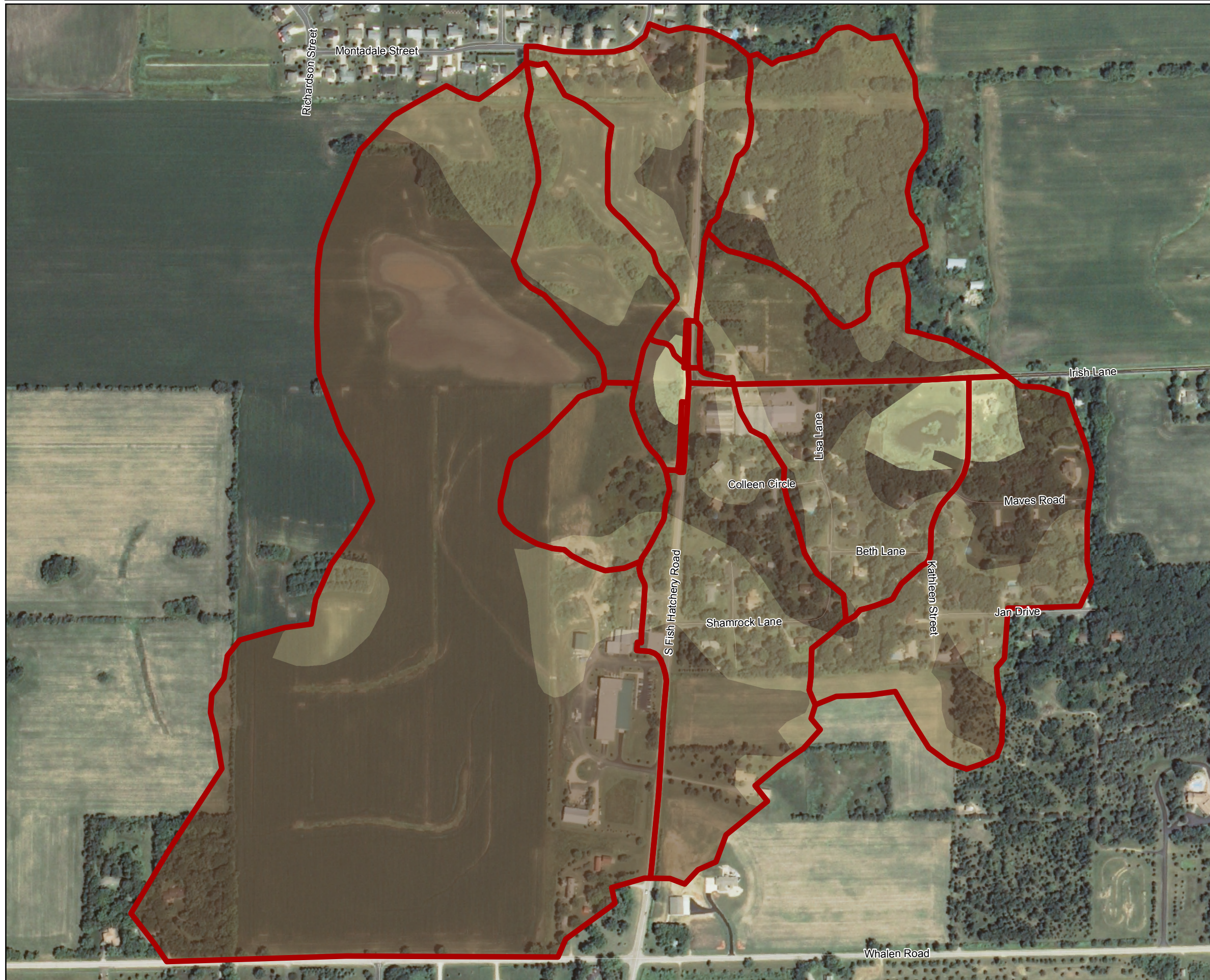
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# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 3 Soil Map



### Legend

Watersheds

Roads

### Soil Data

Clay Loam

Loam

Silt Loam



Feet

0 450 900

Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

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were applied according to the weighted average of the area of each soil texture within the delineated watersheds. The Horton infiltration routine was used to simulate the effect of infiltration. For this application, both the initial and asymptotic infiltration rates were set equal to each other. Setting both infiltration parameters to the same values forced the model to apply a constant infiltration rate during the simulation; it also removed dependency on the decay rate of infiltration, which was set to a standard value of 0.00115 sec<sup>-1</sup>, and the regeneration rate of infiltration which was set to a standard value of 10% of the decay rate.

**Table 1 - Design Infiltration Rates According to Soil Texture**

Soil Texture <sup>2</sup>	Design Infiltration Rate Without Measurement <sup>3</sup> (in/hr)
Coarse sand or coarser	3.60
Loamy coarse sand	3.60
Sand	3.60
Loamy sand	1.63
Sandy loam	0.50
Loam	0.24
Silt loam	0.13
Sandy clay loam	0.11
Clay loam	0.03
Silty Clay loam	0.04 <sup>4</sup>
Sandy clay	0.04
Silty clay	0.07
Clay	0.07

1. Source: Wisconsin Department of Natural Resources Conservation Practice Standard 1002 Site Evaluation for Stormwater Infiltration Table 2: Design Infiltration Rates for Soil Textures Receiving Stormwater
2. Use sandy loam design infiltration rates for fine sand, loamy fine sand, very fine sand, and loamy fine sand soil textures.
3. Infiltration rates represent the lowest value for each textural class presented in Table 2 of Rawls, 1998.
4. Infiltration rate is an average based on Rawls, 1982 and Clapp & Hornberger, 1978.

Depression storage was set to default values of 0.05-inches for impervious surfaces and 0.10-inch for pervious surfaces.

Overland sheet flow roughness coefficients (Manning 'n' values) were set to default values of 0.014 for impervious surfaces and 0.45 for pervious surfaces.

Evapotranspiration rates were set at a uniform (default) rate of 0.1 inches per day. This value was kept the same for existing and proposed development conditions.

Rainfall data was manually entered into the XP-SWMM model at 30-minute intervals, using the rainfall record obtained from the Village of Oregon. Model time controls were adjusted so that the simulation start and end dates coincided with the rainfall record.

### **C. Model Calibration**

The City of Fitchburg engineering staff used GPS equipment to delineate the maximum edge of water observed following the June 2008 rainfall events. The delineated line is shown on **Figure 4**. When the delineated highwater boundary was compared to topographic data collected by MSA land surveyors, the apparent flood elevation was approximately 1008.0.

MSA obtained 30-minute incremental rainfall data for May and June 2008 from the Village of Oregon's public works department. The Village of Oregon is approximately four miles away from the Hillside Heights pond, so it is possible that rainfall patterns in Oregon were different from those occurring in the Hillside Heights neighborhood. However, comparison of hourly incremental data collected at the Dane County Regional Airport for the June 2008 shows a similar pattern of rainfall. **Figure 5** compares plots of cumulative rainfall totals from the Village of Oregon and from Dane County Airport. Note that the Dane County Airport data was rectified to the Village of Oregon data as of June 1. Despite a similarity in rainfall occurrences and durations, there is an obvious difference in rainfall totals. Since the airport is approximately 12 miles distant from the Hillside Heights neighborhood the data was felt to be too remote to be relied upon for this study. The Oregon rainfall record was used for model calibration.

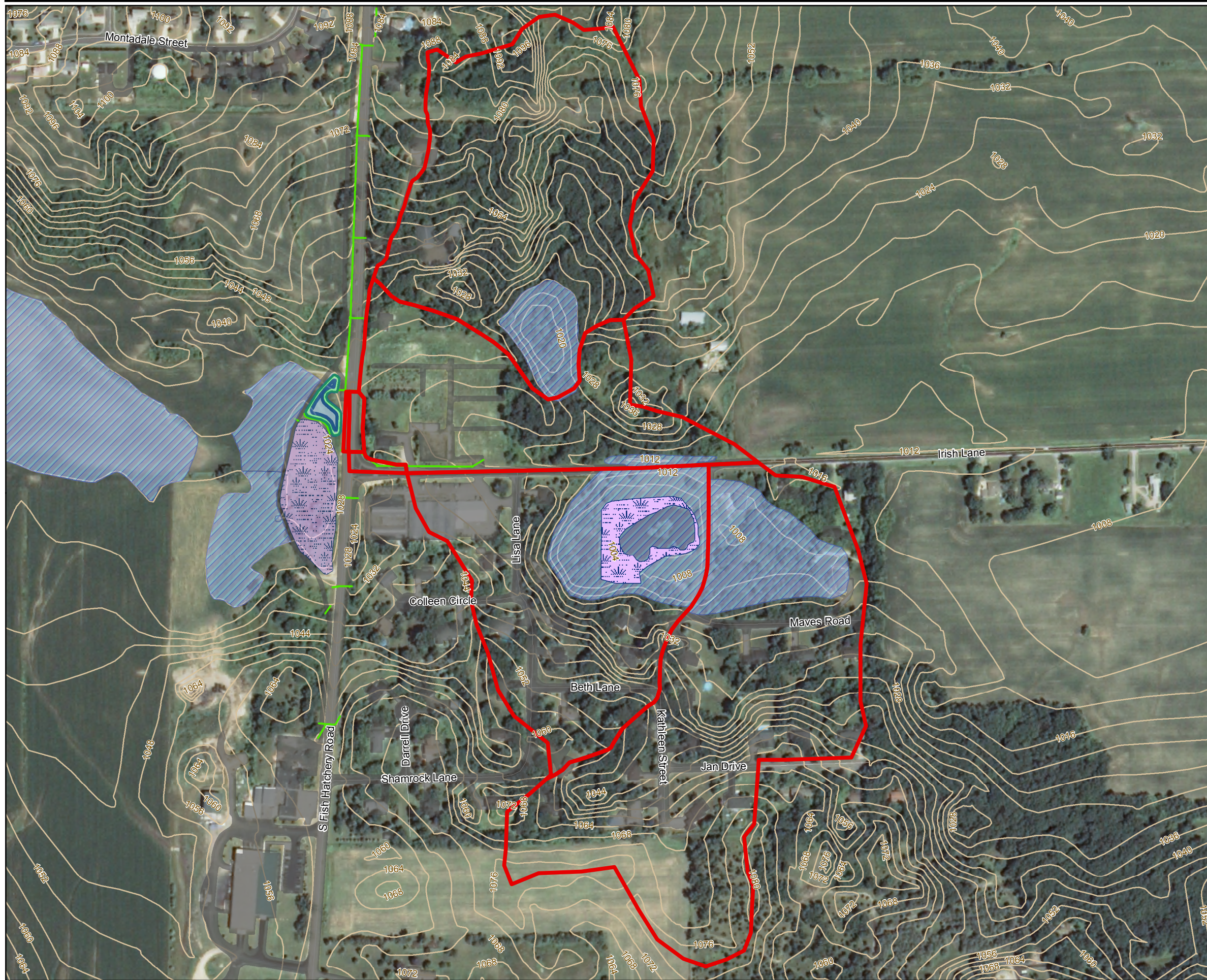
Typically, hydrologic models are calibrated by first adjusting runoff parameters to control the volume of runoff being generated by a rainfall event, then adjusting the peaking factors controlling how quickly runoff reaches the collection system. These methods of calibration involve adjusting hydrologic properties of the model. These properties are, in general, more qualitative, and often are developed from a range of acceptable values such that alteration of individual parameters to match recorded data will still result in parameters within an accepted range. Only after a calibration has incorporated all the necessary adjustments to the hydrologic properties are hydraulic properties adjusted, and only if absolutely necessary. The reason that hydraulic properties such as storage volume are not often altered during calibration is that most hydraulic properties are not subject to interpretation.

For this application of the XP-SWMM model, most of the primary hydrologic input parameters were directly measured from mapping data including area, slope, and impervious fraction. The only remaining primary hydrologic input parameter is subcatchment width. Subcatchment width is a parameter roughly equivalent to the inverse of the time-of-concentration and is a major factor in the XP-SWMM solution engine for determining peak runoff rates. For this application, subcatchment width was derived from directly measured data, but in a somewhat qualitative process and so would normally be one of the first variables evaluated when completing a model calibration. However, the only data available

# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 4 Hillside Heights Pond Drainage Area



### Legend

- Watersheds
- Impervious Areas
- Proposed Forebay
- Existing Depressions
- Existing Wetland
- Proposed Storm Sewer
- Roads
- 4-ft contours



Feet

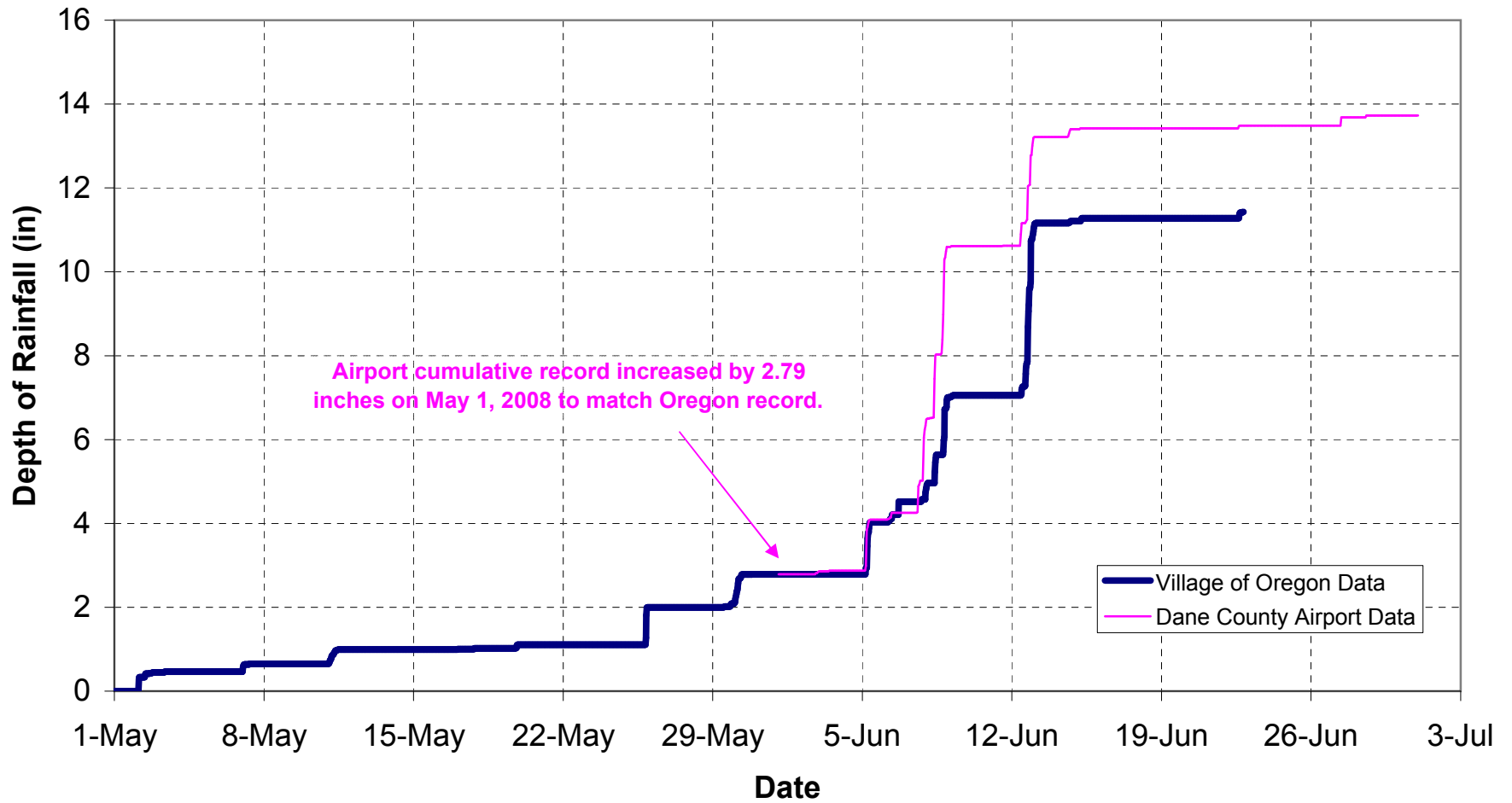


Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

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**Figure - 5**  
**Cumulative Rainfall Records**  
Village of Oregon Public Works and  
Dane County Regional Airport



for calibration of this model is the single data point representing the recorded high water mark in the land-locked Hillside Heights Pond. Since the basin is land-locked, the high water mark will not be affected by peak runoff rates (unless runoff rates are exceptionally small, on the order of magnitude of infiltration or evaporation rates). As such, subcatchment width was not used for model calibration.

Since all the primary hydrologic parameters were either directly measured or found to be insensitive, the model calibration was accomplished through modification of the secondary input parameters; specifically, infiltration. Infiltration parameters were selected as they have a direct effect on runoff volume and have a wide range of acceptable values. Other secondary data have only a small range of acceptable values and modeled runoff volumes show little sensitivity across this range.

**Table 2**, below, summarizes a sensitivity analysis completed for the model calibration. The table compares infiltration rate, expressed as a multiple of the rate recommended in CPS 1002 against the modeled peak flood elevation during the May/June 2008 rainfall events using the infiltration rate multiplier.

**Table 2 - Model Sensitivity to Infiltration Rates**

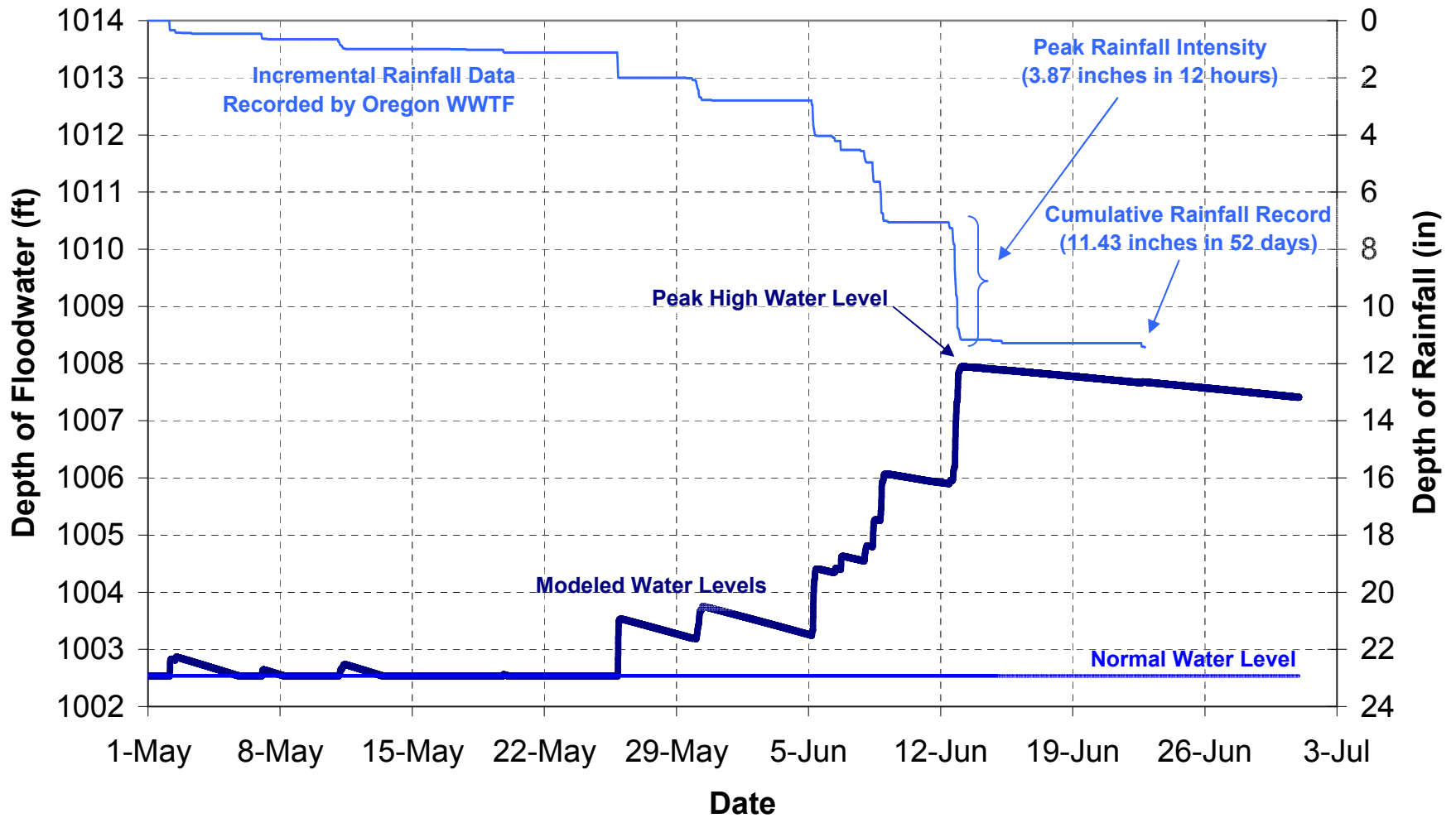
Infiltration Multiplier <sup>1</sup>	Peak Flood Elevation <sup>2</sup>
1.0	1010.89
2.5	1008.84
3.0	1008.50
4.0	1007.95

1. Multiplier applied to individual watershed infiltration rates determined by Dane County Soil Atlas data and infiltration values listed in CPS 1002.
2. The observed peak flood elevation following the May/June 2008 rainfalls was 1008.0

Model calibration was achieved by multiplying the infiltration rates for soil types given in CPS1002 by a factor of 4. Since the soils are predominantly silt loam texture according to the Dane County Soil Atlas, the effective infiltration rates in the watershed are in the 0.4-0.5 in/hr range.

**Figure 6** presents time-series data from rainfall and water surface elevation in the Hillside Heights Pond. The water surface elevation series shows how the pond was initially able to return to its apparent normal water level between rainfall events in early May. However, in late May and early June the rate of rainfall runoff greatly exceeded the capacity for infiltration (and evaporation) within the basin and the water levels continued to increase until they reached their peak on June 13. Note the tailing arm on the water surface data series, the slope of the line shows that water levels drop at approximately 1 foot every four weeks.

**Figure - 6**  
**Hillside Heights Flood Conditions**  
**May/June 2008**



It should be noted that during the calibration there was no condition where water crossed over South Fish Hatchery Road – even under ‘uncalibrated’ model conditions where model input values incorrectly over-estimated runoff rates and volumes. After calibration the model was solved for the 100-yr 24-hr rainfall and it was confirmed that there is no discharge across South Fish Hatchery Road to the Hillside Heights Pond. **Figure 4** shows the area contributing to the Hillside Heights Pond; the total drainage area is 76 acres.

#### **D. Existing Conditions 100-yr Flood Elevation**

The calibrated XP-SWMM model was subsequently used to determine the 100-yr flood elevation using the standard single-event protocols preferred by local, state, and federal regulators; specifically, application of a 6-inch rainfall depth applied over 24-hours using an SCS Type 2 distribution. Under these conditions, the 100-yr 24-hr rainfall flood elevation is 1008.7.

The approximate flood damage elevation of the lowest house (SE corner of Irish and Kathleen) is 1008.8. In addition to the flood risk to this property there are several yards that are inundated during flood events smaller than the 100-yr event. However, what may be more significant to the neighborhood is the loss of the use of the public park at the southeast corner of Hillside Heights Pond.

**Figure 7** illustrates the estimated extent of 100-yr flooding in the Hillside Heights Pond. It also shows the historic data on expected flood elevations recorded on the original plat document.

#### **E. Flood Reduction Alternatives Analysis**

In general there are five approaches that can be taken to address flooding problems; floodproofing or purchase-and-demolition of flood prone structures, or making improvements to the drainage system that reduce inflows, increase storage, or increase outflows. Floodproofing and purchase-and-demolition projects are activities that treat the symptoms of a problem without actually removing the source of the problem. (Note however, that for cost-comparison purposes an estimate to flood-proof the one home within the 100-year floodplain is provided).

**Figure 8** shows a schematic representation of the alternatives evaluated in the study.

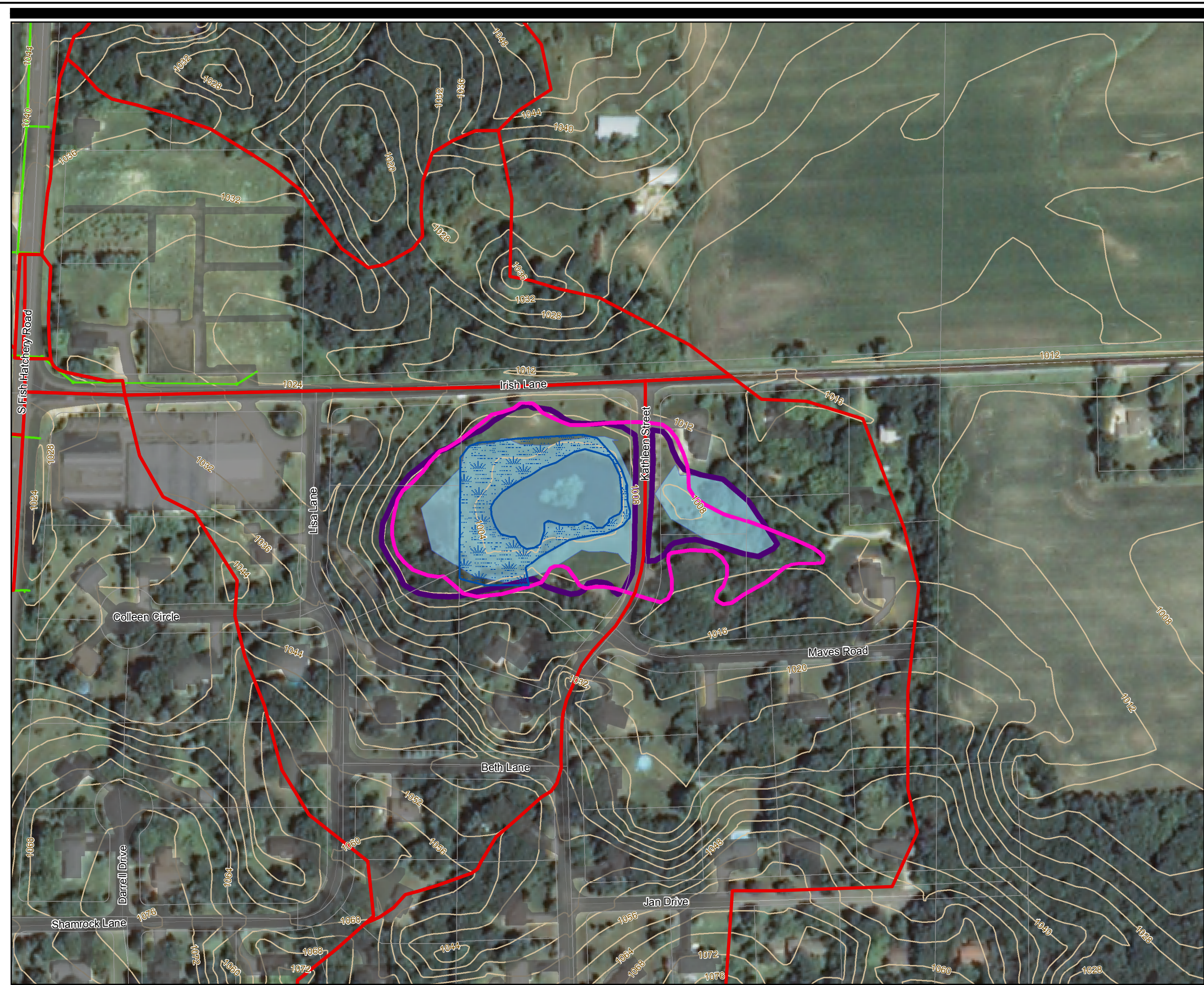
##### **1. Alternative #1 – Floodproofing.**

There is only one home known to be below the 100-yr flood elevation. This is the home at 2424 Kathleen St. which was knowingly constructed with an opening below the plat-recorded high water mark elevation by the owner at their own risk (see

# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 7 Hillside Heights Pond Water Levels



### Legend

- Watershed Boundaries
- 100-yr Floodplain (2009)
- 2' Above High Water Elev. (1965)
- Water Elev. June 16, 2008
- Wetlands Delineation Area
- Parcels
- 4-ft Contours



Feet



Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

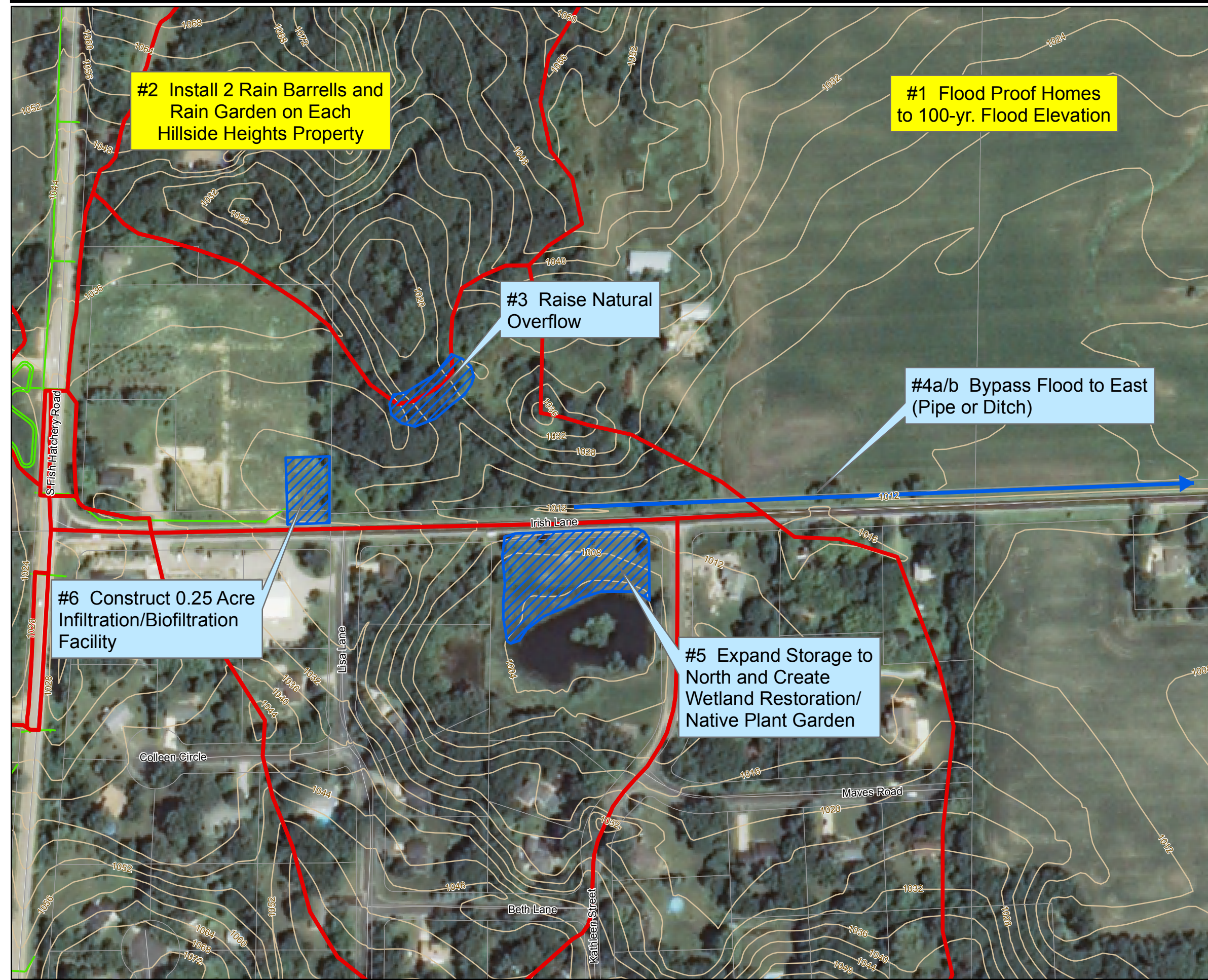
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# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## Figure - 8 Alternative Improvement Options Map



### Legend

- Watershed Boundaries
- Proposed Storm Sewer
- Parcels
- 4-ft contours



Feet



Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

Drafted - GMD, Date - 090909, File - g:/projects/...7729001



attached zoning permit application). Floodproofing could be applied to the home to reduce the risk of damage to the home in the event of a high water occurrence. Floodproofing is a process for preventing or reducing flood damages to the structure and/or to the contents of buildings located in flood hazard areas. For the most part, it involves altering or changing existing properties. There are two general approaches to floodproofing; raising or moving the structure or constructing barriers to stop floodwaters from reaching the damageable portions of structures. Sometimes these barriers can be located outside the building to be floodproofed and can take the form of levees or floodwalls. Other times the barriers can be within the building itself and can take the form of sealed glass-block windows, or water-tight doors. There is a third type of floodproofing called wet-floodproofing which involves modifying a structure to allow floodwaters inside, but which ensures that there is minimal damage to the building's structure and to its contents. Wet floodproofing often includes modifications that protect or relocate utilities and furnaces to above the anticipated flood level.

The cost of floodproofing can have a wide range depending on the anticipated depth of flooding and the chosen method for floodproofing. An anticipated range of costs would be \$6,000 to \$10,000 for the one home in the floodplain. Given the magnitude of costs for other alternatives, floodproofing the home is the lowest-cost alternative.

Floodproofing the home will have no effect on reducing flood elevations or decreasing the frequency that the park spaces are under water.

## **2. Alternative #2 – Installing Rain Barrels and Rain Gardens.**

The City of Fitchburg has implemented a stormwater utility. As an incentive to homeowners to lower their utility bill the City promotes installation of rain barrels and rain gardens to reduce runoff and to conserve water. This alternative evaluates the effect of each Hillside Heights Neighborhood property owner installing two 55 gallon rain barrels and a rain garden on their property.

The City's minimum size requirement for rain gardens to be eligible for a utility credit is 100 cubic feet per residential property. A pair of rain barrels provides 14.7 cubic feet of additional storage per property. If all 47 properties in the study area had rain barrels and rain gardens the total storage added to the system would be 5,400 cubic feet.

The effect of this storage was evaluated by incorporating an additional abstraction of 5,400 cubic feet in the watershed. This situation was only appropriate for a single-event scenario as a long-term scenario would require user input on how frequently the rain barrels were emptied to be meaningful. The effect on (single-event) 100-yr flood elevations at Hillside Heights Pond was a reduction of 0.04 feet.

The City of Fitchburg has provided a cost range of \$50-\$200 for two rain barrels and a range of \$200 to \$2,000 for the rain garden installation. The range of costs represent the difference between doing the work themselves or hiring the work out. For comparative purposes a cost of \$500 per home was agreed upon for this study.

### **3. Alternative #3 – Prevent Discharge from Basin North of Irish Lane.**

The natural depression on the private property north of Irish Lane discharges approximately 2.4 cfs peak and 0.2 ac-ft volume during the 100-yr storm. If the throat where this runoff passes was raised by less than one foot (plus an additional amount for freeboard) the storage area could be made landlocked for up to the 100-yr event. This would result in a reduction in the 100-yr flood elevation in the Hillside Heights pond of 0.03 feet.

However, this would raise the flood elevation in the landlocked basin and would inundate more land than is currently flooded. While the cost to construct the berm would be negligible, the cost to purchase the land where the additional impoundment will occur could be substantial. A preliminary estimate is \$70,000.

### **4. Alternative #4 – Bypass Flows East along Irish Lane.**

Under 100-yr existing conditions there is 12.7 cfs peak runoff and 2.1 ac-ft of volume passing under Irish lane via the existing 24" CMP. If this is bypassed to the east (including all flow and volume from the basin north of Irish Lane, then the 100-yr flood elevation in the Hillside Heights pond could be reduced by 0.6 feet.

A 24" plastic pipe installed at 0.5% slope could convey this flow, but it would need to be approximately 3,400 feet long before it would daylight. This pipe would run approximately to Caine Road. The estimated cost to construct a drain tile outlet is approximately \$115,000 but does not include any improvements to the downstream watershed to offset the additional stormwater being sent. The cost of these improvements could easily be several hundred thousand dollars.

Alternatively a 'v' bottom ditch with 3:1 side slopes could convey the same flow at a depth of 1.5 feet and a 0.5% slope. This would run for approximately 2,000 feet before cutting through the saddlepoint where it would freely discharge in the existing ditch section. However, at 0.5% this ditch will not drain effectively and will have isolated low spots. A 1% slope would be more desirable; however, the channel would need to run far past Caine Road, to a point beyond the limits of this study area before it could drain through existing ditches. The cost to construct a ditch at a 0.5% slope is estimated to be \$60,000. However, as above, these costs do not include any improvements to the downstream watershed. Additionally, due to the need excavate

the ditch and lay-back the side-slope it will be necessary to acquire land or easements to construct the ditch. This could also add substantially to the project cost.

**5. Alternative #5 – Enlarge the Hillside Heights Pond**

If the Hillside Heights pond is enlarged to the north, between the existing waters-edge and Irish Lane to create a flat 'wetland restoration' area then the 100-yr flood elevation in the Hillside Heights pond drops by 0.7 feet.

The pond enlargement evaluated under this scenario entails excavation from the toe of slope on Irish Lane at a 6:1 slope to a point approximately six inches above the pond normal water level (approximately 1002.5) and then extending horizontally to the existing edge of the pond. The east-west extent of excavation would be confined within the existing east-west extent of the pond.

The estimated cost to increase storage in this area and restore the area as a wetland is approximately \$180,000.

**6. Alternative #6 – Construct an Infiltration Facility on City Owned Land at Irish Lane and Fish Hatchery Road**

If the City were to construct a 0.25 acre infiltration facility at the outfall of the storm sewer running from Fish Hatchery Road along the north side of Irish Lane, then the following improvements to the Hillside Heights pond could be expected depending on the infiltration rate achieved as shown in Table 3.

**Table 3 - Effectiveness of Infiltration Facility on City Land**

<b>Infiltration Rate</b>	<b>Flood Elevation Reduction</b>
0.5 inches/hour	0.1 feet
1.0 inch/hour	0.2 feet
2.0 inches/hour	0.3 feet <sup>1</sup>

1. At 2.0 inches per hour and a 4 foot depth (24-hour drawdown) there is essentially zero discharge from this infiltration facility during the 100-yr events.

The estimated cost to construct a 0.25 acre infiltration facility is approximately \$120,000.

**Alternatives #5 and #6 Combined.**

If the City implemented alternatives #5 and #6 and achieved a 1.0 in/hr infiltration rate in the infiltration facility then the 100-yr flood elevation in Hillside Heights pond would be reduced by 1.0 foot.

The estimated cost to construct both the infiltration facility and the enlarged pond in Hillside Heights is approximately \$270,000.

**Table 4** below summarizes the results of the alternatives analysis.

**Table 4 - Results of Flood Elevation Reduction Alternatives Analysis**

Number	Description	100-yr Flood Elevation Reduction <sup>1</sup>	June 2008 Elevation Reduction	Construction Cost Estimate <sup>3</sup>
1	Floodproof Homes	0 feet	N/A <sup>2</sup>	\$6,000-\$10,000 per home
2	Install Rain Barrels and Rain Gardens at All Homes	0.04 feet	N/A <sup>2</sup>	\$500 per home <sup>4</sup>
3	Prevent Discharge from Basin North of Irish Lane	0.03 feet	N/A <sup>2</sup>	\$70,000
4a	Bypass all flows along north side of Irish Lane via Pipe	0.6 feet	N/A <sup>2</sup>	\$115,000+ <sup>5</sup>
4b	Bypass all flows along north side of Irish Lane via Swale	0.6 feet	N/A <sup>2</sup>	\$60,000+ <sup>5</sup>
5	Enlarge Hillside Heights Pond	0.7 feet	0.9 feet	\$180,000
6	Construct Infiltration Facility north of Irish Lane	0.2 feet	0.4 feet	\$120,000
5 + 6	Construct #5 and #6	1.0 feet	1.3 feet	\$270,000

1. Reduction in 100-yr flood elevation (6.0" rainfall in 24-hrs)
2. Not evaluated
3. Preliminary Concept Cost Estimates -  $\pm$  50%
4. Assumes installation by property owner
5. Costs reflect improvements necessary to discharge water across high-point to the east. They do not include any improvements through the neighboring watershed. The cost of these improvements could easily be several hundred thousand dollars.

A meeting was held with the residents of the Hillside Heights neighborhood on July 9, 2009. The findings of this study were presented to the residents and comments were collected by City and MSA staff. While no role-call vote was tallied, it appeared that consensus of the neighborhood was that the preferred alternative involved making improvements to the pond to

increase its storage capacity (alternative #5). Verbal comments in support of this option included suggestions that the pond enlargements include native plantings and an interpretive foot path with access around the pond. It was also suggested that excavated material could be used to raise the elevation of the existing park to reduce future occurrences of nuisance water on the playground.

It was noted by City officials that improvements to the Hillside Heights pond were not currently included in the City's capital improvement plan and that the project would need to be added by City Council action before any additional planning for the project could proceed.

## **APPENDIX A**

### **Topographic Survey Maps**

# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## MSA Survey



Feet



Sources:  
- Base data provided by Dane County  
- Base data provided by City of Fitchburg

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# Hillside Heights & Fish Hatchery Watershed Study

City of Fitchburg  
Dane County, Wisconsin

## MSA Survey



Feet



Sources:  
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- Base data provided by City of Fitchburg

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## **APPENDIX B**

### **Wetland Documentation**



209 Commerce Parkway | PO Box 128 | Cottage Grove, Wisconsin 53527-0128  
Ph: 608.839.1998 | Fax: 608.839.1995

[www.nrcdifference.com](http://www.nrcdifference.com)

April 6, 2009

Ms. Cami Peterson  
Wisconsin Department of Natural Resources  
3911 Fish Hatchery Road  
Fitchburg, WI 53711

***RE: Hillside Heights - Jurisdictional Determination; City of Fitchburg, Dane County, WI***

Dear Ms. Peterson:

On behalf of the City of Fitchburg, Natural Resources Consulting, Inc. (NRC) is requesting a jurisdictional determination with respect to an exemption under Adm. Code NR 103.06 for a stormwater pond and associated wetland fringe (Figure 4) located in Section 22, Township 06 North, Range 09 East, City of Fitchburg, Dane County, Wisconsin. Specifically, the property is located at the southwest corner of Irish Lane and Kathleen Street (Figure 1).

The pond was created in 1968 as a means of stormwater retention for the surrounding Hillside Heights development. The associated wetland fringe developed post-1968 as a result of increased stormwater volume within the internally drained watershed. Maintenance activities were completed within the stormwater pond by the City of Fitchburg circa 1994, including dredging, regarding the western portion of the pond. The City of Fitchburg is currently evaluating various enhancements within the watershed to alleviate concerns of stormwater flooding onto adjacent private properties. One of the options the City is currently evaluating is whether any expansion of the pond limits may lead to improved recharge and/or flood retention capacity of stormwater.

The Natural Resources Conservation Service (NRCS) mapped the pond and surrounding landscape as the hydric soil series Sable silty clay loam (Figure 2). However, these soil mapping efforts were conducted after the pond was created. The Wisconsin Department of Natural Resources (WDNR) Wetland Inventory Data does not identify wetland on-site. The WDNR Hydrography Data identifies the pond as open water. No other hydrology features are present (Figure 3).

Historic aerial photographs further support that the pond was created for stormwater management during the neighborhood's 1968 development and is not natural in origin. Prior to 1968 this location was in active agricultural production. Wetland signatures are not present within the 1955 or 1962 aerial photographs. However, the 1937 photograph indicates wetland signatures that comprise a small portion of the pond's current size. Post-1968 the pond increased in size as impervious surfaces associated with the residential development were added. (Attachment 1).

The current conditions consist of the stormwater pond and associated wetland. NRC completed a preliminary wetland boundary determination in 2009 which extends slightly up gradient of the open water fringe (Figure 4). The wetland fringe consists of mowed and maintained turf grass. The wetland formed

within historical upland as a direct result of increased stormwater, which correlated with the increase of surrounding development. Therefore, given the intent of the pond creation as a stormwater pond and consequential formation of a wetland fringe, the features appear to meet the definition of an artificial wetland and exemptions under NR 103.06(4)(a) “*sedimentation and stormwater detention basins and associated conveyance features operated and maintained only for sediment and flood storage purposes;*”.

Please provide us with your jurisdictional determination, specifically with respect to the wetland exemptions described above. If you have any further questions or require additional information, please contact me at (608) 839-1998.

Sincerely,

**Natural Resources Consulting, Inc.**



Charlie Bauer  
Staff Scientist

Cc:  
Rick Eilertson, City of Fitchburg  
Eric Thompson, MSA

Enclosures:  
Figures 1-4  
Historic Aerial Photographs  
Site Photographs

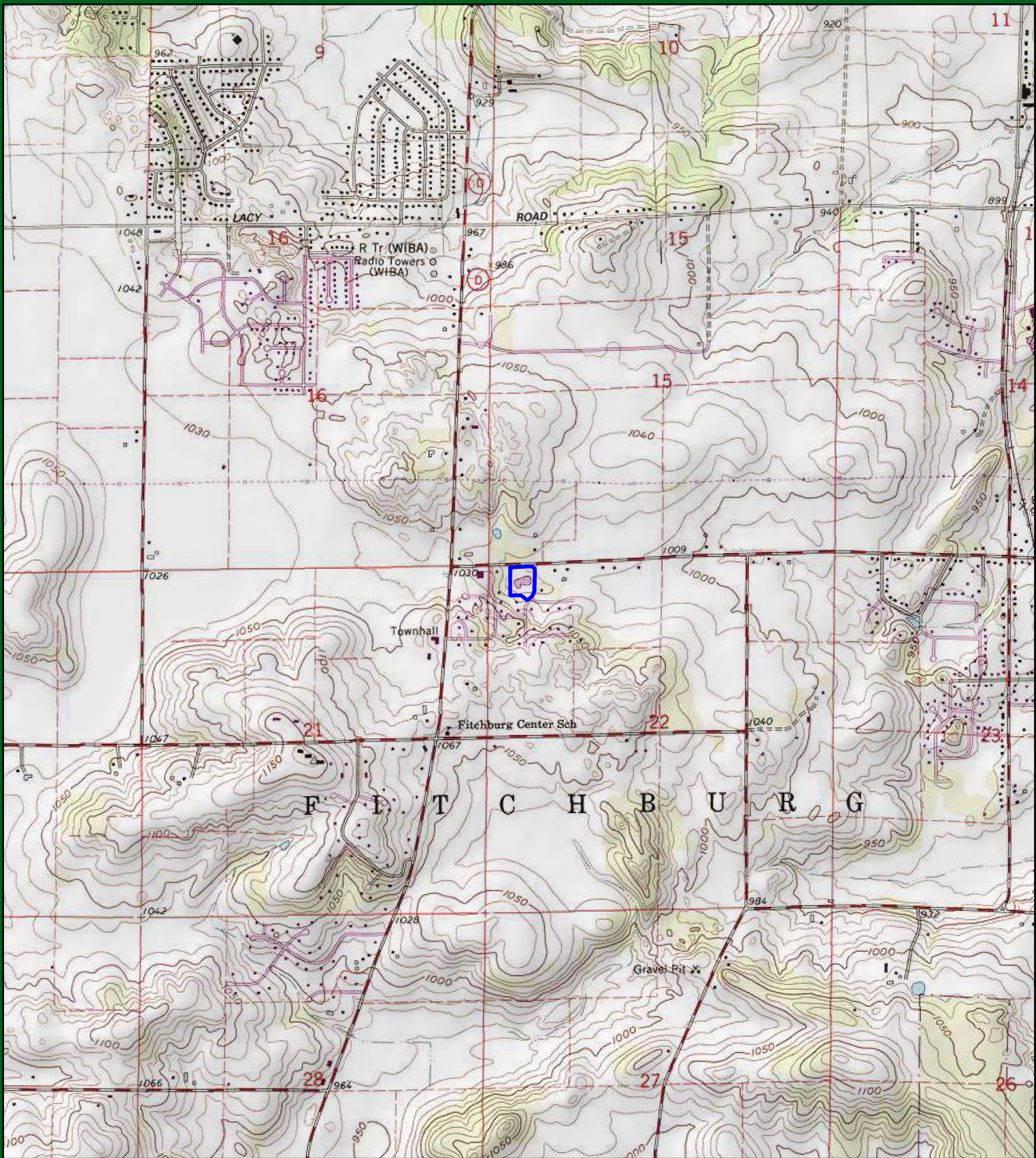
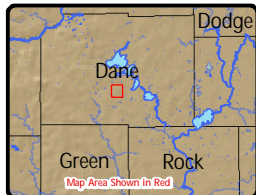


Figure 1. Project Location and Topography  
Hillside Heights



**Location**  
 Sec 22, T06N, R09E  
 City of Fitchburg, Dane County, WI

0 1,000 2,000 Feet

**Project Information**  
 Project Number : 009-0006-01  
 Modified February 18, 2009

**Legend**

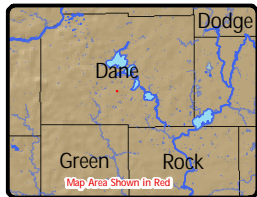
Approximate Project Location

**NRC**  
 Natural Resources Consulting, Inc.

209 Commerce Parkway  
 P.O. Box 128  
 Cottage Grove, WI 53527-0128  
 phone: 608-839-1998  
 fax: 608-839-1995  
[www.nrcdifferences.com](http://www.nrcdifferences.com)



Figure 2. NRCS Soil Survey Data  
Hillside Heights



**Location**  
 Sec 22, T06N, R09E  
 City of Fitchburg, Dane County, WI

**Project Information**  
 Project Number : 009-0006-01  
 Modified February 18, 2009

**Legend**

Approximate Project Location	Section Lines
NRCS Soil Survey Data	DNR 24k Hydrography
Hydric Soils	Perennial Stream
Poss. Hydric Inclusions	Intermittent Stream
Non-Hydric Soils	24K Hydro Layer

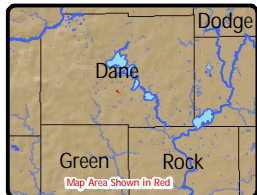
**NRC**  
 Natural Resources Consulting, Inc.

209 Commerce Parkway  
 P.O. Box 128  
 Cottage Grove, WI 53527-0128  
 phone: 608-839-1998  
 fax: 608-839-1995  
[www.nrcdifferences.com](http://www.nrcdifferences.com)

The information presented in this map document is advisory and is intended for reference purposes only.



Figure 3. WI Wetlands Inventory Data  
Hillside Heights



**Location**  
 Sec 22, T06N, R09E  
 City of Fitchburg, Dane County, WI

**Project Information**  
 Project Number : 009-0006-01  
 Modified February 18, 2009

**Legend**

- Approximate Project Location
- WI Wetlands Inventory Data\*
- Section Lines
- DNR 24k Hydrography
- Perennial Stream
- Intermittent Stream
- 24K Hydro Layer

\*No Data within View Frame

**NRC**  
 Natural Resources Consulting, Inc.

209 Commerce Parkway  
 P.O. Box 128  
 Cottage Grove, WI 53527-0128  
 phone: 608-839-1998  
 fax: 608-839-1995  
[www.nrcdifferences.com](http://www.nrcdifferences.com)

T6N, R9E, S16

T6N, R9E, S15

Irish Ln

Lisa Ln

Kathleen Ln

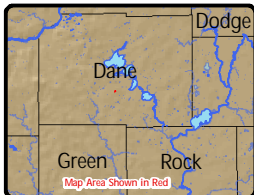
T6N, R9E, S21

T6N, R9E, S22

Maves Rd

Beth Ln

### Figure 4. Preliminary Wetland Determination Hillside Heights



**Location**  
 Sec 22, T06N, R09E  
 City of Fitchburg, Dane County, WI

**Project Information**  
 Project Number : 009-0006-01  
 Modified February 19, 2009

**Legend**

- Approximate Project Location
- Preliminary Wetland Determination
- Section Lines
- DNR 24k Hydrography
- Perennial Stream
- Intermittent Stream
- 24K Hydro Layer

**NRC**  
 Natural Resources Consulting, Inc.

209 Commerce Parkway  
 P.O. Box 128  
 Cottage Grove, WI 53527-0128  
 phone: 608-839-1998  
 fax: 608-839-1995  
[www.nrcdifferences.com](http://www.nrcdifferences.com)

Data Sources include WDOT, WDNR, WDOA and 2007 USGS Urban Orthophotography



2000



1995



1992



1990



1987



1986



1976



1968



1962



1955



1937



East Edge of Property V. S.jpg



North Edge End of Property V. W.jpg



Pond V. NE.jpeg



Pond V. S.jpg



Southeast Corner V. E.jpeg



Southwest Corner - V. W.jpeg



West Edge of Property V. N.jpeg

**From:** Peterson, Cami L - DNR [Cami.Peterson@Wisconsin.gov]  
**Sent:** Friday, May 15, 2009 10:52 AM  
**To:** Jeff Kraemer  
**Subject:** RE: Hillside Heights - Fitchburg  
 Jeff,

This is a wetland so no chapter 30 dredging, etc. and WQC would be the only thing that applies.

Cami

---

**From:** Jeff Kraemer [mailto:jkraemer@NRC-INC.NET]  
**Sent:** Wednesday, May 13, 2009 10:03 AM  
**To:** Peterson, Cami L - DNR  
**Cc:** Rick Eilertson (E-mail)  
**Subject:** RE: Hillside Heights - Fitchburg

Thanks Cami –

Since this is fundamentally a stormwater detention basin and was created for that purpose, but based on your review does not meet the artificial designation, what would the permitting process entail for maintaining the functions of the stormwater basin, whether that requires maintenance dredging and/or expansion of the pond? Perhaps neither of these activities are jurisdictional?

Thanks,

Jeff Kraemer  
 Principal Scientist  
**NRC**  
 (608) 839-2010  
[www.nrcdifference.com](http://www.nrcdifference.com)

---

**From:** Peterson, Cami L - DNR [mailto:Cami.Peterson@Wisconsin.gov]  
**Sent:** Wednesday, May 13, 2009 9:54 AM  
**To:** Jeff Kraemer  
**Subject:** RE: Hillside Heights - Fitchburg

Jeff,

My apologies on the lateness of the review. The determination got logged in as a general jurisdiction determination and not an artificial wetland determination so I didn't look at it until this morning at the prompt of your email.

Here are my thoughts on this site:

- 1) Even though the NRCS mapping occurred after the pond was created the hydric soil layer is much larger than the existing pond so I don't see where the pond could have created the soil type in this instance.
- 2) I agree there is definitely a wetness signature on the 1937 photo. However, there is also something going on in the 1955 and 1962 photos. Not necessarily a wetness signature, but the farming practice is different in that in both years that area was avoided.

So, I don't see conclusive evidence this is an artificial wetland and I can't grant an exemption. Chapter 30 wouldn't apply here, but potentially NR299 Water Quality Certification would.

**Cami Peterson**

Water Management Specialist

South Central Region

Wisconsin Department of Natural Resources

(📞) **phone:** (608) 275-3208

(📞) **fax:** (608) 275-3338

(✉️) **e-mail:** [cami.peterson@wisconsin.gov](mailto:cami.peterson@wisconsin.gov)

---

**From:** Jeff Kraemer [mailto:[jkraemer@NRC-INC.NET](mailto:jkraemer@NRC-INC.NET)]  
**Sent:** Wednesday, May 13, 2009 7:26 AM  
**To:** Peterson, Cami L - DNR  
**Subject:** Hillside Heights - Fitchburg

Cami –

Did you get a chance to review the wetland exemption request for Hillside Heights on behalf of Fitchburg? We will be presenting some stormwater management improvement options at a neighborhood meeting within a few weeks, and this is an important component. If we could get a response from you as soon as possible we would appreciate it.

Thanks,

Jeff Kraemer  
Principal Scientist

**NRC**

Natural Resources Consulting, Inc.

Regulatory and Scientific Expertise – Wetlands, Soils, Ecology, Restoration

209 Commerce Parkway | Cottage Grove, WI 53527

Ph: 608.839.1998 | Fax: 608.839.1995 | Cell: 608.575.5783

Direct: 608.839.2010 | [jkraemer@nrc-inc.net](mailto:jkraemer@nrc-inc.net) | [www.nrcdifference.com](http://www.nrcdifference.com)

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## **APPENDIX C**

### **Open House Attendance List**

**Hillside Heights Watershed  
OPEN HOUSE/COMMENTS SESSION  
Thurs., July 9, 2009, 5:30pm – 7:00pm  
SIGN-IN SHEET**

	Attendee's Name	Address (Home or e-mail)	Phone #	*
1	Jeff Kraus	NRC	608839220	
2	Steve Arnold	Common Council	6082787700	
3	Linda Weidemann	luweide@gmail.com (REC)	608.274.0903	y
4	Don Moriva	2393 Lisa Ln.	271-1475	
5	Ken Russell	5483 Marc Rd	271-4716	
6	Rena Gelman	2457 Lise Lane	270.0660	
7	Rick Eilertson	5520 Lacy Road rick.eilertson@cityofhillside.org, WI 55	270-4264	X
8	Dianne Linskens	2392 Kathleen St	276-7623	
9	Mike Linskens	"	"	
10	David Fahey	5376 Irish Lane	274-3517	*
11	Joe Roberts	5511 Mark's Rd	271-3457	
12	Louise A. Olson	2414 LISA LN	276-8786	
13	Mike Moschman	2403 KATHLEEN ST	2745248	Y
14	Scott ENDL	P&R City Bldg	270-428	
15	Joleen Jones	2424 Kathleen St.	310-4386	
16	Brian Ast	"	"	
17	Bill Weaver	2414 Kathleen St.	609-7772	
18	Deb Weaver			
19	Samuel Cooke	5267 Lacy Rd	273-2694	Y
20	ERIC THOMPSON	MSA	242-7778	
21	Connie Dowling	5481 Irish Lane	692-1944	
22	RW Johnson	<del>2384</del> Kathleen St.	271-0631	
23	Adelle Johnson	<del>2384</del> Kathleen St	271-0631	
24	Shawn Pfaff	5205 Day City Pl	2788344	✓

\* Please e-mail me an electronic copy of handouts presented at the Forum. (Y or N)

**Hillside Heights Watershed  
 OPEN HOUSE/COMMENTS SESSION  
 Thurs., July 9, 2009, 5:30pm – 7:00pm  
 SIGN-IN SHEET**

	Attendee's Name	Address (Home or e-mail)	Phone #	*
25	Jay Alton	jay@fitchburgjay.com	438-9261	
26	Diane Streck	dstreck@execpc.com		N
27	Holly Powell	5520 Lacy Road		
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\* Please e-mail me an electronic copy of handouts presented at the Forum. (Y or N)

## **APPENDIX D**

### **Open House Comments**

Hillside Heights Watershed Study  
OPEN HOUSE/COMMENTS SESSION

Question / Comments Sheet

Please use this sheet to write down any questions or comments you may have regarding the Hillside Heights Watershed Study. You may leave this sheet at the table following the presentation or fold it and mail to the City of Fitchburg, Attn: Rick Eilertson, Environmental Engineer. Thank you for sharing your questions and comments with us. You may also e-mail additional questions and comments to: [rick.eilertson@city.fitchburg.wi.us](mailto:rick.eilertson@city.fitchburg.wi.us)

Name: Rebecca Russell Address: 5483 Maves Rd.  
E-mail: vrbecky@gmail.com

I needed to leave the meeting at 6:30 to return to work, but it appeared that our area has 2 problems

① the runoff from the farm behind us

② the saturation of soil in the lower levels.

My problem(s) are with water runoff that is coming down the hill and back on my south window well.

I believe I heard glass blocks in the window might prevent the water from coming in.

This only happens during heavy rains. So far this year has been O.K. but it can be a real mess when it happens. Hopefully I am at home to sweep toward the drain or call for help if worse.

Suggestions?

I have a second concern about my septic system. Water has been observed coming back in when pumped since 1996 (? or 98) perhaps saturated. Ground water could be a factor?? I have had only one serious backup several years ago. And one minor backup when roots were a factor.

I secretly hope for a sewer line, but may eventually have to put in a hill?? I'm to be careful

Suggestions??

Thank you for the program!

Hillside Heights Watershed Study  
OPEN HOUSE/COMMENTS SESSION

Question / Comments Sheet

Please use this sheet to write down any questions or comments you may have regarding the Hillside Heights Watershed Study. You may leave this sheet at the table following the presentation or fold it and mail to the City of Fitchburg, Attn: Rick Eilertson, Environmental Engineer. Thank you for sharing your questions and comments with us. You may also e-mail additional questions and comments to: [rick.eilertson@city.fitchburg.wi.us](mailto:rick.eilertson@city.fitchburg.wi.us)

Name: Samuel Cooke

Address: 5267 Lay Rd

E-mail: SamuelCooke@sbcglobal.net

- I can appreciate the issues associated with the stormwater issues in this area and something should definitely be done to mitigate the problem.

- I made the point, during the meeting, that despite the Alternative 4a & 4b (especially 4b) having a better cost it does not include the cost of the damage to the downstream farm that could occur given the water being directed downstream.

**APPENDIX E**

**Zoning Permit Application – 2424 Kathleen St.**

# Letter to the City of Fitchburg

**Disclaimer:**

Joleen Jones and Brian Ast do not hold the city of Fitchburg or its zoning department liable for any future problems that occur because of flooding and for us not conforming to the high water mark of 165.5 feet.

Joleen Jones      5/6/98  
Joleen Jones      Date

Brian Ast      5/6/98  
Brian Ast      Date

BA      Lot #26  
2424 Kathleen Street



CITY OF FITCHBURG  
 PLANNING/ZONING DEPARTMENT  
 2377 S. FISH HATCHERY ROAD  
 FITCHBURG, WI 53711 (608) 275-7141

# ZONING PERMIT APPLICATION

Permit No. 98-037

**Section 1 to be completed by applicant**

JOB ADDRESS (Street Number and Name) <u>2424 Kathleen St</u>		LOT # <u>26</u>	SUBDIVISION <u>First Addition To Hillside Heights</u>
OWNER'S NAME <u>Brian Ast &amp; Joleen Jones</u>		MAILING ADDRESS (Include Zip Code) <u>70 Sunfish Ct, Madison WI 53713</u>	DAYTIME PHONE # <u>(608) 288-1152</u>
CONTRACTOR'S NAME <u>Custom Construction</u>		MAILING ADDRESS (Include Zip Code) <u>8106 Burr Oak Tr Cross Plains, WI 53528</u>	DAYTIME PHONE # <u>(608) 798-4345</u>

PROJECT (Check One)  NEW BUILDING  ADDITION  ALTERATION OR REPAIR TO EXISTING BUILDING  MOVING  DEMOLITION  OTHER \_\_\_\_\_

BUILDING TYPE (Check One)  SINGLE FAMILY  DUPLEX  MULTI-FAMILY  COMMERCIAL/INDUSTRIAL  GARAGE/STORAGE  OTHER \_\_\_\_\_

I, the undersigned, do hereby certify that the above information is correct and agree that in the performance of this work I will be bounded by and submit to all statutes of the State of Wisconsin, conform to all applicable codes and ordinances of the City of Fitchburg and abide by all rules and regulations prescribed by the Zoning Department.

SIGNATURE OF APPLICANT Jamie Zajack DATE 4/24/98

FLOODPLAIN: Yes: \_\_\_\_\_ No:  WATER: Municipal: \_\_\_\_\_ Private:  SANITARY PERMIT NO. X-98-0177

URBAN SERVICE AREA: Yes: \_\_\_\_\_ No:  SEWER: Municipal: \_\_\_\_\_ Private:

C.U.P., REZONING OR VARIANCE PERMIT NO. \_\_\_\_\_ BUILDING PERMIT NO. \_\_\_\_\_

PROPERTY DESCRIPTION:  
Lot 26 First Addition to Hillside Heights  
Town of Fitchburg, Dane County Wis Part of the NW 1/4 Sec 22  
T6N R9E

PARCEL NO. 15-0609-222-2626-2

ZONING DISTRICT Town of Fitchburg LOT AREA (Sq. Ft.) 45,375 REQUIRED SETBACKS: (in feet)

FRONT	REAR	LEFT	RIGHT	OTHER
<u>30'</u>	<u>35'</u>	<u>10'</u>	<u>25'</u>	

APPROVED USE OF BUILDING: Single family ARCH. APPROVAL DATE: \_\_\_\_\_

DATE ISSUED 4-30-98 EXPIRATION DATE 4-30-99 ZONING OFFICIAL [Signature]

PERMIT FEE \_\_\_\_\_

CONDITIONS OF APPROVAL This Permit is Issued Pursuant to the Following Conditions. Failure to Comply May Result in Suspension or Revocation of This Permit or Other Penalty.

- All lot corners must be visible or indicated by stakes.
- Note: See plat map for information on storm water pond height. No exposed building elevation shall be below 165.5' median datum. 163.5' is estimated high water level of pond on or 1 of P10.
- Drive is required to be paved within 1yr of building completion.

SECTION 1

SECTION 2

