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**Babcock Basin-Design Phase**



**Ellen Stevens, Ph.D., P.E., PLLC**

in collaboration with

**GA** **GOSE &  
ASSOCIATES**

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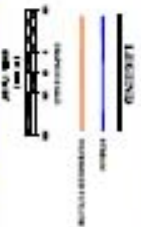
# Stillwater

**LEGEND**

- City Boundary
- Water
- Highway
- Railroad

Scale: 0 to 1 Mile

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**Project requirements and methods for incorporating public values and interest**

- **Focus on a Regional stormwater management solution**
  - **Don't just move the problem downstream**
  - **Use LID where feasible – solve the problem at the source**
  - **Consider acquisition where politically feasible**
- **No Adverse Impact – NAI**
  - **Model both LID and conventional stormwater facilities**
  - **Produce a valid pre- and post-project comparison**

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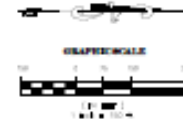
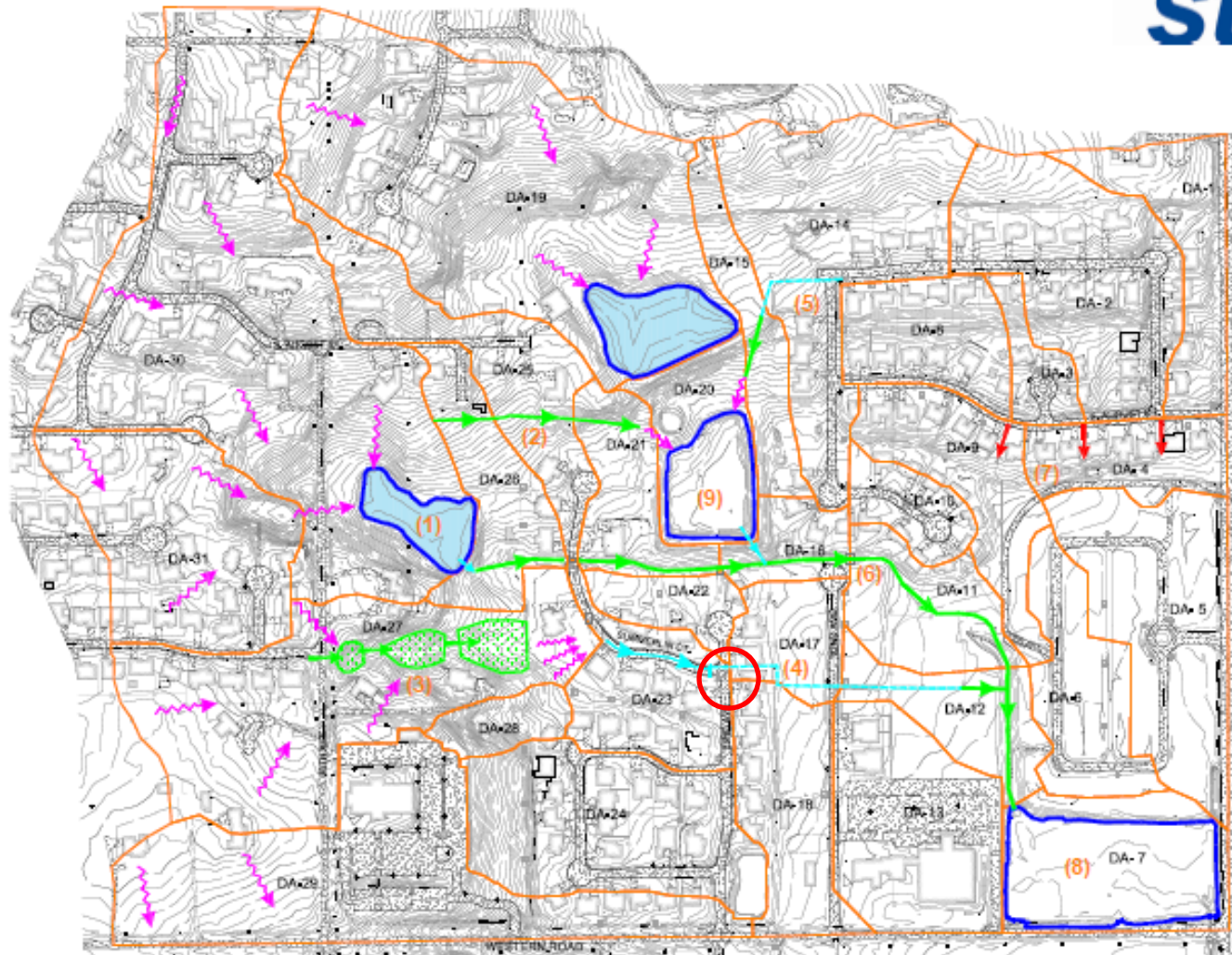
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## **Assessment of the identified problem areas and propose conceptual solutions**

**Solutions were developed to satisfy the following objectives:**

- **Provide safe conveyance to protect homes from flooding and keep roadways safe for travel**
- **Infiltrate or otherwise slow down runoff upstream to reduce the amount of hard infrastructure required downstream**
- **Be implemented with No Adverse Impact**
- **Ideally, two or more alternatives can be developed for each identified area, to allow for selection based on cost, effectiveness in mitigating the problem, and environmental benefits or preserving and restoring the natural and beneficial functions of creeks and riparian areas**





- (1) Pond South of Summerlin Ct.
- (2) Diversion Channel through DA-26 and DA-28
- (3) Bioretention Multiple Basins
- (4) Summerlin Ct. Storm Sewer Grate
- (5) Diversion Channel Through DA-14 and DA-16
- (6) Improve Channel from 23rd to Arbor Village
- (7) Misc. Repairs of channels and flumes
- (8) Enlarge Arbor Village Pond
- (9) Incorporate Existing Detention Facility



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Component 1 Problems: Culvert is undersized and will overtop in relatively frequent events. Overtopping discharge flows east on roadway and flows to intersection of W 23<sup>rd</sup> and Summerlin Ct.

- LID Solution

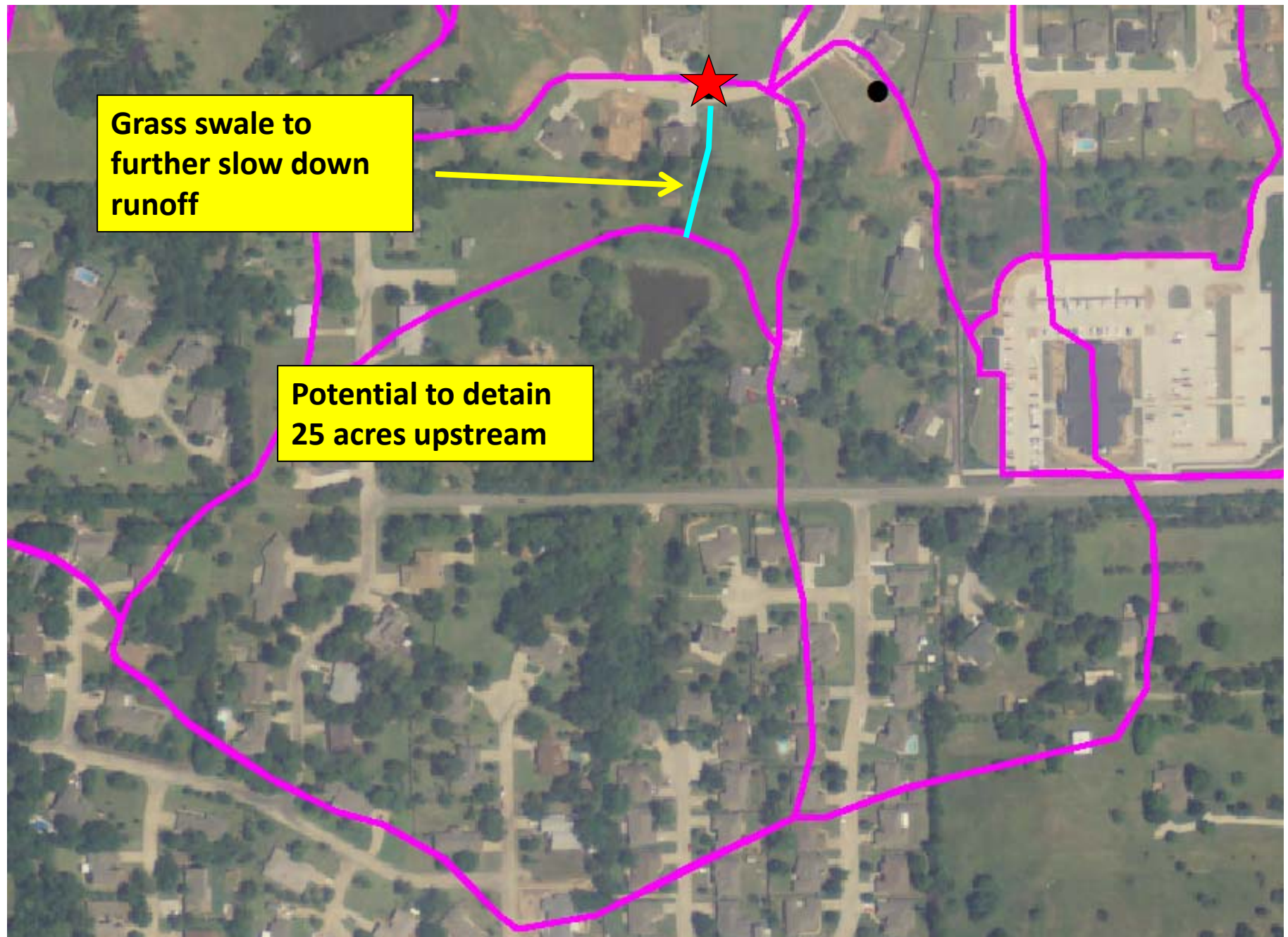
- Convert existing farm pond to wet detention (25 acre DA)
- Grass swale through low area upstream of culvert

- Reduce discharge and sediment load into culvert, then re-evaluate culvert capacity

- Impact

- Reduced discharge in channel to 1/5 of original amount
- Culvert did not have to be replaced





**Component 3 - Bioretention**

Component 3 Problem: Runoff from approx. 13 acres drains to Summerlin, adding to the excess runoff at the intersection of Summerlin and 23<sup>rd</sup>.

○ LID Solution

- Grass swale or enhanced bioswale upstream to reduce runoff
- Buy lot and install landscaping features that promote infiltration

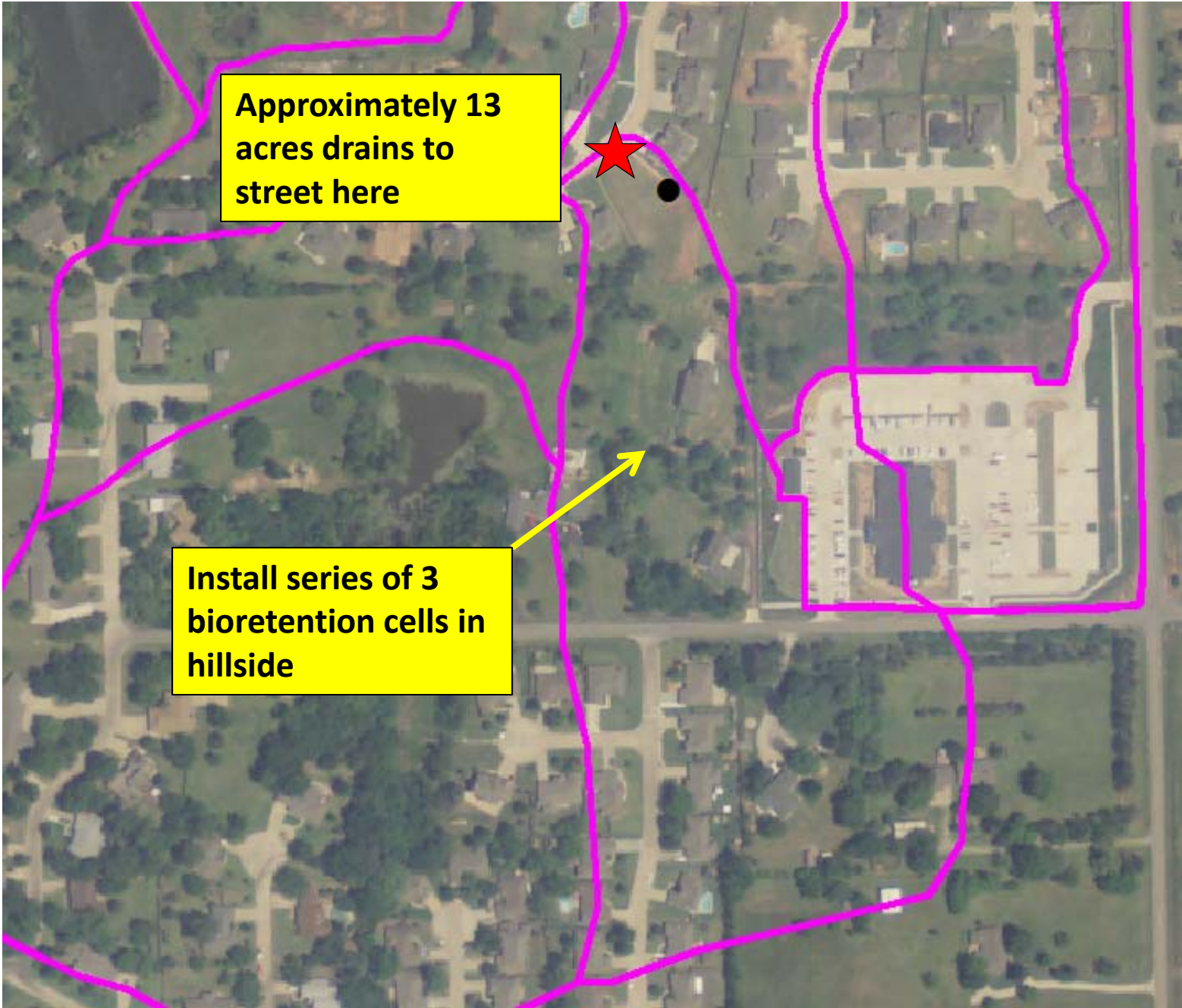
- Reduces flow into easement and street; prevents building of a future home that is likely to be damaged

○ Conventional Solution

- Construct larger concrete channel between lots; may require more easement
- May need storm sewer between lots and W 23<sup>rd</sup>

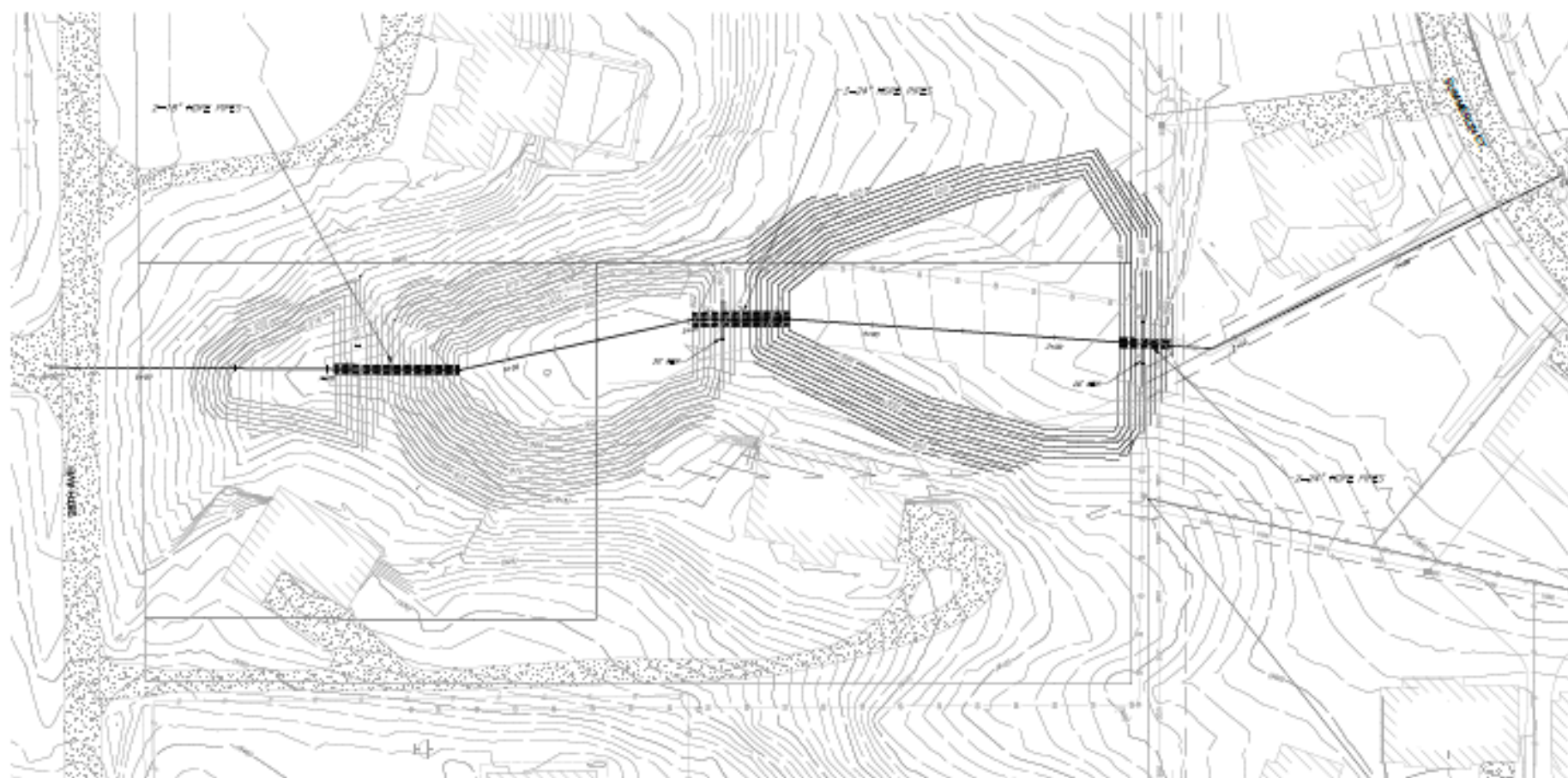
- Very disruptive to street; future home may still be susceptible to damage





**Approximately 13  
acres drains to  
street here**

**Install series of 3  
bioretention cells in  
hillside**



Problem: Runoff going north on Summerlin Ct. to the intersection does not turn the corner and go west to the flume at the end of the cul-de-sac

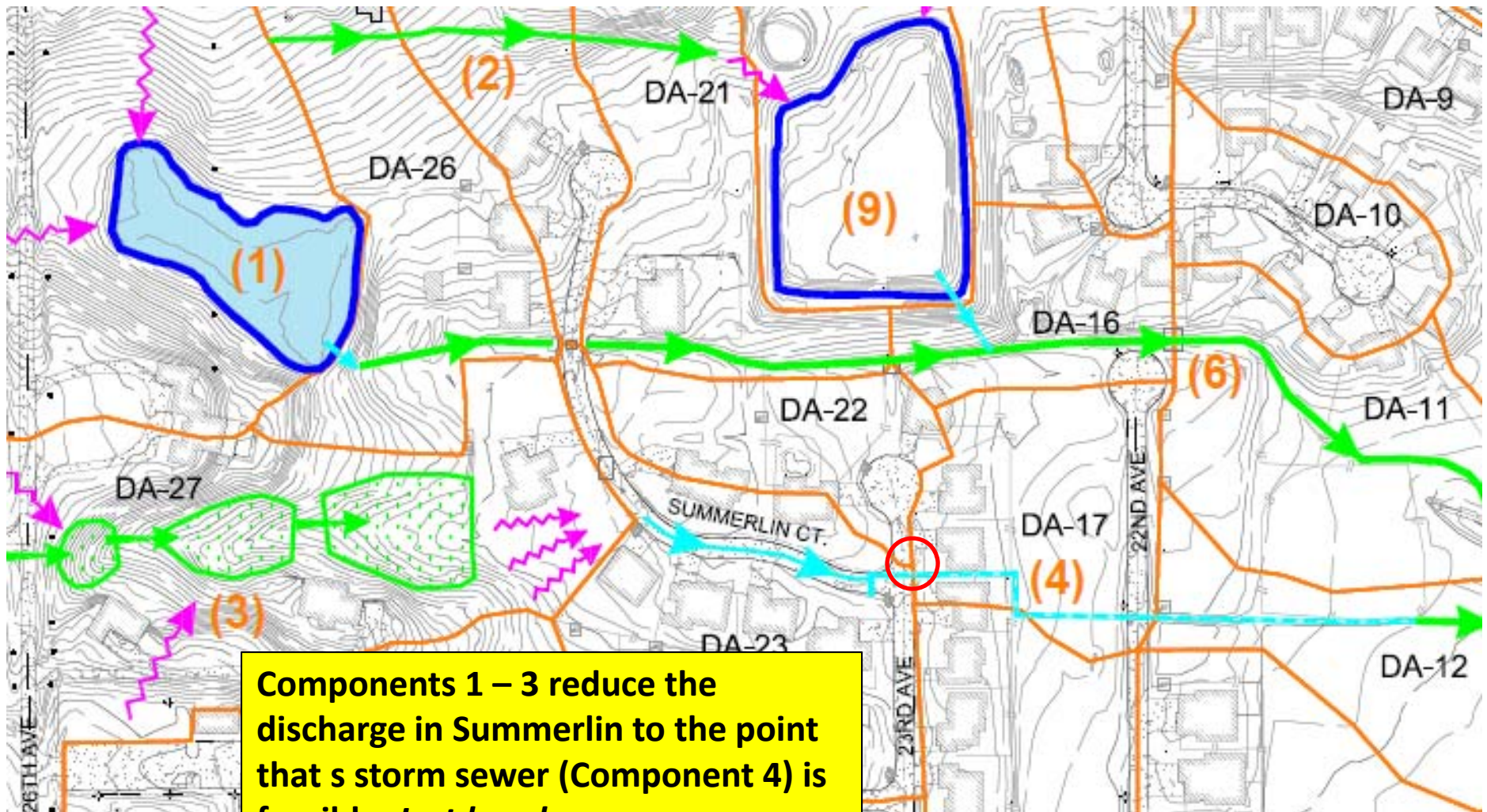
### ○ LID Solution

- Reduce runoff in street from upstream (at source)
- Consider buying out one home to construct open channel to south and west (not likely to be feasible, even if cost-effective)

### ○ What will work

- Components 1, 2, 3 AND
- Construct grates in Summerlin Ct. to intercept runoff and convey in storm sewer to the south of the church
- Also reduces discharge in main channel





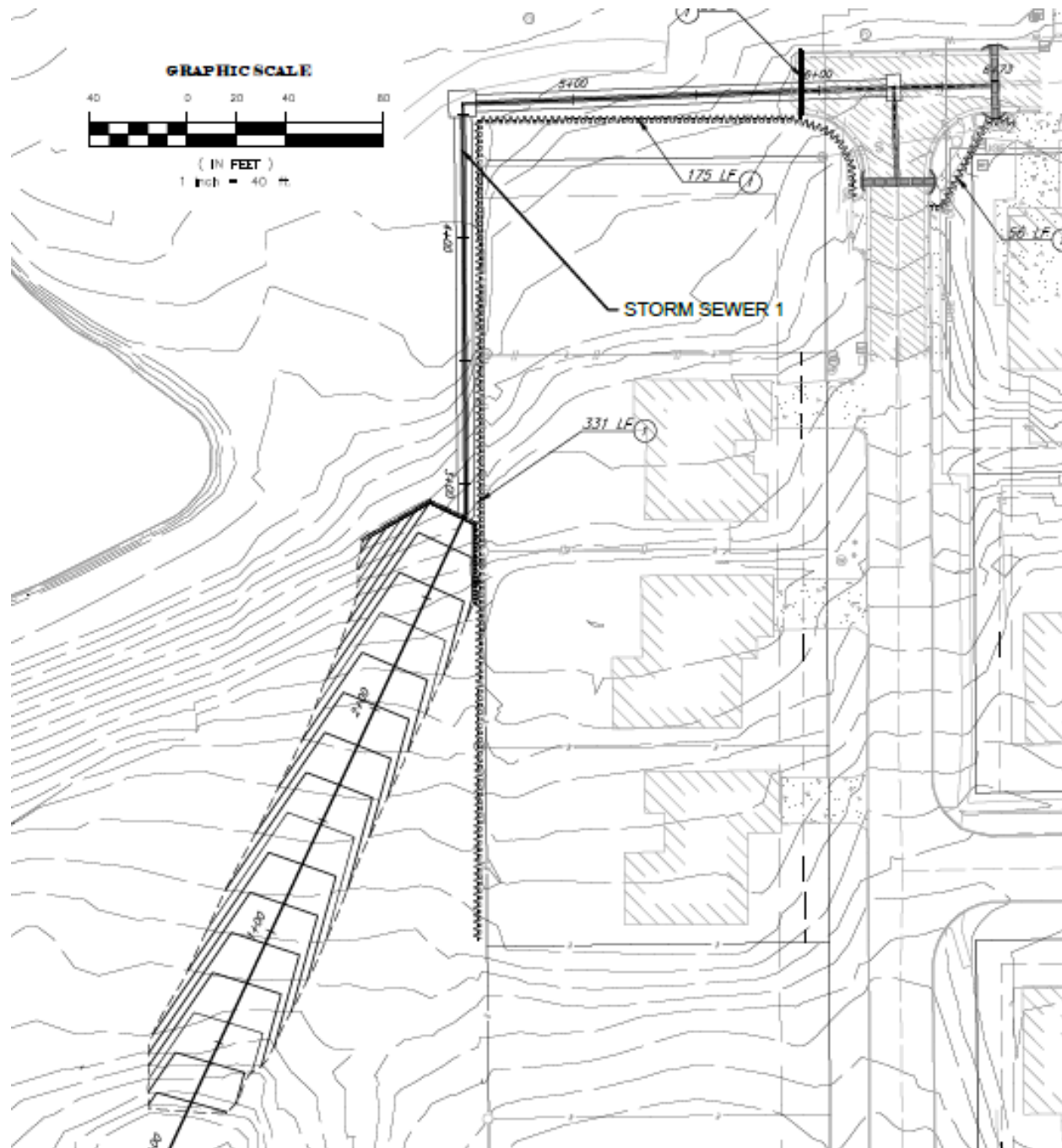
Component 5 Problem: About 10 acres drains to two grates on 22<sup>nd</sup> Ct. There is no overflow flume for any bypass from the grates, so excess runoff could enter homes

### ○ Solution

- Intercept runoff at west end of street and divert to dry detention
- Requires street grates and storm sewer (no way to collect in flumes or curb cuts)
- Reduces discharge so that grates are adequate

### ○ Additional Benefits

- Reduces discharge in main channel
- Contributes to feasibility of keeping main channel a grass channel



**Component 9 – Reduce Discharge on W 22nd**



Component 6 Problem: Main channel is eroding in places, has steep banks in others, and has migrated out of its easement

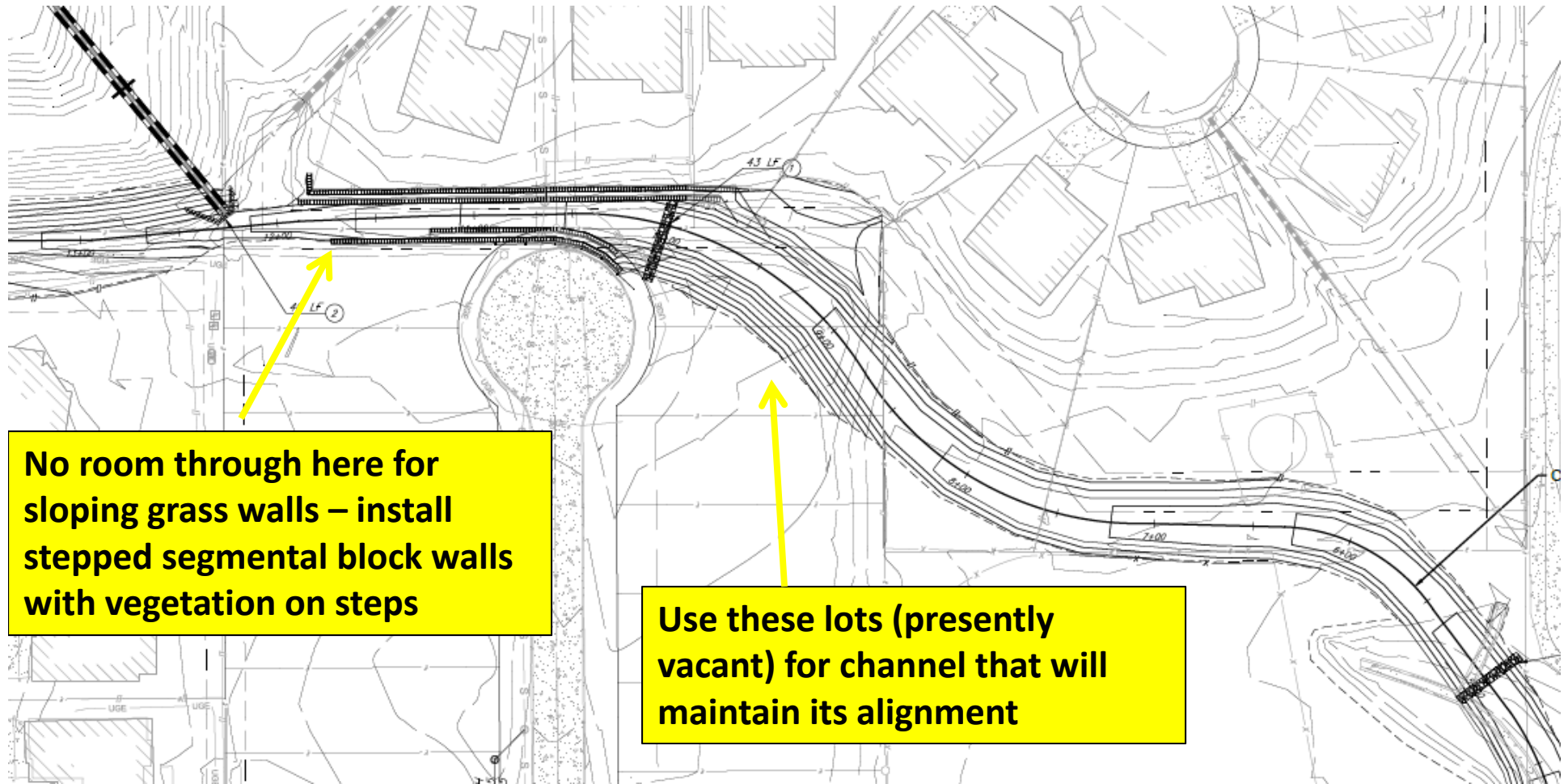
○ Solution

- Grade to create a stable grass channel which can be maintained

○ Components

Contributing to LID

- 1 – reduces discharge
- 2, 5 – diverts runoff to dry detention
- 3 – flood storage in bioretention
- 4 – diverts runoff to north of church, reduces discharge in portion with homes



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## Conclusions

- LID features can be used to decrease runoff at its source
- Some combination of LID and conventional features needed for retrofit
  - Assuming demolishing homes is off the table
- Project reinforces that considering a watershed as a whole is the *best approach* to stormwater management



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THANK YOU



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