

# **Creation of a geospatial school campus boundary layer for Santa Barbara County, California**

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September 26, 2012

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# Presentation Outline

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## Background

Currently, there is no statewide geospatial layer representing school campus boundaries in California. GreenInfo Network has determined that the creation of a polygon layer of school campus boundaries would aid in many different spatial analysis for various clients. This project is a pilot to help identify a process to create a statewide layer and to assess if a school campus boundaries layer would significantly improve spatial analysis results.

Scope: Santa Barbara County, selected because of the manageable size of the data

Megan's Law and the Family Smoking Prevention and Tobacco Control Act have been chosen as use cases to illustrate the importance of using a school campus boundary layer.

- Megan's Law: All registered sex-offenders under California Penal Code 3003.5.(b) are prohibited to reside within 2,000 feet of any public or private school, or park where children regularly gather [1].
- Family Smoking Prevention and Tobacco Control Act: Restricts the advertising of tobacco products to children. The original bill limits any type of outdoor advertising (i.e. retailer window displays) within 1,000 feet of schools or playgrounds. The bill has been challenged by the tobacco industry and has not yet been put into been implemented [2].

## Project Objective

1. Create a geospatial polygon layer of all public primary and secondary school campus boundaries within Santa Barbara County, California
2. Compare the location of geocoded school points to school polygons. Find how many geocoded points are within the polygon. For the school points that are not within the school polygon, calculate the straight-line distance from the point to the polygon edge.
3. Identify sex-offenders in the buffer extents of the school point and in the buffer extent of the school polygon.
4. Identify tobacco retailers in the buffer extents of the school points and in the buffers extents of the school polygons.

# Data

## **School Addresses**

- California Department of Education (CDE) 2011 Data
- available at <http://www.cde.ca.gov/ds/>
- All schools, charters, special education, continuing education
- Status of school : active, pending, merged
- Special ID (CDS code) for each school

## **Santa Barbara County Parcel Polygon Data**

- Acquired from Santa Barbara County, 2011 Data
- Parcel Addresses, Parcel Identification Number (PIN), Ownership, Land use

## **Sex Offender Residence Addresses**

- Santa Barbara County Sheriff Department, no date, updated continuously
- Available at <http://www.sbsheriff.org/offenderwatchdisclaimer.htm>
- Address, Name, Offense

## **Addresses of Retailers with Tobacco Licenses**

- California State Board of Equalization, regulate licenses
- Available by request

# Research Approach

## Create school point layer

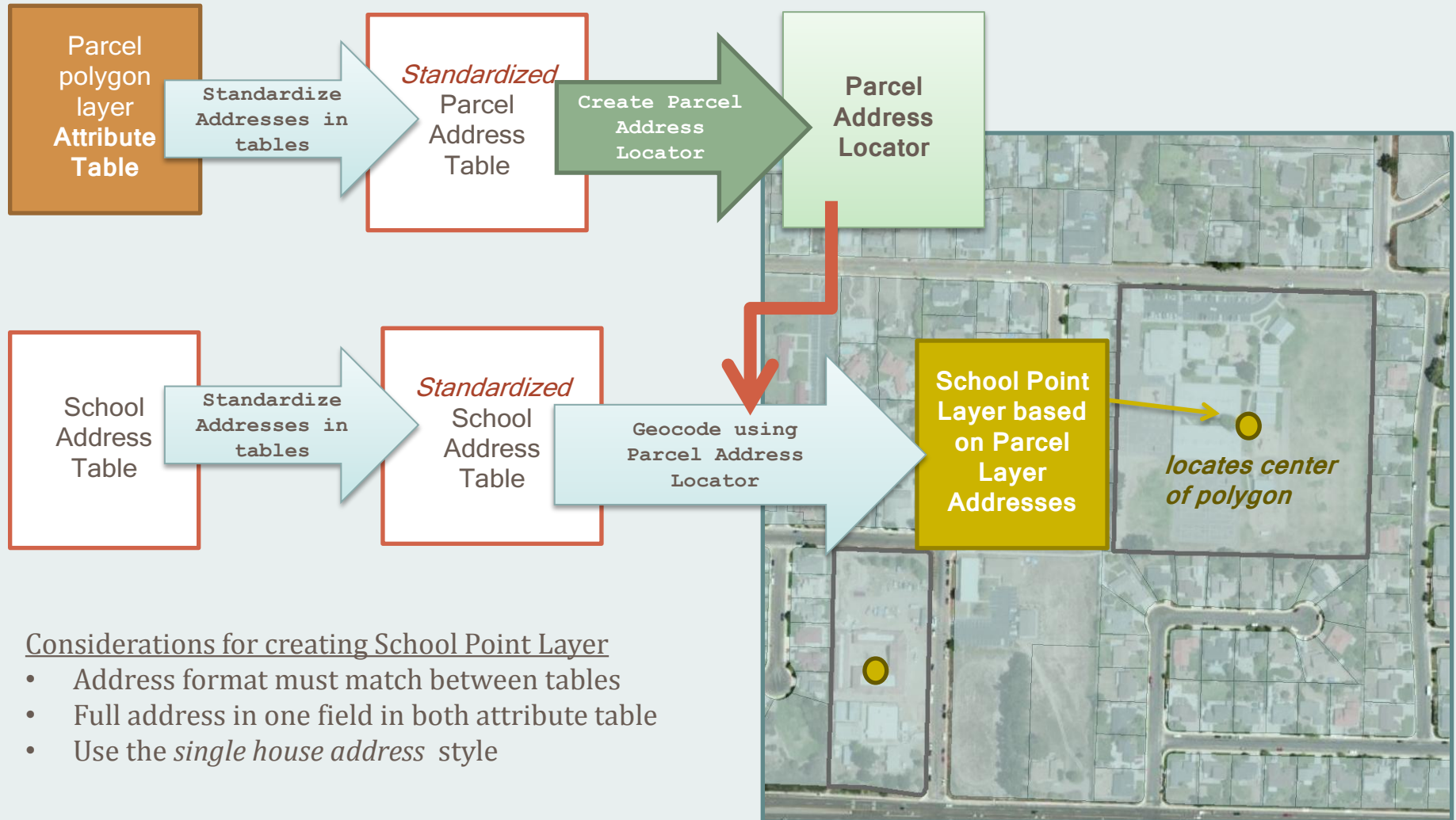
1. Geocode school addresses using ArcGIS 10 US Streets Geocode Service



# Research Approach

## Create polygon layer, part I

Geocode school addresses to parcel polygons



### Considerations for creating School Point Layer

- Address format must match between tables
- Full address in one field in both attribute table
- Use the *single house address* style

# Research Approach

## Create polygon layer, part II

Locate school parcel polygons & create school polygon layer

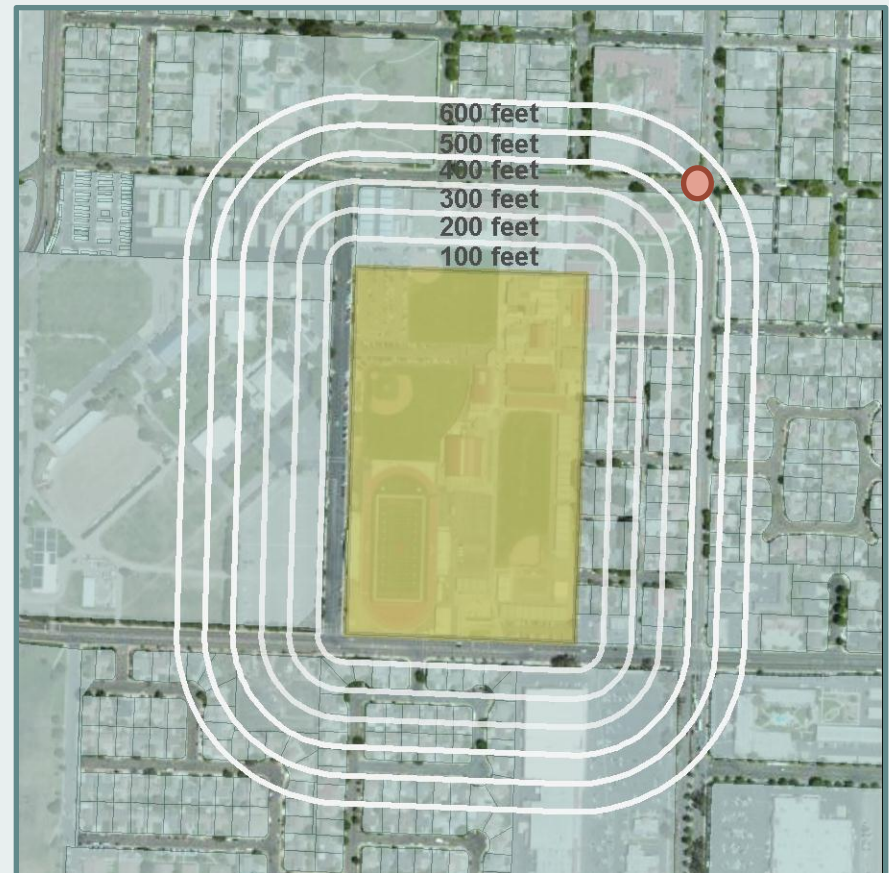




# Research Approach

## Compare the location of geocoded school points to the school polygons

1. Identify all school points within school polygons using select by location
2. Calculate the straight-line distance between remaining points and polygon edge
  - Create concentric buffers in 100 feet intervals around the polygon
  - Identify school points corresponding with each buffer



# Research Approach

## **Identify sex-offenders and tobacco retailers within buffer extents of school polygons and school points**

### *Sex-offenders*

- Identify sex-offenders within 2,000 feet of school polygon & 2,000 feet of school point
- Identify sex-offenders that are within 2,000 feet of the school polygon but not within 2,000 feet of the school point
- Identify sex-offenders that are within 2,000 feet of the school point but not within 2,000 feet of the school polygon

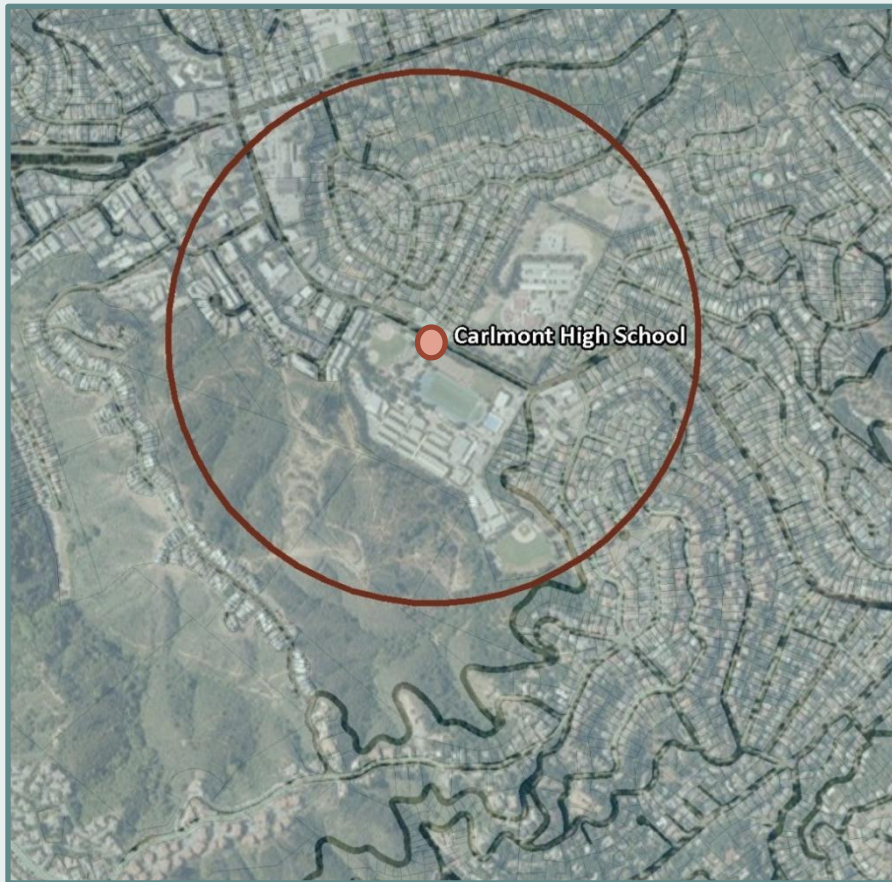
### *Tobacco retailers*

- Identify tobacco retailers within 1,000 feet of school polygon & 1,000 feet of school point
- Identify tobacco retailers that are within 1,000 feet of the school polygon but not within 1,000 feet of the school point
- Identify tobacco retailers that are within 1,000 feet of the school point but not within 1,000 feet of the school polygon

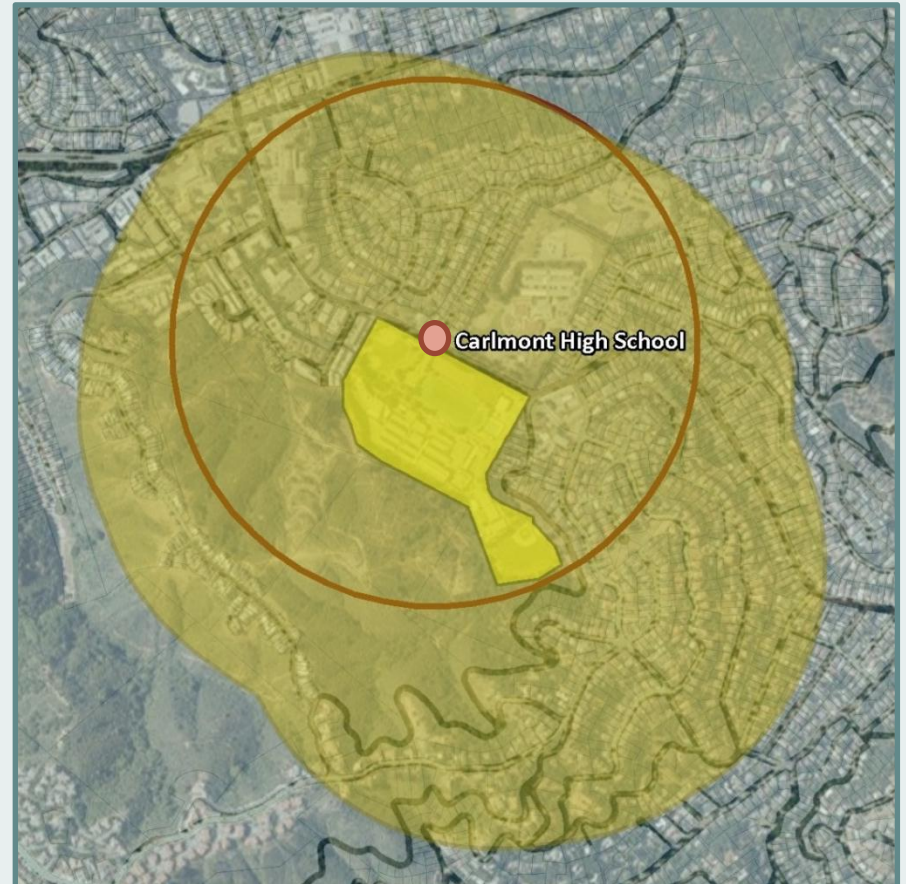
## Example

### Buffer extents of school point and school polygon

*2,000 foot buffer applied to school point*



*2,000 foot buffer applied to the school polygon*



# Anticipated Results

## **Street Geocoding of school address to create school point layer**

1. High match-rate, spatial accuracy not suitable for intended use case analysis
2. Easy to use, quickly creates layer of school points

## **Creating school polygons based on the parcel polygon**

1. Creating custom address locator is cumbersome, need to standardize addresses
2. Low-match rate, high accuracy in location
3. Creating actual school polygon layer will be labor intensive

## **Comparison of location of geocoded school points to the school polygons**

1. Very few, if any, school points will be in the school polygon
2. Not really sure what type of distances I will find from the school point to the polygon edge

## **Number of sex-offenders and tobacco retailers identified in the buffer extents**

1. Most likely, there will be more tobacco retailers and sex-offenders identified in the buffer extents of the school polygons than in the buffer extent of the school point.
2. Not really sure to what degree this will be



# Why do School Campus Boundaries Matter?

## *Journal Articles that support the need of an accurate school campus polygon layer*

- Zandbergen found that ‘typical street geocoding is insufficient for fine-scale analysis and more accurate alternatives need to be considered’ in a study looking at the exposure of air pollutants from high use roads to school children [3].
- Research has also suggested that the use of street geocoding is not appropriate for the implications of criminal justice policies concerning the residency restrictions of sex-offenders [4]

## *Other potential uses of a school campus polygon layer*

- California Department of Public Health has been looking at the potential of pesticide exposure to school children. The school polygon layer could be used for environmental health studies to identify potential risk to school children.
- Organizations interested in open space or joint use of school land could use the school campus polygon layer to assess a school campus’ open space.
- School facilities managers have shown an interest in a school polygon layer to help ‘house’ school buildings attribute data.

# Timeline

## October

- Create the school point & polygon layers, buffer layers
- Geocode sex-offenders addresses
- Geocode tobacco retailer addresses
- Identify sex-offenders and tobacco retailers within buffer extents
- Locate all points within polygons, calculate distances from point to polygon edge

## November

- Synthesize findings
- Write report

## December 4, 2012

- Present at San Francisco Bay Area GIS Users Group, Berkley California

## References

- [1] - CAL PENAL Code § 3003.5.(b)(2012) – California law restricting sex-offenders residency locations
- [2] - H.R. 1256 (111th)(2012): Family Smoking Prevention and Tobacco Control Act
- [3] - Zandbergen, P. A., & Green, J. W. (2007). Error and bias in determining exposure potential of children at school locations using proximity-based GIS techniques. *Environmental Health Perspectives*, vol. 115 (no. 9), pp. 1363-1370. Brogen and Partners.
- [4] – Zandbergen, P.A., Hart, T.C. (2008). Geocoding Accuracy Considerations in Determining Residency Restrictions for Sex Offenders. *Criminal Justice Policy Review*, vol. 20 (no. 1), pp. 62-90. Sage Publications