

## DATA COLLECTION

### *AutoCAD and GIS*

The City's AutoCAD and GIS data were missing a large quantity of information critical to accurately modeling the storm drain system. Routinely encountered examples include:

- missing pipe sizes;
- no manhole indicated where two pipes join;
- catch-basins represented as manholes;
- sections of the system not drawn into the plans;
- rim and/or invert elevations missing from all manholes and catch-basins (nodes);
- assumed pipe slopes missing on 54 percent of pipes; and
- all outfall elevations missing

Schaaf & Wheeler found that much of the storm drain data in AutoCAD were either not included or un-attributed. The City's GIS has 2,289 pipes and 2,247 nodes (manholes, catch basins and outfalls). All nodes were lacking rim and invert elevations. Only two of the 2,289 pipe links did not have diameter information and 1,240 did not include slope information. It was noted that pipes with no diameter in the City's AutoCAD were assigned a 12-inch diameter, by the City, in the GIS. In some cases this 12-inch size is incorrect. The previously described topographic data was used to assign rim elevations to all nodes in order to create a consistent source of surface elevations.

### *Historical Data and As-Built*

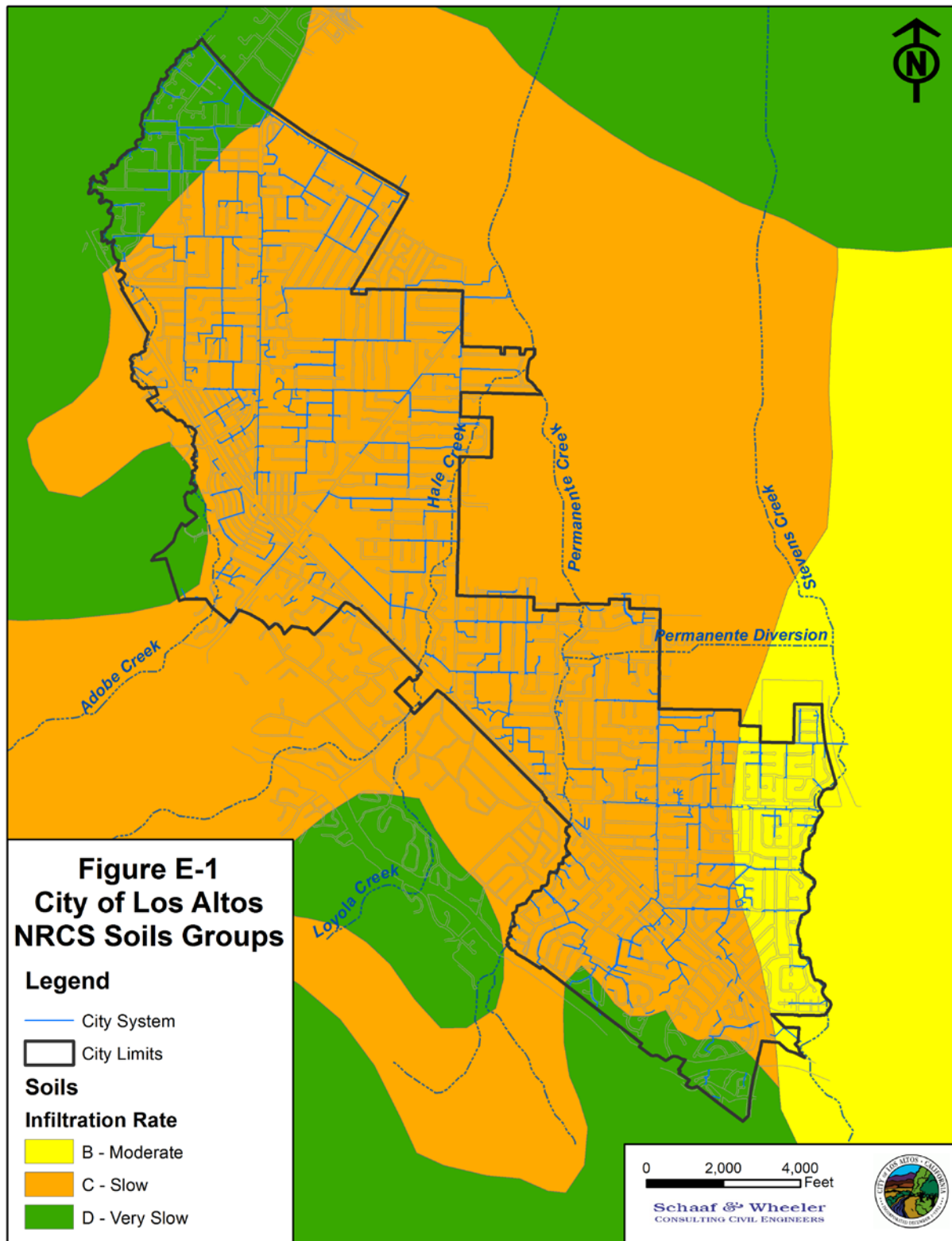
A hard copy of the 1966 SDMP was also reviewed for relevant data. As-built information from Caltrans and Santa Clara County for Highway 280, El Camino Real and Foothill Expressway was reviewed for storm drainage data. The City's as-built and improvement plans were reference for data. A key data source is the *City of Los Altos Storm Drainage Assessment District - Prj 1967-11, "As-built 3/11/1969."*

### *Field Measurements*

Schaaf & Wheeler conducted selective field research to verify pipe sizes, layouts, and to measure invert depths.

### *Soils*

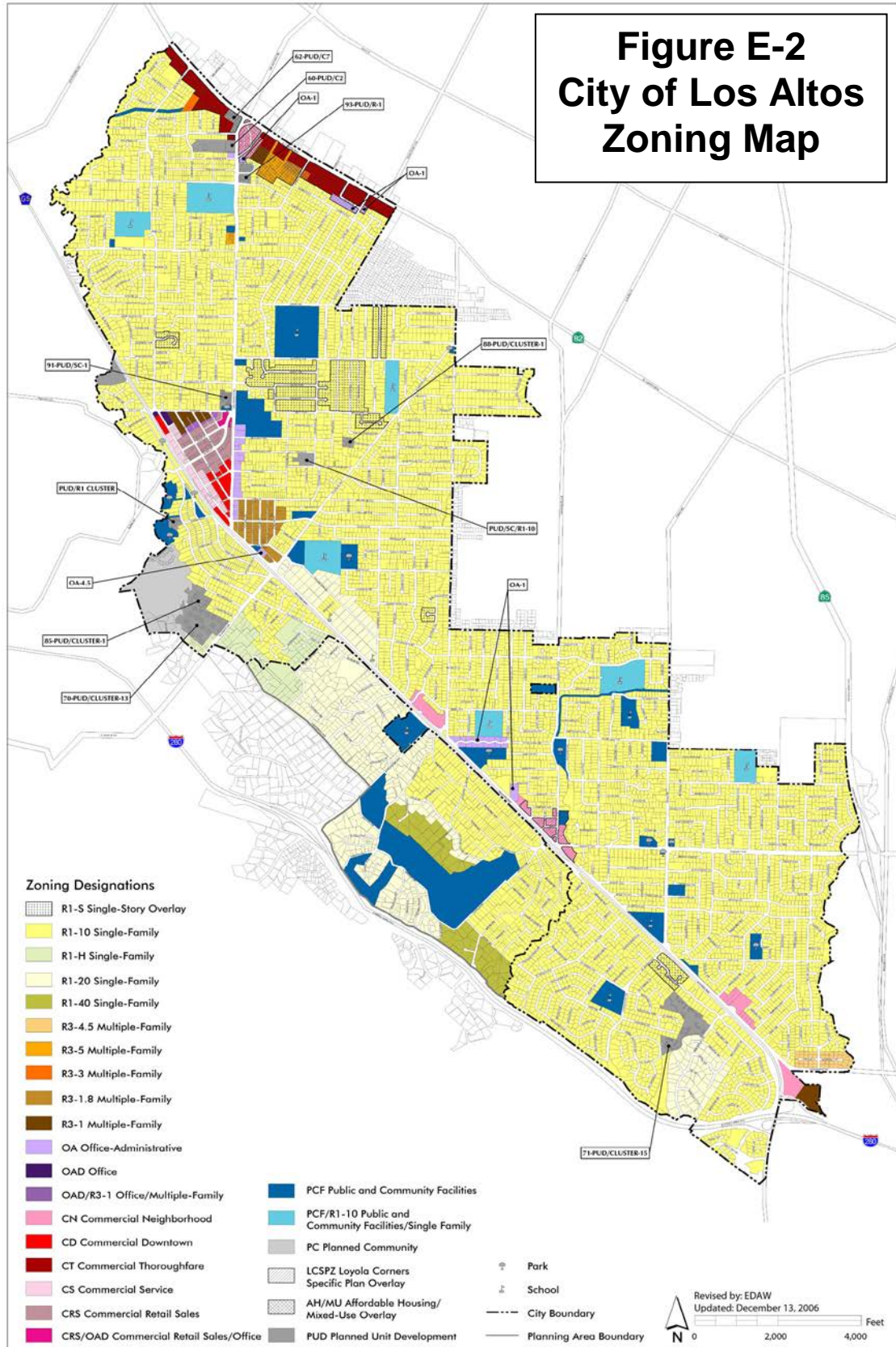
Figure E-1 shows the NRCS classification of the soils within the City of Los Altos.

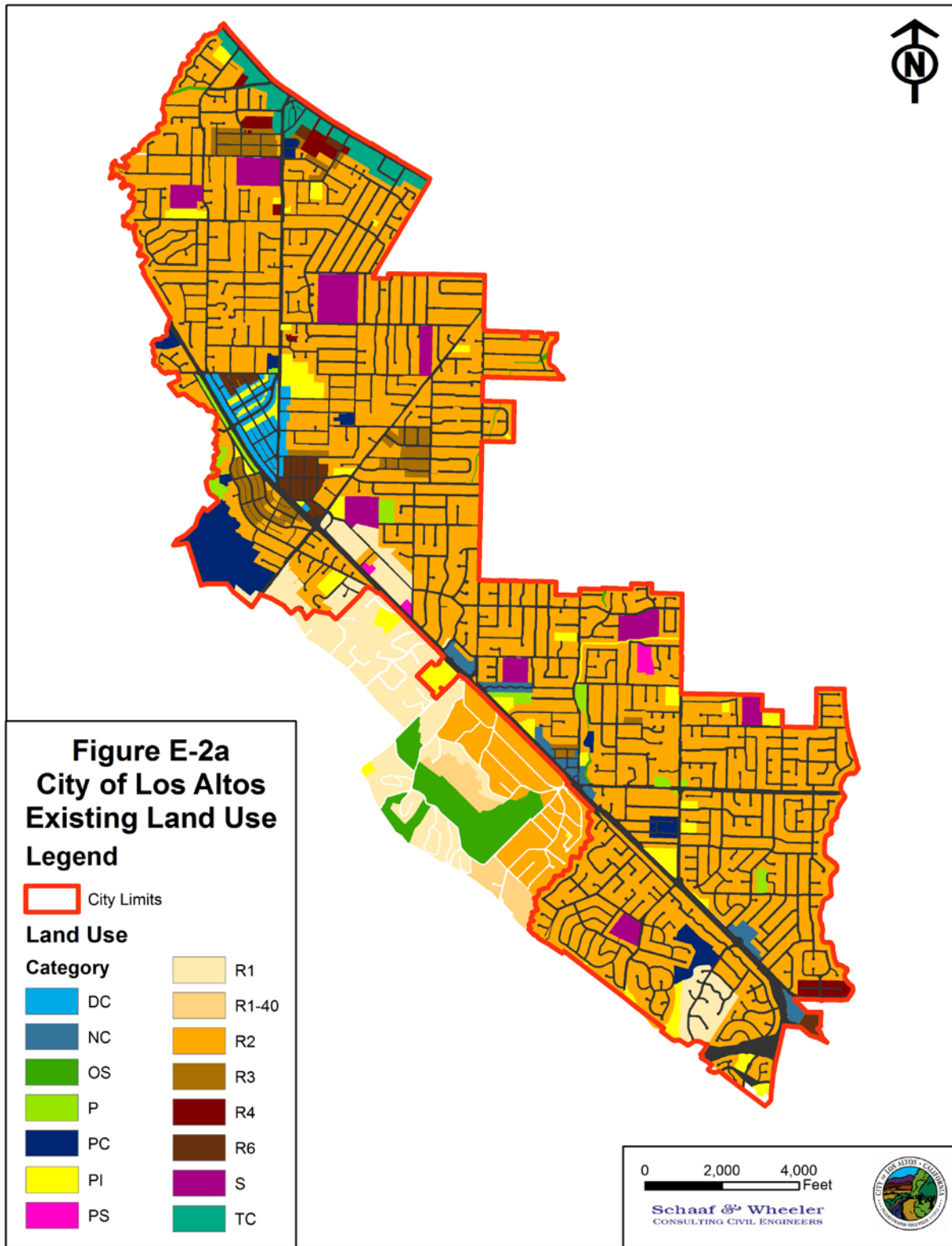


### *Land Use*

Although open space is scattered throughout the City, the vast majority of Los Altos has been urbanized. The *2002 City of Los Altos General Plan* sets the City's development policies for the period 2002-2020. The City's zoning information was made available to Schaaf & Wheeler in graphical and GIS formats. Figure E-2 is the effective City Zoning Map and Figure E-2a is the effective Land Use map. The City's parcel GIS data, which includes zoning and land use attributes, was used to determine runoff characteristics. Each land use type is assigned a runoff curve number that varies with land use and soil type, as set forth in the Santa Clara County Hydrology Manual.

The hydrologic methodology used for the City's Storm Drain Master Plan (SDMP) is consistent with the County Drainage Manual. Rainfall runoff is determined by soil type, CN, and percent impervious. Infiltration losses are based on CN and only applied to pervious surfaces. Soils classification is based on hydraulic soil group (A, B, C or D); this data is produced by the National Resource Conservation Service (NRCDs) and available in GIS format from the Santa Clara Valley Water District (SCVWD). Figure E-3 illustrates the soil groups in the City of Los Altos. Because Los Altos has a number of residential neighborhoods without sidewalks or curb and gutter, land use CN values are adjusted to incorporate the increased impervious area by assuming 15% of the street right-of-way (ROW) is pervious with CN values representing poor quality open space. These CN values are associated with low vegetation that may not be well maintained, gravel, and bare dirt.

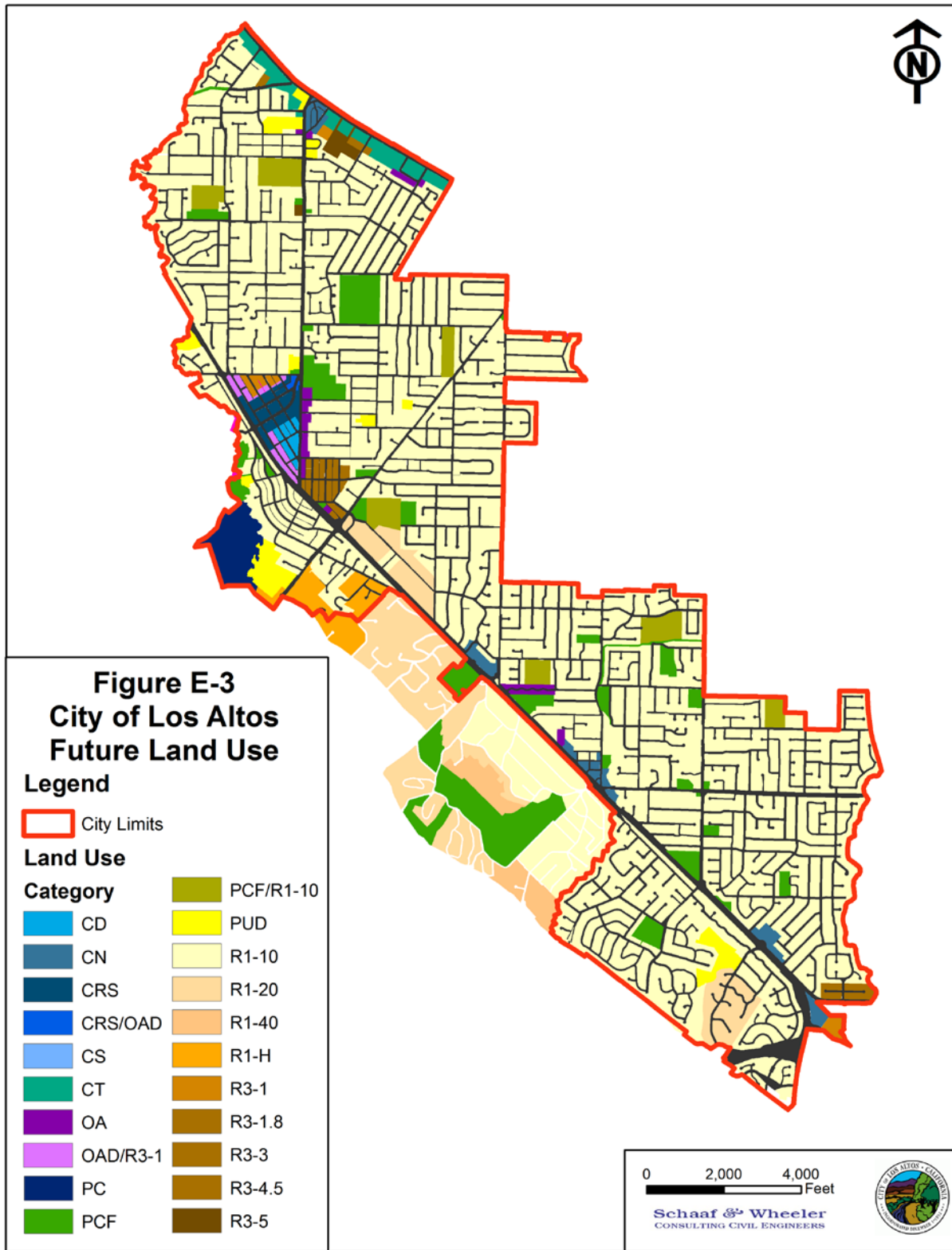




Because the City of Los Altos is mostly built out, there is little potential for large development within the City's limits; however there is potential for redevelopment and other land use changes that could affect runoff. Schaaf & Wheeler analyzed the changes in CN and imperviousness based on the City's parcel GIS. This data includes current land use attributes as well as zoning. We assumed zoning represents future land uses. Figure E-3 illustrates the future land use patterns. Based on the City's GIS, zoned land uses in Los Altos are roughly 71% residential, 3% office and commercial, 5% public facilities and, 21% street ROW. Table E-1 contains the percent impervious and CN values for each zoning category.

**Table E-1. Zoning SCS Curve Numbers and Percent Impervious**

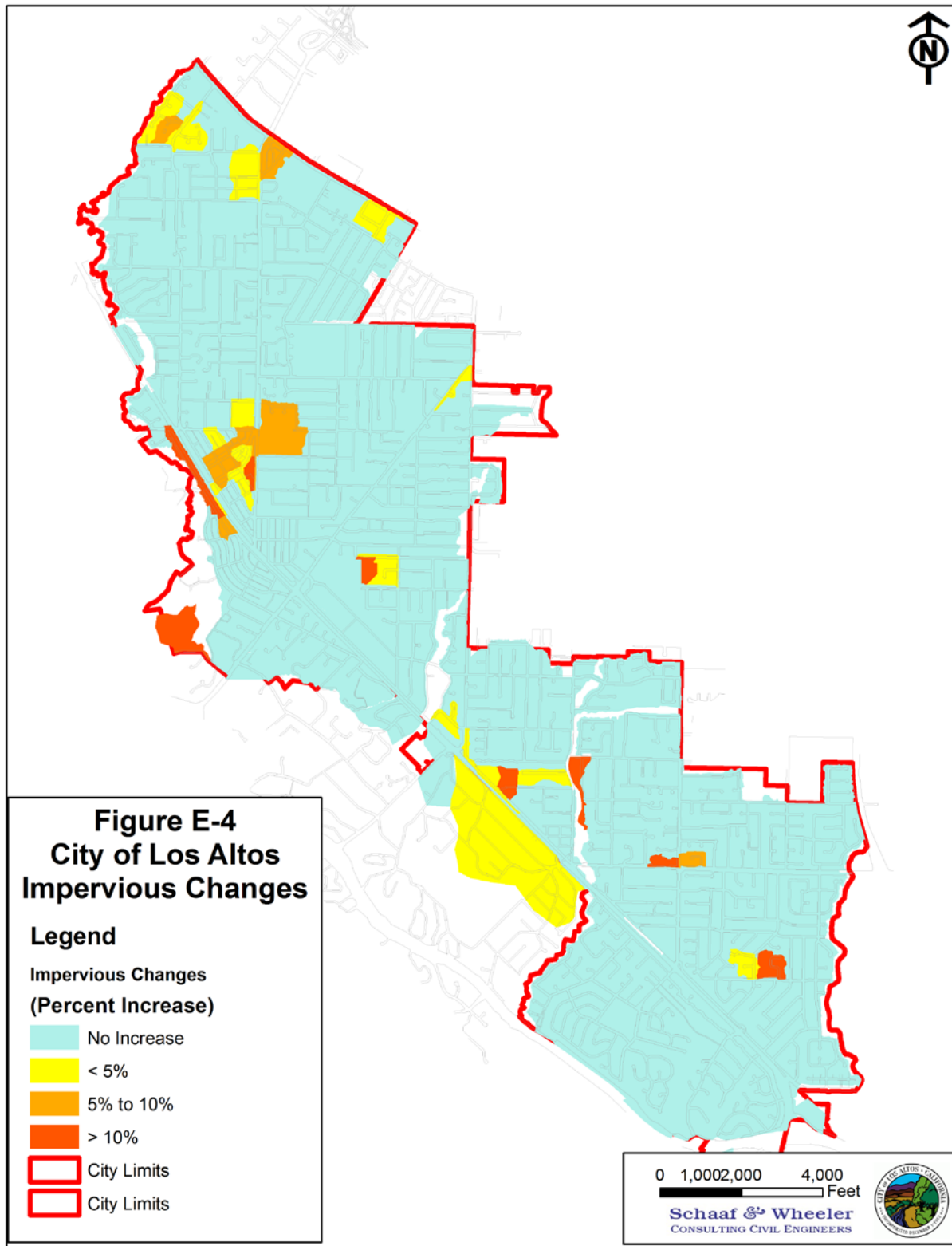
LAND USE CATEGORY	Percent Impervious	Hydrologic Condition	Soil Group B	Soil Group C	Soil Group D
Single Story Overlay (R1-S)	40%	Fair	58	71	74
Single Family (R1-10)	50%	Fair	58	71	74
Single Family (R1-H)	50%	Fair	58	71	74
Single Family (R1-20)	40%	Fair	58	71	74
Single Family (R1-40)	40%	Fair	58	71	74
Multiple-Family (R3-4.5)	50%	Fair	58	71	74
Multiple-Family (R3-5)	50%	Fair	58	71	74
Multiple-Family (R3-3)	50%	Fair	58	71	74
Multiple-Family (R3-1.8)	60%	Fair	58	71	74
Multiple-Family (R3-1)	60%	Fair	58	71	74
Office-Administrative (OA)	90%	Fair	58	71	74
Office/Multiple-Family (OAD/R3-1)	90%	Fair	58	71	74
Commercial Neighborhood (CN)	95%	Fair	58	71	74
Commercial Downtown (CD)	95%	Fair	58	71	74
Commercial Thoroughfare (CT)	95%	Fair	58	71	74
Commercial Service (CS)	95%	Fair	58	71	74
Commercial Retail Sales (CRS)	95%	Fair	58	71	74
Commercial Retail Sales/Office (CRS/OAD)	95%	Fair	58	71	74
Public and Community Facilities (PCF)	95%	Fair	58	71	74
Public and Community Facilities/Single (PCF/R1-10)	50%	Fair	58	71	74
Planned Community (PC)	50%	Fair	58	71	74
Planned Unit Development (PUD)	50%	Fair	58	71	74
Streets (TR)	85%	Poor	68	78	79



Changes in land use could impact the Curve Number or watershed imperviousness, thereby changing the response to a given storm event. Because this hydrologic methodology only applies the Curve Number within the pervious areas, and there are no changes to the parameters affecting the pervious Curve Numbers (soil type and hydrologic condition), changing land use would only cause very slight changes to weighted Curve Numbers based on the small changes in impervious area. While these very small changes are accounted for in the hydrologic models, they are not worth depicting graphically.

The major land use change potentially affecting storm runoff is an increase in impervious area. Figure E-4 shows the potential changes in imperviousness of each sub-watershed in the City. There are some areas of the City where the impervious percentage for land use is higher than zoning values. Our analysis assumes only increases in imperviousness will occur with land use changes. The current zoning adds 900,000 square feet of impervious surface, which is approximately 0.5-percent of the City. A majority of this area is from parks and open space with low existing land use percent impervious but zoned as Public and Community Facilities with a high impervious potential. We do note that Mr. Zach Dahl with the City Planning Department indicates there are no current plans to change any existing parks or open spaces to buildings or parking lots. The proposed improvements for the City's Civic Center were analyzed and shows the percent impervious changing from 64 percent to 71-percent impervious.

GIS comparisons show potential land use changes within the City of Los Altos are minimal. The SWMM models are used to determine if there are any significant impacts from these changes to the storm drainage system in the form of increased storm runoff. It is important to note that runoff is not necessarily directly proportional to the percentage of impervious surfaces. For example, a 10 percent increase in impervious surface does not necessarily equate to a 10 percent increase in storm runoff.



### ***FEMA and SCVWD Data***

The Santa Clara Valley Water District's (SCVWD) GIS, which includes creek centerlines, watershed delineations and 1-foot contour topography, was also referenced in this study. FEMA reports were referenced for creek water surface levels.

### ***Operations and Maintenance***

The City's Operations and Maintenance (O&M) section provided numerous documents, logs and worksheets including:

- FY08-09 Completed Outfall Inspection
- FY08-09 Training Log 07/-01/08 to 06/30/09
- FY09-10 Adopted Budget Dept Enterprise Funds SWMP
- FY09-10 Adopted Budget Maintenance Services SWMP
- General Fund Equipment FY08-09 SWMP
- Heavy Leaf Pickup 2008
- Rainy Day Troublespot List, Reviewed 09/01/05
- Storm Area Logs 2003-current
- Storm Drain Inlet and Outfall Inspection and Cleaning N6 J6
- Storm Drain Inlet Insp and Cleaning 2008-2009 A1 J6
- Storm Drainage Practices Survey – 04/26/06
- Street Sweeping Schedule FY2009-2010
- Streets and Roads O&M SCCURPP 2004
- Storm worksheet 2003-2004
- Urban Runoff Management Program Annual Report FY 2008-2009

### ***Financial***

Financial data being collected includes:

- Fiscal Year 2009/2010 Adopted Operating Budget (with notes and ancillary schedules)
- Fiscal Year 2009-2013 Adopted Capital Improvement Program (with notes and ancillary schedules)
- Fiscal Year 2008/2009 Comprehensive Annual Financial Report (with notes and ancillary schedules)
- Fiscal Year 2009/2010 Trial Balance (with year-to-date selection to be determined at point of collection)
- Fiscal Year 2009/2010 payroll data for select personnel
- Fiscal Year 2009/2010 overhead cost allocation plan
- Fiscal Year 2008/2009 Fixed Asset Report/Depreciation Schedule
- Time Studies for select activities and personnel

### ***Data Quality***

It is not known how many pipe diameters are incorrect. The City's GIS is missing 55% of pipe slopes (Figure E-5). There are no invert or rim elevations in the City's GIS database due to funding restraints. Also, portions of the 1966 SDMP data do not match as-built plans obtained from the City.

### ***Storm Drain Tie-Ins***

Figure E-6 illustrates the connections between the City of Los Altos' storm drainage network and surrounding communities. Legal agreements between the communities were researched by Schaaf & Wheeler. City of Mountain View is not aware of any existing agreements. Per a March 22, 2010 email from Jacqueline Andrews Solomon, City of Mountain View's Deputy Public Works Director, "There are not any agreements between the two cities that the folks here who would know (Bob Kagiya and David Serge) know of."

