

At Risk: The Bay Area Greenbelt

2017 METHODOLOGY



Photo: Cait Hutnik, Coyote Ridge between southern San Jose and Morgan Hill in Santa Clara County.

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At Risk 2017 Methodology released by Greenbelt Alliance on January 31, 2017.

[At Risk: The Bay Area Greenbelt 2017 Report](#)

[At Risk 2017 GIS Data](#)

FEEDBACK / QUESTIONS?

Please direct questions and comments regarding At Risk research to Adam Garcia, agarcia@greenbelt.org.

INTRODUCTION & PURPOSE

The greenbelt lands surrounding the Bay Area provide the region much of its vitality and identity. Greenbelt Alliance exists, in part, because sprawl development tends to be invisible until it's too late to stop. General plans, specific plans, and development proposals may go through the proper channels—but for most people, the first sign of planned development is a bulldozer leveling a hill, or a billboard popping up in an orchard. By then, it's hard to stop. Not all developments should be stopped, but many developments planned for natural areas and farmland would be better for residents and the environment if they were built in existing cities and towns. For these reasons, Greenbelt Alliance acts as a watchdog. The At Risk research seeks to evaluate the 3.6 million acres of open space land surrounding San Francisco Bay Area cities and alerts the Bay Area to threats that may have gone unseen, until now.

Preparing this report is a massive undertaking, and it represents a snapshot in time. Greenbelt Alliance releases a new “At Risk” report roughly every five years: this report is the product of a comprehensive review of the state of the region in 2016, for release in 2017. To create this report, Greenbelt Alliance performs a detailed mapping analysis using Geographic Information Systems (GIS) software, ArcGIS, to addresses three topics: development pressure, policy protection, and natural values.

The At Risk analysis evaluates development pressure factors on open space surrounding the region's cities, policy protection measures to protect or minimize impact to the land, and the interweaving natural and agricultural values and benefits that tell the story of these Bay Area greenbelt landscapes. This research models the cumulative strength of natural value policy protection measures against the overlapping development pressure factors to derive an At Risk score that approximates the likelihood of urban development for a given area. This land development assessment is then reported in time horizons. Land at high risk is likely to be developed within 10 years; land at medium risk is likely to be developed within 30 years, and low risk land as unlikely to develop in the next 30 years.

Additionally, the project gathers and evaluates spatial data from the best available research to understand where vital lands provide clean water, food, and wildlife habitat supporting healthy ecosystems. Comparing this natural value data against the At Risk results provides a plausible estimate of the potential loss of these ecosystem service benefits and values.

STUDY AREA

The At Risk analysis focuses on San Francisco Bay Area greenbelt lands outside of the continuous urbanized areas, defined by land developed at densities of more than one building per 1½ acres in accordance with the California Department of Conservation or lands unbuilt but in the process of grading the land for development. The research covers eight of the Bay Area counties, excluding San Francisco, since its land is either developed or protected as parks. The 2017 policy protection analysis limited the review of city policies to only those cities adjacent to large tracts of unprotected open space; cities with no place to expand because they are bordered by other jurisdictions or by protected lands were excluded.

SOFTWARE REQUIREMENTS

In order to process the complete set of At Risk data layers, ArcGIS version 9.3 with Spatial Analyst or equivalent mapping program (QGIS) are required. Common mapping processes utilized include geo-referencing planning images, creating new features, multiple layer unions, field dissolves, and slope and elevation measurements.

METHODS: HOW WE FIND WHAT'S AT RISK

DEVELOPMENT PRESSURE

To amass the information needed to assess development pressures, we review all city and county general plans and zoning, as well as other local ordinances. We also review city and county websites and local news for development proposals, talk with local advocates, and use our staff's local knowledge to get as comprehensive a picture as possible of all proposals and plans, both past and present. Multiple past proposals for a given area can be an indication of future risk.

Growth projections from the state and the region's Plan Bay Area also feed into our analysis. In 2016, regional housing opportunity sites became available as parcel data; this has given us better information—and made it clear that more land is at risk, especially in unincorporated areas, based on maps created by counties like Solano and San Mateo.

AT RISK FOCUS: THE URBAN THRESHOLD

- This analysis is focused on the near and long term spatial factors that lead towards urbanization.
- The state of California defines urban or “developed” as density of greater than one building unit per 1½ acres.

Boundaries are key for determining where development is likely to go. We gather information on city limits, growth boundaries, urban service areas, spheres of influence, and longer-term planning areas, largely from jurisdictions' general plans and Local Area Formation Commission (LAFCo) websites, which oversee these boundaries. We also factor in natural boundaries and the geography of the landscape, such as proximity to roads or existing development, as well as slope—flat land is generally at greater risk.

POLICY PROTECTION

For policy protections, we look at city and county plans, ballot measures, and ordinance listings to find hillside, riparian, watershed, habitat, and agricultural policies. We use regional, state and federal protected lands databases to find parks and conservation easements, map out voter-approved and other jurisdictional measures protecting natural and agricultural values, and include coastal and bay land data from regional and state agencies to encompass shoreline protections. Greenbelt lands are covered by policy measures that vary in their efficacy at protecting cultivated or natural resource lands. High policy protection lands are protected by one or more policy measures that prohibit most development on that land. Medium policy protection lands are protected by one or more policy measures where development is intended to be limited but is still possible with a special permit. Low policy protection lands do not fall under any specific protective policy measures.

AT RISK MODELING

Finally, we assign scores to both development pressures and policy protections based on their contribution or hindrance to urbanization of greenbelt lands. These scores are relative: for example, a project being considered for approval would get a higher development pressure score than farmland that is zoned “rural residential” but where nothing is yet proposed. Similarly, land outside an urban growth boundary would be scored higher as

policy protected, but land in a publicly-owned park would get an overall higher protection score. The set of development pressure layers are unioned and scored, then repeated with the policy protection layers. The cumulative policy protection scored layer is subtracted from cumulative development pressure layer to estimate the likelihood of the open space land becoming urbanized. A range of scores from this spatial comparison establish the time horizons of whether land is at high risk—with development likely within 10 years—or medium risk—with development likely within 30 years.



VALUE OF NATURAL LANDS

To assess the natural and agricultural values of the land, we gather datasets from public agencies and research organizations. We compile farm and rangeland maps, as well as data on watersheds, groundwater basins, and wetlands, from state agencies. We include maps of critical habitat and flood zones from federal agencies. The Bay Area Open Space Council provides maps of priority conservation lands for biodiversity and regional habitat connectivity, and we compile trails data from several sources. An expansion of this year's report is the below ground or soil carbon storage for protection from climate change. Biomass and carbon data come from recent research by federal agencies and universities; we then break out the data for each county.

HOW DO WE DEFINE RISK AND PROTECTION?

PERMANENT PROTECTION : The purchase of land or development rights to permanently prevent development, as on most public lands, land trust properties, and conservation easements.

STRONG PROTECTION : Greenbelt lands that are protected by one or more policy measures that prohibit most development on that land.

MODERATE PROTECTION : Greenbelt lands that are protected by one or more policy measures where development is intended to be limited but is still possible with a special permit.

WEAK PROTECTION : Greenbelt lands that do not fall under any protective policy measures or that are protected by only vaguely worded ordinances or zoning.

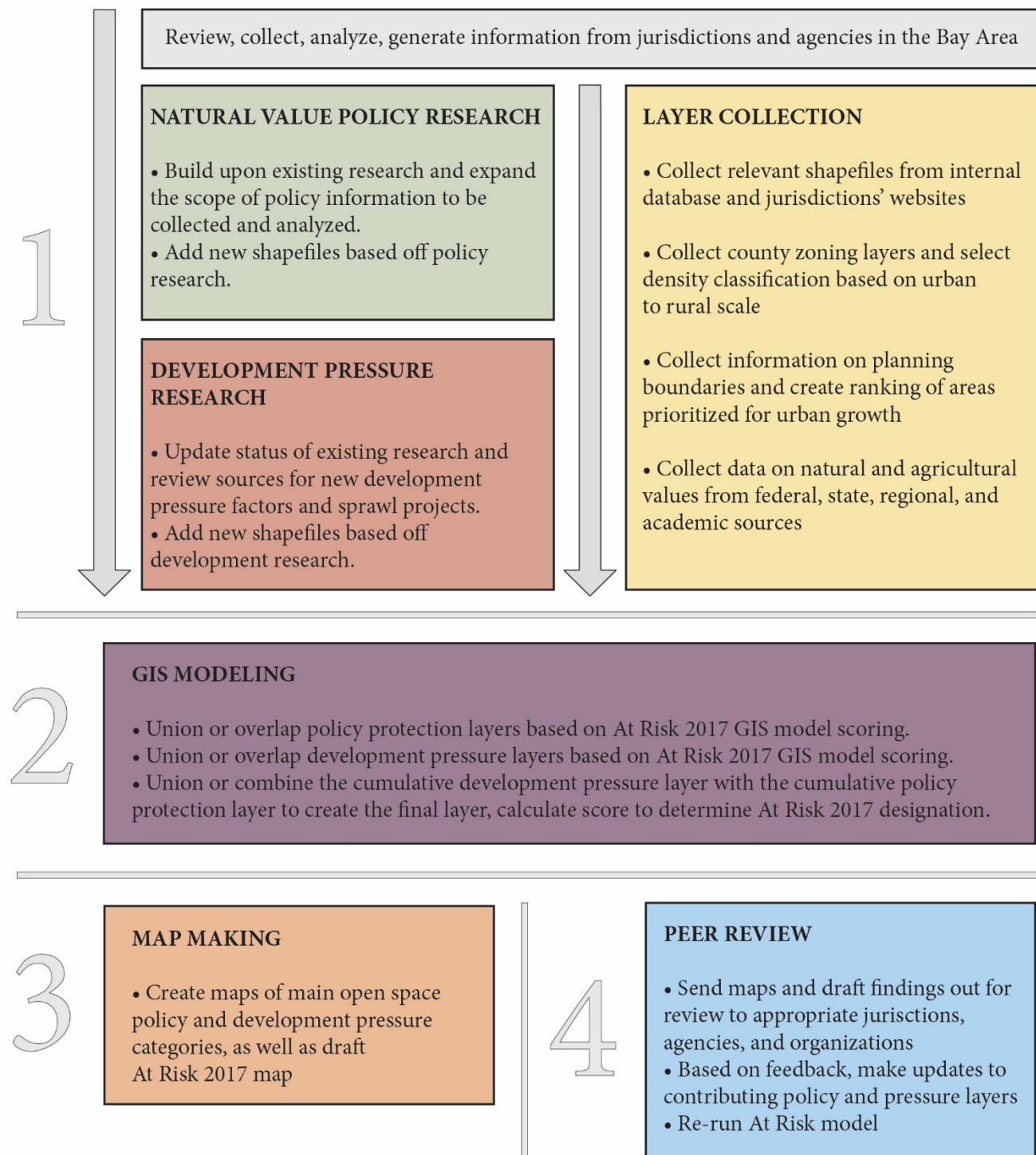
LOW RISK : Greenbelt lands that are not likely to be developed in the next 30 years.

MEDIUM RISK : Greenbelt lands that are likely to be developed in the next 30 years.

HIGH RISK : Greenbelt lands that are likely to be developed in the next 10 years.

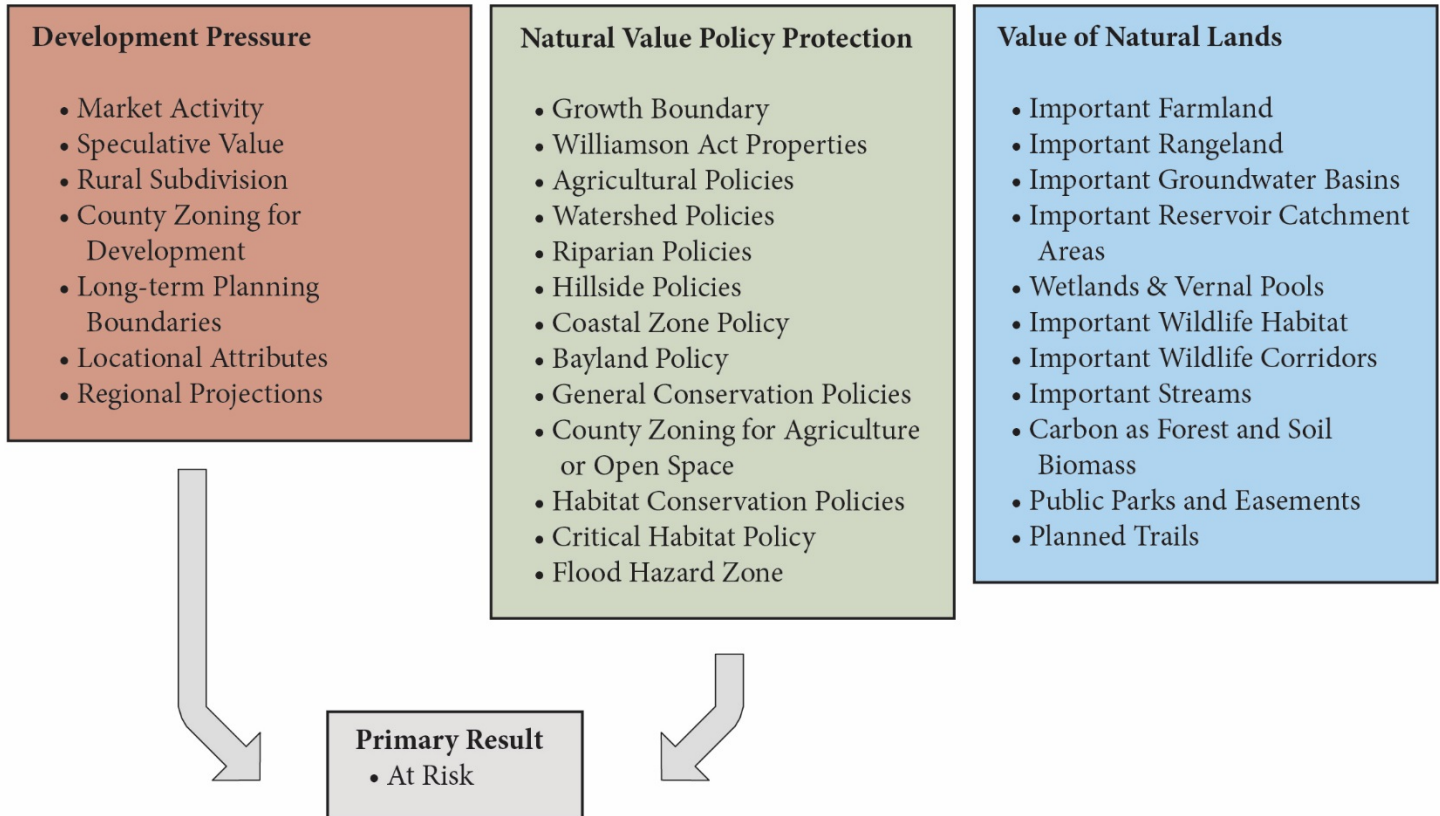
URBAN AND GRADED UNBUILT LAND : Urban development is recognized as land with more than one building on a one and a half acre lot according to the California Department of Conservation. This urban designation also includes lands that have been graded and prepared for development, but have no buildings constructed yet.

METHODS: AT RISK 2017 RESEARCH FLOW



DATA SOURCES

These tables list the data layers used in each section. Following the tables are descriptions of each layer. The Risk Evaluation section lists the relative weight of each of these factors.



PRIMARY RESULT - AT RISK

The At Risk layers provide a calculated assessment of the likelihood of urban development over the next several decades based on a spatial comparison of weighted or scored layers between development pressure factors against policy protection factors. The probability of development is divided into three categories as high risk of urban development within 10 years, medium risk from 10 to 30 years and low risk as more than 30 years chance of developing. Information for the At Risk 2017 analysis was compiled by Greenbelt Alliance staff and interns.

DATA SOURCES: DEVELOPMENT PRESSURE

URBAN OR UNBUILT GRADED LAND

Land identified in 2012 as urban or developed in California's Farmland Monitoring and Mapping Program (FMMP) from datasets available for the Bay Area counties in August 2016

(<http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx>). This urban designation includes lands that have been graded and prepared for development, but have no buildings constructed yet based upon aerial imagery analysis. Land outside this urban area is the At Risk study area.

MARKET ACTIVITY – APPROVED OR PROPOSED PROJECTS

Development proposals and approved projects in a city or county entitlement process that lie outside of San Francisco Bay Area's contiguous urbanized lands. This information was collected by Greenbelt Alliance staff and interns through August 2016 by searching jurisdictional planning websites that list current development proposals and environmental impact reports, field interviews by regional representatives, and updating past At Risk research.

MARKET ACTIVITY – HOUSING OPPORTUNITY SITES

The inventory of the Regional Housing Needs Assessment (RHNA) opportunity sites (<http://gis.abag.ca.gov/gisdata.html>) from the Association of Bay Area Governments (ABAG). These sites were identified by city and county governments as sites to meet their “fair share” housing needs. All RHNA sites proposed on urban land were considered infill sites and excluded from the analysis. The RHNA 5 (2014-2022) sites submitted to ABAG by jurisdictions are an indication that development is likely and are weighted more heavily than previous RHNA 4 (2007-2013) sites. Data compiled by Greenbelt Alliance staff in June 2016.

MARKET ACTIVITY – SPECULATIVE VALUE, RURAL SUBDIVISION, QUARRIES

These are areas under consideration for near and longer term development outside the Bay Area's contiguous urbanized lands, though no official planning proposal has been submitted to a jurisdiction's planning department. This includes projects and boundary expansions proposed in the last five years on greenbelt lands but that have since been rescinded from the entitlement and planning process. Both quarry projects and larger rural properties dividing into smaller parcels can often lead to eventual urbanization. This data was collected by Greenbelt Alliance staff and interns through field interviews by field representatives, collecting news articles, and updating past At Risk research to generate shapefiles of areas under development speculation.

HISTORICAL DEVELOPMENT PRESSURE

Areas consistently identified at High and Medium Risk over the previous four At Risk reports from 1996, 2000, 2006 and 2012 are considered to have historical development pressure.

MARKET ACTIVITY - WILLIAMSON ACT PROPERTY EXPIRING

A limited number of Williamson Act properties (see Policy Protection) were counted as a development pressure if they were non-renewing/expiring and within an existing urban growth area. Data was compiled and assessed by Greenbelt Alliance staff in May 2016.

COUNTY ZONING FOR DEVELOPMENT

Using county zoning shapefiles from their respective websites, the zoning designations were measured and scored according to a range of their minimum allowable densities.

Bay Area Zoning Classification (acres/unit)

- Urban Residential $\leq 1.5-2.5$
- Rural Ranchette $>1.5-2.5$ AND $<20-30$
- Rural Estate $\geq 20-30$

County zoning for exclusive agriculture is considered a policy protection in our At Risk model. Timber production zoning was removed from the model as there were no known examples of this land management practice leading to urbanization. Zoning shapefiles downloaded from Bay Area counties by Greenbelt Alliance staff and interns in May 2016.

REGIONAL GROWTH PROJECTIONS

Three datasets show long-range projections of business-as-usual urban development patterns produced by the state and Bay Area region. These projections help highlight which areas are most likely to urbanize in 10 to 30 years.

Plan Bay Area 2013, which projects growth patterns through 2040, presented a set of development scenarios to compare performance targets against regional goals as well as for its environmental review process. The Regional Growth Trend scenario shows how the region would grow if current growth patterns failed to comply to existing growth boundaries and could expand to low-lying areas for continued urbanization along the city or county's edges. Data compiled by Greenbelt Alliance staff based on Plan Bay Area 2013 Environmental Impact Report.

The California Natural Resources Agency released a statewide report with results of a series of baseline population and urban growth projections for the state's urban counties through the years 2020 and 2050. This data was presented in map and table form; these projections are based on extrapolations of current population trends and recent urban development trends. Data compiled by Greenbelt Alliance staff in June 2016.

The adopted growth projections for Plan Bay Area 2013 show existing and projected homes through 2035 by traffic analysis zones (TAZ), approximate to census tracts. The projected housing densities were calculated for projected units in 2035 divided by the TAZ acreage without protected parks and easements. The census housing density results were sorted along the ranges from the Bay Area Zoning Classification above. Data compiled by Greenbelt Alliance staff based upon the adopted growth patterns from Plan Bay Area 2013 TAZ shapefile.

PARCELS IN PROXIMITY TO MAJOR/MINOR ROADS AND RECENT DEVELOPMENT (2008 – 2012)

Parcels in close proximity to major roads are much more likely to be developed due to their accessibility to regional amenities. Additionally, parcels within ¼ mile of existing and recent urban development occurring between 2008 and 2012 (based on the FMMP data) are also more likely to develop due to their proximity to resources. This information was calculated by Greenbelt Alliance using parcel data from the Association of Bay Area Governments and road data from California's Department of Transportation.

URBAN SERVICE AREA

The urban service area boundary (USA) is a planning area regulated by each county's Local Agency Formation Commission (LAFCo) that delineates where land is available for development and services. California Gov. Code Section 56080 describes it as "undeveloped, or agricultural land, either incorporated or unincorporated, within the sphere of influence of a city, which is served by urban facilities, utilities, and services". USA boundaries were collected in August 2016 from Santa Clara and Sonoma planning websites, as well as Solano's equivalent Municipal Service Area. Boundaries were downloaded or digitized from city and county planning maps by Greenbelt Alliance staff in May 2016.

GROWTH BOUNDARY

A planning boundary of a city and/or county defining where urban growth can and cannot occur. Lands outside a growth boundary are considered to have declining pressure, whereas lands inside a growth boundary are considered to have higher development pressure. Data compiled by Greenbelt Alliance staff and interns based upon current general plan maps and Local Agency Formation Commission (LAFCo) maps from November 2016.

CITY LIMITS

A city's boundary that defines where urban services and utilities are provided. Data compiled by Greenbelt Alliance staff and interns based upon general plan maps, LAFCo maps and from the California Department of Forestry and Fire Protection in May 2016.

SPHERE OF INFLUENCE

A city's boundary that defines the future area of a local agency's probable physical boundaries, regulated by Local Agency Formation Commissions. Data compiled by Greenbelt Alliance staff and interns based upon general plan maps and LAFCo maps from May 2016.

PLANNING AREAS

A planning area is a non-LAFCo regulated boundary showing planning horizons in longer terms than Spheres of Influence. Boundaries were collected and digitized from General Plan maps by Greenbelt Alliance staff and interns.

DATA SOURCES: POLICY PROTECTION

PERMANENT PROTECTION

Areas permanently protected from development, including most publicly owned lands, land trust properties, and conservation easements. Data downloaded by Greenbelt Alliance staff in August 2016 from the National Conservation Easement Database (<http://www.conservationeasement.us/>), California Protected Areas Database (<http://www.calands.org/>), and the Bay Area Easement and Protected Area Databases (<http://www.bayarealands.org/upload/page.php?pageid=6>).

GROWTH BOUNDARY

Voter-approved agreements for coterminous urban growth boundaries shared by a county and its cities. These policies offer a high degree of protection by restricting urban growth to inside the boundary. In other cases where only cities have urban growth boundaries, a county may still allow urban development on lands that fall within their county jurisdiction. The Bay Area has two voter-approved shared city-county growth boundaries in Contra Costa County and East Alameda County.

Rural county zones are large continuous areas designated by a county's general plan to maintain low density rural development and open space preservation. These areas include the Rural Mid-Coast and South Coast of San Mateo County's Rural/Urban Boundary as well as Marin County's Inland Rural and Coastal Corridors.

WILLIAMSON ACT PROPERTIES

Williamson Act properties are enrolled in a state program providing property tax relief to owners of farmland and open-space land in exchange for a ten-year agreement that the land will not be developed or otherwise converted to another use. Data was downloaded from county websites or emailed from county staff to Greenbelt Alliance and includes properties enrolled in 2016 for all Bay Area counties except Marin which is from 2012.

AGRICULTURAL POLICIES

Jurisdictional policies adopted to protect farms and ranches from urban development. Policies include Napa County's Measure J and Solano County's Orderly Growth Initiative, in which a proposed change in zoning to land with agricultural zoning designations or non-conforming use of the land must be approved by a vote of the people in the county. Includes city and county area policies that prioritize agricultural conservation of natural

resources and preservation of farms and ranches. Data compiled by Greenbelt Alliance staff and interns in May 2016 based upon counties' general plans and zoning maps.

WATERSHED POLICIES

Watershed-zoned areas from county general plans and jurisdictional policies adopted to protect drinking and irrigation water watersheds from urban development. Policies include voter-protected agricultural watershed county lands in Napa County's Measure J, Solano County's Orderly Growth Initiative for marsh and watershed designated lands, and groundwater policies in Sonoma County. Data compiled by Greenbelt Alliance staff and interns in May 2016 based upon counties' general plans and zoning maps, or by downloading data from jurisdictional websites.

RIPARIAN POLICIES

Riparian policies limit or prohibit new construction within a certain buffered distance from rivers and streams to avoid adverse impacts of urban development. A buffer calculates the distance from centerline of a river based on the jurisdiction's policy. Data compiled by Greenbelt Alliance staff and interns in May 2016 based upon general plans, or by downloading data from jurisdictional websites.

HILLSIDE POLICIES

Hillside areas identified as important for protection or to minimize landslide threat based up the physical descriptions in city and county general plans. Policies mapping using a digital elevation model to assess the slope of a hill, the area of a hill above a certain elevation, and the area within a certain vertical or horizontal distance from a ridge line. The slope is calculated as slope percent rise, an elevation area is selected above the lowest limit of the defined elevation, horizontal distance from the ridge is calculated using a buffer, while vertical distance from a ridge is calculated from the elevation data as a vertical drop relative to the height of the closest point on the ridgeline. Data compiled by Greenbelt Alliance staff and interns through August 2016, and processed based upon general plan policies, as well as city and county-provided data.

COASTAL ZONE POLICY

The Coastal Zone is the area under regulatory control by coastal management agencies over all federal activities and federally licensed activities that affect coastal resources. The shapefile was acquired in May 2016 by Greenbelt Alliance staff and is available by request through the Caltrans GIS data library (<http://www.dot.ca.gov/hq/tsip/gis/datalibrary/gisdatalibrary.html>).

BAYLANDS POLICY

Areas identified as important for protection and conservation falling under the jurisdiction of the Bay Conservation and Development Commission (BCDC). The Commission holds authority over development projects falling within the San Francisco Bay, including Suisun, San Pablo, Honker, Richardson, San Rafael, San Leandro and Grizzly Bays and the Carquinez Strait, certain waterways that flow into the Bay, certain salt ponds or managed wetlands around the Bay, a shoreline band jurisdiction which extends 100 feet inland from the Bay, and the Suisun Marsh. Data compiled by Greenbelt Alliance staff in March 2012 based upon plan maps and jurisdictional coverage description available through San Francisco Bay Plan website (http://www.bcdc.ca.gov/laws_plans/plans/sfbay_plan#5).

GENERAL CONSERVATION POLICIES

These policies provide limited protection to a range of natural and agricultural values. They include rural growth measures and open space reserves that are set aside permanently or temporarily by a single jurisdiction or among

several jurisdictions. Data compiled by Greenbelt Alliance staff and interns based upon general plan maps through August 2016.

CRITICAL HABITAT POLICY

Areas identified as essential for the conservation of a threatened or endangered species under the Federal Endangered Species Act that may require special management and protection. These areas are based upon January 2016 data and are available for download from U.S. Fish and Wildlife Service Critical Habitat Portal (<http://criticalhabitat.fws.gov/crithab/>).

HABITAT CONSERVATION POLICIES

Areas identified as important for protection and conservation in jurisdictional plans and in the Bay Area's Habitat Conservation Plans (HCPs). These areas do not necessarily show the entire HCP boundary, but rather those areas designated for limited or prohibited development. Data compiled by Greenbelt Alliance staff and interns through August 2016 based upon interviews, HCP documents, and HCP-provided shapefiles.

FLOOD HAZARD ZONE

Flood plain hazard areas identified as subject to flooding where development is limited or prohibited. Data compiled by Greenbelt Alliance staff in May 2016 based upon the U.S. Federal Emergency Management Agency (<https://hazards.fema.gov/femaportal/NFHL/searchResult>).

NATURAL AND AGRICULTURAL COUNTY ZONING

Land designated by the county primarily for farmland, grazing land, watershed lands, or natural resource management. This excludes rural zoning which allow homes on mixed agricultural zoned lands. County zoning shapefiles downloaded from county websites. Zoning shapefiles downloaded from Bay Area counties by Greenbelt Alliance staff and interns in May 2016.

GENERAL CONSERVATION POLICY - PRIORITY CONSERVATION AREAS

Priority Conservation Areas (PCAs) are lands that provide agricultural, natural resource, scenic, recreational, and/or ecological values and ecosystem functions (<http://abag.ca.gov/priority/conservation/>). These areas are identified through consensus by local jurisdictions and park/open space districts as lands in need of protection due to pressure from urban development or other factors. PCAs are categorized by four designations: Natural Landscapes, Agricultural Lands, Urban Greening and Regional Recreation. Data downloaded from the Association of Bay Area Governments (<http://gis.abag.ca.gov/gisdata.html>) in June 2016.

DATA SOURCES: VALUE OF NATURAL LANDS

WETLANDS AND VERNAL POOLS

Marine and terrestrial wetlands identified in the U.S. Fish and Wildlife Service's National Wetland Inventory (<http://www.fws.gov/wetlands/Data/State-Downloads.html>), vernal pools mapped from the California's Department of Fish and Game California Central Valley Vernal Pool Habitat GIS Data (<https://www.wildlife.ca.gov/Data/GIS/Clearinghouse>), and bay lands and wetlands in San Francisco Estuary's Institute's Bay Area Aquatic Resource Inventory (<http://www.sfei.org/data/baari-version-20-gis-data#sthash.NGff5BuC.dpbs>). Data compiled by Greenbelt Alliance staff through August 2016.

IMPORTANT STREAMS

Streams identified as Critical 1 or Critical 2 for Stream Conservation Targets in the Conservation Lands Network (<http://www.bayarealands.org/mapsdata.html>) by the Bay Area Open Space Council, as well as streams identified as Threatened by U.S. Fish and Wildlife Service's Critical Habitat Portal (<http://criticalhabitat.fws.gov/crithab/>). Data compiled by Greenbelt Alliance staff through August 2016.

IMPORTANT WATERSHED LANDS

Lands identified as important for providing drinking water and irrigation, combining reservoir catchment and groundwater basins. From California's Department Water Resources (DWR) and monitoring data from the State Water Resources Control Board, groundwater basins were classified based on use and vulnerability. Reservoir catchment areas from DWR are assigned the combined volume of all reservoirs within their watershed system according to the average reservoir storage volume. Both DWR layers can be downloaded from the 2010 Forest and Range Assessment as 'Groundwater Basins' and 'Surface Water Storage Watersheds' (http://frap.fire.ca.gov/data/frapgisdata-sw-rangeland-assessment_data). Data compiled by Greenbelt Alliance staff in June 2016.

IMPORTANT FARMLAND

Land identified as important for farming based on all farmland categories from California's Farmland Monitoring and Mapping Program (FMMP). The FMMP data is the primary layer that includes Bay Area county soil type results from 2012 and is available for download through their FTP site (<http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx>). Data compiled by Greenbelt Alliance staff in August 2016.

IMPORTANT RANGELAND

Land identified as important for grazing based on soil type from the Farmland Monitoring and Mapping Program (FMMP). The FMMP data is the primary layer that includes Bay Area county results from 2012 and is available for download through the FTP site (<http://www.conservation.ca.gov/dlrp/fmmp/Pages/Index.aspx>). Data compiled by Greenbelt Alliance staff in August 2016.

PUBLIC PARKS AND EASEMENTS

San Francisco Bay Area lands identified through August 2016 in the California Protected Areas Database (<http://www.calands.org/>) as allowing public access on the property. Data downloaded by Greenbelt Alliance staff in August 2016.

PLANNED TRAILS

Regional trail routes that are proposed for the San Francisco Bay Trail (<http://www.baytrail.org/maps.html>), Bay Area Ridge Trail (www.ridgetrail.org), Priority Conservation Area trails (<http://gis.abag.ca.gov/gisdata.html>), Napa Valley Vine Trail, California Coastal Trail, SF Bay Water Trail, American Discovery Trail, Juan Bautista de Anza Trail, and East Bay Regional Park District based on shapefiles acquired in May 2016. These trail shapefiles were collected from their respective agencies by Greenbelt Alliance staff and can be acquired by requesting the files directly from the agencies.

IMPORTANT HABITAT

Wildlife areas recommended by the Bay Area Open Space Council as important for creating an interconnected regional habitat network and for preserving biodiversity. Data includes essential, important, and fragmented habitat lands of the Conservation Lands Network, as well as Critical Wildlife Linkages, and is available for download along with additional habitat information (<http://www.bayarealands.org/mapsdata.html>).

CARBON STORAGE

The above- and below-ground carbon storage data is collected from academic and government research. Soil carbon (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053628#value) is a measure of the carbon contained within soil organic matter. Living, aboveground carbon density on natural (ie non-urban, non-cropland) landscapes was measured in vegetation in 2010 (Mg/ha) at 30 square meter tracts and converted to the total county biomass as metric tons ([Gonzalez, P., J.J. Battles, B.M. Collins, T. Robards, and D.S. Saah. 2015.](#)).

RISK EVALUATION

The At Risk 2017 analysis measures the likelihood of development over the next 30 years on open space lands around the cities of the San Francisco Bay Area counties. The 2017 At Risk report is based on the analysis of data collected up through November 2016 and builds upon past research. The final At Risk results are calculated using a geographic information system, or GIS model to approximate likelihood of urbanization. It measures development pressure and policy protection of natural and agricultural values using a weighted model to directly compare the relative urgency or significance of a given threat or policy layer. Stronger policy measures, such as areas protected under voter-approved policies, and strong development pressures, like a housing project given a green light for construction, are given a higher weight. As the strength of the urban development pressure or natural value policy protection diminishes, so does the relative weight of that spatial layer. To derive the final At Risk 2017 results, the cumulative weight of the policy protection measures are subtracted from the cumulative weight of the development pressure threats. Thereby, voter protected areas are given a low score while development proposals receive a high score. This ranking approach leads to a spectrum where urban is the highest positive scoring while permanently protected areas like parks are given the lowest negative scoring. The At Risk results of High, Medium, and Low are derived by setting the scoring thresholds along the range of scores that most accurately reflects the likelihood of urban development.

AT RISK 2017 MODEL

DEVELOPMENT PRESSURE FACTORS		SCORE	POLICY PROTECTION FACTORS		SCORE		
Market Conditions	Unbuilt Graded Land	100	Permanent Protection	Protected Area - Park (Fee)	3,000		
	Market Activity	20		Protected Areas – Easement	3,000		
	RHNA 4 and 5 Opportunity Sites	3, 10	High Protection	Agricultural Watershed Policy- Voter Approved		6	
	Developer Speculation	10		Growth Boundary - Voter Approved		6	
	Approved Rural Subdivision	10		Medium Protection	Agricultural Policy - Prohibited		4
	Historical Development Pressure	3			General Conservation Policy - Prohibited. . .		4
Locational Attributes	Urban Land	500	Habitat Conservation Policy - Prohibited . . .		4		
	Parcels Adjacent to Existing and Recent Development	0.5, 1	Hillside Policy - Prohibited		4		
	Low Sloped Areas from 0-5% and 6-15% . . .	2, 1	Riparian Policy - Prohibited		4		
	Parcels Adjacent to Major Roads	1	Watershed Policy - Prohibited		4		
County Zoning	Open Space County Land Zoned for:		Growth Boundary - Prohibited		4		
	• Urban Residential	6	Williamson Act Property		3		
	• Rural Ranchette	3	Low Protection	Baylands Policy		1	
	• Rural Estate	1		Coastal Zone Policy		1	
Regional Projections	Plan Bay Area Adopted Growth Projections			Agricultural Policy - By Permit		0.5	
	• Urban Residential	1.5		General Conservation Policy - By Permit . .		0.5	
	• Rural Ranchette	1		Habitat Conservation Policy - By Permit . . .		0.5	
	• Rural Estate	0.5		Hillside Policy - By Permit		1	
	Plan Bay Area 2013 Regional Growth Trend	0.5		Riparian Policy - By Permit		1	
	California Growth Projections for 2020 and 2050	1.5, 1		Agricultural and Natural Resource County Zoning		0.5	
County and City Planning Boundaries	Inside All Primary Growth Boundaries* . . .			Flood Hazard Zone		0.5	
	Inside Primary Growth Boundary but Outside City Limit			Critical Habitat Policy		0.5	
	Inside City Limits but Outside Urban Growth Boundary		<div>Policy Protection of Natural Values:<div>- Development Allowed “By Permit” - Development “Prohibited”</div></div>				
	Inside Sphere of Influence but Outside Primary Growth Boundaries						
	Inside a Planning Area and Outside any Spheres of Influence and Primary Growth Boundaries						
	Williamson Act Expiring Inside Primary Growth Boundary						
			AT RISK MODEL				
	Cumulative Development Pressure Score		minus	Cumulative Policy Protection Score		equals	
<div><div>AT RISK LABEL</div><div>SCORE</div><div>Protected Area - Park (Fee) and Easement</div><div>-6,022</div><div>Urban - Park (Fee) and Easement</div><div>-5,352</div><div>Protected Area - Park (Fee) or Easement</div><div>-5,903</div><div>Urban - Easement</div><div>-5,366</div><div>Low Risk</div><div>-3,023</div><div>Medium Risk</div><div>-2,960</div><div>High Risk</div><div>-2,896</div><div>Urban</div><div>-2,377</div><div></div><div>-24</div><div></div><div>7</div><div></div><div>8</div><div></div><div>19</div><div></div><div>20</div><div></div><div>56</div><div></div><div>94</div><div></div><div>637</div></div>							

DATA AVAILABILITY

The At Risk GIS data for which this document does not include an external link for original data is available for download at greenbelt.org/at-risk-2017-gis-data.