SECTION 6: CLIMATE CHANGE ADAPTATION

Despite efforts to reduce greenhouse gas emissions, greenhouse gases can remain in the atmosphere for hundreds of years. Therefore, it is probable that climate change impacts will still be observed. The impacts vary dependant upon the region. In California, climate change may result in a decreased water supply, sea level rise, increased wildfires, to name a few. In order to manage these impacts, the City's vulnerability to these impacts is assessed and strategies have been developed to adapt to the projected changes.

Climate change adaptation refers to efforts that respond to the impacts of climate change, such as adjustments in natural or human systems to actual or expected climate changes to minimize harm or take advantage of opportunities.

Goal: Protect City of Ramon residents and resources from negative climate change impacts.

Determining potential future impacts from climate change is an evolving process. The 2009 California Climate Adaptation Strategy provides a proactive foundation for an ongoing adaptation process within California for the sectors with the greatest risks. The document provides strategies for state and local governments to adapt to climate change (CNRA 2009). By incorporating applicable strategies as CAP Implementation Strategies, the City is taking a proactive approach to ensure that impacts to the City are minimized.

The following represent the main risks from climate change that could be experienced in the City of San Ramon. The General Plan policies that would decrease the risks to the City are presented as well as new CAP implementation strategies that would further reduce risks and protect City residents and resources from potential impacts from climate change.

6.1 - Wildfires

The San Ramon Valley Fire Protection District provides fire protection services to the incorporated and unincorporated portions of San Ramon.

The risk of both urban and wildland fires exists in the San Ramon Planning Area. The hazards related to wildland fires are related to a combination of factors including winds, temperatures, humidity levels, fuel moisture content of vegetation and topography. The risk to the community is increased in some areas because of the combustibility of building materials including roofs, adequacy of access roads, water supply duration, and pressure and maintenance of flammable vegetation surrounding structures.

Fire hazards in San Ramon are usually created by increases in the number of homes adjoining open space; therefore, much of the threat of wildland fires is due to open

grasslands abutting residential developments. Many neighborhoods within the City are located in remote regions and are surrounded by grasslands, such as the development shown in the photograph. As San Ramon continues to expand, more of these wildland urban interface areas are created. This situation creates extreme fire hazards, and San Ramon is committed to planning development, with the help of fire protection agencies, that minimizes the risk of fire to the greatest extent possible.

San Ramon Wildland Urban Interface Area
Source: Matt Jalbert

Because of an extended dry season with low humidity, San Ramon has many days where fire danger is critical. Within the City, fuel loading is light and wildfire hazard is moderate, except in areas adjacent to the City where steep woodland slopes and rolling grassy hills create high to extreme hazards. Areas in and around San Ramon representing the greatest risk are the Dougherty Valley and Tassajara Valley areas to the east of the City Limit and the wildland areas at the Planning Area's western edge and northwestern corner.

New development has the potential to create increased fire hazards caused by interactions between open grassland and dense residential development. Therefore, projected development in the City's Planning Area will likely require the construction of fire suppression services facilities for new subareas and compliance with General Plan policies intended to minimize this potential impact. The budgeting and timing of such construction should be considered with respect to safety and the pace of new development. Moreover, community design techniques that allow optimal fire services response time should remain a priority.

Wildfire occurrence in California was modeled under a range of future climate and development scenarios. A summary of that modeling follows.

Substantial increases in wildfire are anticipated for most scenarios, although the range of outcomes is large and increases with time. The increase in wildfire area burned associated with the higher emissions pathway (Special Report on Emissions Scenarios [SRES A2]) is substantial, with increases statewide ranging from 57 percent to 169 percent by 2085, and increases exceeding 100 percent in most of the forest areas of Northern California in every SRES A2 scenario by 2085 (Westerling et al. 2009).

San Ramon Valley Fire Protection District
Source: San Ramon Valley Fire Protection District

Maps were created utilizing this modeling data by CalAdapt (2010). The area in which the Eastside Specific Plan area is located is associated with a "very high" fire threat and a "very high" fire threat to people. Review of the maps indicates that, based on the potential for climate change, the danger of wildfires may be between 0.4 and 1.2 times more than in the historical period.

According to the California Department of Forestry and Fire Protection (2010), in California in 2009, there were 8,291 fires with 93,296 acres burned. In 2008, there were 5,744 fires with 390,615 acres burned.

The following General Plan policies would reduce wildfire risks to the City. Note that policies marked with a "G" are guiding policies and policies with an "I" are implementation policies.

6.2 - General Plan Policies

3.1-I-7 Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.

3.2-I-1 Adopt "Findings of Consistency" that ensure new projects will comply with the City's performance standards through its development review process.

7.6-G-1 Collaborate with the San Ramon Valley Fire Protection District to deliver a high level of public protection services that protect life, property, and the environment.

7.6-I-1 Continue to coordinate with the San Ramon Valley Fire Protection District to provide adequate fire protection facilities and services to meet the needs of the community.

7.6-I-2 Seek input from the San Ramon Valley Fire Protection District to ensure that fire protection measures are identified during the development review process.

9.5-G-1 Minimize the risks to lives, property, and natural environment due to fire hazards.

9.5-I-1 Require site design features, which are based on a wildfire risk assessment, and fire retardant building materials to reduce the risk of fire within the City.

9.5-I-2 Require the completion of a Fire Protection Plan for new development adjacent to a Fire Hazard Area in order to determine which mitigation measures are appropriate to minimize fire hazard.

9.5-I-3 Work with the Fire Protection District on planning for a new training facility at an appropriate location where neighborhood impacts would be mitigated.

9.5-I-4 Require sprinklers in new homes located more than 1.5-miles from a fire station.

9.5-I-5 Require sprinklers in all mixed use development to protect residential uses from non-residential uses, which typically pose a higher fire risk.

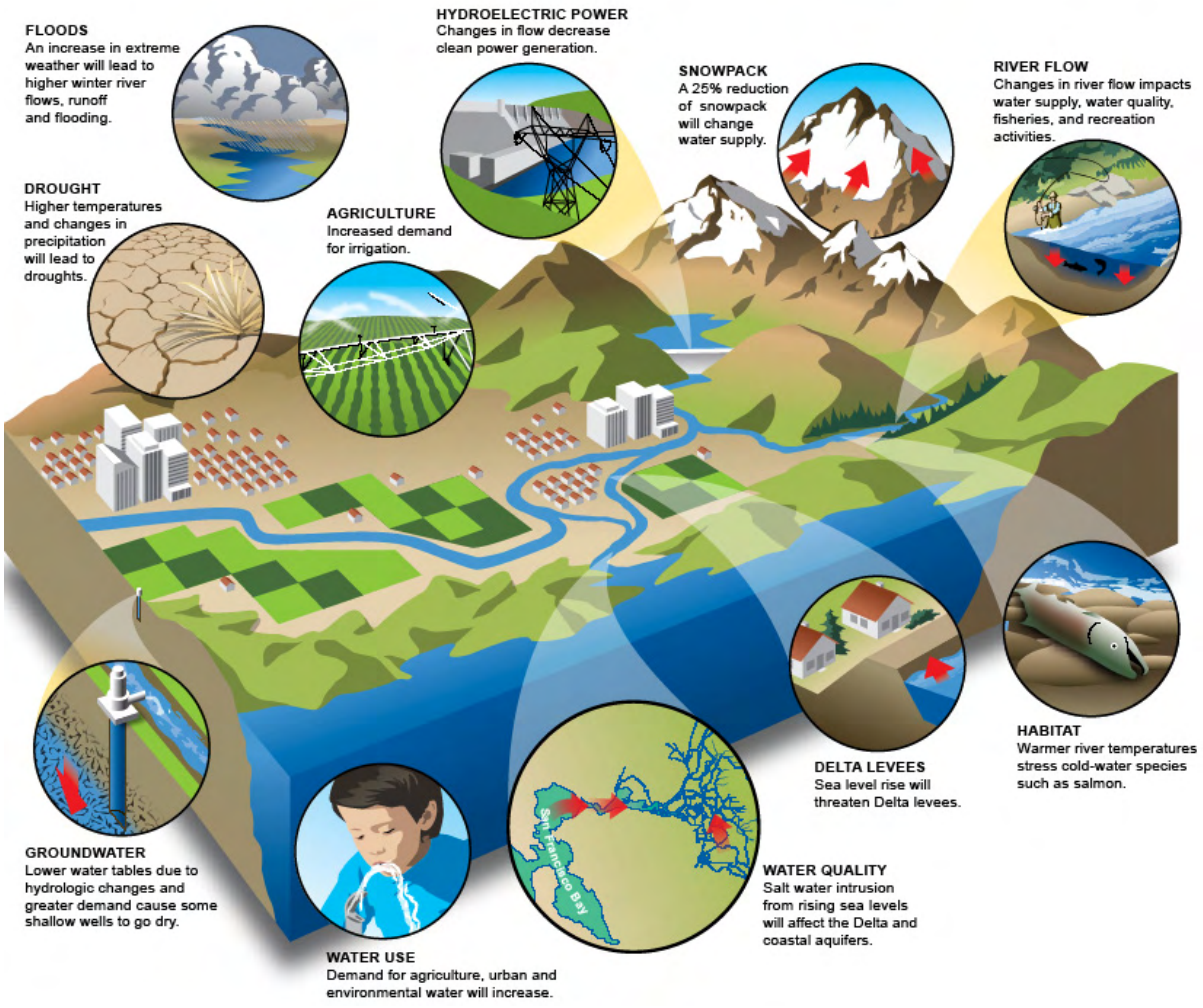
6.3 - Water

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages. East Bay Municipal Utility District (EBMUD) and Dublin San Ramon Services District (DSRSD) provide potable water service to San Ramon. EBMUD generally serves the northern, western, and central portions of San Ramon, while DSRSD serves the majority of Dougherty Valley. The EBMUD obtains approximately 90 percent of its water supply from the Mokelumne River watershed in Alpine, Amador, and Calaveras counties in the Sierra Nevada Mountains. The remaining 10 percent are provided by local runoff collected in its five terminal reservoirs (EBMUD 2009).

Figure 8 shows how climate change can impact a watershed. One of the potential impacts of climate change is a loss of natural snowpack, particularly the Sierra Nevada snowpack. Snowmelt provides an annual average of 15 million acre-feet of water, released between April and July each year (Department of Water Resources 2008). The California Department of Water Resources projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack.

Changes in precipitation patterns are expected to cause increased flooding. For the purposes of federal flood insurance, the Federal Emergency Management Agency has traditionally used the 100-year flood event, which refers to the level of flood flows that has a 1-percent chance of being exceeded in any single year. As California's hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Moreover, as peak flows and precipitation change over time, climate change calls into question assumptions of "stationarity" that is used in flood-related statistical analyses like the 100-year flood.

Figure 8: How Climate Change Impacts a Watershed



The California Department of Water Resources (2008) recommends that local governments implement land use policies that decrease flood risk. These following recommendations are included as CAP implementation policies where applicable and feasible.

- Local land use agencies should update General Plans to address increased flood risks posed by climate change. General Plans should consider an appropriate risk tolerance and planning horizon for each locality.
- Local governments should site new development outside of undeveloped floodplains unless the floodplain has at least a sustainable, 200-year level of flood protection.
- Local governments should use low-impact development techniques to infiltrate and store runoff.
- Local governments should include flood-resistant design requirements in local building codes. State, federal, and local agencies should develop conjunctive use management plans that integrate floodplain management, groundwater banking, and surface storage. Such plans could help facilitate system reoperation and provide a framework for the development of local projects that are beneficial across regions.
- Local land use agencies should adopt ordinances that protect the natural functioning of groundwater recharge areas.

The City of San Ramon obtains a portion of its water from the State Water Project, which obtains part of its water from Sierra snowpack. Therefore, the City may be vulnerable to a decreased water supply. The City can adapt to potential decreases in water supply by reducing water use, which are outlined in the following General Plan policies.

GENERAL PLAN POLICIES

3.1-I-7 Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.

3.2-I-1 Adopt "Findings of Consistency" that ensure new projects will comply with the City's performance standards through its development review process.

8.8-G-1 Promote the implementation of water quality and conservation programs and measures by San Ramon employers, residents, and public agencies.

8.8-I-1 Require new development projects to implement indoor water conservation and demand management measures.

8.8-I-2 Require new development projects to implement outdoor water conservation and demand management measures.

8.8-I-3 New development in areas where recycled water service exists or is planned shall be plumbed with "purple pipe" and other measures necessary to accommodate non-potable water service.

Note that the San Ramon Valley Recycled Water Program currently serves recycled water to more than 270 locations in Dublin and San Ramon. Customers include the cities of Dublin and San Ramon, the Dublin Unified School District, the San Ramon Valley Unified School District, Dublin Ranch Golf Club, and the Bridges Golf Club at Gale Ranch. In a 12-month period in 2007 and 2008, the program provided 817 million gallons of recycled water to Dublin and San Ramon (Dublin San Ramon Services District 2008).

8.8-I-4 Require new development to meet the State Model Water Efficient Landscape Ordinance (MWELO).

8.8-I-5 Collaborate with DERWA (Dublin San Ramon Services District and East Bay Municipal Utilities District Recycled Water Authorities) to expand the recycled water distribution system in an efficient and timely manner.

8.8-I-6 Continue implementation of the City of San Ramon Stormwater Program to reduce storm water pollution, provide public education, and to protect the water quality of the City's local creeks and streams.

8.8-I-7 Promote the protection of groundwater resources by collaborating with agencies that monitor and oversee clean-up efforts at existing sources of pollution.

As precipitation falls in the form of rain rather than snow with greater storm intensity, high frequency flood events are projected to increase. There is currently no known literature that suggests an increase in flooding from climate change in the San Ramon area; however, it is possible that there could be changing weather patterns that would result in heavy downpours of rain in the area, which could cause flooding. In addition, the potential for increased wildfires resulting from climate change could increase floods following fire. The City of San Ramon General Plan contains the following policies, which would reduce flooding impacts.

GENERAL PLAN POLICIES

8.4-G-1 Acquire, preserve, and maintain open space and its natural resources for future generations.

8.4-I-2 Enhance San Ramon's creeks and riparian corridors by requiring preservation or replacement of riparian vegetation, as appropriate and in conformity with regulatory requirements.

8.4-I-9 Consider alternatives to culverting or channelization of waterways during all stages of the review process.

8.4-I-11 Continue participation in the Contra Costa Clean Water Program to control stormwater pollution and protect the quality of the City's waterways.

8.4-I-12 Monitor the condition of waterways within the City limits and take proactive measures to prevent degradation.

9.4-G-1 Protect the community from risks to lives and property posed by flooding and stormwater runoff.

9.4-I-1 Eliminate hazards caused by local flooding through improvements and ongoing maintenance to the storm drain system and/or creek corridors.

9.4-I-2 Require new development to prepare hydrologic studies to assess storm runoff impacts on the local and subregional storm drainage systems and/or creek corridors.

9.4-I-3 Require new development to provide a funding mechanism for ongoing maintenance of detention basins and other stormwater control measures. Maintenance may be by the City under contract, or by a private entity.

9.4-I-4 Establish landscape and maintenance guidelines for required detention basins to ensure that such facilities achieve a look and quality that is consistent with the landscape of San Ramon and applicable regulatory requirements.

9.4-I-5 Maintain flood insurance rate maps and post for public education.

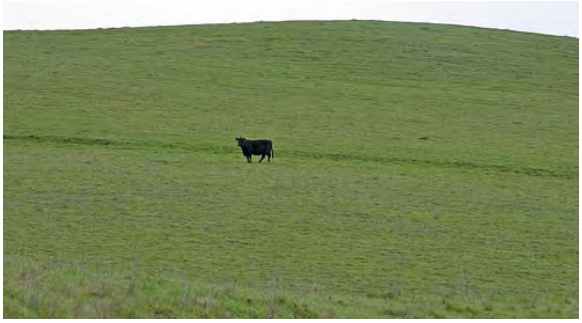
9.4-I-6 Explore new funding mechanisms for enhancing the riparian environment and converting, where possible, flood control channels back to a more natural setting while keeping the existing uses and maintaining sufficient carrying capacity of the channels.

9.4-I-7 All new developments shall not increase runoff to the 100-year peak flow in the City's flood control channels or to local creeks and shall be substantially equal to pre-development conditions. All new storm water systems shall be in compliance with the requirements of the City's storm water discharge permit with the Regional Water Quality Control Board.

9.4-I-8 New development shall be required to locate buildings above the 100-year floodplain to minimize potential flood damages.

6.4 - Agriculture

Between 2000 and 2008, incremental changes from Non-irrigated Farmland and Other Lands to Urban Land had occurred, consistent with the General Plan 2030 and adopted Specific Plans.



Grazing Land
Source: East Bay Regional Parks District

General Plan 2030 Figure 8-4 identifies 162 acres of land in the San Ramon Planning Area mapped as Prime Farmland (127 acres) and Unique Farmland (35 acres). Farmland of Local Importance (3,054 acres) and other non-farmland are included as "Other Land."

Within the Tassajara Valley, grazing is the primary agricultural activity. However, dry

field crops (oats, wheat, barley, and hay), walnuts, olives, and grapes are also produced in small quantities.

The following General Plan policies would help to decrease impacts to agricultural resources within the City.

GENERAL PLAN POLICIES

- 3.1-I-7 Allow urban development only within the City's Urban Growth Boundary (see Implementing Policies 4.6-I-1 through 4.6-I-5) and only in accord with a plan for full urban services (police, fire, parks, water, sanitation, streets and storm drainage) to which all providers are committed.
- 4.6-I-1 Establish an Urban Growth Boundary (UGB) to the year 2030, as shown on the General Plan Diagram that limits the extent of urban development and services within the San Ramon Planning Area. Amendments to the Urban Growth Boundary greater than 30 acres require City voter approval.
- 8.7-G-1 Encourage the continuation of appropriate agricultural activities within the City's Planning Area, while being cognizant that such uses may transition to non-agricultural uses in the future.
- 8.7-I-1 If Important Farmland is proposed to be converted to non-agricultural use, require evaluation to determine significance of conversion impacts. If the conversion is found to be significant, require mitigation to offset such impacts.
- 8.7-I-2 Process development applications involving land encumbered by Williamson Act contracts only if three years or less prior to expiration/cancellation of the contract.
- 8.7-I-3 Minimize land use conflicts between agricultural and urban uses through site planning techniques.
- 8.7-I-4 Explore opportunities with East Bay Regional Park District (EBRPD), other government agencies, or private organizations to set aside and manage undeveloped lands as open space that are contiguous and sufficient in size to allow continued agricultural uses.
- 8.7-I-5 Designate land for rural conservation along the west side of Bollinger Canyon Road near the Las Trampas Regional Wilderness in order to preserve visual open space, to provide opportunities for horse-keeping and part-time ranching, and to maintain compatibility with adjoining agricultural uses.

6.5 - Emergency Preparedness

In the event of a wildfire, flood, or some other emergency, the City has taken steps to include emergency management procedures. The General Plan contains the following policies that would ensure that the City is well prepared for an emergency:

GENERAL PLAN POLICIES

9.1-G-1 Maintain the City's Emergency Operations Plan as the guide for emergency management in San Ramon.

9.1-I-1 Maintain and update the City's Emergency Operations Plan, as required by State and Federal laws, to minimize the risk to life and property of seismic and geologic hazards, hazardous materials and waste, and fire.

9.1-I-2 In collaboration with other agencies, maintain and disseminate emergency preparedness information.

9.1-I-3 Coordinate regular exercises and drills with emergency organizations. Provide training opportunities for all City staff to be adequately trained to State and Federal requirements.

The City participates in a Joint Powers Agreement (JPA) Citizen Corps Council program as encouraged by Federal Emergency Management Agency (FEMA) in collaboration with the San Ramon Valley Fire Protection District, San Ramon Valley Unified School District, and Town of Danville. The joint program conducts an annual emergency preparedness community fair, provides a Community Emergency Response Team (CERT) program, and conducts regular trainings and drills with interested residents and businesses. Public education and emergency preparedness information are shared between the agencies for common dissemination to the public, consistent with the "be ready" federal and state campaigns.

6.6 - Other Potential Impacts

Other climate change impacts include sea level rise and energy supply disruptions. Sea level rise would not impact San Ramon, as the City is located at least 300 feet above sea level. According to Moser et al. (2009), sea levels are likely to increase by up to 35 inches by the year 2100, depending on the magnitude of climate warming.

Climate change could increase extreme conditions such as heat waves. Higher temperatures could increase the frequency, duration, and intensity of conditions favorable to ozone formation by 75 to 85 percent (California Energy Commission 2006). More severe heat could result in a greater risk of people suffering from death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress. Most development includes the installation of air conditioning units, which would help to prevent severe, heat-related illness, but which results in additional energy use. Increased heat could cause energy demand increases and possible supply disruptions. Energy efficiency measures as discussed in the Climate Action Strategies section would help to offset increased energy usage and decrease potential heat related health risks.

6.7 - CAP Implementation Strategies

The following CAP Implementation Actions will help to implement the General Plan policies listed above.

CAP Implementation Strategy		Timetable	Responsibility
ADAPT-1	New projects shall assess the significance of increased wildfires, decreased water supply, changes in agriculture, increased flooding, and any other potential impacts from climate change in California Environmental Quality Act documents.	Ongoing	Planning Services
ADAPT-2	Create an outreach and/or rebate program that encourages businesses and residents to construct graywater and rainwater collection systems on their properties. A minimum of one City employee should have appropriate training regarding these systems to help interested parties develop systems (see City of Santa Rosa for example).	Before December 31, 2011	Public Services/ Engineering Services
ADAPT-3	Developers shall provide an assessment of a project's potential impacts on the local and subregional storm drainage systems, so that the City can determine appropriate mitigation to ensure that system capacity and peak flow restrictions are not exceeded.	Ongoing	Engineering Services
ADAPT-4	To reduce flood peaks, reduce sedimentation, temporarily store floodwaters, recharge aquifers and restore environmental flows, flood management should be integrated with watershed management on open space, agricultural, wildlife areas, and other low-density lands.	Ongoing	Engineering Services
ADAPT-5	Low-impact development techniques should be used in new development to infiltrate and store runoff.	Ongoing	Engineering Services Planning Services

The following targets will help to keep the General Plan policy implementation.

Targets		Responsibility
1	Increase the number of structures in the City with graywater and/or rainwater collection systems by 15% from 2008 levels by the year 2020.	Public Services Engineering Services Planning Services
2	Increase recycled water use by 15% from 2008 levels by the year 2015. Increase recycled water use by 30% from 2008 levels by the year 2020.	Public Services Engineering Services Planning Services