# NATURAL ENVIRONMENT

VISION: Palo Alto will meet today's needs without

compromising the needs of future generations. Palo Alto will respect and manage natural resources in a way that sustains the natural environment and protects our foothills, baylands, creeks, parks, urban forest, wildlife and open space legacy. A substantial portion of the City will remain as open space. Even in built-up areas, the network of parks will provide access to nature and an urban forest will provide ecological and health benefits and a source of beauty for residents. Palo Alto will strive for clean air and clean water. Policies and programs will foster energy and water conservation. Finally, the City will maintain a sustainable water supply for the future, and facilitate the implementation of climate change adaptation strategies.

# INTRODUCTION

The Natural Environment Element addresses the management of open land and natural resources in Palo Alto, as well as responding to environmental risks such as air pollution and climate change. It is one of the broadest elements of the Comprehensive Plan, encompassing three of the seven elements mandated by the State: Open Space, Conservation and Noise.

The text is organized into eight topics, each with a corresponding goal, policies and programs:

- > Open Space
- > Urban Forest and Understory
- Creeks and Riparian Areas
- Water Resources
- Air Quality

# 4



- Noise
- Energy
- > Climate Change

The Natural Environment Element does not include policies relating to mineral resources because Palo Alto does not contain any mineral deposits of regional significance.

# OPEN SPACE

Well over a third of Palo Alto's land area consists of designated Open Space and Public Conservation Land. Although open spaces in City include privately owned land and neighborhood and district parks, the vast majority of Palo Alto's Open Space and Public Conservation Land consists of parks and preserves devoted to passive use and ecological health. As shown on Map N-1, these spaces are diverse in size and character, ranging from the 2,100 acres of shoreline that comprise the Palo Alto baylands to the 200-acre Los Trancos Open Space Preserve, nestled in the foothills. Each open space area is defined by a combination of resources and habitats that require different approaches to preservation and coordination with outside entities. Map N-2 illustrates the vegetation and habitat types located in Palo Alto. At the same time, these diverse open spaces comprise an integrated natural network supporting Palo Alto's livability and resiliency, and are an important recreational resource highly valued by the community. The Parks, Trails, Open Space & Recreation Master Plan provides the City with guidance regarding future renovations and capital improvement needs for parks, trails, open space and recreation facilities. The policies and programs in this Element which focus on open space are consistent with the Master Plan and continue to protect individual open spaces from negative physical impacts, while supporting linkages between those spaces that are vital to the natural balance of the City and encouraging responsible public access.



Palo Alto's urban forest, defined as the trees, plants, soil and associated organisms, has long been a source of civic pride—and current research shows that it also offers an array of tangible benefits: improving public health, cleaning the air, absorbing carbon dioxide, reducing stormwater runoff and supporting animals and pollinators. The Urban Forest Master Plan (UFMP) seeks to foster a sustainable urban forest in Palo Alto by establishing long-term management goals and strategies. Consistent



#### NATURAL ENVIRONMENT ELEMENT



Source: MIG, 2016 and City of Palo Alto, 2016

NATURAL ENVIRONMENT ELEMENT



with the Master Plan, the following policy framework maintains Palo Alto's longstanding commitment to preserving existing trees, replacing damaged trees and expanding the urban forest with resilient, native species. In addition, new policies in following section have been designed to ensure that the urban forest not only endures, but benefits from, future growth. The section seeks to optimize opportunities presented by new development, while minimizing its negative impacts. It is based on a holistic approach to Palo Alto's "green infrastructure" that recognizes that private property owners, outside agencies, non-profits and the City itself all impact—and are impacted by—the health of the urban forest, from soil to canopy.

## **CREEKS AND RIPARIAN AREAS**

As illustrated on Map N-3, a series of creeks and streams pass through City as they drain the local foothills into the San Francisco Bay. Adobe, Barron, Matadero and San Francisquito Creeks and their tributaries, interface with the land along their banks to form ecosystems known as riparian corridors. The policies and programs recognize the value and diversity of Palo Alto's creeks. Where the creeks and corridors generally located west of Foothill Expressway are generally still in a natural or mostly undisturbed state, they support diverse plant and animal life, both as permanent homes and as migratory pathways, and offer recreational opportunities to reconnect with nature. Farther downstream, in the flatter, urbanized parts of Palo Alto, some reaches have been heavily engineered over the past decades and now primarily serve a very important role as flood control channels, while others retain some natural characteristics. All creek segments are valuable opportunities for connection within Palo Alto's ecological and recreational network and merit protection and enhancement. Map N-4 shows areas where development should be set back from creeks to respect and preserve their natural state and ecological value. Partnerships with the Santa Clara Valley Water District (SCVWD) and other outside organizations will be key to protecting and improving creeks that cross jurisdictional boundaries. In addition, related policies and programs in the Land Use and Community Design Element highlight the importance of creeks in defining the character of the City and some of its neighborhoods.

## WATER RESOURCES

Maintaining the life-sustaining properties of water as a natural resource is a complex challenge. Water is dynamic, contested and increasingly scarce. The topics addressed in the Water Resources section are as wide-ranging as the needs water itself serves. Policies and programs protect the quality and reliability of the City's long-term water



NATURAL ENVIRONMENT ELEMENT



NATURAL ENVIRONMENT ELEMENT



Source: ESRI, 2010; Tiger Lines, 2010; USGS, 2010; NHD, 2013; City of Palo Alto, 2016; PlaceWorks, 2016.

MAP N-4



supply, including during periods of drought. Maintaining the quality of the City's water supply requires protecting both surface water and groundwater from the impacts of past and future development, through requirements for low-impact development and careful regulation of sub-surface dewatering. The City must support the efforts of regulatory bodies, and partner with the multiple jurisdictions through which Palo Alto's water resources flow. The policies and programs in the Water Resources section also ensure that the City's water and wastewater infrastructure are efficient, effective and guide future improvements to the Regional Water Quality Control Plant (RWQCP) and the purple pipe network to reflect the growing role of recycled water.

## **AIR QUALITY**

Healthy, breathable air is regional resource, and maintaining air quality is a responsibility shared by each of the local jurisdictions that benefit from it. In the San Francisco Bay Area, federal and State air quality regulations are strengthened by additional programs of the Bay Area Air Quality Management District (BAAQMD). Emerging concerns about specific types of air pollutants, such as particulate matter, cannot be addressed by a single city, but Palo Alto is committed to monitoring and understanding these risks, as well as participating in regional solutions. The policies and programs in this section also promote education and lifestyle choices that benefit public health within and outside the City, from adopting low emission alternatives to wood burning stoves to avoiding prolonged automobile idling.

# NOISE

Palo Alto's bustling urban environment generates noise from traffic, trains, airports, construction and yard maintenance, among other sources. Existing and future noise contours within Palo Alto are shown on Maps N-5 and N-6, respectively. The Comprehensive Plan addresses these diverse noise sources and provides the policy foundation for much more rigorous requirements established in the City's Noise Ordinance. The policies and programs in this section regulate the placement of future "sensitive receptors"—homes, schools, medical clinics and the like—in compatible noise environments, and acknowledge the importance of quiet environments in public open space and conservation areas. This section also guides the analysis and design of proposed new development to avoid creating new noise impacts on existing sensitive receptors. In addition, this section supports the City's ongoing efforts to coordinate with regional, State and federal authorities on noise issues of concern to the Palo Alto community, such as overflights into and out of Bay

NATURAL ENVIRONMENT ELEMENT

City Limit

Sphere of Influence



NATURAL ENVIRONMENT ELEMENT



60 dBA CNEL contour

65 dBA CNEL contour 70 dBA CNEL contour

Source: City of Palo Alto, 2013; USGS, 2010; NHD 2013; ESRI, 2010; Tiger Lines, 2010; US Geological Survey Open File Report 06-1037, 2006; PlaceWorks, 2015.

• Caltrain Stations

Highways

Railroads

City Limit

Sphere of Influence

MAP N-6

Area airports (e.g., San Francisco International and Palo Alto airport) and the proposed High Speed Rail project.

# ENERGY

The City of Palo Alto provides electric service through the Utilities Department. As the negative impacts of fossil fuel extraction and consumption escalate, the City is committed to developing a sustainable, carbon-neutral, cost-effective energy supply. This refers to an energy portfolio that decreases the City's reliance on fossil fuels, thus reducing the release of greenhouse gas (GHG) emissions, by supporting the production of energy from carbon-free, renewable sources. Achieving these goals requires carefully balancing the benefits and liabilities of diverse energy sources and strategies, educating the public on home- and business-based renewable energy and energy efficiency strategies and encouraging and incentivizing widespread implementation of those strategies.

# CLIMATE CHANGE AND CLIMATE ADAPTATION

Palo Alto is committed to meaningful action to slow global warming and adapt to changes in the climate that are already underway. The policies and programs under this goal were developed in parallel with the City's Sustainability and Climate Action Plan, or S/CAP and will support the City's efforts to achieve the Council-adopted goal of reducing City- and community-based GHG emissions to 80 percent below 1990 levels by the year 2030. Similarly, a diverse range of adaptive improvements will ensure that the City's built environment and infrastructure are resilient to climate change related impacts such as sea level rise.



# GOALS, POLICIES AND PROGRAMS

# **OPEN SPACE**

GOAL N-1 Protect, conserve and enhance Palo Alto's citywide system of open space, including connected and accessible natural and urban habitats, ecosystems and natural resources, providing a source of public health, natural beauty and enjoyment for Palo Alto residents.

#### CONNECTIVITY AND ECOLOGY

- POLICY N-1.1 Preserve, protect and enhance public and private open space and ecosystems of Palo Alto from the foothills to the baylands. Respect the role that natural and landscaped areas within the urbanized part of the city play in a resilient ecological continuum, as illustrated on Map N-1.
  - Program N1.1.1
     Develop Comprehensive Resource

     Conservation
     Plans
     for
     the

     Pearson
     Arastradero
     Preserve,



Esther Clark Preserve and Foothills Park to steward the protection of local ecosystems.

- **Program N1.1.2** Promote and support ecosystem protection and environmental education programs in Palo Alto.
- POLICY N-1.2 Maintain a network of parks and urban forest from the urban center to the foothills and Baylands that provide ecological benefits and access to nature for all residents.
- **POLICY N-1.3** Encourage the management of private open space areas, including agricultural land, golf courses, private residential yards, and other land that provides habitat for wildlife in a manner that protects and enhances habitat and reinforces natural wildlife corridors, consistent with the Parks, Trails, Open Space and Recreation Master Plan and UFMP, as periodically amended.

Program N1.3.1 Work to maintain Williamson Act agricultural preserve contracts within the City.

**Program N1.3.2** Provide information and support programs that encourage residents to enhance their private yards with native plant species and low impact landscaping.

- Policy N-1.4 Protect special-status species and plant communities, including those listed by State and federal agencies and recognized organizations from the impacts of development and incompatible activities.
  - Program N1.4.1 Periodically review California Environmental Quality Act (CEQA) thresholds of significance regarding special status species to identify changes in listed species recommended by professionally recognized scientific experts.



- **Program N1.4.2** Explore the feasibility of expanding the use of overlay tools such as the Site and Design (D) Review Combining District or similar development review and restriction tools to protect special-status species and their habitats from development.
- **Program N1.4.3** Assess opportunities to expand habitats of special-status species within publicly owned open spaces.
- POLICY N-1.5 Preserve and protect the Bay, marshlands, salt ponds, sloughs, creeks, and other natural water or wetland areas as open space, functioning habitats, and elements of a larger, interconnected wildlife corridor, consistent with the Baylands Master Plan, as periodically amended, which is incorporated here by reference.
  - **Program N1.5.1** Maintain the value of local wetlands as habitats by ensuring adequate flow from the Bay and minimizing effluent.
- **POLICY N-1.6** Preserve and protect the foothills and hillside areas, recognizing their unique value as natural ecosystems and interconnected wildlife corridors.
  - **Program N1.6.1** Continue to coordinate City review, particularly by Planning, Public Works and Community Services Departments, of projects that might impact the City's foothills and hillside areas.

#### ACCESS AND RECREATION

POLICY N-1.7 Carefully manage access and recreational use of environmentally sensitive areas, including the baylands, foothills and riparian corridors, in order to protect habitats and wildlife from the impacts of humans and domesticated animals.



- **Program N1.7.1** Examine and improve existing management practices including the provision of access to open space for City vehicles and equipment, to ensure that natural resources are protected.
- Program N1.7.2 Protect wildlife in public open space areas by improving litter collection, restricting the use of non-recyclable plastics, prohibiting the feeding of wild, feral and stray animals in open space, and enforcing dog leash laws.
- **Program N1.7.3** Provide information about responsible behavior in environmentally-sensitive areas through signage, pamphlets and documents on the City's website.
- **Program N1.7.4** Review and map existing easements and maintenance roads for potential trails and trail connections.

#### NATURAL CHARACTER OF THE FOOTHILLS

- POLICY N-1.8 Minimize impacts of any new development on the character of public open space and the natural ecology of the hillsides.
- POLICY N-1.9 All development in the foothill portion of the Planning Area (i.e., above Junipero Serra Boulevard) should visually blend in with its surroundings and minimize impacts to the natural environment. As such, development projects should:
  - Not be visually intrusive from public roadways and public parklands.
  - > Be located away from hilltops.
  - Be clustered, or closely grouped, in relation to the area surrounding to reduce conspicuousness minimize access roads, and reduce fragmentation of natural habitats.
  - Include built forms and landscape forms that mimic the natural topography.
  - > Retain existing vegetation as much as possible.
  - Utilize natural materials and earth tone or subdued colors.
  - > Include landscaping composed of native species that require little or no irrigation.
  - > Include exterior lighting that is low-intensity and shielded from view.
  - > Include access roads of a rural rather than urban character.



#### EXPANSION OF PARKS AND OPEN SPACE

- POLICY N-1.10 Support regional and sub-regional efforts to acquire, develop, operate, and maintain a seamless open space system, including habitat linkages and trail connections extending north-south and east-west from Skyline Ridge to San Francisco Bay.
  - Program N1.10.1 Use City funds and seek additional sources of funding, including State and federal programs, to finance open space acquisition, maintenance or conservation.



- **Program N1.10.2** Create mechanisms to monitor, assess and respond quickly to land acquisition opportunities that would expand or connect the City's system of parks and open spaces, and establish a long-term funding strategy for acquisition that would enable the City to move quickly when opportunities arise.
- **POLICY N-1.11** Work with Stanford University, Santa Clara County, SCVWD and regional organizations to create multi-use trail connections between urban areas and open space, including creeks and rights-of-way, while ensuring that the natural environment is protected.
- POLICY N-1.12 Work with Stanford and Santa Clara County to preserve Stanford's foothill property northeast of Interstate 280. Act as an advocate to Santa Clara County to preserve open space links between Stanford, the urban area and the foothills.
- POLICY N-1.13 Evaluate and mitigate the construction impacts associated with park and recreational facility creation and expansion.

# URBAN FOREST AND UNDERSTORY

# GOAL N-2 A thriving urban forest that provides public health, ecological, economic, and aesthetic benefits for Palo Alto.

#### Role of the Urban Forest

POLICY N-2.1 Recognize the importance of the urban forest as a vital part of the city's natural and green infrastructure network that contributes to public health, resiliency, habitat values, appreciation of natural systems and an attractive visual character which must be protected and enhanced.

#### PALO ALTO COMPREHENSIVE PLAN NATURAL ENVIRONMENT ELEMENT

- Program N2.1.1 Explore ways to prevent and ameliorate damage to trees and tree roots by above and below ground infrastructure and buildings.
- POLICY N-2.2 Use the UFMP, as periodically amended, to guide City decisions related to all elements of Palo Alto's urban forest, from its understory habitat to canopy cover.
  - Program N2.2.1 Periodically update the UFMP and Tree Protection Ordinance to



ensure policies and regulations set leading standards for tree health practices.

- **POLICY N-2.3** Enhance the ecological resilience of the urban forest by increasing and diversifying native species in the public right-of-way, protecting the health of soils and understory vegetation, encouraging property owners to do the same and discouraging the planting of invasive species.
- **POLICY N-2.4** Protect soils in both urban and natural areas as the foundation of a healthy urban forest. Recognize that healthy soils are necessary to filter air and water, sustain plants and animals and support buildings and infrastructure.
  - **Program N2.4.1** Promote landscape design that optimizes soil volume, porosity, structure and health, as well the location, shape and configuration of soil beds.

#### PROTECTION AND EXPANSION

- **POLICY N-2.5** Enhance tree health and the appearance of streets and other public spaces through regular maintenance as well as tree and landscape planting and care of the existing canopy.
- **POLICY N-2.6** Improve the overall distribution of citywide canopy cover, so that neighborhoods in all areas of Palo Alto enjoy the benefits of a healthy urban canopy.
- **POLICY N-2.7** Strive toward the aspirational, long-term goal of achieving a 50 percent tree canopy cover across the city.
  - **Program N2.7.1** Maintain and irrigate healthy trees in parks, open space, parking lots and City rights-of-way, while identifying and replacing unhealthy trees in those areas.
  - **Program N2.7.2** Continue to invest in the care, irrigation and monitoring of street trees during drought conditions.

- **Program N2.7.3** Actively pursue funding for tree planting to increase canopy cover significantly across the city, avoid a net loss of canopy at the neighborhood level and attain canopy size targets in parks, open space, parking lots and City rights-of-way.
- **POLICY N-2.8** Require new commercial, multi-unit and single-family housing projects to provide street trees and related irrigation systems.
- POLICY N-2.9 Minimize removal of, and damage to, trees due to construction-related activities such as trenching, excavation, soil compacting and release of toxins.
  - Program N2.9.1 Increase awareness, severity and enforcement of penalties for tree damage.
  - **Program N2.9.2** Develop a program for using the City's Urban Forestry Fund to replace trees lost to public improvement and infrastructure projects, with replanting occurring onsite or as close to the original site as is ecologically appropriate.
- **POLICY N-2.10** Preserve and protect Regulated Trees, such as native oaks and other significant trees, on public and private property, including landscape trees approved as part of a development review process and consider strategies for expanding tree protection in Palo Alto.
  - Program N2.10.1 Continue to require replacement of trees, including street trees lost to new development.
  - **Program N2.10.2** As part of the update of the Tree and Landscape Technical Manual, consider expanding tree protections to include additional mature trees and provide criteria for making site-specific determinations of trees that should be protected.
  - **Program N2.10.3** Consider revisions to the permit process to increase transparency regarding tree removals and expanded opportunities for community members to appeal the removal of trees.
- POLICY N-2.11 Coordinate City review by the Urban Forester, Planning, Utilities, and Public Works Departments, of projects that might impact the urban forest.

Program N2.11.1 Develop a transparent and publicly accessible street tree removal and replacement schedule.

Program N2.11.2 Develop a program to replace unhealthy public trees over time.

#### PARTNERSHIPS FOR THE URBAN FOREST

- **POLICY N-2.12** Protect, revitalize, and expand Palo Alto's urban forest through public education, sensitive regulation and a long-term financial commitment that is adequate to protect this resource.
  - **Program N2.12.1** Explore ways to leverage the fact that Palo Alto's urban forest alleviates climate change by capturing and storing carbon dioxide.

#### PALO ALTO COMPREHENSIVE PLAN NATURAL ENVIRONMENT ELEMENT

- POLICY N-2.13 Partner and coordinate with organizations and individuals dedicated to the health of Palo Alto's urban forest.
  - Program N2.13.1 Work with local nonprofits to establish one or more tree planting programs that are consistent with the UFMP, and rely on locally native, resilient species. Review existing tree planting guidelines to ensure they achieve these objectives.
  - Program N2.13.2 Provide on-going education for City staff, residents and developers regarding landscape, maintenance and irrigation practices that protect the urban forest and wildlife species.
  - **Program N2.13.3** Involve tree owners in tree maintenance programs.



- **Program N2.13.4** Cooperate with the Palo Alto Unified School District, Stanford University, Caltrain, Caltrans, Pacific Gas & Electric, and other public and private entities to ensure that their tree planting, tree removal and maintenance practices are consistent with City guidelines.
- POLICY N-2.14 In order to protect, enhance and augment the urban forest along El Camino Real, Page Mill Road and Oregon Expressway, periodically revisit existing maintenance agreements with Caltrans and the County of Santa Clara.

# CREEKS AND RIPARIAN AREAS

- GOAL N-3 Conservation of both natural and channelized creeks and riparian areas as open space amenities, natural habitat areas and elements of community design.
- POLICY N-3.1 All creeks are valuable resources for natural habitats, connectivity, community design, and flood control, and need different conservation and enhancement strategies. Recognize the different characteristics along creeks in Palo Alto, including natural creek segments in the city's open space and rural areas, primarily west of Foothill Expressway; creek segments in developed areas that retain some natural characteristics; and creek segments that have been channelized. Pursue opportunities to enhance riparian setbacks along urban and rural creeks as properties are improved or redeveloped.

POLICY N-3.2 Prevent the further channelization and degradation of Palo Alto's creeks.

#### CREEK SETBACKS

POLICY N-3.3 Protect the city's creeks from the impacts of future buildings, structures, impervious surfaces and ornamental landscaping and preserve their function as habitat connectivity corridors by establishing a range of setback requirements that account for existing creek conditions, land use characteristics, property ownership and flood control potential.

> Program N3.3.1 Update the Stream Corridor Protection Ordinance to explore



150 feet as the desired stream setback along natural creeks in open space and rural areas west of Foothill Expressway. This 150-foot setback would prohibit the siting of buildings and other structures, impervious surfaces, outdoor activity areas and ornamental landscaped areas within 150 feet of the top of a creek bank. Allow passive or intermittent outdoor activities and pedestrian, equestrian and bicycle pathways along natural creeks where there are adequate setbacks to protect the natural riparian environment. Within the setback area, provide a border of native riparian vegetation at least 30 feet along the creek bank.

The update to the Stream Protection Ordinance should establish:

- Design recommendations for development or redevelopment of sites within the setback, consistent with basic creek habitat objectives and significant net improvements in the condition of the creek.
- Conditions under which single-family property and existing development are exempt from the 150-foot setback.
- > Appropriate setbacks and creek conservation measures for undeveloped parcels.
- **Program N3.3.2** Examine the development regulations of the Stream Corridor Protection Ordinance, with stakeholder involvement to establish appropriate setback requirements that reflect the varying natural and channelized conditions along creeks east of Foothill Expressway. Ensure that opportunities to provide an enhanced riparian setback along urban creeks as properties are redeveloped or improved are included in this evaluation.
- **Program N3.3.3** For all creeks, update the Stream Corridor Protection Ordinance to minimize impacts on wildlife by:
  - > Limiting the development of recreational trails to one side of natural riparian corridors.

Requiring careful design of lighting surrounding natural riparian corridors to maximize the distance between nighttime lighting and riparian corridors and direct lighting away from the riparian corridor.

#### MANAGEMENT AND ENHANCEMENT

- **POLICY N-3.4** Recognize that riparian corridors are valued environmental resources whose integrity provides vital habitat for fish, birds, plants and other wildlife, and carefully monitor and preserve these corridors.
  - **Program N3.4.1** Develop a community creek stewardship program to promote existing creek clean-up days, organize new events, and increase appreciation of riparian corridors.
- **POLICY N-3.5** Preserve the ecological value of creek corridors by preserving native plants and replacing invasive, non-native plants with native plants.
- **POLICY N-3.6** Discourage bank instability, erosion, downstream sedimentation, and flooding by minimizing site disturbance and nearby native vegetation removal on or near creeks and by reviewing grading and drainage plans for development near creeks and elsewhere in their watersheds.
  - **Program N3.6.1** Review and update the Grading Ordinance to ensure that it adequately protects creeks from the erosion and sedimentation impacts of grading.
- **POLICY N-3.7** Avoid fencing, piping and channelization of creeks when flood control and public safety can be achieved through measures that preserve the natural environment and habitat of the creek.
- POLICY N-3.8 Work with the SCWVD, San Francisquito Creek Joint Powers Authority (JPA) and other relevant regional and non-governmental agencies to enhance riparian corridors, provide compatible low-impact recreation and ensure adequate flood control.
  - **Program N3.8.1** Work with the SCVWD to develop a maintenance, restoration and enhancement program that preserves flood protection while preserving riparian habitat, and identifies specific stretches of corridor to be restored or daylighted, standards to be achieved and sources of funding. Include provisions for tree and vegetation planting to enhance natural habitat and shade cover.
  - **Program N3.8.2** Participate cooperatively in the JPA to achieve increased flood protection, habitat preservation, enhancement and improved recreational opportunities along San Francisquito Creek.

# WATER RESOURCES

# GOAL N-4 Water resources and infrastructure that are managed to sustain plant and animal life, support urban activities, and protect public health and safety.

#### WATER SUPPLY AND SAFETY

- POLICY N-4.1 Maintain a safe, clean and reliable long-term supply of water for Palo Alto.
- POLICY N-4.2 Maintain cost-effective citywide water conservation and efficiency programs for all customers, including low income customers, through education, rebates, assistance programs and building requirements.
  - Program N4.2.1 Educate customers on efficient water use (indoor and outdoor), tree care and landscaping options.
- POLICY N-4.3 Encourage owners of existing residential and commercial property to conserve water by modeling best practices including replacing inefficient plumbing fixtures in buildings, installing drought tolerant landscape and harvesting rainwater.



POLICY N-4.4 Manage water supply and water quality to reflect not only human use but also the water needed to sustain plant and animal life.

DROUGHT

- POLICY N-4.5 Support the development a multi-faceted approach to ensure resilient supply and management of water in Palo Alto, during significant periods of drought.
  - **Program N4.5.1** Study the supply and quality of local groundwater aquifers to better understand their utility as natural water storage.
  - **Program N4.5.2** Work with local public agencies to educate residents regarding the public health, fire and overall quality of life risks associated with long-term drought.

POLICY N-4.6 Retain and utilize rainwater on site to the extent possible.

Program N4.6.1 Encourage residents to use rain barrels or other rainwater reuse systems.

#### GROUNDWATER

- **POLICY N-4.7** Ensure regulation of groundwater use to protect it as a natural resource and to preserve it as a potential water supply in the event of water scarcity.
  - **Program N4.7.1** Support and participate in the work of the SCVWD to prepare a high-quality groundwater management plan that will address groundwater supply and quality, including, as appropriate:
    - > An understanding of subsurface hydrology.
    - > Strategies to reduce depletion.
    - Opportunities to recharge groundwater, including through use of recycled water and extracted groundwater.
    - Methods to ensure that uncontaminated, toxin-free groundwater is used in a manner that benefits the community, for example in irrigation of parks, street cleaning and dust suppression.
    - > An approach to metering extracted groundwater.
  - **Program N4.7.2** Support the SCVWD and the Regional Water Quality Control Board (RWQCB) to implement their mandate to protect groundwater from the adverse impacts of urban uses.
  - **Program N4.7.3** Work with the SCVWD and RWQCB to identify and map key groundwater recharge and stormwater management areas for use in land use planning and permitting and the protection of groundwater resources.
- **POLICY N-4.8** Conserve and maintain subsurface water resources by exploring ways to reduce the impacts of residential basement dewatering and other excavation activities.
  - **Program N4.8.1** Research and promote new construction techniques and recharge strategies developed to reduce subsurface and surface water impacts and comply with City dewatering policies.
  - **Program N4.8.2** Explore appropriate ways to monitor dewatering for all dewatering and excavation projects to encourage maintaining groundwater levels and recharging of the aquifer where needed.
- POLICY N-4.9 Work with neighboring jurisdictions and regional agencies to protect groundwater.

WATER QUALITY AND STORMWATER MANAGEMENT

POLICY N-4.10 Reduce pollution in urban runoff from residential, commercial, industrial, municipal, and transportation land uses and activities.

- Program N4.10.1 Monitor and implement practices for reducing water pollution. Examples include state-of-the-art best management practices (BMPs), land use planning approaches and construction of modern stormwater management facilities.
- Program N4.10.2 Continue public education programs on water quality issues, including BMPs for residents, businesses, contractors and City employees.



Program N4.10.3 Implement swift and rigorous spill

response, cleanup and follow-up investigation procedures to reduce the impacts of toxic spills on the city's creeks and San Francisco Bay.

- **Program N4.10.4** Increase monitoring and enforcement of existing prohibitions on materials and practices known to impact local water quality, such as use of copper, in the design and construction industries.
- POLICY N-4.11 Conduct regular street-sweeping to collect trash and road surface pollutants before they enter stormwater runoff.
  - **Program N4.11.1** Evaluate neighborhoods where parking controls may hinder street sweeping and recommend any changes that are needed.
- POLICY N-4.12 Promote sustainable low water and pesticide landscaping practices on both public and private property.
  - **Program N4.12.1** Implement the City's Integrated Pest Management Policy with periodic assessments of pesticide use and use of BMPs to reduce pesticide applications and toxicity and maximize non-chemical control.
  - **Program N4.12.2** Revise the City's Tree and Landscape Technical Manual to include stronger requirements for least-toxic practices in the landscape permitting process.
  - **Program N4.12.3** Promote the value of toxin-free landscape management, and educate residents about the impacts of common fertilizers, herbicides, insecticides and pesticides on local water quality.

#### PALO ALTO COMPREHENSIVE PLAN NATURAL ENVIRONMENT ELEMENT

- POLICY N-4.13 Encourage Low Impact Development (LID) measures to limit the amount of pavement and impervious surface in new development and increase the retention, treatment and infiltration of urban stormwater runoff. Include LID measures in major remodels, public projects and recreation projects where practical.
  - **Program N4.13.1** Promote the use of permeable paving materials or other design solutions that allow for natural percolation and site drainage through a Stormwater Rebate Program and other incentives.
  - **Program N4.13.2** Develop and implement a green stormwater infrastructure plan with the goal to treat and infiltrate stormwater.
  - **Program N4.13.3** Mitigate flooding through improved surface permeability or paved areas, and stormwater capture and storage.
- **POLICY N-4.14** Improve storm drainage performance by constructing new system improvements where necessary.
  - **Program N4.14.1** Establish a standardized process for evaluating the impacts of development on the storm drainage system, including point source discharge, base flow and peak flow.
  - **Program N4.14.2** Complete improvements to the storm drainage system consistent with the priorities outlined in the City's Storm Drainage Master Plan, as amended.

#### WASTEWATER TREATMENT

- POLICY N-4.15 Reduce the discharge of toxic materials into the City's sanitary sewer collection system by promoting the use of BMPs and reducing pollutant levels in City wastewater discharges.
  - Program N4.15.1 Work with commercial and industrial dischargers to identify and implement pollution prevention measures and BMPs to eliminate or reduce the discharge of metals and other pollutants of concern.



- **Program N4.15.2** Encourage commercial dischargers to consistently go beyond minimum requirements of the Clean Bay Business Program.
- POLICY N-4.16 Provide, maintain and operate wastewater treatment facilities, including maintaining adequate capacity at the Regional Water Quality Control Plant (RWQCP) located in Palo Alto, to accommodate projected economic and

	population growt water, clean air, a	h. Ensure that the plant operates in compliance with applicable local, State, and federal clean nd health and safety regulatory requirements.		
	Program N4.16.1	Implement approved recommendations based on the Long-Term Facilities Plan prepared for the RWQCP.		
	Program N4.16.2	2 Develop a plan to address ongoing operations of the RWQCP taking potential sea level rise and growth in surrounding communities into account.		
Recycled Water				
Policy N-4.17	Improve source c water, to maximiz	ontrol, treatment, and distribution of recycled water, including reducing the salinity of recycled e its use.		
	Program N4.17.1	Evaluate the expansion of existing recycled water infrastructure to serve a larger area. Develop a plan to install "purple pipe" when streets are opened for other infrastructure work.		
	Program N4.17.2	2 Evaluate the possibility of using recycled water as an emergency water supply.		
	Program N4.17.3	Investigate ways to reuse non-traditional water sources including recycled, gray, black and stormwater.		
Policy N-4.18	Require large new projects to provide systems that can accept recycled water for landscape irrigation and toilet and urinal flushing, consistent with the City's Recycled Water Ordinance, as amended.			
AIR QUALITY				
GOAL N-5	Clean, healthfu	l air for Palo Alto and the San Francisco Bay Area.		
Policy N-5.1	Support regional, importance to a h	State, and federal programs that improve air quality in the Bay Area because of its critical ealthy Palo Alto.		
	Program N5.1.1	Provide City input on significant proposals for air quality legislation and state implementation plans.		
	Program N5.1.2	Implement Bay Area Air Quality Management District (BAAQMD) recommended standards for the design of buildings near heavily traveled roads, in order to minimize exposure to auto-related emissions.		
	Program N5.1.3	Explore adopting new standards that target the reduction of very fine particulate matter ( $PM_{2.5}$ ), which is associated with increased impacts on health.		
Policy N-5.2	Support behavior changes to reduce emissions of particulates from automobiles.			

#### PALO ALTO COMPREHENSIVE PLAN NATURAL ENVIRONMENT ELEMENT

- **Program N5.2.1** Promote understanding of the impacts of extended idling on air quality, for residents, autodependent businesses and schools.
- **Program N5.2.2** Consider adopting and enforcing penalties for drivers that idle for longer than 3-5 minutes.
- **POLICY N-5.3** Reduce emissions of particulates from, manufacturing, dry cleaning, construction activity, grading, wood burning, landscape maintenance, including leaf blowers and other sources.
  - **Program N5.3.1** Cooperatively work with Santa Clara County and the BAAQMD to ensure that mining and industrial operations mitigate environmental and health impacts.
  - **Program N5.3.2** Monitor particulate emissions at local California Air Resources Board monitoring stations and make the information easily available to citizens.
  - **Program N5.3.3** Promote understanding of the health impacts of particulate emissions and provide information to residents and businesses about steps they can take to reduce particulate emissions, such as reducing or eliminating wood burning or using low emission alternatives to wood-burning stoves and fireplaces.
  - **Program N5.3.4** Explore feasible and cost-effective opportunities to reduce concrete and asphalt use by the City, in parks and other public projects.
- **POLICY N-5.4** All potential sources of odor and/or toxic air contaminants shall be adequately buffered, or mechanically or otherwise mitigated to avoid odor and toxic impacts that violate relevant human health standards.
- **POLICY N-5.5** Support the BAAQMD in its efforts to achieve compliance with existing air quality regulations by continuing to require development applicants to comply with BAAQMD construction emissions control measures and health risk assessment requirements.
- **POLICY N-5.6** Mitigate potential sources of toxic air contaminants through siting or other means to reduce human health risks and meet the BAAQMD's applicable threshold of significance. When siting new sensitive receptors such as schools, day care facilities, parks or playgrounds, medical facilities and residences within 1,000 feet of stationary sources of toxic air contaminants or roadways used by more than 10,000 vehicles per day, require projects to consider potential health risks and incorporate adequate precautions such as high-efficiency air filtration into project design.

# NOISE

### GOAL N-6 An environment that minimizes the adverse impacts of noise.

INTERIOR AND EXTERIOR AMBIENT NOISE AND PROJECT DESIGN

- POLICY N-6.1 Encourage the location of land uses in areas with compatible noise environments. Use the guidelines in Table N-1 to evaluate the compatibility of proposed land uses with existing noise environments when preparing, revising, or reviewing development proposals. Acceptable exterior, interior and ways to discern noise exposure include:
  - The guideline for maximum outdoor noise levels in residential areas is an L<sub>dn</sub> of 60 dB. This level is a guideline for the design and location of future development and a goal for the reduction of noise in existing development. However, 60 L<sub>dn</sub> is a guideline which cannot necessarily be reached in all residential areas within the constraints of economic or aesthetic feasibility. This guideline will be primarily applied where outdoor use is a major consideration (e.g., backyards in single-family housing developments, and recreational areas in multiple family housing projects). Where the City determines that providing an L<sub>dn</sub> of 60 dB or lower outdoors is not feasible, the noise level in outdoor areas intended for recreational use should be reduced to as close to the standard as feasible through project design.
  - Interior noise, per the requirements of the State of California Building Standards Code (Title 24) and Noise Insulation Standards (Title 25), must not exceed an L<sub>dn</sub> of 45 dB in all habitable rooms of all new dwelling units.
- POLICY N-6.2 Noise exposure(s) can be determined from (a) the noise contour map included in this plan, (b) more detailed noise exposure studies, or (c) on area-specific or project-specific noise measurements, as appropriate.
- Policy N-6.3 Protect the overall community and especially sensitive noise receptors, including schools, hospitals, convalescent homes, senior and child care facilities and public conservation land from unacceptable noise levels from both existing and future noise sources, including construction noise.
  - **Program N6.3.1** Continue working to reduce noise impacts created by events and activities taking place in communities adjoining Palo Alto.
  - **Program N6.3.2** Evaluate the feasibility of adopting noise criteria in the purchase of new City vehicles and equipment.
  - **Program N6.3.3** Update the Noise Ordinance, as needed, to provide for clear interpretation of the regulations, to review the effectiveness of existing standards, and to ensure that regulations address contemporary issues.

#### TABLE N-1 LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENT

			Exterior Noise Exposure L <sub>dn</sub> or CNEL, dB						
Land Use Category				60	65	70	75	80	
Residential, Hotel, & Motels									
Outdoor Sports & Recreation, Neighborhood Parks & Playgrounds									
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches									
Office Buildings, Business Commercial, & Professional									
Auditoriums, Concert Halls, & Amphitheaters									
Industrial, Manufacturing, Utilities, & Agriculture									
	Normally Acceptable	Specified land use is satisfactory, based upon convention, construction, without any special in	n the assum	nption that quirements	: any build s.	dings invol	ved are o	of normal	
	Conditionally Acceptable	Specified land use may be permitted only after needed noise insulation features included in th	er detailed e design.	analysis of	the noise	e reduction	requirem	ients and	

New construction or development should generally not be undertaken because mitigation is usually not

Source: City of Palo Alto, 2017.

Unacceptable

**POLICY N-6.4** Minimize roadway noise through prudent street, flow and right-of-way design.

feasible to comply with noise element policies.

NEW PERMANENT NOISE SOURCES

- POLICY N-6.5 Protect residential and residentially-zoned properties from excessive and unnecessary noise from any sources on adjacent commercial or industrial properties.
- **POLICY N-6.6** Apply site planning and architectural design techniques that reduce overall noise pollution and reduce noise impacts on proposed and existing projects within Palo Alto and surrounding communities.
- **POLICY N-6.7** While a proposed project is in the development review process, the noise impact of the project on existing residential land uses, public open spaces and public conservation land should be evaluated in terms of the increase in existing noise levels for the potential for adverse community impact, regardless of existing background noise levels. If an area is below the applicable maximum noise guideline, an increase in noise up to the maximum should not necessarily be allowed.

	<b>Program N6.7.1</b> Update noise impact review procedures in the Noise Ordinance and the Zoning Code to address appropriate requirements for analysis and thresholds for impacts on residential land uses and publicly owned conservation land.					
Policy N-6.8	The City may require measures to reduce noise impacts of new development on adjacent properties through appropriate means including, but not limited to, the following:					
	<ul> <li>Orient buildings to shield noise sensitive outdoor spaces from sources of noise.</li> <li>Construct noise walls when other methods to reduce noise are not practical and when these walls will not shift similar noise impacts to another adjacent property.</li> <li>Screen and control noise sources such as parking lots, outdoor activities and mechanical equipment, including HVAC equipment.</li> <li>Increase setbacks to serve as a buffer between noise sources and adjacent dwellings.</li> <li>Whenever possible, retain fences, walls or landscaping that serve as noise buffers while considering design, safety and other impacts.</li> <li>Use soundproofing materials, noise reduction construction techniques, and/or acoustically rated windows/doors.</li> <li>Include auxiliary power sources at loading docks to minimize truck engine idling.</li> <li>Control hours of operation, including deliveries and trash pickup, to minimize noise impacts.</li> </ul>					
Policy N-6.9	Continue to require applicants for new projects or new mechanical equipment in the Multifamily, Commercial, Manufacturing or Planned Community districts to submit an acoustical analysis demonstrating compliance with the Noise Ordinance prior to receiving a building permit.					
Policy N-6.10	Continue to regulate noise from leaf blowers and residential power equipment.					
	<b>Program N6.10.1</b> Evaluate changes to the Noise Ordinance to further reduce the impacts of noise from leaf blowers and residential power equipment.					
Construction No	DISE					

- **POLICY N-6.11** Continue to prioritize construction noise limits around sensitive receptors, including through limiting construction hours and individual and cumulative noise from construction equipment.
  - **Program N6.11.1** For larger development projects that demand intensive construction periods and/or use equipment that could create vibration impacts, such as the Stanford University Medical Center or major grade separation projects, require a vibration impact analysis, as well as formal, ongoing monitoring and reporting of noise levels throughout the entire construction process pertinent to industry standards. The monitoring plan should identify hours of operation and could include information on the monitoring locations, durations and regularity, the instrumentation to be used and appropriate noise control measures to ensure compliance with the noise ordinance.

#### AIRPORTS AND AIRCRAFT

POLICY N-6.12 Ensure compliance with the airport related land use compatibility standards for community noise environments, shown in Table N-1, by prohibiting incompatible land use development within the 60 dBA CNEL noise contours of the Palo Alto airport.

Program N6.12.1 Continue working to reduce noise associated with operations of the



Palo Alto Airport. Also, ensure compliance with the land use compatibility standards for community noise environments, shown in Table N-1, by prohibiting incompatible land use development within the 60 dBA CNEL noise contours of the airport.

**Program N6.12.2** Participate in appropriate public forums and engage with other governmental agencies and representatives to ensure that activities at airports in the region do not negatively affect noise levels in Palo Alto.

#### Rail

- POLICY N-6.13 Minimize noise spillover from rail related activities into adjacent residential or noise-sensitive areas.
  - **Program N6.13.1** Encourage the Peninsula Corridors Joint Powers Board to pursue technologies and grade separations that would reduce or eliminate the need for train horns/whistles in communities served by rail service.
  - Program N6.13.2 Evaluate changing at-grade rail crossings so that they qualify as Quiet Zones based on Federal Railroad Administration (FRA) rules and guidelines in order to mitigate the effects of train horn noise without adversely affecting safety at railroad crossings.
  - **Program N6.13.3** Participate in future environmental review of the California High-Speed Rail (HSR) Project, planned to utilize existing Caltrain track through Palo Alto, to ensure that it adheres to noise and vibration mitigation measures.

# POLICY N-6.14 Reduce impacts from noise and ground borne vibrations associated with rail operations by requiring that future habitable buildings use necessary design elements such as setbacks, landscaped berms and soundwalls to keep interior noise levels below 45 dBA Ldn and ground-borne vibration levels below 72 VdB.

# **ENERGY**

## GOAL N-7 A clean, efficient energy supply that makes use of cost-effective renewable resources.

- **POLICY N-7.1** Continue to procure carbon neutral energy for both long-term and short-term energy supplies, including renewable and hydroelectric resources, while investing in cost-effective energy efficiency and energy conservation programs.
  - **Program N7.1.1** Meet customer electricity needs with least total cost resources after careful assessment of environmental cost and benefits.
- **POLICY N-7.2** Advance the development of a "smart" energy grid, a diverse energy resource portfolio, and technologically advanced public utilities as a key part of a smart and connected city.
  - **Program N7.2.1** Promote the adoption of cost-effective, renewable energy technologies from diverse renewable fuel sources by all customers.
  - Program N7.2.2 Assess the feasibility of using life cycle analysis and total cost of ownership analysis for public and private projects, funded by the project proponent, in order to minimize the consumption of energy, the production of greenhouse gases, including GHG emissions of construction materials and demolition and costs over the life of the project.
- **POLICY N-7.3** Prioritize the identification and implementation of cost-effective, reliable and feasible energy efficiency and demand reduction opportunities.
- POLICY N-7.4 Maximize the conservation and efficient use of energy in new and existing residences and other buildings in Palo Alto.
  - **Program N7.4.1** Continue timely incorporation of State and federal energy efficiency standards and policies in relevant City codes, regulations and procedures and higher local efficiency standards that are cost-effective.
  - **Program N7.4.2** Implement cost effective energy efficiency programs for all customers, including low income customers.
  - **Program N7.4.3** Incorporate cost-effective energy conservation measures into construction, maintenance and City operation and procurement practices.
  - **Program N7.4.4** Implement gas and electric rates that encourage efficient use of resources while meeting State law requirements that rates be based on the cost of service.
  - **Program N7.4.5** Continue to provide public education programs addressing energy conservation and efficiency.

POLICY N-7.5 Encourage energy efficient lighting that protects dark skies and promotes energy conservation by minimizing light and glare from development while ensuring public health and safety.

POLICY N-7.6 Support the maximum economic use of solar electric (photovoltaic) and solar thermal energy, both as renewable supply resources for the Electric Utility Portfolio and as alternative forms of local power generation.



**Program N7.6.1** Explore changes to building and zoning codes to incorporate solar

energy, energy storage and other energy efficiency measures into major development projects, including City-owned projects.

- **Program N7.6.2** Promote use of the top floors of new and existing structured automobile garages for installation of photovoltaic panels and green roofs.
- Program N7.6.3 Promote solar energy in individual private projects.
- **POLICY N-7.7** Explore a variety of cost-effective ways to reduce natural gas usage in existing and new buildings in Palo Alto in order to reduce associated greenhouse gas emissions.
  - **Program N7.7.1** Evaluate the potential for a cost-effective plan for transitioning to a completely carbon-neutral natural gas supply.
  - **Program N7.7.2** Explore the transition of existing buildings from gas to electric or solar water and space heating.
- POLICY N-7.8 Support opportunities to maximize energy recovery from organic materials such as food scraps, yard trimmings and residual solids from sewage treatment.
  - **Program N7.8.1** Evaluate energy efficient approaches for the treatment and reuse of organic waste that maximize resource recovery and reduce greenhouse gas generation at the RWQCP located in Palo Alto and the Palo Alto Landfill.

Program N7.5.1 Monitor professional and medically-sound research and studies on light-emitting diodes (LEDs).

# CLIMATE CHANGE AND CLIMATE ADAPTATION

# **GOAL N-8** Actively support regional efforts to reduce our contribution to climate change while adapting to the effects of climate change on land uses and city services.

- POLICY N-8.1 Take action to achieve target reductions in greenhouse gas emission levels from City operations and the community activity of 80 percent below 1990 levels by 2030.
  - Program N8.1.1 Participate in cooperative planning with regional and local public agencies, including on the Sustainable Communities Strategy, on issues related to climate change, such as greenhouse gas



reduction, water supply reliability, sea level rise, fire protection services, emergency medical services and emergency response planning.

- **Program N8.1.2** Pursue or exceed State goals of achieving zero net carbon for residential buildings by 2020 and commercial buildings by 2030, without compromising the urban forest.
- **POLICY N-8.2** With guidance from the City's Sustainability and Climate Action Plan (S/CAP) and its subsequent updates and other future planning efforts, reduce greenhouse gas emissions from City operations and from the community.
  - **Program N8.2.1** Periodically update the S/CAP consistent with the update schedule in the approved S/CAP; this update shall include an updated greenhouse gas inventory and updated short, medium and long-term emissions reduction goals.
- **POLICY N-8.3** Prioritize infrastructure improvements that address adaptation of critical facilities to climate change in the Capital Improvement Program (CIP) five-year plan.
  - **Program N8.3.1** Protect the Municipal Services Center, Utility Control Center, and RWQCP from the impacts of sea level rise.
- **POLICY N-8.4** Continue to work with regional partners to build resiliency policy into City planning and capital projects, especially near the San Francisco Bay shoreline, while protecting the natural environment.
  - **Program N8.4.1** Prepare response strategies that address sea level rise, increased flooding, landslides, soil erosion, storm events and other events related to climate change. Include strategies to respond to the impacts of sea level rise on Palo Alto's levee system.

NATURAL ENVIRONMENT ELEMENT