

Chapter Nine

Environment

Introduction

The natural geologic and geographic features of land within and surrounding the City limits of Provo contribute to the visually spectacular setting for Provo, provide habitat for a widely diverse range of plant and animal life, affect the year-round climate of the area, and provide abundant opportunities for recreation on land and water. These features, along with their many associated resources, attract and support industry and thriving residential, business and academic communities.

These natural features also affect, and sometimes constrain, the development of land, the design and construction of infrastructure to support development, and use of resources within the natural environment. Land development and associated activities can also impact the natural environment in harmful ways. General Plan policies for future development should consider “environmental issues” – issues resulting from the interaction between the natural environment and the built environment.

This element identifies issues and concerns relating to protection of the environment, as well as to the impacts and constraints of natural features on the wise use of land. This element of the General Plan examines critical environmental issues and considers means of preserving the environment for the future. Inherent in these considerations is the need to build responsibly so as to ensure human safety and to reduce the risk of property damage.

A number of federal environmental regulations also have an impact on the planning and implementation of projects within the developed environment. These include the Clean Air Act, the Clean Water Act, and the National Environmental Protection Act (NEPA).

Natural Resources

Provo City is rich in natural resources. Some resources are visible in the landscape, while others are buried in the soil. “Conservation” refers to the wise use of resources – developing resources, while respecting the need to ensure future viability of these and related resources. Definitions of “conservation” include phrases such as, “to protect from loss or depletion,” and “to use carefully.” Other terms are often used in relation to protection of undisturbed resources (“preservation”), to the repair of environmental damage to return land to its previous state (“restoration”), and to offset damage in one area by enhancing the natural environment in other areas (“mitigation”). Natural resource usage should be tempered with wisdom and governed by a vision of future needs and desires for the natural, physical environment.

The following sections will consider the City's natural resources – air, forests, soils, rivers, wildlife, minerals – and make recommendations for the protection, conservation, development, and use of these resources.

Air

In 1970, Congress passed the Clean Air Act, which established ambient air quality standards for several types of air pollution. The Clean Air Act Amendments of 1990 were passed in an effort to reemphasize the air quality standards. They established deadlines for progress to be achieved in non-attainment areas with accompanying federal funding and penalties for noncompliance. The amendments require that all federally-funded highway and transit projects come from a Transportation Plan and Transportation Improvement Program (TIP) that conforms with the latest State [Air Quality] Implementation Plans (SIPs).

“Non-attainment areas” are those areas that were found to repeatedly violate the National Ambient Air Quality Standards (NAAQS). In Utah County, this happened in the late 1980s. Non-attainment areas are classified as marginal, moderate, serious, severe, or extreme. Counties can become non-attainment areas for one or more of four pollutants: particulate matter (PM₁₀), sulfur dioxide (SO₂), carbon monoxide (CO) and ozone (O₃). As of January, 2010, Utah County is designated as non-attainment for PM₁₀.¹

Utah County may encounter strong winter-time temperature inversions that trap air in the valley. As particles are emitted into the stagnant air, concentrations may increase to levels that could exceed the national standard. The primary manmade components of PM₁₀ include nitrogen oxides (NO_x), fugitive dust from road sanding, motor vehicles, combustion of solid fuels, agricultural activities, and construction services. About 60% of PM₁₀ emissions in Utah County are attributed to motor vehicles; the rest come from industrial and area-wide sources. Control strategies include the wood burning restrictions program, encouraging combustion of natural gas rather than coal during winter at major industrial sources, continuing inspection and maintenance programs for automobiles, and encouraging alternative transit modes.

The primary manmade source of CO is the incomplete combustion of fuels such as gasoline. Local weather conditions and the increasing number of automobiles in the area influence CO levels. Control strategies for CO emissions include wood burning restrictions during winter months, which are defined by red, yellow, or green burn days. Since mobile emissions are the primary source of CO, a number of control strategies are directed toward motor vehicles; strategies include enhanced vehicle inspection and maintenance programs, the oxygenated fuels program, roadside enforcement of vehicle emission standards, ridesharing programs, and transportation control measures such as transit improvements and parking lot permits from the Utah Division of Air Quality. It is important to note that the control strategies imposed by the SIP in Utah County have been immensely successful. It has been more than a decade since exceedance was noted in PM₁₀ and since 1996 that exceedance was registered in Provo City for CO.

¹ Environmental Protection Agency, Carbon Monoxide Nonattainment Area Report. Retrieved online Apr 27, 2010 at (<http://www.epa.gov/oaqps001/greenbk/pnca.html>).

Not meeting the air quality standards developed by the federal government can result in the loss of federal funding for transportation projects. Unless the region's Long Range Transportation Plans and the Transportation Improvement Program can be shown to conform with Environmental Protection Agency regulations, no new capacity-increasing highway or transit projects that are regionally significant may be implemented. The policies that must be implemented to ensure cleaner air may be strict, but achieving clean air has become critical not only to community health, but also to moving forward with any new transportation projects. Provo City will continue to investigate and implement transportation-related measures to reduce air pollution. Recent improvements in air quality have led to a determination that the oxygenated fuels program will not be required for year 2005 in Utah County.

Forests

Provo City owns many forested acres in the South Fork and Squaw Peak areas. These lands lie next to United States Forest Service lands. While these forests are to be enjoyed, they are also important watershed areas. Strict enforcement of watershed policies is needed to maintain the water supply quality. Forested lands are designated in the General Plan as Developmentally Sensitive (DS).

Provo City has an urban forestry program that manages the public tree resources within Provo City. Trees are valuable to the city in terms of the appearance and microclimate of neighborhoods. Efforts should be continued in the management of a sustainable urban forest. New trees should be planted on a systematic basis to replace trees that decline in health due to urban impacts, old age, or insects/disease. The City's urban forestry program should continue to provide guidance to citizens regarding the selection, planting, and proper maintenance of trees citywide. This guidance should include educational information on appropriate pruning of mature trees, including the avoidance of "topping," which creates an unnatural appearance for deciduous trees and eventual decline in the health of individual trees and the urban forest.

Soils

In order to provide the best mix of future land uses, the capability of the land to support a specific use, and the compatibility of the current land use with the proposed future use, must be considered.

Soils vary in terms of their suitability for agricultural, residential, public facility, commercial, and industrial uses. Knowledge of soil types is very important when determining land uses. Areas with shallow water tables have limited use for foundations and septic tanks. Steep slopes with rocky soils place severe limitations on foundations and other underground building features.

Soil Limitations for Foundations

When placing a foundation, the potential for settling, cracking, and flooding of basements needs to be considered. The weight capacity of the soil is important in such considerations.

Rivers

The Parks and Recreation Department, which has been actively developing the riverside parks system, monitors and maintains the levees in cooperation with the Storm Water Division of the

Public Works Department. The 1983 floods made clear the need to develop a storm drain system that would protect property, decrease soil erosion, and prevent toxic materials from entering the natural stream system that runs through the heart of Provo City. Several million dollars have been spent to upgrade the system. Improving the storm drain system is a primary function of the Storm Water Division of the Public Works Department. (For more details, please refer to the Storm Water subsection of the Public Services and Facilities Element in Chapter Ten. For more information concerning flooding, see the Flood Hazard and Control heading, below.)

Wildlife

In the process of identifying, preserving, and mitigating wetlands (creating new wetlands to offset the loss of wetlands that are eliminated or compromised during the course of land development), the City has effectively protected habitats and created new wildlife habitats for waterfowl and other aquatic life. The land west and south of Provo along Utah Lake and the land south of East Bay are prime locations for wildlife preserves and are to remain wetlands.

Parts of west Provo are being considered as additional wildlife preserves. The creation of a wetland bank will be valuable to Provo's future development potential. The designation of Developmentally Sensitive (DS) protects natural habitats and local deer trails.

Minerals

At present there are no active mining operations within Provo, and none are anticipated in the future.

Land Use Regulation

Hillsides

Areas generally located above the approximate 5,200-foot level of the east bench are designated in the General Plan as Developmentally Sensitive (DS). The ancient Lake Bonneville shoreline hovered at this altitude. Gilbertian fresh water deposits from glacial run-off during the Pleistocene Era (Ice Age) entered Lake Bonneville. These consolidated conglomerate deposits occur in sloping areas with steep grades. Their proximity to the Wasatch Fault Line also contributes to the unstable nature of the land. The existing and future Bonneville Shoreline Trail is just below the actual shoreline and follows the Questar Gas easement, which acts as a buffer and provides transition between the higher slopes and development existing or planned at lower elevations.

Land at this altitude along the east bench of Provo has been determined to have a greater incidence of poor stability for construction due to soils, slopes and faulting. The east-bench DS designation was mapped in general correlation with the 5,200-foot elevation or by concentration of slopes 25 percent or greater, with some adjustment to reflect existing development. Capabilities for providing fire control, water and other services above the 5,200-foot level are also development impediments. Access to these areas is very limited, and new roads are difficult to construct due to grade limitations and soil stability.

For these reasons, any new development or construction to be considered for these areas will require geologic and soils testing and slope analysis by a qualified professional to determine suitability for development. As in other areas of the city with steep slopes or other natural limitations, development within these lands is generally subject to the Sensitive Lands ordinance of Title 15, Land Use and Development. Disturbance of hillsides with slopes greater than 30 percent is prohibited by this ordinance. Other community interests in preserving hillside views from the valley, protecting significant geologic features that give character to the land, and preserving open space may not be related to geologic stability or feasibility of engineering solutions to development. They are, however, considerations that are relevant to the long-term planning of Provo City and may be factors in restricting or limiting development on the hillsides.

Other lands designated Developmentally Sensitive(DS) are west of I-15, incorporating significant land areas along the shoreline of Utah Lake. This designation reflects wetlands that provide valuable environmental benefits; these areas must be given special consideration in development in accordance with federal, state and local laws. Lands designated as DS also include areas of potential flooding and high water tables, both of which figure into the determination of the types of development suitable for these lands and any special construction limitations for uses in these areas.

Title 15 Land Use and Development, of the Provo Municipal Code, was amended in 1999 to adopt Chapter 15.05, Sensitive Lands, regulating the development of land with particular geologic, hydrologic, and topographic features and limitations. This chapter addresses:

1. high-risk development,
2. uses and actions prohibited due to geologic or topographic features, soil conditions, or presence of surface or groundwater,
3. procedures to minimize risk to the project and to the environment,
4. special engineering or geologic evaluation and reporting requirements,
5. standards for hillside development where slopes exceed ten percent,
6. development in high water table and wetland areas, and
7. professional qualifications required for environmental studies and related reporting.

Other chapters of the Zoning (Title 14) and Land Use and Development (Title 15) ordinances have been adopted to modify development standards where opportunities may be realized to preserve open lands, reduce impacts to land features and vegetation, establish conservation easements, or eliminate mass grading where topography is a desirable natural feature within the built environment. These include the Subdivision ordinance in Title 15 and elements of the Planned Development, Research and Business Park, and Planned Industrial Commercial zones.

Protection of Water Quality

Watersheds

Watersheds critical to Provo City's spring collection areas exist in several areas of Provo Canyon as well as South Fork of Provo Canyon. Watershed areas for surface waters tributary to the Provo River are much more extensive and extend all the way to the Upper Provo River drainageways.

Provo City has adopted a Watershed Protection Ordinance designed primarily to protect the City's pristine spring collection areas from potential contamination. This ordinance is based upon State law which allows a municipality to exercise extraterritorial jurisdiction in watershed areas. While the ordinance is not intended to prohibit any or all development in watershed areas, it does allow the City to regulate development in such a way as to protect the integrity of the City's sources of water supply.

Wetlands

Wetlands play an important role in the ecological system. They are recharge zones for natural aquifers and ground water reservoirs. Wetlands provide a habitat for many varieties of aquatic, land, and waterfowl wildlife. Natural beauty is sustained by wetlands. Wetlands can be created and incorporated into the landscape of industrial parks, subdivisions, and shopping centers. This is being done already in areas of the city (for example, East Bay Business Park and golf course), but additional incentives to create and preserve wetlands in appropriate locations may be desirable.

Storm Drainage

As wetlands are natural recharge zones which are necessary for continued replenishment of groundwater, concerns arise with respect to development. Rain water run-off is ordinarily absorbed into the ground. However, as open lands are replaced with impervious surfaces such as buildings, streets, and parking lots, this natural recharge process is disrupted.

On impervious surfaces, oil, antifreeze, and other toxic substances (including those deposited on streets by the exhaust systems or leaking transmissions of automobiles) are concentrated and redirected into the storm drainage system, which drains directly into the rivers and lakes. In short, these substances are never broken down biologically, as they should be, because toxins are not filtered through the soil, as occurs with natural recharge, or treated at the wastewater treatment plant, as with discharges to the sanitary sewer system. As a result, these pollutants threaten to contaminate surface waters. Significant amounts of common pollutants, or even smaller amounts of regulated pollutants, may also be discharged into soils with the resulting contamination of ground water. As these types of pollutants are not typically identified with a specific "point source," such as an industrial plant with regulated discharges, these are categorized as "nonpoint source" pollutants.

Increasing levels of pollutants in water sources may lead to additional regulation of municipalities under federal and State pollution control laws, resulting in additional costs to municipalities for treating and controlling storm water discharges to waterways. Programs to educate citizens on responsible maintenance of automobiles and disposal of waste materials, ordinances regulating the amount of impervious surface within a development, and standards to reduce pavement by improving efficiency in the design of streets may enhance storm water collection and discharge programs established under the Municipal Services and Facilities chapter of this plan. Other Land Use and Development ordinances regulate requirements for grading and drainage plans and establish requirements for soil testing, flood control, and conveyance of runoff water from developed land, which may have the additional benefit of reducing silt and other discharges affecting surface water quality.

Flood Hazard and Control

Soil Drainage and Overflow Hazard

Flood hazards must be recognized when locating housing, business, or industry. The federal government has issued specific regulations to cities where extensive flood areas are located. Thus, knowing which soils are susceptible to flooding and the overall drainage capabilities of soils in Provo is important. Generally, floods have occurred near Utah Lake in poorly drained, lower lying areas which are susceptible to rising water levels. Serious flash flooding has occurred along the Provo River and in the mouths of both Slate and Rock Canyons. The last major floods of this nature were in 1983 and 1984. With the addition of the Jordanelle Dam upstream of the Deer Creek Dam, greater capacity is available to store runoff and to manage potential flooding through control of these two dams as a system.

Flood Insurance Study

A flood insurance study for the city has been developed by the Federal Emergency Management Agency (FEMA). The study includes flood insurance rate maps that identify areas of the city subject to flooding during 100 year flood episodes. Land use policies should discourage dense development in flood hazard areas. Zoning ordinance provisions can be utilized to ensure that development in flood hazard areas occurs in accordance with FEMA regulations. Administration of flood zone regulations consistent with federal law enables Provo citizens to be eligible for participation in the national flood insurance program.

Upstream of Provo, the Deer Creek Dam on the Provo River is managed by the Provo River Water Users Association. This facility helps provide for the water needs of the community. Although there is no cause for concern at this time, extraordinary events could lead to the failure of this dam. In 2002, the U. S. Department of the Interior, Bureau of Reclamation, re-mapped the approximate areas that would be affected by such an event in order to provide information for public and emergency service providers who must prepare response plans in anticipation of this unlikely event.

Geological Hazards

Safety is a primary concern when discussing the environment. Because Provo lies along the Wasatch Fault, one of the largest continuous fault lines in the United States, Provo development may be impacted by the potential for rock fall, faults, earthquakes and liquefaction, land slides, and strata expansion. The City Engineering Division coordinates with the State of Utah Geologist in assessing risk factors and appropriate design and mitigation for projects within geologically active areas. Building codes administered by the City Building Inspection Division also address the stability of buildings potentially affected by seismic activity.

Rock Fall

Frost wedging can cause boulders to fall from the mountains of the Wasatch Range. Homes located in the foothills are at risk to potential rock fall. As boulders fall and roll through the gullies and ravines of the hillside, it is possible that a multi-ton boulder may find its resting place in a residential area. While it is too late to protect existing homes from this danger, caution must be taken to

prevent new homes from being built in the path of potential rock falls, avoiding possible damage to persons and property. There has been two major boulders that have broken off from the cliffs above Provo and fallen during the spring thaw period, causing significant damage to two homes bordering the Y Mountain area. Future planning for development along the mountainside should consider this issue and explore measures to balance development needs with the potential for future damage to structures and lives.

Faults, Earthquakes and Liquefaction

There is great potential for earthquake damage along the Wasatch Front. Areas with high risk of earthquake damage due to liquefaction (soil liquefaction as a result of ground movement) are found throughout the city (see Map # 9.1 Liquefaction Hazards Map). The river bottoms and the west side, especially near Utah Lake, are areas in danger of damage caused by liquefaction. Special engineering standards and additional code requirements must be met to build in these areas.

Earthquake hazards in Provo are important considerations for planning. Map #9.2 Geologic Hazards Map shows two major faults exposed in the mountains east of Provo and two inferred faults, one in the mountains and one in the valley. The term “inferred fault” means that somewhere between the mountains and Utah Lake there is probably an additional fault. An exact location of this fault would be difficult to pinpoint. The following general considerations should be made with respect to planning in fault areas:

1. Major hazards caused by earthquakes are violent ground movement, soil instability, ground shifts, rock slides, and snow slides.
2. Hazardous effects to structures and development can be tempered by sound planning and engineering which identifies and protects areas of greatest concern.

Through compliance with seismic codes and building regulations, earthquake damage can be minimized in the central area of Provo. The inferred fault need not be a major obstacle to development or new construction in Provo City.

Land Slides

Along the Wasatch Front, alluvium or unconsolidated strata is deposited at the canyon mouths. This land can move in what is called a land slide or slump. When the water table rises, soils become saturated. Water adds weight to the soil, causing movement down the slope. This movement is very rapid at times and can cause major property damage and, occasionally, loss of life.

Strata Expansion

The Manning Canyon Shale Formation and its related problems for development are common along the Wasatch Front. This formation is characterized by soils and strata that expand and shift when saturated. Many building foundations have been displaced and cracked in areas associated with this formation, in particular along the higher benches, due to strata expansion.

Extensive areas affected by strata expansion and rock fall have been identified through geologic research. The public needs to be made aware of incentives and funds available to land owners who want their lands designated as permanent open spaces, or who will record conservation easements

on their lands, or who will grant public access across their lands for nature trails or parks. These opportunities to provide open spaces and recreational access – and to prevent problems associated with development of sensitive lands – could be beneficial to the community in ways not yet realized.

Conclusion

Environmental issues are interrelated with many aspects of the General Plan. Decisions affecting the environment affect everyone who lives in that environment and warrant careful consideration. The natural environment may also significantly impact planning and processes associated with the built environment and influence development patterns within the city. The use of sound community planning, urban design and engineering principles, combined with a respect for natural values that contribute to the quality of life within and around Provo, can help us to wisely use the resources available to us and ensure their long-term survival for the good of future generations.

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