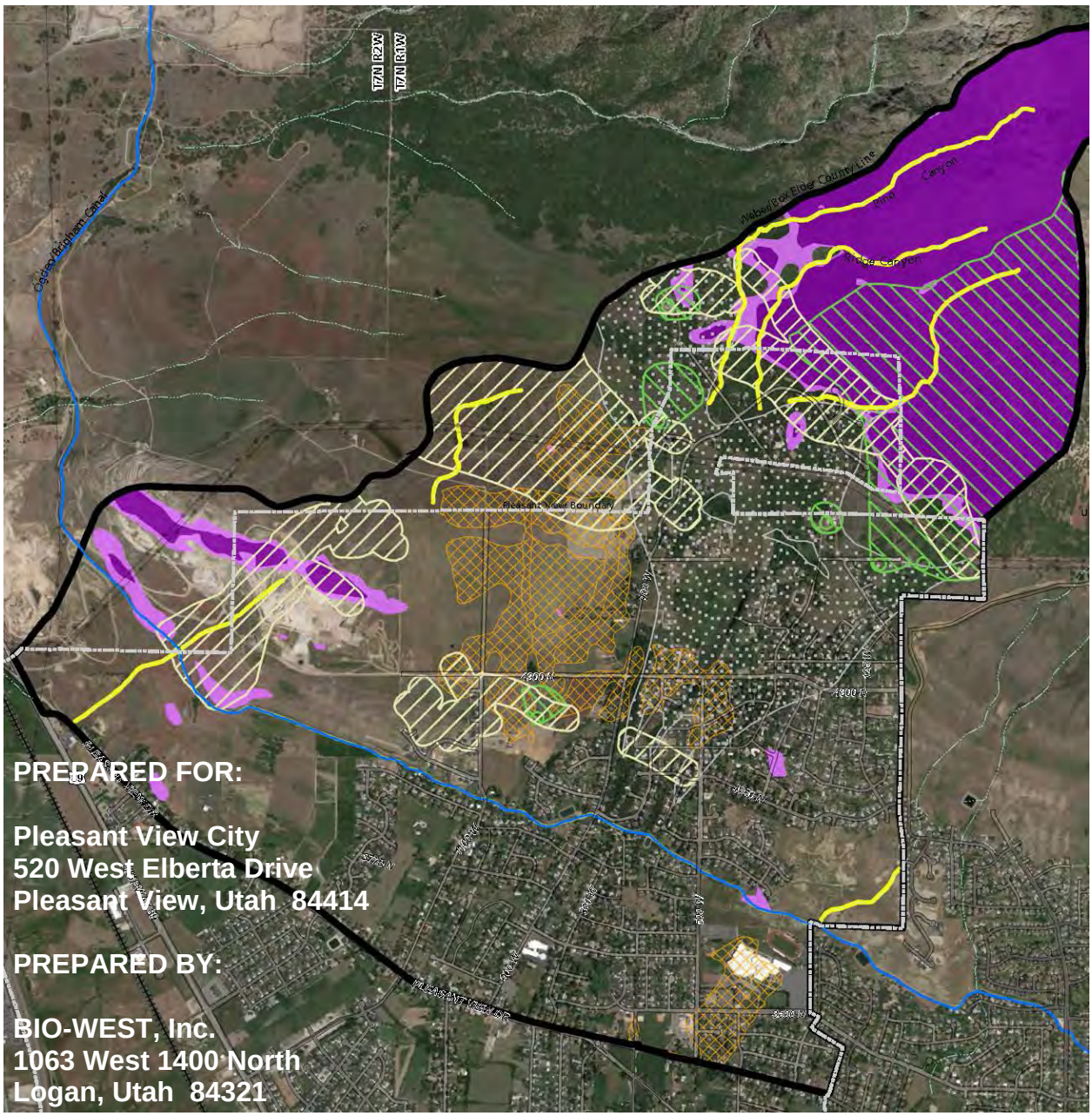
PLEASANT VIEW CITY FOOTHILL AREA LAND PLANNING STUDY

March 2016



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1.0 PREFACE

Over the past ten years Pleasant View City (City) has experienced substantial residential development, and current development is beginning to encroach upon the City's sensitive foothill areas. Areas previously identified as sensitive have had an agricultural zoning (e.g., A-5, five-acre lot size minimum) since before the City managed its own land use development when planning functions were administered by Weber County. In the last year though, there have been pressures to consider general plan amendments and re-zonings that could potentially cause drastic changes in the foothill area vicinity. Continued development in this area is of particular concern because it may negatively affect important community resources, such as wildlife habitat and groundwater quality, and because naturally occurring hazards, such as landslides and earthquake faults, may make certain areas unsafe for future residents.

City officials hired BIO-WEST to conduct a comprehensive land planning study to obtain information that could be used in the proper management of future growth in the City's foothill study area, which includes a major portion of the City's undeveloped land. It is with this foresight and within this context that the Pleasant View City Foothill Area Land Planning Study (the Study) was initiated. A major objective of the Study is to provide the City with effective tools that can be used to guide future growth and development in the study area, ensuring that the health, safety, and welfare of Pleasant View residents is not compromised. The tools developed for this Study include:

- Natural Resource Inventory Maps
- Natural Resource Constraints Maps
- Potential Development Scenario Maps
- Recommended Development Master Plan Map
- Recommended Development Guidelines

The tools developed for this Study rely on the accuracy of data incorporated from previously completed studies, in particular the Natural Constraints to Urban Development in the North Ogden Area study (Ridd and Kaliser 1978), and additional limited fieldwork performed during the summer of 2015 to verify existing information. Any additional studies regarding resources within the study area that are currently being prepared, and other future studies that pertain to the study area, should also be considered when development proposals are presented to the City.

This Study provides information and recommendations for developers, residents, elected officials, and City staff to use, as the study area is developed over time. This Study is designed to guide development, not to constrain or restrict it. Visioning of future development must be assessed by the joint efforts of Pleasant View residents, the Pleasant View Planning Commission, and the Pleasant View City Council. Specific development proposals will be analyzed upon formal submittal to the City. Development proposals should incorporate the findings of this Study, the Pleasant View City General Plan, and any existing City ordinances that may apply.

2.0 PURPOSE

The purpose of this Study is to direct future development within the study area, in order to protect important natural resources, avoid natural or human-made hazards, and preserve lands for future public use. To this end, this Study is an initial step that identifies potential areas that should be protected, avoided, or preserved

based on information from the Resource Inventory Maps and Resource Constraints Maps (see Section 5). These maps were derived from published and unpublished information that was recorded for large geographical areas. As such, mapping components of this Study should not be taken literally without the benefit of more site-specific information when appropriate.

This Study is designed to assist developers, residents, elected officials and City staff in addressing the pending changes that may occur in the study area over the next 10 to 15 years and beyond. The focus of this Study is to provide information that will encourage innovative and creative residential developments within the study area. This Study is intended to identify those areas where developers may be required to conduct more site-specific studies prior to development approval.

This Study is also intended to produce definitive policy directions in the form of a recommended Development Master Plan and Development Guidelines for the study area. These plans and guidelines form the basis for making decisions about the importance of community resources within the study area. They also provide understanding about what issues are of critical concern to all interests of the community. The Development Master Plan and Development Guidelines prepared for this Study are discussed in detail in Sections 7 and 8.

3.0 BACKGROUND OF THE STUDY AREA

The City lies in the north-central part of Weber County in northern Utah, approximately 40 miles north of Salt Lake City (see Figure 1). Beyond the City limits, to the north and the east lie the Wasatch Mountains, part of the Wasatch-Cache National Forest. Ben Lomond, to the northeast, peers majestically over the City. In this part of the Salt Lake Valley, the Wasatch Mountains protrude sharply upward from the valley floor. The study area elevation ranges from 9,700 feet at Ben Lomond Peak to 4,400 feet near Pleasant View Drive. Because of its foothill location, surrounded by mountains to the north, the City commands a panoramic view of the Salt Lake Valley to the west and south (see Photo 1).

Currently, the City has a population of approximately 7,500 (Pleasant View City 2015) individuals and comprises approximately 6.7 square miles (4,300 acres) of land. The study area consists of approximately 3,421 acres of land with approximately 67 percent (2,285 acres) inside the City limits, approximately 14 percent (470 acres) within the U.S. Forest Service boundary, and the remaining 19 percent (666 acres) within unincorporated Weber County. Most of the existing development within the study area is primarily in residential, open space, and agriculture land uses. According to Pleasant View City Corporation Future Land Use Map adopted August 25 2009, most of the study area falls into the following three categories: Rural Residential (0 – 1 units/acre), Very Low Density Residential (1 – 2 units/acre), and Low Density Residential (2 – 4 units/acre).

Residential subdivisions currently exist in the southern and eastern portions of the study area and are rapidly developing towards the north and west (see Photo 2). There are approximately 1,631 acres, or 48 percent of the lands that are currently undeveloped within the study area. Approximately 965 acres lie within incorporated city limits and 666 acres that lie in the unincorporated county. Under current zoning, there is the potential for over 2,100 additional residential units that could be developed within the study area.

Photo 1. A characteristic view of the Salt Lake Valley toward the southeast of the study area.

Photo 2. Residential development is expanding northward through the study area.

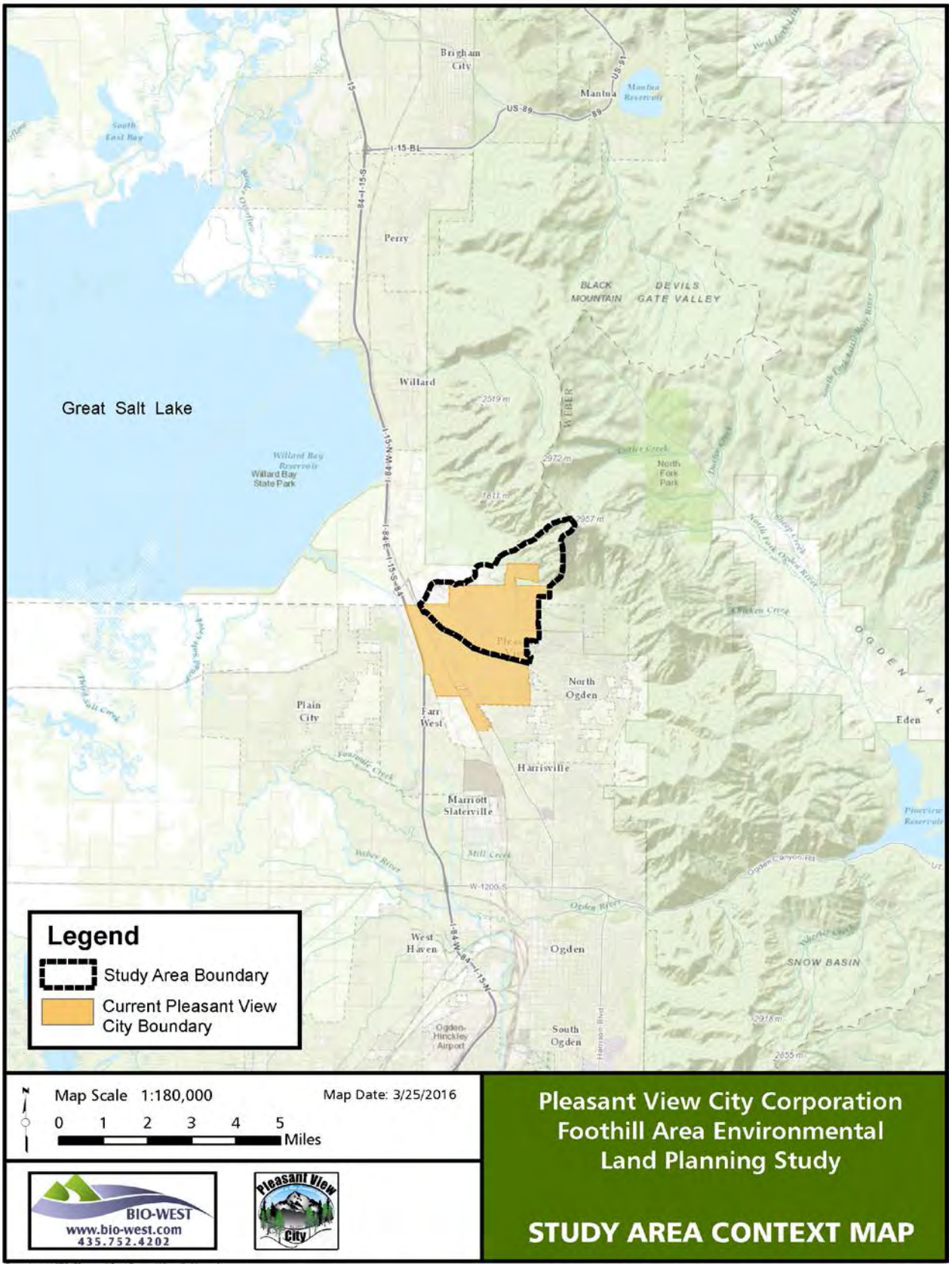

Figure 1. Study area context map for the Foothill Area Environmental Land Planning Study.

4.0 OVERVIEW OF THE PLANNING PROCESS

The implementation of this Study involved a five step planning process: (1) Creating Resource Inventory Maps; (2) Creating Resource Constraints Maps; (3) Creating Alternative Development Scenarios; (4) Creating a Development Master Plan; and (5) Creating Development Guidelines (see Figure 2). Each of these steps is described in detail later in this Study. In addition to implementing these five steps, a review of previous City planning documents and public input helped in identifying planning issues, prioritizing resource concerns, and recommending a preferred Development Master Plan.

Citizen participation was also incorporated into the planning process. A series of open house public workshops was held by the City to garner public participation for the 2014 General Plan Update. The open house attendees had an opportunity to fill out a survey. Those survey data (found in Appendix B of the General Plan) have been taken into consideration for this Pleasant View City Foothill Area Land Planning Study.

5.0 RESOURCE INVENTORY AND CONSTRAINTS MAPPING

Prior to initiating the resource mapping effort, a Base Map (see Figure A-1) was created that shows the boundaries of the study area. Also included on the Base Map is a watershed boundary that defines the furthest limits of lands surrounding the study area, which were mapped for each resource. The watershed boundary extends beyond the City limits in order to identify an extended “area of influence” that needs to be considered in future foothill area development decisions. Existing roads and residential development are also shown. The study area boundary, existing city boundary, and existing development are common elements on all of the Resource Inventory and Constraints Maps. Each resource that was incorporated into the Study is briefly described below. All maps are included in Appendix A.

Using existing data and information from field investigations conducted as part of this Study, a team of resource specialists mapped characteristics of different natural and human-made resources within the study area. The resulting Resource Inventory Maps characterize resource conditions such as Geomorphology, Geology, Earthquake Faults, Hydrology, Slope, Soils, Groundwater Recharge, and Water Source Protection Zones. In addition to recommendations from resource specialists, information from the Resource Inventory Maps was then used to generate Resource Constraints Maps.

Resource Constraints Maps delineate locations within the study area that pose “severe,” “moderate,” or “slight” constraints to residential development, based upon the specific characteristics of each resource. For example, the entire study area was mapped according to slope steepness. Areas with slopes between 15 and 20 percent steepness were considered to pose “slight” constraints to residential development. Steeper areas with 21 to 25 percent steepness were considered to pose “moderate” constraints to residential development while slopes 26 to 30 percent steepness were considered to pose “severe” constraints to residential development. While development would not be impossible in severe constraint areas, it could be unsafe and more expensive to implement and service. Resource Inventory Maps and Resource Constraints Maps were used in creating the Recommended Development Master Plan and Development Guidelines for the study area.

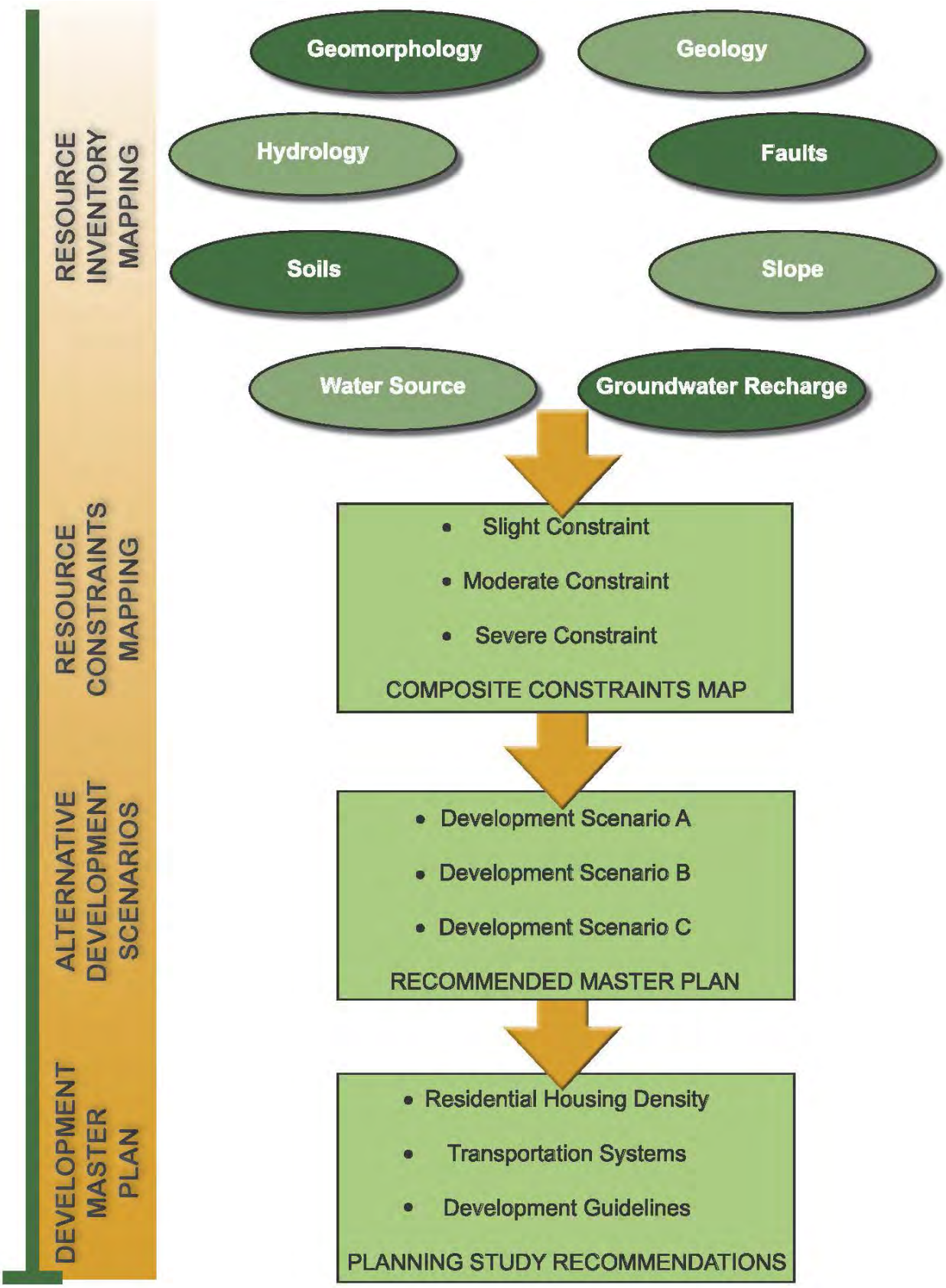

Figure 2. Overview of the Foothill Area Environmental Land Planning Study planning process.

5.1 Geomorphology

The Geomorphological Conditions Map (Figure A-2) shows the geologic processes that have influenced the topography of the study area. The study area is located within the Basin and Range province, at the base of the Wasatch Mountains. Historical Lake Bonneville deposits are present in the southern portion of the study area. The topography of the study area can be characterized as mountainous and alluvial terrain.

While no evidence exists that gravity-driven, slope-related processes including avalanches, landslides, and rock slides have occurred within the study area, areas southeast of the study area do show evidence of these processes. One large historical rock slide/landslide occurred in the North Ogden area and deposited material approximately 0.5 mile away from the mountain front (Pashley and Wiggins 1971). Another historical rock slide/landslide occurred near Beus Canyon in Ogden and deposited material approximately 1 mile away from the mountain front (Pashley and Wiggins 1971). These rock slides/landslides may have been induced by movement along the Wasatch fault, which is present in the study area. The bedrock units that are exposed on the mountainous terrain in the study area are susceptible to rock slides and landslides because they are highly fractured by faults that occur in the area.

The information from the Geomorphological Conditions Map was used to create the Landslide and Avalanche Constraints Map (Figure A-3). The Landslide and Avalanche Constraints Map shows zones around geomorphological features that could be hazardous to development. Historical rock slides and landslides in the area indicate that material may be deposited from 0.5 to 1 mile from the steep mountain front (Pashley and Wiggins 1971). A “severe constraints” classification was applied to areas within 0.5 mile of the mountain front. A “moderate constraints” classification was applied to areas between 0.5 and 1 mile of the mountain front. A “slight constraints” classification was applied to areas greater that 1 mile from the mountain front.

5.2 Geology

The Geological Conditions Map (Figure A-4) indicates the locations of bedrock types, historical Lake Bonneville deposits, and sediment formations such as alluvial fans. The geologic data was compiled from the U.S. Geological Survey Geologic Map of the North Ogden Quadrangle and part of the Ogden and Plain City Quadrangles (Crittenden and Sorensen 1985). The geologic deposits of an area indicate the types of geologic processes that occurred in the past, and are expected to occur in the future. Geologic deposits are sediments that are transported by debris flows, floods, and streams that occur over a long period of time (i.e., hundreds of years). For example, alluvial fans, which are sedimentary deposits that accumulate below the mouths of canyons, indicate potential hazardous conditions to development. Numerous buildings constructed on alluvial fans along the Wasatch front have been destroyed or damaged by debris flows and floods (Wieczorek et al. 1993; Kaliser 1983; Marsell 1971).

A debris flow or “flash flood” is a rapidly moving mix of sediment and water. Debris flows carry sediment ranging in size from clay particles to car-sized boulders. Debris flows occur during events of intense precipitation or rapid snow melt (Marsell 1971). Debris flows are one of the main geological processes that occur on alluvial fans. Debris flows do not occur every year, but can be very destructive when they do occur. The presence of alluvial fan deposits within the study area indicate that debris flows have occurred within the study area in the past and that the study area is susceptible to future debris flow events.

On September 7, 1991 a debris flow deposited snow approximately 1,300 feet from the mountain front causing damage to homes in the Cameron Cove Subdivision, which is located approximately 2.5 miles southeast of the study area in North Ogden City. This event indicates how far a debris flow could deposit material from the mountain front.

Information from the Geological Conditions Map was used to create a Geological Constraints Map (Figure A-5). The portion of alluvial fans closest to active stream channels, or closest to the mountain front, were mapped as having severe constraints to development because of the high potential for debris flows. Alluvial fan deposits located away from active stream channels or at some distance from the mountain front were mapped as having moderate constraints to development because of the moderate potential for debris flows. All other areas were mapped as having slight constraints to development because of the low probability for debris flow events.

5.3 Faults

The Geological Fault Conditions Map (Figure A-6) indicates the locations of active faults and possible fault zones located within the study area. Active faults are hazardous to development and knowledge of their location is important to minimize impacts to critical facilities, such as utility lines, hospitals, and schools during an earthquake event. Active faults typically do not occur along a single fault line but in a wider fault zone where a number of faults may cause surface rupture and ground deformation. The faults in the study area are primarily related to the Wasatch Fault Zone that is present along the mountain fronts of the Wasatch Front. The faults data was compiled from the Natural Constraints to Urban Development in the North Ogden Area, Utah Report (Ridd and Kaliser 1978) and the U.S. Geological Survey Faults Database (USGS 2015). The faults shown on the map are divided into three classifications. Class I faults are deep seated, tectonically induced major fault scarps (surface displacement) of definite location and origin. The Class I faults are clearly identifiable in the field and show evidence of relatively recent activity. Class II faults are clearly faults but more of a shallower nature. Class II fault scarps generally show less surface displacement than Class I faults. Class III faults are zones identified as having possible faults, these zones typically show little or no surface displacement.

The Geological Fault Constraints Map (Figure A-7) depicts buffer zones around the mapped active fault zones. Based on studies on the Wasatch Fault (McCalpin 1987) the fault zone is expected to be approximately 330 feet wide, with a maximum earthquake magnitude of 7.2 to 7.5 on the Richter Scale. Estimates for maximum fault scarp offset range from 10 to 16 feet. A fresh fault scarp is very unstable and will rapidly erode to a less steep angle. The mapped buffer zone includes an additional 20 feet to account for this eroding scarp face. Areas within 175 feet of an active fault zone were considered to pose severe constraints development, areas between 175 and 300 feet of an active fault zone were considered to pose moderate constraints, and areas greater than 300 feet from an active fault zone were considered to pose slight constraints to development.

5.4 Hydrology

Flooding is a natural and necessary part of the hydrologic regime for any stream. However, flooding can cause significant property damage resulting in major economic losses and potentially loss of life. Excluding development within streams and their floodplains, and other areas prone to flooding, would help to prevent such disasters. Floodplains and streams would also continue to provide many ecological services, such as

wildlife habitat and flood attenuation, if development is excluded from these areas. Therefore, accurately identifying flood zones along streams and areas prone to flooding from subsurface flow is key in defining flood hazard areas, and constraints to development. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps FIRMs, which show the location of mapped floodplains, classify the majority of the study area as having minimal risk of flooding, with a small portion of the study area not mapped (Figure A-8).

The National Hydrography Dataset (NHD) shows three intermittent streams within the study area: Pine Canyon Creek, Ridge Canyon Creek, and an unnamed creek in the upper part of the study area (Figure A-9). The northwestern edge of the study area contains two additional unnamed intermittent creeks. The southeastern edge of the study area contains the downstream portion of an intermittent stream that flows mostly outside the study area. The USGS defines an intermittent stream as one that "contains water for part of the year, but more than just after rainstorms and at snowmelt" (http://nhd.usgs.gov/FeatureDirectory.pdf). These channels discharge onto an alluvial fan where flow disperses and infiltrates the soils and becomes subsurface flow. These streams may also branch into multiple channels on the alluvial fan surface (Ridd and Kaliser 1978).

The Ogden-Brigham Canal (Canal) cuts across the natural drainages, as it runs from North Ogden City across the alluvial fan in Pleasant View City, continuing north towards Brigham City, and represents a hydrologic barrier for surface water channels within the study area (Figure A-9). The Canal splits the study area into an area above the Canal that contains flow paths, and an area below the Canal. The area below the Canal may concentrate runoff into flow paths draining westward away from the Canal. However, the contributing area is small and would have little effect on the amount of water a given flow path would be carrying during a rainfall or storm water runoff event.

A study (Ridd and Kaliser 1978) completed for the North Ogden area, which has similar hydrology and topography, classified drainages within the study area as active or inactive, defining active channels as having an unvegetated channel bottom while inactive channels may have vegetation (Figure A-9). The location and activity of these drainages may have changed since that study was completed because of massive flood events that occurred in the 1980s, development in the study area since that time, and continued fluvial processes such as erosion and deposition over the ensuing decades.

Four watersheds were delineated to calculate the flood flow discharges for various return intervals for the six streams shown on the NHD. StreamStats (http://water.usgs.gov/osw/ streamstats/utah.html) was used to delineate watersheds within the study area and estimate flood flows generated from each watershed (Figure A-9). StreamStats is a USGS online tool that delineates watersheds from a 10 meter accurate digital elevation model, in conjunction with regional regression equations generated for ungauged streams in Utah, to estimate flood flows (Wilkowske, C.D., Kenney, T.A., and Wright, S.J., 2008). The regional regression equations use StreamStats output, such as drainage area and other parameters, to estimate flows for return intervals from 2 to 100 years (Table 1), along with an estimate of error. These watersheds are indicative of contributing area for the streams. For areas not included in a watershed, but within the study area, the soils survey contains information about limitations to development based on flooding hazard (see Section 5.6).

Table 1. Summary of estimated peak flood flows for various return intervals and average annual flow generated from StreamStats.

PEAK FLOW RETURN INTERVAL (YEARS)	WATERSHED 1 FLOW (CUBIC FEET PER SECOND)	WATERSHED 2 FLOW (CUBIC FEET PER SECOND)	WATERSHED 3 (CUBIC FEET PER SECOND)	WATERSHED 4 (CUBIC FEET PER SECOND)
2	2.14	25.8	1.25	0.52
5	5.15	47.7	3.2	1.46
10	7.93	65.4	5.06	2.42
25	11.5	82.2	7.54	3.77
50	15.7	108	10.4	5.33
100	19.6	126	13.2	6.9
200	24.0	145	16.4	8.76
500	32.8	184	22.8	12.6
Average annual flow	0.35	3.67	0.21	0.0887

The watersheds are then defined as having potentially active channels, or inactive channels, using the active and inactive channel data from the Ridd and Kaliser (1978) report (Figure A-9). Not all of the study area is incorporated into a watershed. Some areas are alluvial surfaces with little topography that indicates the presence of a channel, or to accurately delineate a watershed. Again, these areas are alluvial, and may not have distinct or active channels. Instead, flow paths may vary and potentially include subsurface flow.

In comparing the locations of active and inactive channels, there are many active channels in the study area within and near Watershed 1. Assuming the conditions from 1978 are similar to today, it is likely that this drainage, and areas nearby, will have small streams that should be accounted for in development (see Section 8.0). Although the NHD shows no intermittent stream downstream of the upper watershed (Pine Creek, Ridge Creek, and an unknown drainage), this area likely has a significant swale or channel that flows at the very least during storms and snowmelt/runoff. Aerial imagery shows such a drainage in Watershed 2. According to Ridd and Kaliser (1978), the area near and within Watershed 2 includes a combination of active and inactive streams, with the active stream reaching to the Canal. Watershed 3 is in an area with channels characterized primarily as inactive, with no active channels present (Ridd and Kaliser 1978). Watershed 4 is within an area that has active channels (Ridd and Kaliser 1978) and includes an intermittent stream. Regardless of whether the channel is classified as active or inactive, any channel feature and depression has the capability of collecting surface runoff resulting in stream flow. The actual amount of flow depends on runoff generated that reaches the channel and if the stream bed intercepts subsurface flow.

To truly know what the flood hazard is for a specific property within the study area, the locations of streams and swales that have flow during rainfall and/or runoff events needs to be determined. The active and inactive flood hazard maps are likely somewhat inaccurate because they are based on data from the late 1970's. The watersheds that StreamStats generated also have limited accuracy because they are based on digital elevation models with 10-meter resolution. Because the flood flows generated from StreamStats are in part based on watershed area, flood flow estimates are somewhat inaccurate as well. Better topographic data and verifying the locations of active streams and potentially active swales would improve the determination of potential flood hazard areas. The state is planning to obtain statewide LIDAR data, and such an analysis would be feasible once data for the study area are available.

The Flood Potential Constraints Map (see Figure A-10) designates locations within the study area where development constraints associated with hydrological features may occur. Areas of “severe constraints” are located within 30 feet of a stream channel or within 16 feet of the Ogden-Brigham Canal. Development in these areas will likely cause adverse impacts to the quality, quantity, and timing of runoff. Areas of “moderate constraints” are located 30 to 100 feet from a stream channel. Areas of “slight constraints” are located more than 100 feet from stream channels and more than 17 feet from the Ogden-Brigham Canal.

5.5 Slope

The entire study area was mapped according to slope steepness. The Slope Conditions Map (see Figure A-11) indicates differences in the slope of the land within the study area. For this project, slope has been grouped into five categories: 0 to 15 percent, 15 to 20 percent, 20 to 25 percent, 25 to 30 percent, and over 30 + percent. A 10 percent slope means that for every 100 feet traveled horizontally, the elevation rises 10 feet.

Topography gradient or steepness of the land (i.e., the slope) is an important factor in assessing the suitability of developing houses, infrastructure, and other facilities. Most people recognize that building on a flat area is easier and less costly than building on steeper areas. This information is particularly important to community leaders since infrastructure, such as roads and sewers, become more difficult to construct and maintain in areas steeper than 10 percent. In general, as the slope increases, the development and service costs also increase. In addition, steeper slopes are more prone to hazards such as landslides, rock falls, and debris flows.

The Slope Constraints Map (see Figure A-12) depicts the slope-related constraints to development. Areas within the 0 to 15 percent slope category are considered to pose “no constraints” on development; areas within the 15 to 20 percent slope category are considered to pose “slight constraints” on development; areas within the 20 to 25 percent are considered to pose “moderate constraints” on development; areas within the 25 to 30 percent slope category are considered to pose “severe constraints” on development; and over 30 percent slope areas are considered to be “no build” since development may be unsafe, unsightly, or substantially more expensive to implement. In fact, existing City ordinances prohibit development on slopes steeper than 30 percent (Pleasant View City, 2012).

5.6 Soils

The Soil Conditions Map (see Figure A-13) identifies the different types of soils found within the study area, as defined by the U.S. Natural Resources Conservation Service (NRCS). Soil types were grouped together based on limiting factors (i.e. qualities that could limit development) to produce the Soil Constraints Map (see Figure A-14). Limiting factors include shallow depth to bedrock, shallow depth to water table, rock outcrops, and gravel pits. Soils were designated as posing “very slight constraints,” “slight constraints,” “low constraints,” “moderate constraints,” or “high constraints” to development, based on ratings by the NRCS (NRCS 1975). Table 2 provides a summary of soil types found within the study area and their limiting factors.

Knowledge of soil characteristics is important when planning land uses within a particular area. Whether the intended use is for agriculture, transportation, residential, commercial, or industrial purposes, certain soil types will be more suitable than others. Locating residential developments within soils that may pose a hazard to structural integrity can be a costly and dangerous endeavor.

Table 2. Information on limiting factors of soil types found within the study area.

SOIL SERIES AND MAP SYMBOL	ESTIMATED SOIL PROPERTIES SIGNIFICANT TO ENGINEERING				ENGINEERING INTERPRETATION OF SOILS
	Depth to Water Table (inches)	Depth to Restrictive Layer (inches)	Shrink-Swell Potential	Potential Slopes	Limitations for Use in Residential Development (Building Foundations)
Ackmen loam : AbC, AbD, AbE2	>80	>80	Low	3 to 20%	Moderate
Draper loam: DrC	36-60	>80	Moderate	3 to 6%	Severe
Francis loamy fine sand: FcC, FcD, FcE2	>80	>80	High	3 to 20%	Low
Hillfield-Timpanogos-Parleys complex: HTG2	>80	>80	High	30 to 60%	High
Ironton silt loam: IaC	24-36	>80	Low	3 to 6%	High
Kidman fine sandy loam: KaB	>80	>80	Low	1 to 3%	Slight
Kilburn-Francis association: KFE2,	>80	>80	Low	10 to 20%	Slight
Kilburn gravelly sandy loam: KgE2	>80	>80	Low	10 to 20%	Slight
Kilburn cobbly sandy loam: KlE2	>80	>80	Low	10 to 20%	Very Slight
Layton loamy fine sand: LcD	>80	>80	Low	6 to 10%	Low
Marriott gravelly sandy loam: MgD, MgE2	>80	>80	Low	6 to 20%	Moderate
Parleys loam: PaC, PaD, PaE2, PbA	>80	>80	Moderate	3 to 20%	Severe
Pleasant View loam: PvB, PvC, PvD, PvE, PvE2, PwD	>80	>80	Low	1 to 20%	Moderate
Ridd stony/rocky sandy loam: RdD, RkE2, RkG2, RrE	>80	20-40	Low	6 to 30%	Moderate
Sterling very rocky loam: ShF2	>80	>80	Low	6 to 50%	Moderate
Timpanogos loam: TbB, TbC, TbD2, TcD, TcE, TDD	>80	>80	Low to Moderate	1 to 20%	Moderate

Texture is one of the most important soil characteristics because it influences many other properties such as water retention, compaction ability, erosion potential, and fertility. Soil texture describes the proportionate distribution of different sizes of mineral particles in a soil. Generally, sandy soils are low in organic material and fertility; low in ability to retain moisture and nutrients; and well-drained and therefore well suited for road foundations and building sites. Finer textured soils are generally more fertile, containing more organic matter and are better able to retain moisture and nutrients. Soils that are so fine-textured as to be classified as clay, have characteristics that adversely affect their suitability as building sites and for road construction.

5.7 Groundwater Recharge

Many communities throughout the Intermountain West, including Pleasant View, rely on groundwater to provide domestic water supplies. Groundwater is typically supplied by water infiltrating into the ground in recharge areas. Groundwater recharge occurs when there is enough water present to move through the unsaturated zone of the soil into an aquifer. An aquifer is an underground layer of porous sediment or rock that contains water. Development in groundwater recharge areas, such as those that exist in the study area, creates impermeable surfaces that may result in less water infiltrating into the ground during spring flows and storm events. The reduced infiltration may lower the groundwater levels in the study area and reduce

the supply of groundwater available to community residents. The Groundwater Recharge Conditions Map (Figure A-15) shows where groundwater recharge and discharge areas are located within the study area (Anderson et al. 1994).

The Groundwater Recharge Constraints Map (Figure A-16) indicates where groundwater recharge and discharge areas occur in the study area. Groundwater recharge areas pose severe constraints to development due to the importance of maintaining an adequate and high quality water supply for Pleasant View City. Development in these areas will create impermeable surfaces which will cause reductions to infiltration and the groundwater supply. In addition, the quality of the groundwater may be impacted due to changes in land management within the recharge areas. Groundwater discharge areas pose moderate constraints to development due to the potential for encountering high groundwater levels and unstable building conditions.

5.8 Water Source Protection Zones

Several drinking water source protection zones have been established in the study area according to Utah State Administrative Code R309-600. Drinking water source protection zones are established to protect groundwater sources of drinking water, such as wells and springs from becoming contaminated from potential contamination sources. A potential contamination source is defined as any facility or site which employs an activity or procedure which may potentially contaminate groundwater. Development in drinking water source protection zones, such as those that exist in the study area, needs to be monitored to prevent potential contamination sources from impacting the public drinking water supply.

Drinking water source protection areas are divided into four separate zones for management purposes. Zone 1 is defined as an area 100 feet around a wellhead or collection area of a spring. Zone 2 is defined as the area within the 250 day groundwater travel time to the wellhead or collection area of a spring. Zone 3 is defined as the area within the 3 year groundwater travel time to the wellhead or collection area of a spring. Zone 4 is defined as the area within the 15 year groundwater travel time to the wellhead or collection area of a spring. The Water Source Protection Zones Map (Figure A-17) shows where drinking water protection zones are located within the study area.

Information from the Water Source Protection Zones Map was used to create a Water Source Constraints Map (Figure A-18). Areas designated on the map as Zone 1 or Zone 2 were mapped as having severe constraints to development because of the close proximity to a drinking water source and the high potential of drinking contamination from potential contamination sources. Areas designated on the map as Zone 3 or Zone 4 were mapped as having moderate constraints to development because of the further distance from a drinking water source and the moderate potential of drinking contamination from potential contamination sources.

6.0 ALTERNATIVE DEVELOPMENT SCENARIOS

One tool used commonly by planners to manage information across an area of land is called a Geographic Information System or GIS. This tool allows planners to “overlay” layers of information on top of each other to begin to understand how various opportunities or constraints exist across a landscape. Overlaying this information, or data, is a dynamic process allowing City staff, residents, and planners to make planning decisions based on prioritized concerns. Furthermore, development can be directed into the most suitable (i.e., least resource constraining) areas.

In the overlay process, as used for this project, data from a number of Resource Constraints Maps were combined and superimposed on the Base Map, resulting in the Composite Constraints Map (see Figure A-19). Areas of severe constraints for a number of important resources were allowed to "override" areas of moderate and slight constraints. The Composite Constraints Map indicates where the combination of selected resources (i.e., steep slopes, ground fault zones, active stream channels, alluvial fans, soils, and drinking water source locations) would pose severe constraints to development.

The information from the Composite Constraints Map was used to guide the creation of three conceptual alternative development scenarios for this Study. The conceptual nature of the alternative development scenarios is intended to represent a spectrum of possible futures for the hillside study area, given general guidelines regarding conservation goals. These scenarios are:

- Conceptual Development Scenario A: Full Build-Out
- Conceptual Development Scenario B: Focused Development
- Conceptual Development Scenario C: Maximum Open Space

Each Development Scenario Map includes a different combination of the following land use categories: Existing Development Area, Potential Development Area, Existing Public Parks and Open Space, Potential Public Parks and Open Space, Potential Private Open Space, and No-Build Area. The areas included in these Land Use Categories vary with each development scenario. Each development scenario is briefly described in the following section. A summary comparison of the Land Use Categories for each development scenario is provided in Table 3.

Table 3. Summary comparison of the land use categories for each development scenario.

LAND USE CATEGORIES	SCENARIO A: FULL BUILD-OUT CONCEPT	SCENARIO B: FOCUSED DEVELOPMENT CONCEPT	SCENARIO C: MAXIMUM OPEN SPACE CONCEPT
Existing Development Area	1,225 acres (36%)	1,225 acres (36%)	1,225 acres (36%)
Potential Development Area	1,346 acres (39%)	1,091 acres (32%)	650 acres (19%)
Existing Public Parks and Open Space	100 acres (3%)	100 acres (3%)	100 acres (3%)
Potential Public Parks and Open Space	275 acres (8%)	410 acres (12%)	306 acres (9%)
Potential Private Parks and Open Space	0 acre (0%)	120 acres (3%)	665 acres (19%)
Existing Forest Service Lands	475 acres (14%)	475 acres (14%)	475 acres (14%)
Totals	**3,421 acres (100%)**	**3,421 acres (100%)**	**3,421 acres (100%)**

6.1 Conceptual Development Scenario A: Full Build-Out

Scenario A represents maximum development of land within the study area, where all areas suitable for development under existing zoning ordinances would be available for development (see Figure A-20), except those areas classified as "non-developable" under current zoning ordinances. Lands classified as "non-developable" are currently protected under Pleasant View City zoning ordinances, which prohibit development on lands with slopes steeper than 30 percent. Scenario A would allow for residential uses to occupy nearly all lands within the study area, leaving little room for future parks and open space, and possibly putting community infrastructure and homes in harm's way without significant financial expenditures to mitigate risks and protect health, safety, and welfare of residents.

6.2 Conceptual Development Scenario B: Focused Development

Scenario B represents a positive step towards locating development on the most suitable lands within the study area while avoiding the most sensitive lands with inherent risks (see Figure A-21). Areas with the most severe constraints on development, as determined using the overlay process, would be protected as both future public and private parks and open space lands. These future public and private parks and open space lands would include avoiding steep slopes, ground fault zones, active stream channels, and water source protection zones.

6.3 Conceptual Development Scenario C: Maximum Open Space

Scenario C represents a new paradigm for development within the study area that promotes the maximum conservation of sensitive lands within the study area (see Figure A-22) where development would be concentrated in those areas exhibiting the least constraints to development. Some of the important features of Scenario C include efficient infrastructure investments, minimization of impervious surfaces, and density bonuses for open-space subdivision designs. Scenario C includes avoiding steep slopes, ground fault zones, active stream channels, and water source protections zones while protecting groundwater recharge zones. It also promotes the integration of innovative subdivision design that retains more of the natural character of the study area.

7.0 RECOMMENDED DEVELOPMENT MASTER PLAN

The Preferred Development Master Plan represents a further refining of the Conceptual Development Scenario C: Maximum Open Space alternative development scenario described in Section 6.3. It is anticipated that development within “Potential Development Areas” as shown on Figure A-23 will be clustered to provide for meaningful open space and conservation lands between existing and new residential development areas. “Nodes” of development should be concentrated along major roadway intersections and away from sensitive lands where appropriate. Although specific lot sizes may vary, the overall density for a given parcel of land as shown on the City’s adopted “Future Land Use Map” would not be exceeded. Future private and public parks and open space lands are expected to be protected through donation to the City, inclusion in conservation easements, or maintained through a homeowner’s association in perpetuity. Some parks and open space lands may be suitable as future City parks. In addition, connections to existing and planned public trails should be evaluated for all parks and open space lands within the study area. Table 4 provides a summary of the area for each land use category shown on the Preferred Development Master Plan (see Figure A-23).

8.0 RECOMMENDED DEVELOPMENT GUIDELINES

Development guidelines are provisions that should be incorporated into each development proposal submitted to the City. They include specific actions, designs, or criteria to be followed when developments are proposed within the study area. Recommended development guidelines are presented below by resource category.

Table 4. Summary of the area for each land use category in the Preferred Development Master Plan.

LAND USE CATEGORIES	PREFERRED DEVELOPMENT MASTER PLAN
Existing Development Area	1,225 acres (36%)
Potential Development Area	650 acres (19%)
Existing Public Parks and Open Space	100 acres (3%)
Potential Public Parks and Open Space	356 acres (10%)
Potential Private Parks and Open Space	615 acres (18%)
Existing Forest Service Lands	475 acres (14%)
Totals	**3,421 acres (100%)**

8.1 Landslide and Avalanche

Guidelines for development in the landslide and avalanche hazard areas include the following:

- Avoid locating public buildings such as schools or auditoriums in the landslide and avalanche severe constraints areas (i.e., within 0.5 mile of the mountain front).
- Prevent construction of all habitable buildings within 100 feet of active stream channels.

8.2 Debris Flow

Guidelines for development on alluvial fans include the following:

- Preserve existing vegetation within drainage channels to act as a trap for debris flow sediments.
- Provide appropriate setbacks (minimum 100 feet) from drainage channels for new development.

8.3 Faults

Guidelines for development within fault zones include the following:

- Require that all utilities that traverse fault zones be designed to withstand earthquake induced ground movement.
- Prevent construction of habitable dwellings within 175 feet of known faults or landslide areas.

8.4 Hydrology

Guidelines for development in active hydrological areas include the following:

- No development should occur within the 100-year floodplain (where mapped or identified through new site-specific studies).

- No development should occur within 30 feet of the banks of a state-defined channel. The State of Utah Stream Alteration program defines a stream as:

  > A natural stream is any natural waterway that receives enough water to develop an ecosystem that differs from the surrounding upland environment. This is most easily determined by observing vegetation changes. Canals, ditches, or other man-made channels are not considered natural streams (http://www.waterrights.utah.gov/strmalt/faq.asp).

- No development should occur at the mouth of Ridge Canyon, Pine Canyon, and the unnamed canyons along the Forest Service property boundary at the top of the watershed because of risk of torrential flooding during high precipitation or runoff events and the potential for debris flows. Steep slopes would also severely limit development in these areas.

- No development should occur within 16 feet of the Ogden-Brigham Canal.

- No development should occur in areas identified as limited for dwellings with and without basements and/or commercial structures due to flooding based on site-specific soils data.

- Weber County Engineering may review proposed developments within unincorporated areas of Weber County and within Special Flood Hazard Areas (SFHA). “Any structures, fill, or other disturbance within a SFHA requires a floodplain development permit, and in some cases, an elevation certificate as well” (http://www.co.weber.ut.us/mediawiki/index.php/Flood_Maps). Special Floodplain Hazard Areas include areas identified as having a 0.1% probability of flooding (also known as the 100-year floodplain) as shown on FIRMs.

8.5 Slope

Guidelines for development on sloping terrain include the following:

- Limit building on slopes steeper than 15 percent to 20 percent. Slopes in this category are considered to pose slight constraints to development. Where construction occurs on these slopes, proper erosion and sediment controls should be required because the addition of impervious surfaces can cause excess surface runoff leading to erosion. Also the removal of the soil humus and vegetation can lead to stream pollution through increased sedimentation.

- Avoid building on slopes steeper than 20 percent. Steeper areas (20 percent slope or greater) are considered to pose moderate to severe constraints to development. Development would not be impossible in severe constraint areas. However, it would probably be unsafe and would definitely be more expensive to implement.

- Slopes steeper than 30 percent should remain naturally vegetated and non-developed.

8.6 Soils

- Ensure that new development proposals are properly evaluated for potential impacts from severely restrictive soils.

8.7 Groundwater Recharge

Guidelines for development within groundwater recharge areas include the following:

- Require open channel designs for stormwater management to slow water movement and allow for natural infiltration. This may include limiting development of curb and gutter in favor of a system of open channels that carry stormwater runoff to detention basins for proper infiltration.

- Maintain natural infiltration rates wherever possible. This is particularly important at the mouth of canyons where streamflow goes underground.

- Stormwater treatment and infiltration areas (i.e., detention basins) should be developed where impervious surfaces associated with developments (e.g., roads, driveways, rooftops, etc.) impact infiltration.

8.8 Water Source Protection Zones

Guidelines for development within water source protection zones include the following:

- Development within any area identified as a drinking water source protection (DWSP) zone should follow the development guidelines established in the Pleasant View City Drinking Water Source Protection Plan.

- No potential contamination sources shall be located, built, constructed or operated within a 100 foot radius (DWSP Zone 1) of any public water supply wellhead or margin of collection area. A potential contamination source is defined as any discernible, confined, and discrete source of pollutants or contaminates, including but not limited to any site, pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, animal feeding operation with more than ten animal units, landfill, or vessel or other floating craft, from which pollutants are or may be discharged.

- No pollution sources shall be located, built, constructed or operated within any area designated as DWSP Zone 2, unless the owner of the pollution source agrees to implement design or operating standards, as specified by Pleasant View City, which are intended to prevent discharges to public drinking water sources. A pollution source is defined as source discharges of contaminants to ground water or potential discharges of the liquid forms of "extremely hazardous substances" which are stored in containers in excess of "applicable threshold planning quantities" as specified in SARA Title III. Examples of possible pollution sources include, but are not limited to, the following: storage facilities that store the liquid forms of extremely hazardous substances, septic tanks, drain fields, class V underground injection wells, landfills, open dumps, landfilling of sludge and septage, manure piles, salt piles, pit privies, drain lines, and animal feeding operations with more than ten animal units.

- Any proposed development in DWSP Zones 3 and 4 must be reviewed by the Pleasant View City engineer to ensure compliance with State of Utah regulatory standards for public drinking water systems.

9.0 RECOMMENDATIONS

The following represent BIO-WEST's recommendations to the City as a result of the findings in this Study:

- In order to insure sustainable development of the foothill study area, City officials must require that all development proposals incorporate and address the findings of this Study. Information in this Study should be refined over time as new information becomes available. City officials should require that all development proposals within the study area address the constraints presented in this Study while allowing for innovative and creative responses to those constraints.

- Require site-specific studies by professional geologists to locate earthquake faults and recommend appropriate development setbacks for site-specific development proposals.

- Require site-specific studies by professional hydrologists to locate floodplain and flood-prone areas including active and inactive stream channels, and recommend appropriate development setbacks for site-specific development proposals.

- Adopt building codes sufficient to protect buildings from earthquake forces within the study area.

- Consider development of fertilizer and pesticide restrictions/guidelines to protect drinking water quality within the study area.

- Make modifications to existing zoning ordinances to provide for the following:

  (1) Allow for future open space that is either dedicated to the City, donated to a land trust, or maintained through a homeowner's association, in perpetuity, where constraints prohibit development (i.e., conservation areas).

  (2) Allow for flexible housing configurations that require closer grouping of homes on smaller lots resulting in more open space and conservation of sensitive land areas. The intent should be to increase open space within proposed developments and not to increase the overall density of development across the study area. This will result in less roads, utilities, and infrastructure, and therefore expenses to both the City and developers.

  (3) Encourage landscaping with native plant species in residential neighborhoods to maintain visual quality and reduce water consumption. Provide literature to educate new residents on native plantings, including suggestions on plants that are undesirable to deer to minimize anticipated conflicts. Include the names of local nurseries that provide native plants.

(4) Prevent commercial developments, feedlots, septic tanks, or underground/above ground storage tanks from being allowed in groundwater recharge zones to protect drinking water quality.

(5) Develop a series of best management practices to promote low impact developments within the study area (e.g., bio-filters, green roofs, rain gardens, infiltration detention basins, permeable pavements) and to protect groundwater quality.

(6) Create a series of development tools to protect open space and to promote conservation of sensitive lands (e.g., cluster development incentives, open-space subdivision designs, conservation easements, purchase of development rights, technical education and assistance programs).

(7) Update the existing "Sensitive Area Overlay Zone" (Chapter 18.38) of the City's ordinances to comply with the recommendations and information presented in this Study.

10.0 ACKNOWLEDGEMENTS

City Council
Toby Mileski, Mayor
Councilmembers:
Scott Boehme, Jerry Burns, Steve Gibson, Boyd Hansen and Sara Urry

Planning Commission
Danielle Jeppson, Chair
Planning Commissioners:
Neil Amaral, Kristi Hales, Richard Lewis, Andy Nef, Nathan Peterson, Keith Preece, Jim Cummings, Alternate and Jeff Hill, Alternate

City Staff
Melinda Greenwood, City Administrator
Valerie Claussen, AICP Assistant City Administrator
Jay Palmer, Public Works Director
Brandon Jones, Jones and Associates

11.0 LIST OF PREPARERS

NAME	POSITION	EXPERIENCE	RESPONSIBILITIES
Christopher Sands	project manager and senior planner	25+	project team coordination; Study report, guidelines, and recommendations text; public involvement
Sandra Davenport	landscape architect	22	data collection, soils and slope text, mapping
Wes Thompson	senior geologist	27	data collection supervision
Dustin Lofthouse	geologist	10	data collection; geology, geomorphology, faults, groundwater recharge, and water source protection zones text
Shannon Herstein	hydrologist/water quality specialist	16	data collection, hydrology text
Glen Busch	GIS specialist	15	data collation and manipulation, mapping
Sandra Turner	senior writer/editor	25	document design and formatting
Aaron Crookston	cartographer	7	CAD and GIS mapping

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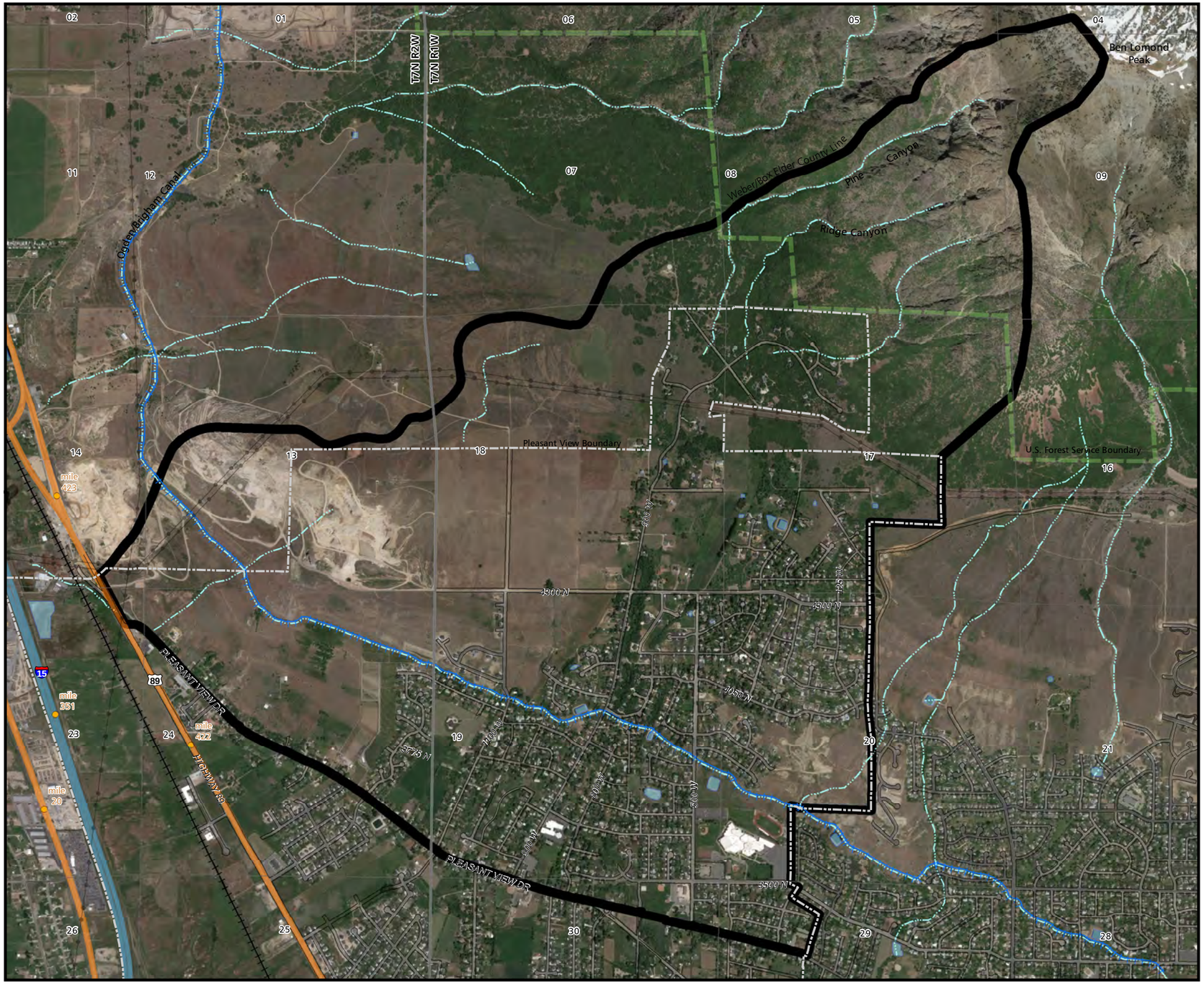
APPENDIX A: MAPS



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Power Transmission Line
- Railroad
- Canal
- Intermittent Stream
- Current City Boundary
- Forest Service Boundary
- Reservoir or Pond
- Study Area Boundary

Map Date: 7/22/2015

N

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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Pleasant View City

BASE MAP

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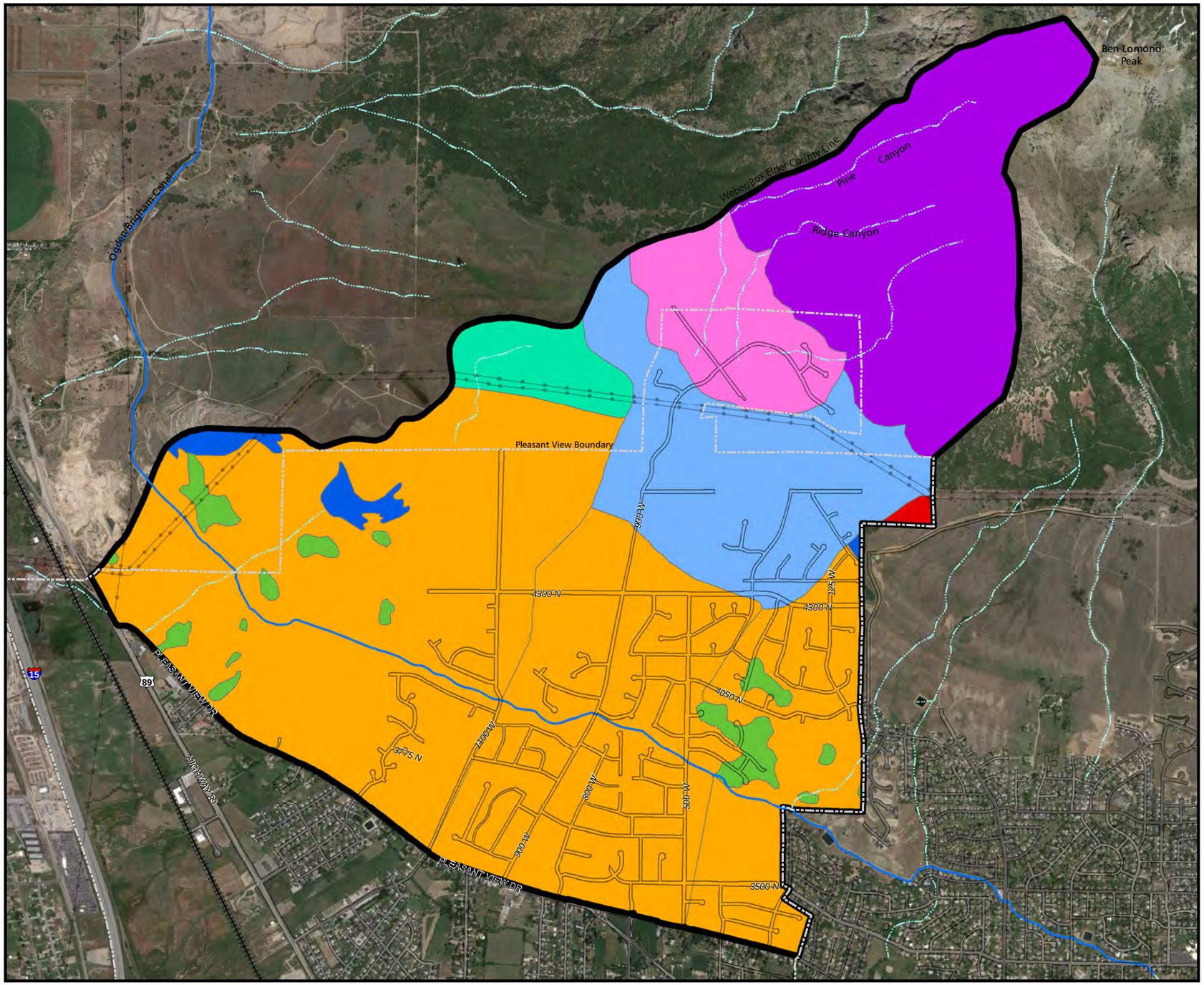

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Geomorphological Conditions

- Active Alluvial Terrain
- Bedrock Block Terrain
- Hummocky Bench Terrain
- Lake Deposit Beach Terrain
- Less Active Alluvial Terrain
- Mountain Block
- Older Alluvial Terrain
- Shoreface Bluff

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

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GEOMORPHOLOGICAL CONDITIONS

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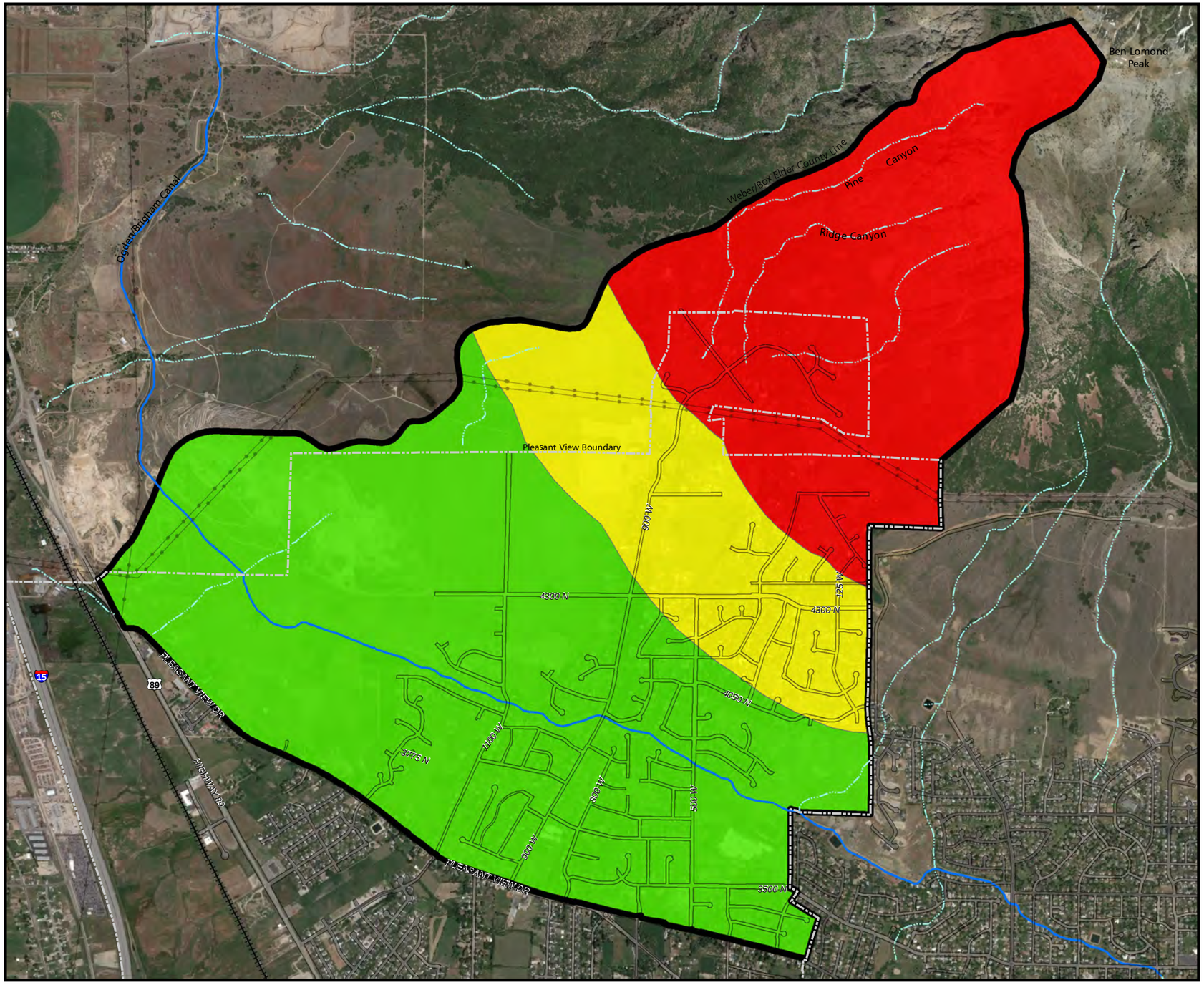

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Canal
- Current City Boundary
- Intermittent Stream

Landslide and Avalanche Constraints

- Slight Constraints
- Moderate Constraints
- Severe Constraints

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

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LANDSLIDE & AVALANCHE CONSTRAINTS

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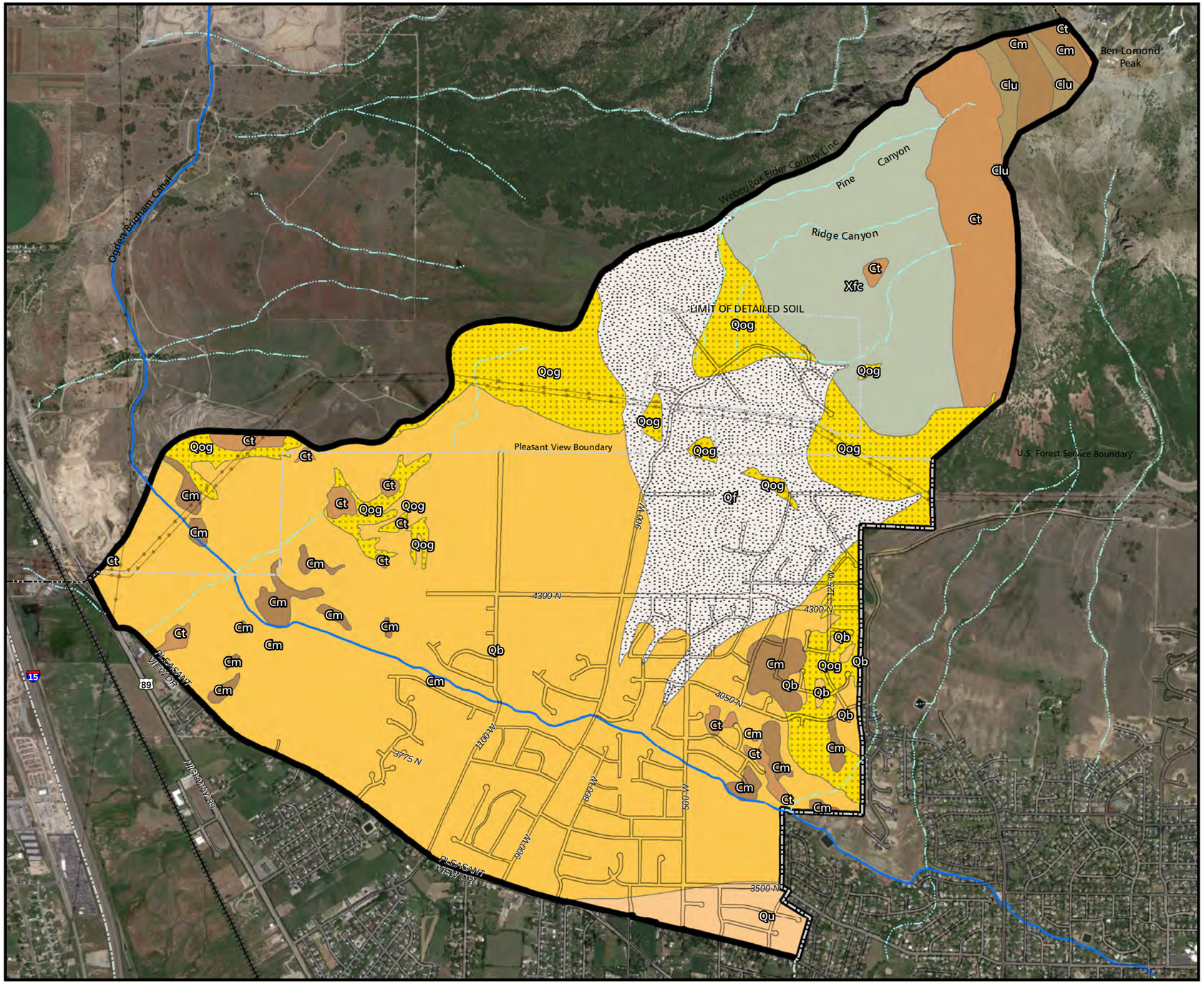

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Geological Unit Conditions

- Clu - Limestone, Undivided (Middle Cambrian)
- Cm - Maxfield Limestone, Undivided (Middle Cambrian)
- Ct - Tintic Quartzite (Middle and Lower Cambrian)
- Qb - Lake Bonneville Doposits (Pleistocene)
- Qf - Alluvial Fan Deposits (Holocene)
- Qog - Older Gravel Deposits (Pleistocene)
- Qu - Special Deposits, Undivided (Holocene and Pleistocene)
- Xfc - Farmington Canyon Complex (Lower Proterozoic)

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

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GEOLOGICAL CONDITIONS

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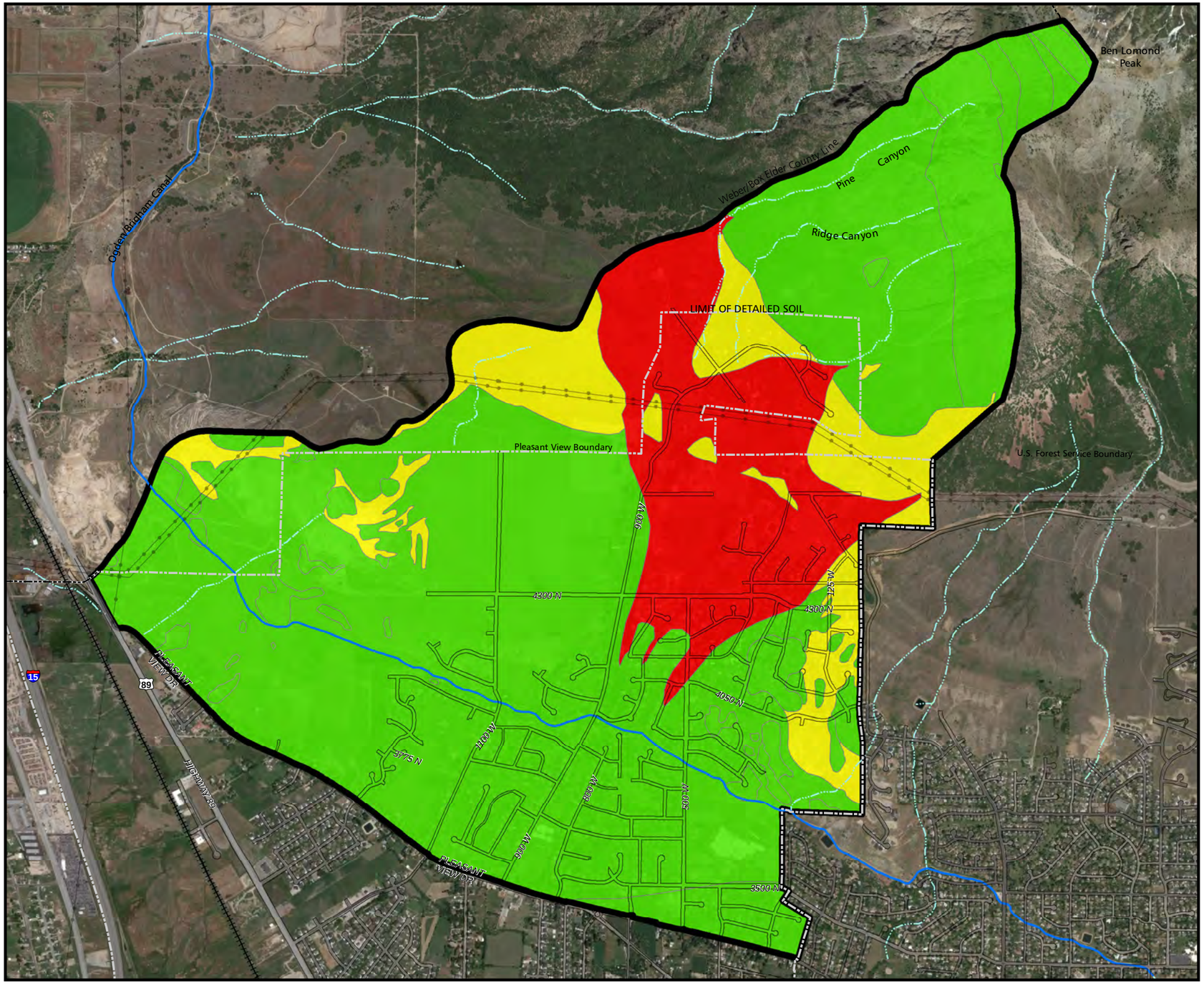

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Geological Constraints

- Slight Constraints
- Moderate Constraints
- Severe Constraints

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

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GEOLOGICAL CONSTRAINTS

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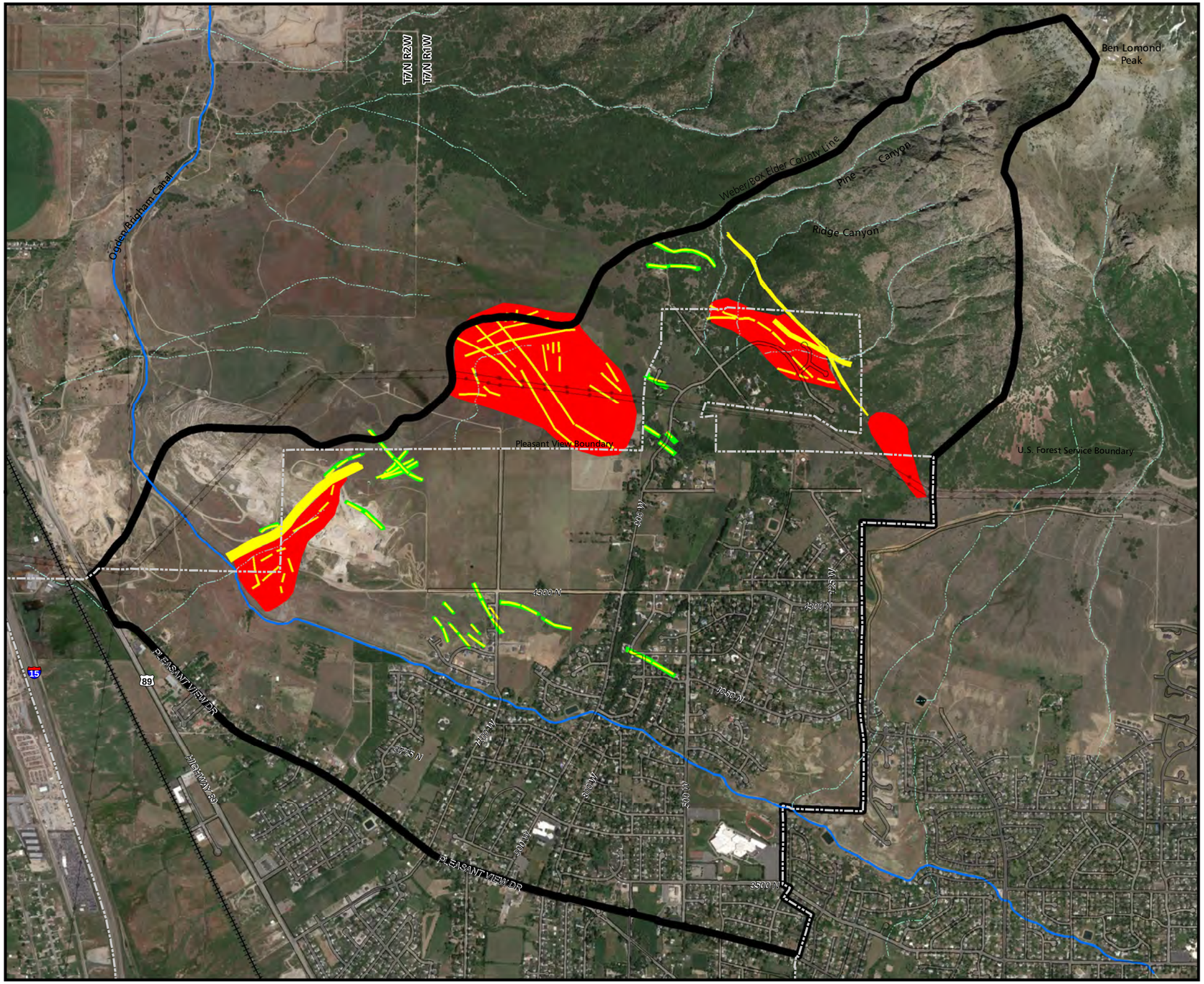

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Geological Fault Conditions

- CLASS I — Deep Seated Faults with Well Defined Scarps
- CLASS II — Probable Surface Fractures with Well Defined Scarps
- CLASS III — Zone of Possible Faults with Little or No Surface Displacment

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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GEOLOGICAL FAULT CONDITIONS

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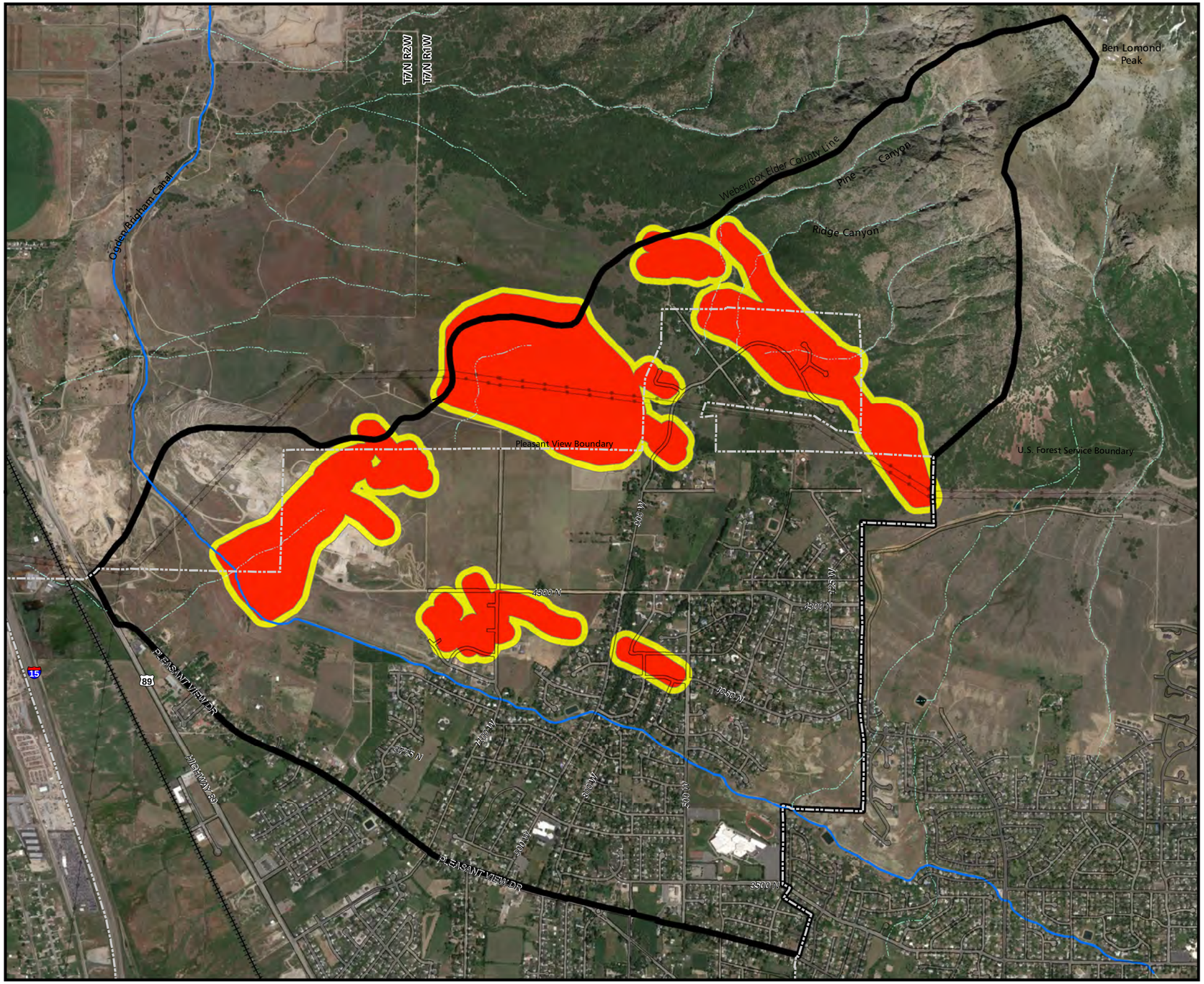

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Canal
- Current City Boundary
- Intermittent Stream

Geological Fault Constraints

- Ground Fault Zones - Moderate Constraints
- Ground Fault Zones - Severe Constraints
- All other Areas are Slight Constraints

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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GEOLOGICAL FAULT CONSTRAINTS

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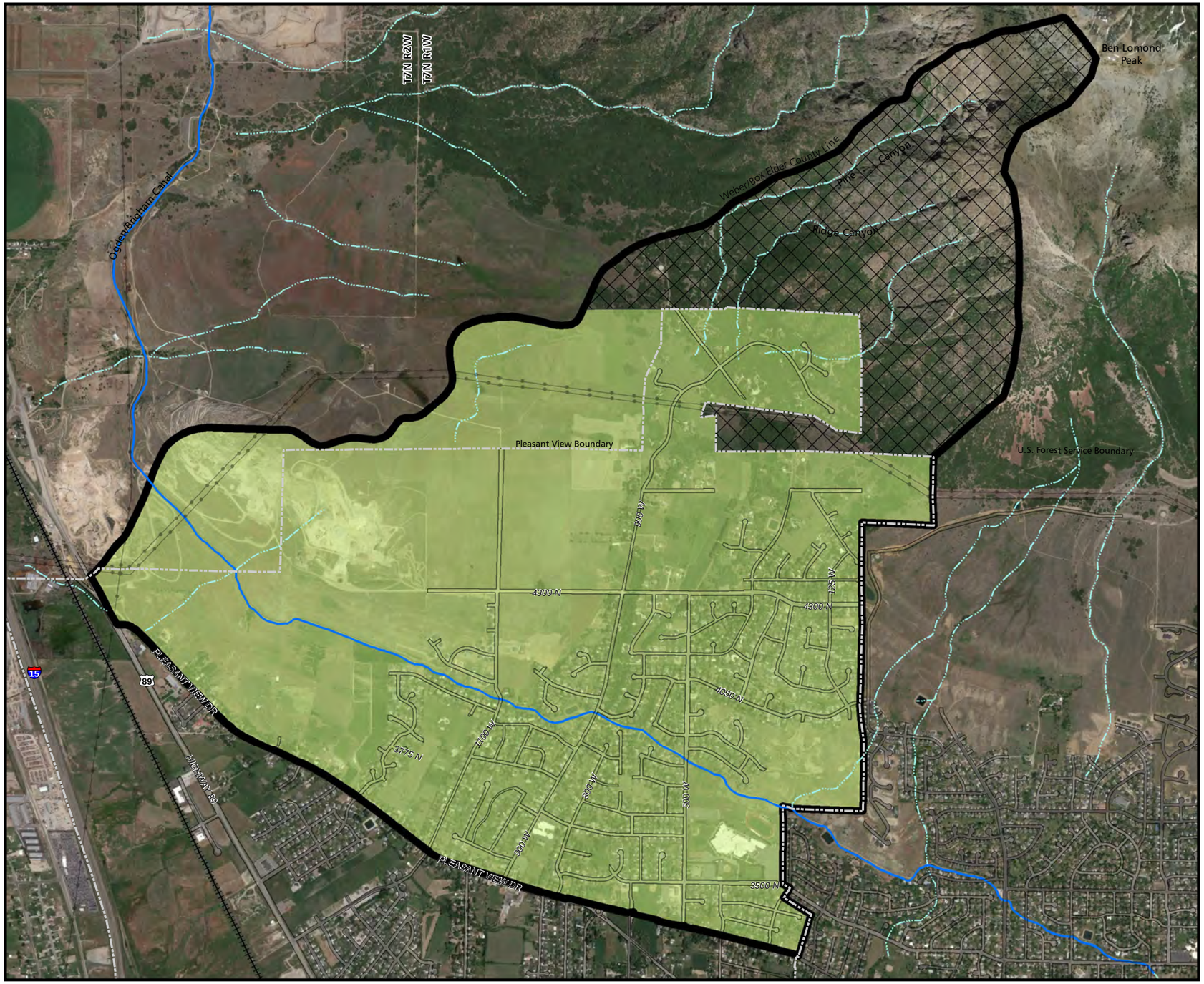

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Canal
- Current City Boundary
- Intermittent Stream

FEMA FIRM Map Zone Conditions

- Zone X - Minimal Flood Hazard (0.2 % annual chance of flood)
- Zone D - Unmapped Flood Hazard

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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FEMA FIRM MAP CONDITIONS

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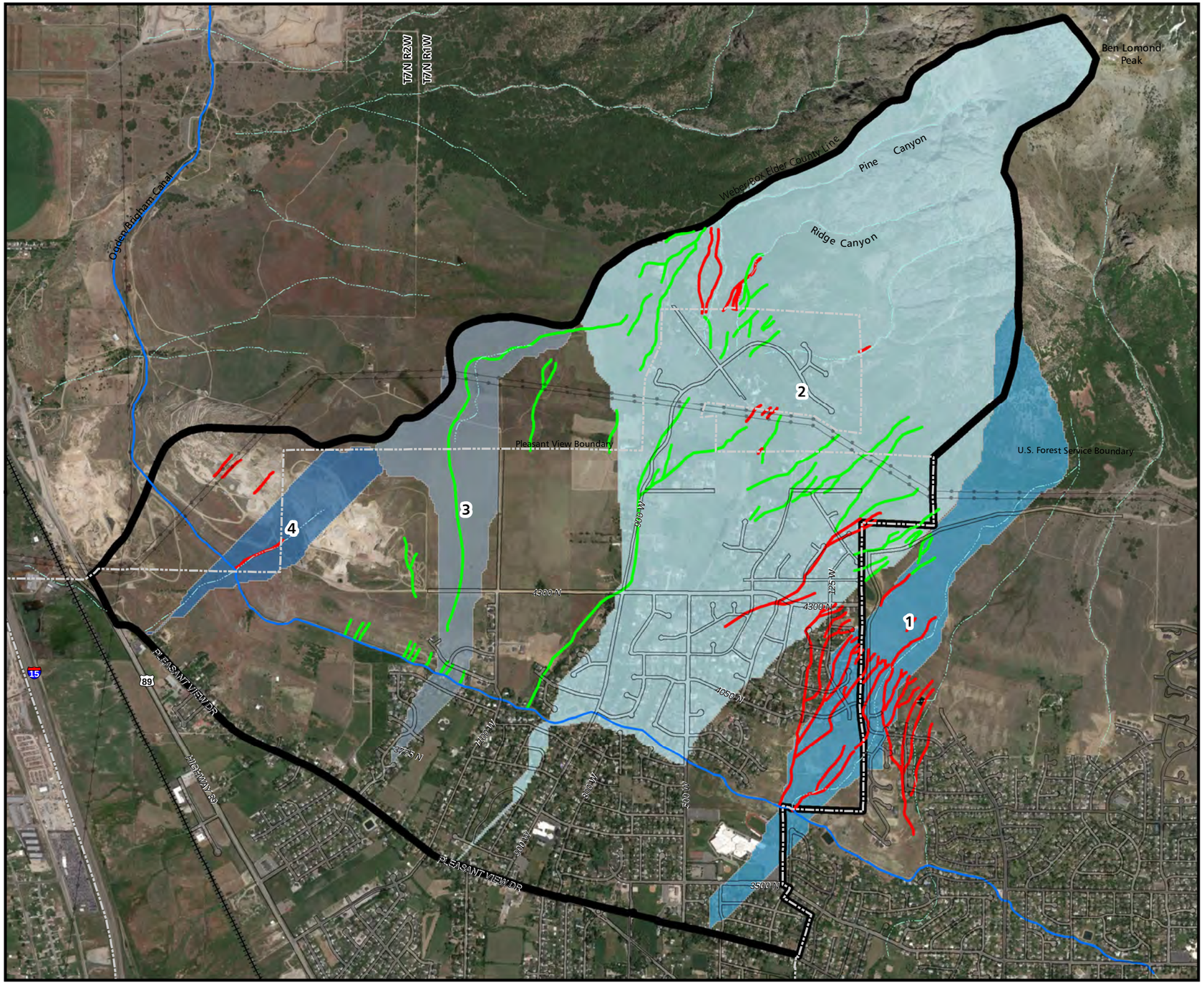

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Stream Channel Classification

- Inactive Channel
- Active Channel

Watersheds

- Watershed 1 (302 acres)
- Watershed 2 (1,556 acres)
- Watershed 3 (204 acres)
- Watershed 4 (84 acres)

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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Pleasant View City

HYDROLOGIC CONDITIONS

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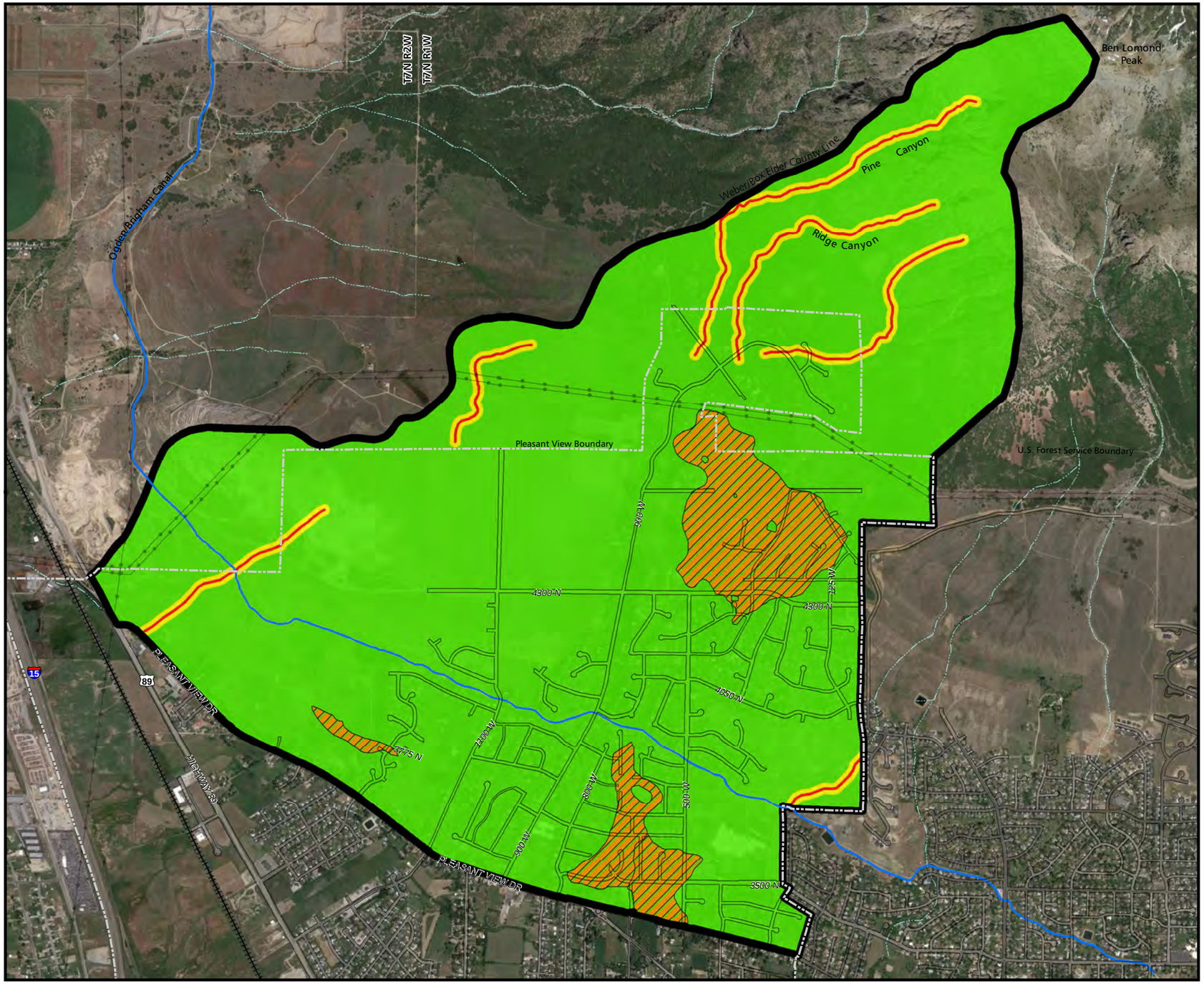

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Flood Potential Constraints

- Soil Types with Potential Flooding Limitations for Structures

Stream Channel Constraints

- Slight Constraints (Outside 100 Feet)
- Moderate Constraints (31 - 100 Feet)
- Severe Constraints (0 - 30 Feet)

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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Pleasant View City

FLOOD POTENTIAL CONSTRAINTS

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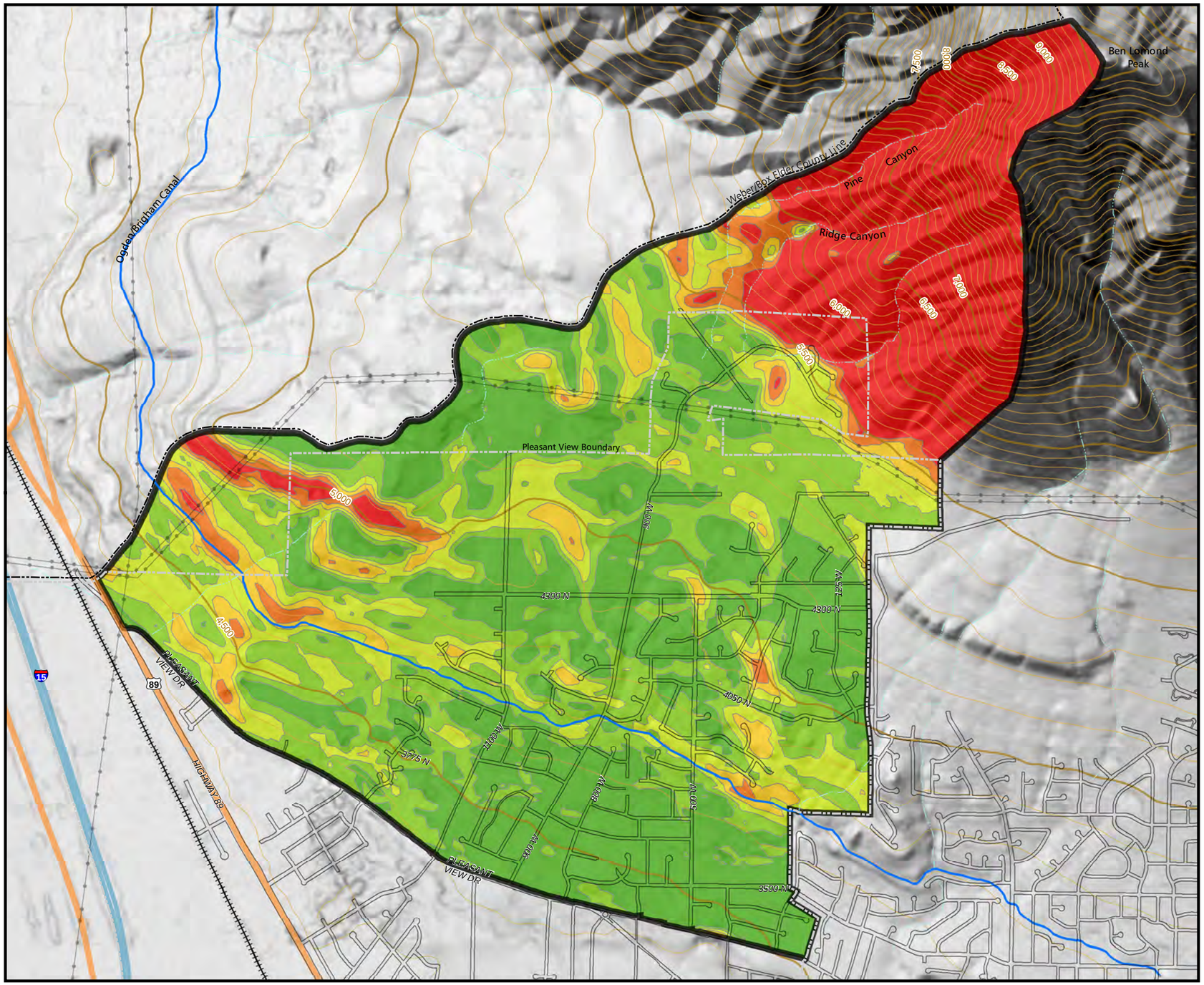

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Slope Conditions

- 0 - 10 Percent
- 10 - 15 Percent
- 15 - 20 Percent
- 20 - 25 Percent
- 25 - 30 Percent
- Over 30 Percent

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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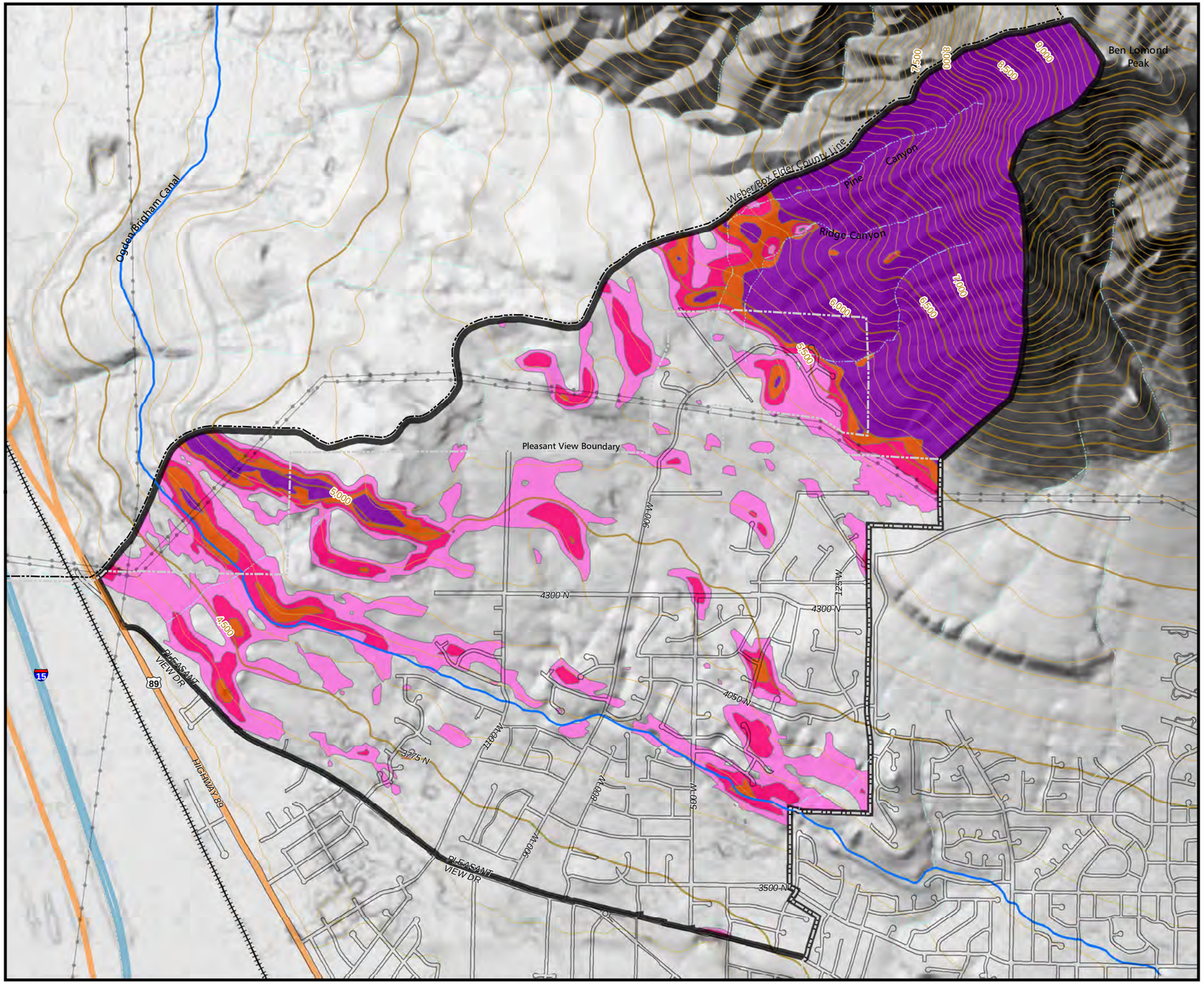
SLOPE CONDITIONS

Q:\projects\1876_PleasantView\Pleasant_Slope.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Slope Constraints

- 0 - 15 Percent - No Constraints
- 15- 20 Percent - Slight Constraints
- 20 - 25 Percent - Moderate Constraints
- 25 - 30 Percent - Severe Constraints
- Over 30 Percent - No Build

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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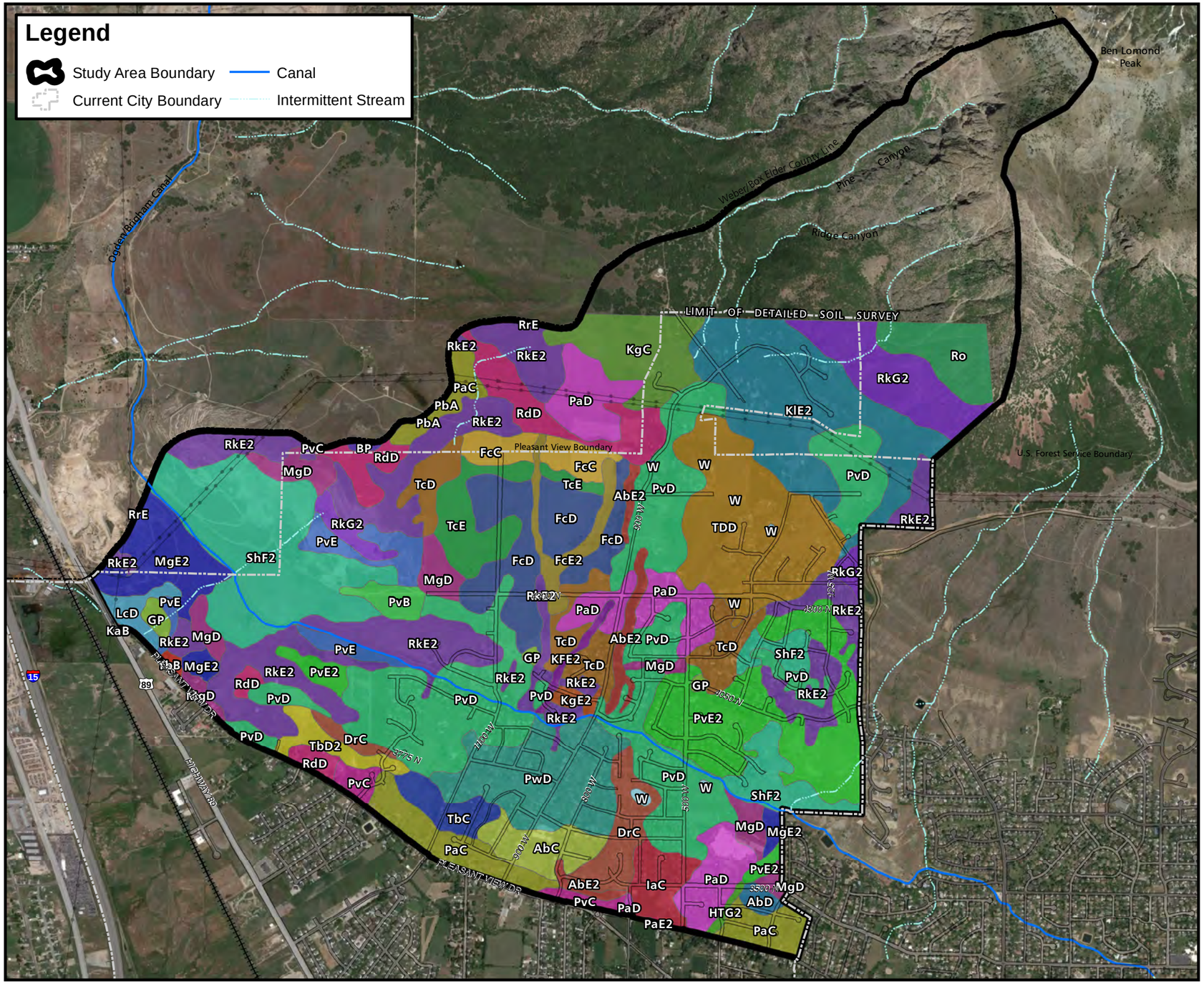
SLOPE CONSTRAINTS

Q:\projects\1876_PleasantView\Pleasant_SlopeConstraints.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Soil Types

- AbC - Ackmen loam, 3 to 6% slopes
- AbD - Ackmen loam, 6 to 10% slopes
- AbE2 - Ackmen loam, 10 to 20% slopes, eroded
- BP - Borrow pits
- DrC - Draper loam, drained, 3 to 6% slopes
- FcC - Francis loamy fine sand, 3 to 6% slopes
- FcD - Francis loamy fine sand, 6 to 10% slopes
- FcE2 - Francis loamy fine sand, 10 to 20% slopes, eroded
- GP - Gravel pits
- HTG2 - Hillfield-Timpanogos-Parleys complex, 30 to 60% slopes, eroded
- IaC - Ironton silt loam, 3 to 6% slopes
- KFE2 - Kilburn-Francis association, 10 to 20% slopes, eroded
- KaB - Kidman fine sandy loam, 1 to 3% slopes
- KgC - Kilburn gravelly sandy loam, 3 to 6% slopes
- KgE2 - Kilburn gravelly sandy loam, 10 to 20% slopes, eroded
- KlE2 - Kilburn cobbly sandy loam, 10 to 20% slopes, eroded
- LcD - Layton loamy fine sand, 6 to 10% slopes
- MgD - Marriott gravelly sandy loam, calcareous variant, 6 to 10% slopes
- MgE2 - Marriott gravelly sandy loam, calcareous variant, 10 to 20% slopes, eroded
- PaC - Parleys loam, 3 to 6% slopes
- PaD - Parleys loam, 6 to 10% slopes
- PaE2 - Parleys loam, 10 to 20% slopes, eroded
- PbA - Parleys loam, 0 to 3% slopes
- PvB - Pleasant View loam, 1 to 3% slopes
- PvC - Pleasant View loam, 3 to 6% slopes
- PvD - Pleasant View loam, 6 to 10% slopes
- PvE - Pleasant View loam, 10 to 20% slopes
- PvE2 - Pleasant View loam, 10 to 20% slopes, eroded
- PwD - Pleasant View gravelly sandy loam, 6 to 10% slopes
- RdD - Ridd stony sandy loam, 6 to 10% slopes
- RkE2 - Ridd rocky sandy loam, 10 to 30% slopes, eroded
- RkG2 - Ridd rocky sandy loam, 30 to 70% slopes, eroded
- Ro - Rock outcrop
- RrE - Ridd-Rock outcrop complex, 10 to 30% slopes
- ShF2 - Sterling very rocky loam, 6 to 50% slopes, eroded
- TDD - Timpanogos variant-Draper complex, 3 to 10% slopes
- TbB - Timpanogos loam, 1 to 3% slopes
- TbC - Timpanogos loam, 3 to 6% slopes
- TbD2 - Timpanogos loam, 6 to 10% slopes, eroded
- TcD - Timpanogos very fine sandy loam, noncalcareous variant, 6 to 10% slopes
- TcE - Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20% slopes
- W - Water

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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SOIL CONDITIONS

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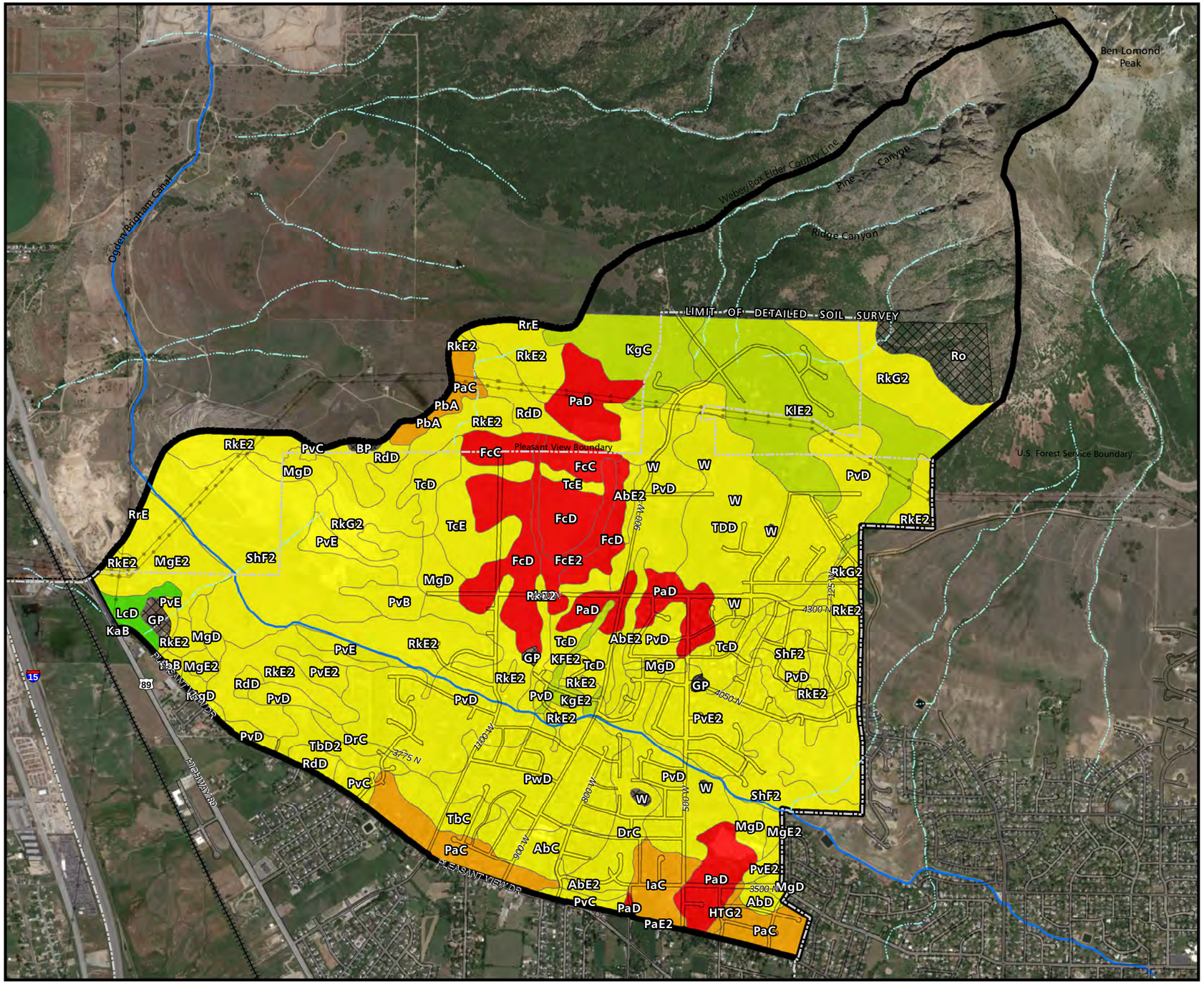

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Geomorphology

- Very Slight Constraints
- Slight Constraints
- Moderate Constraints
- High Constraints
- Severe Constraints
- No Information Available

Map Date: 11/16/2015

Map Scale 1:24,000 — 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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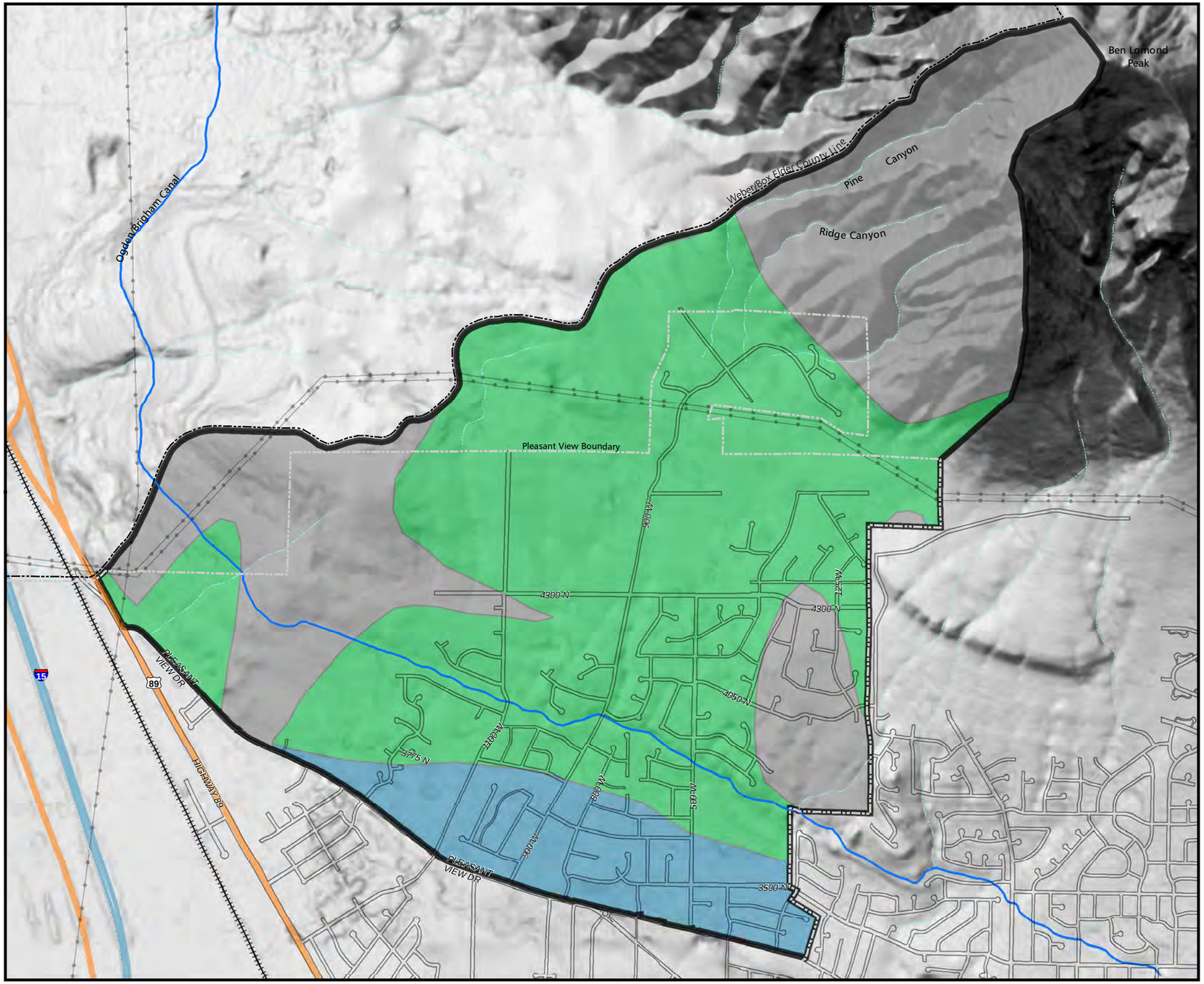
SOILS CONSTRAINTS

Q:\projects\1876_PleasantView\Pleasant_SoilsConstraints.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Groundwater Recharge Conditions

- Bedrock
- Discharge
- Primary Recharge

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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GROUNDWATER RECHARGE CONDITIONS

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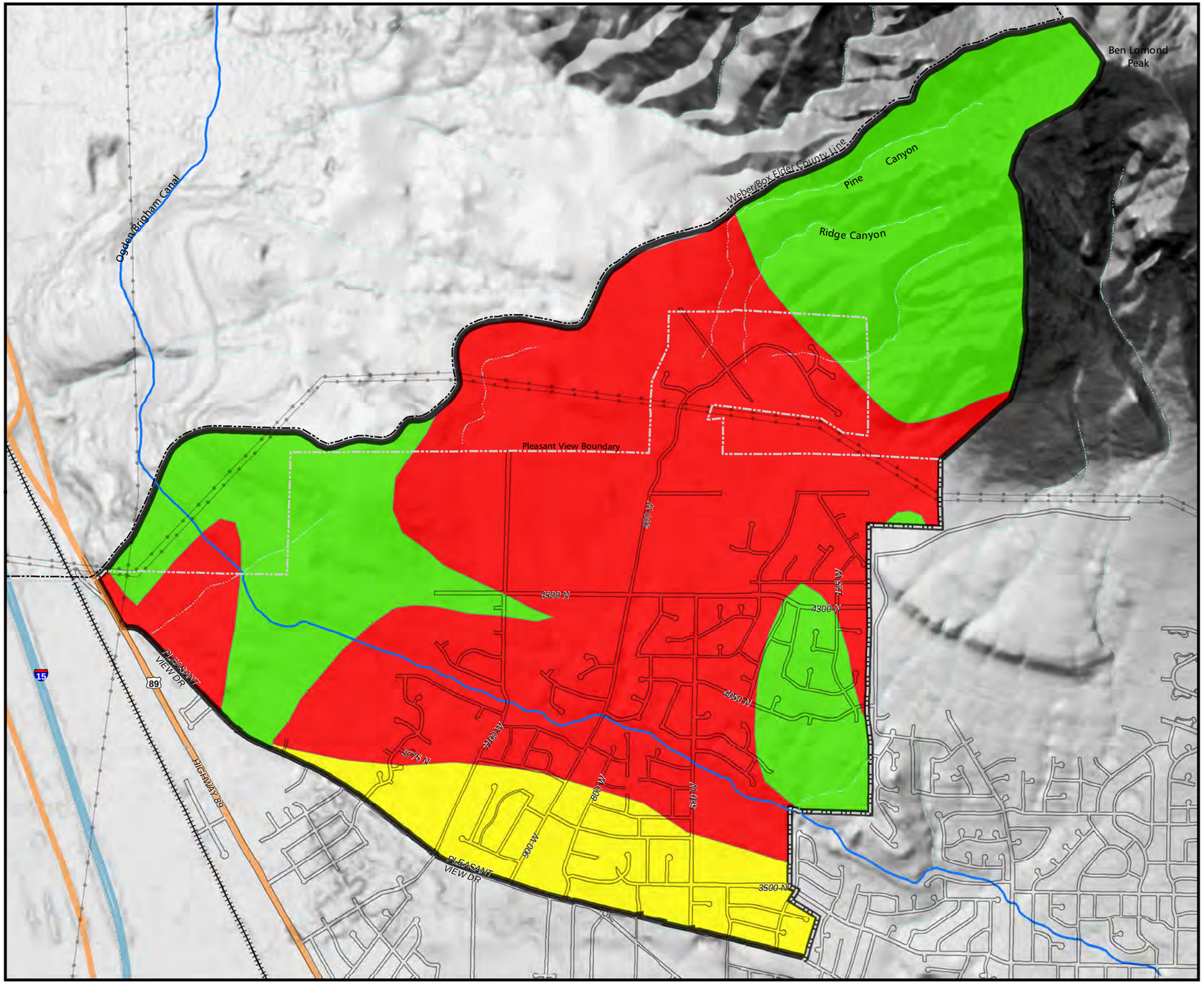

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Groundwater Recharge Constraints

- Slight Constraints
- Moderate Constraints
- Severe Constraints

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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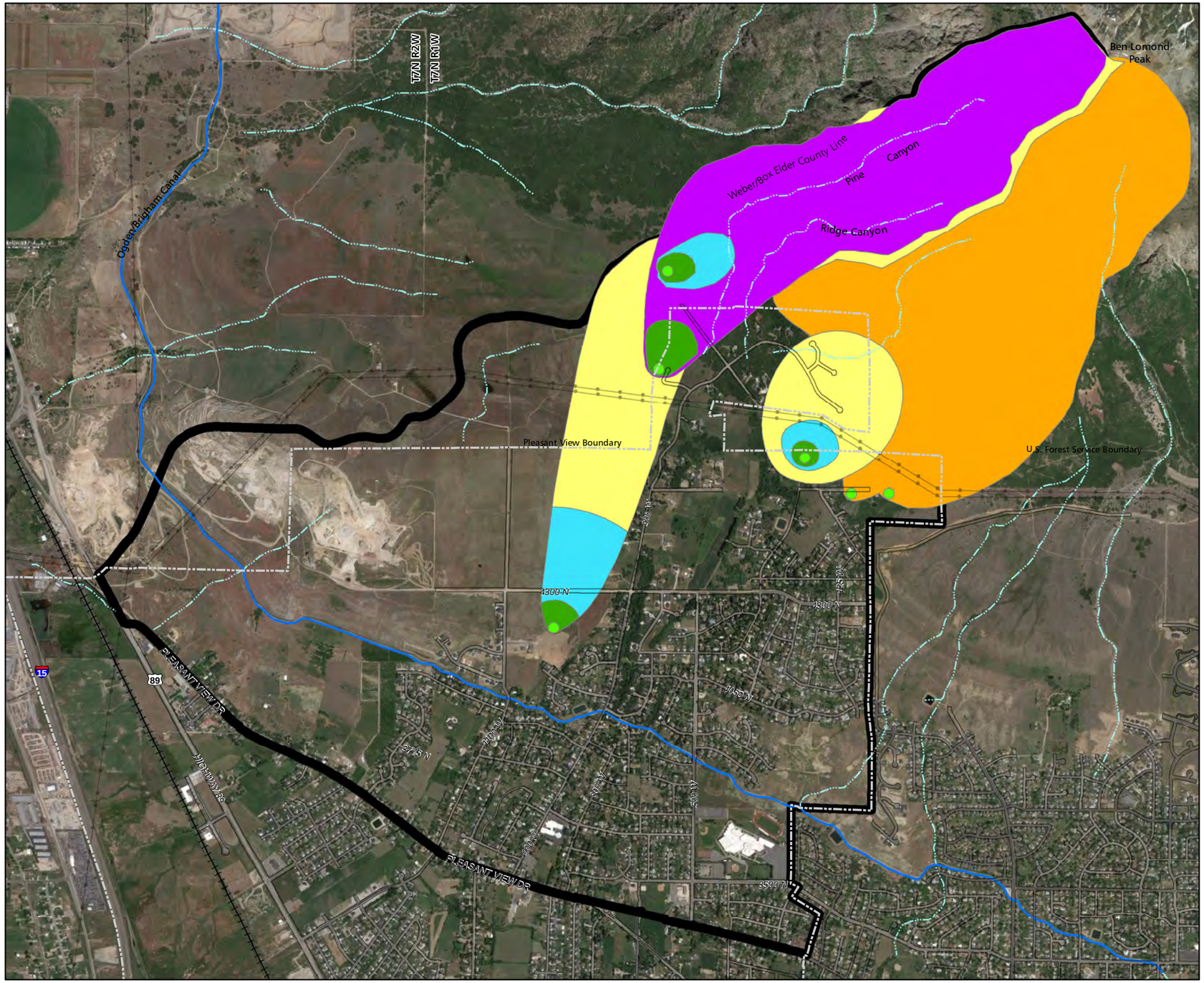
GROUNDWATER RECHARGE CONSTRAINTS

Q:\projects\1876_PleasantView\Pleasant_GroundwaterConstraints.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Drinking Water Source Protection Zones

- Zone 1: 100 Feet From Wellhead or Spring
- Zone 2: 250 Day Groundwater Travel Time
- Zone 2-3-4: 0.5 to 15 Year Groundwater Travel Time
- Zone 3: 3 Year Groundwater Travel Time
- Zone 3-4: 3 to 15 Year Groundwater Travel Time
- Zone 4: 15 Year Groundwater Travel Time

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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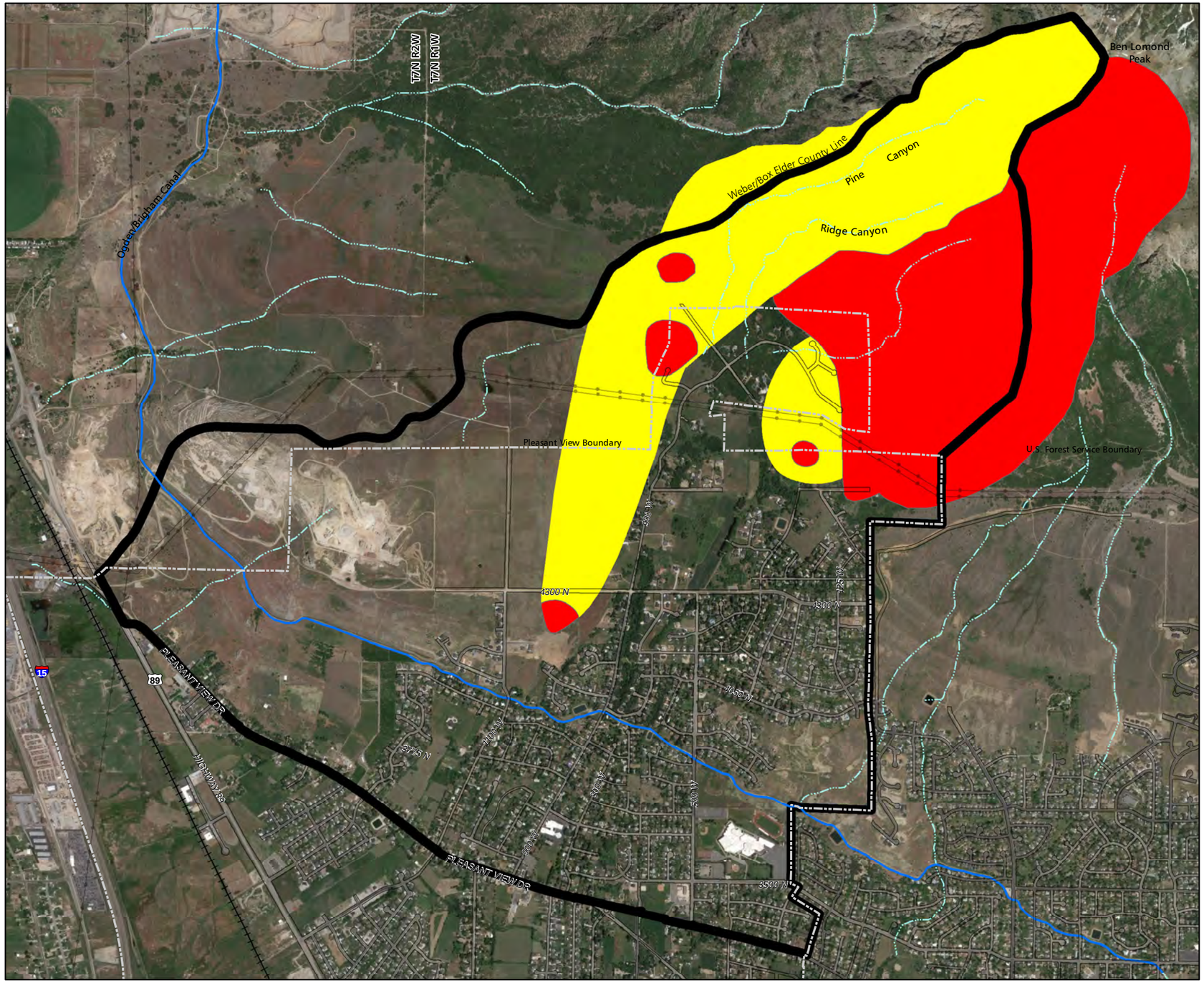
WATER SOURCE PROTECTION ZONES

Q:\projects\1876_PleasantView\Pleasant_WaterSystem.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Water Source Constraints

- Moderate Constraints
- Severe Constraints

Map Date: 11/16/2015

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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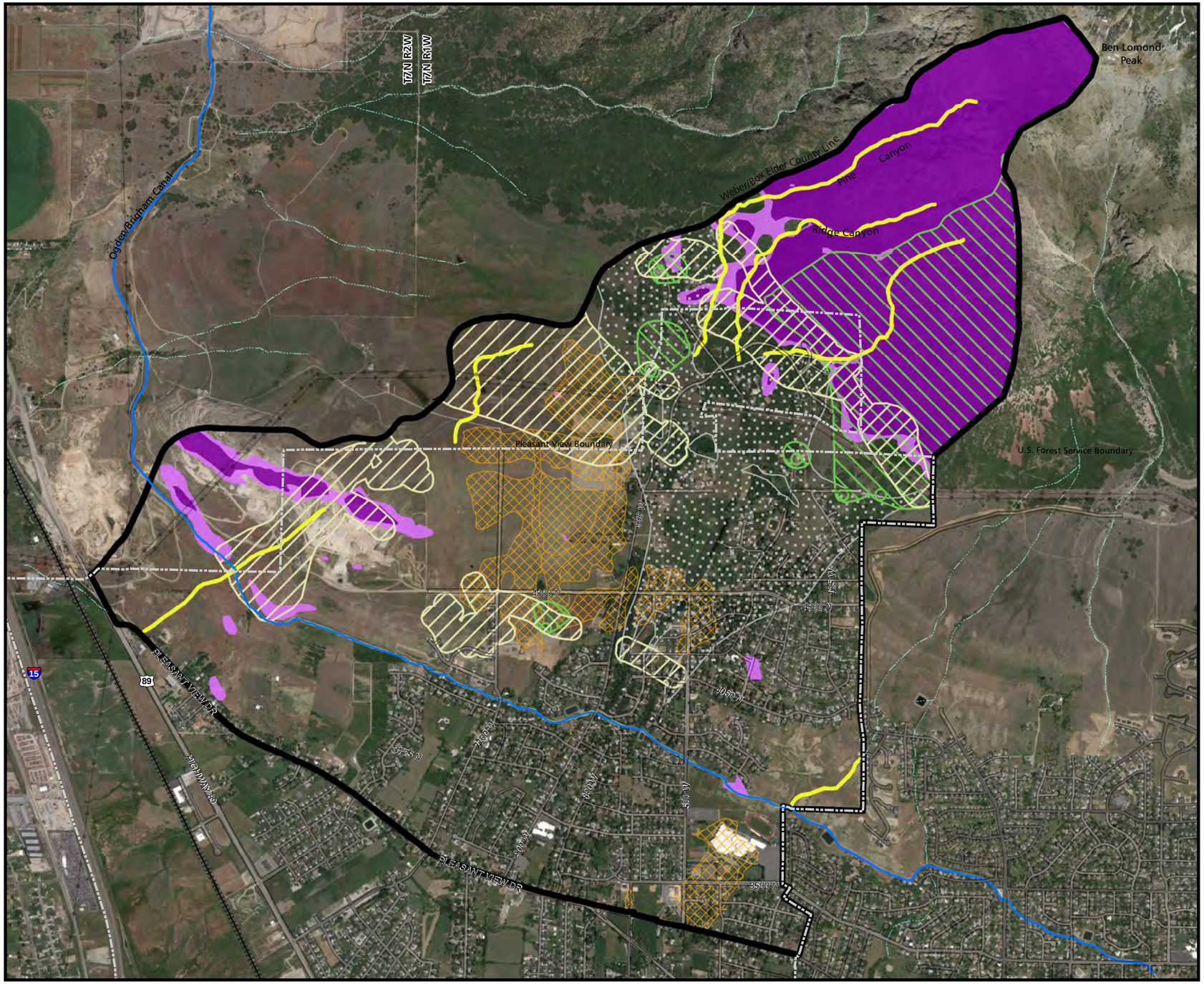
WATER SOURCE CONSTRAINTS

Q:\projects\1876_PleasantView\Pleasant_WaterSystemConstraints.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Canal
- Intermittent Stream

Composite Constraints

- Slope Over 30 Percent - No Build
- Slope 25 - 30 Percent - Severe Constraints
- Ground Fault Zones - Severe Constraints
- Stream Channel (0 - 30 Feet) - Severe Constraints
- Geological - Severe Constraints
- Soils - Severe Constraints
- Water Source - Severe Constraints

Map Date: 4/5/2016

N

Map Scale 1:24,000 1 inch = 2,000 feet

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COMPOSITE CONSTRAINTS

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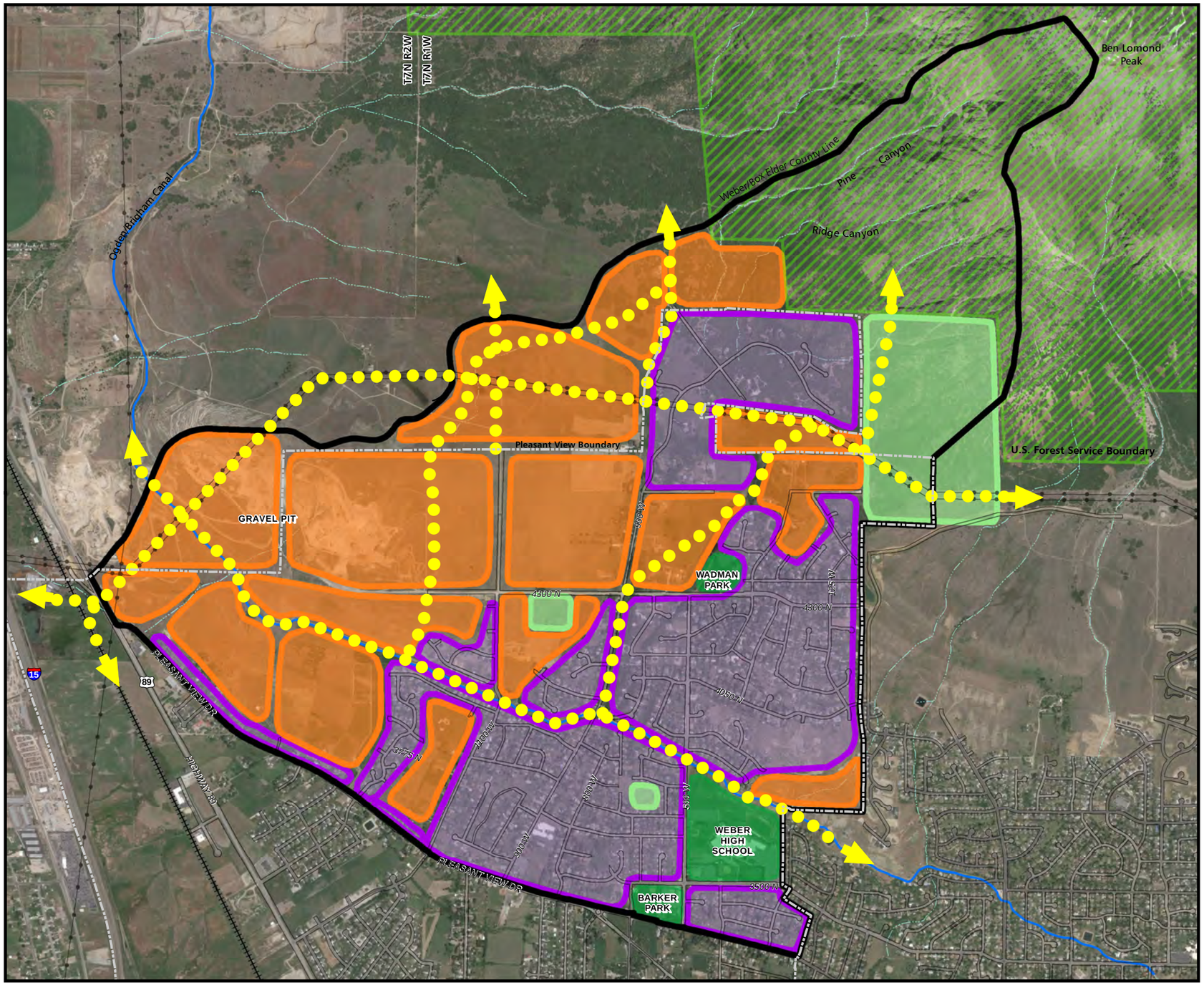

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Forest Service Boundary
- Canal
- Intermittent Stream
- Power Transmision Line

Alternative Composite

- Existing and Potential Non-motorized Trails
- Existing Development Area
- Potential Development Area
- Existing Public Parks and Open Space
- Potential Public Parks and Open Space

Map Date: 2/9/2016

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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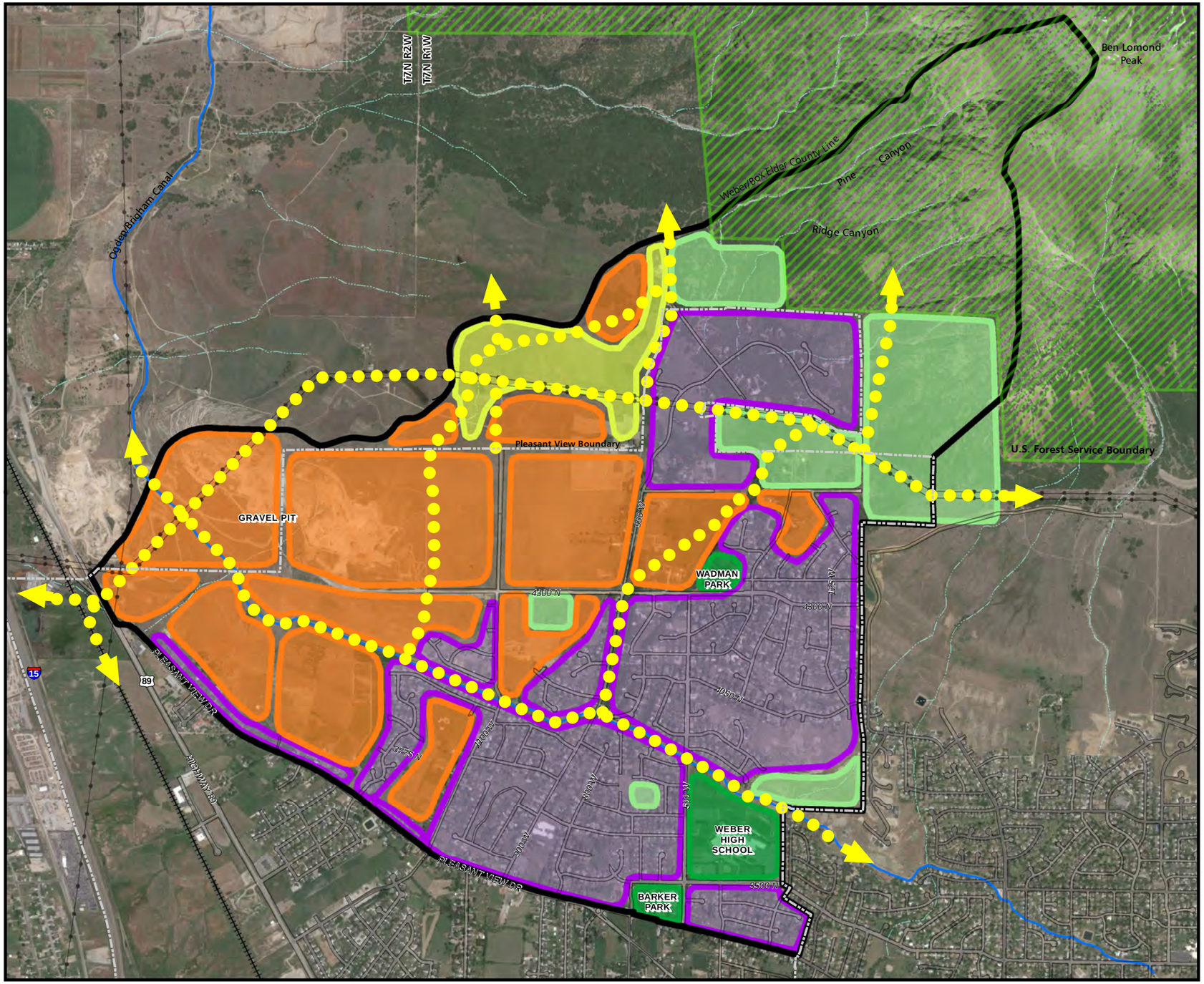
SCENARIO A: FULL BUILD-OUT CONCEPT

Q:\projects\1876_PleasantView\Pleasant_Concept_FullBuild.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Forest Service Boundary
- Canal
- Intermittent Stream
- Power Transmision Line

Alternative Composite

- Existing and Potential Non-motorized Trails
- Existing Development Area
- Potential Development Area
- Existing Public Parks and Open Space
- Potential Public Parks and Open Space
- Potential Private Parks and Open Space

Map Date: 2/9/2016

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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SCENARIO B: FOCUSED DEVELOPMENT CONCEPT

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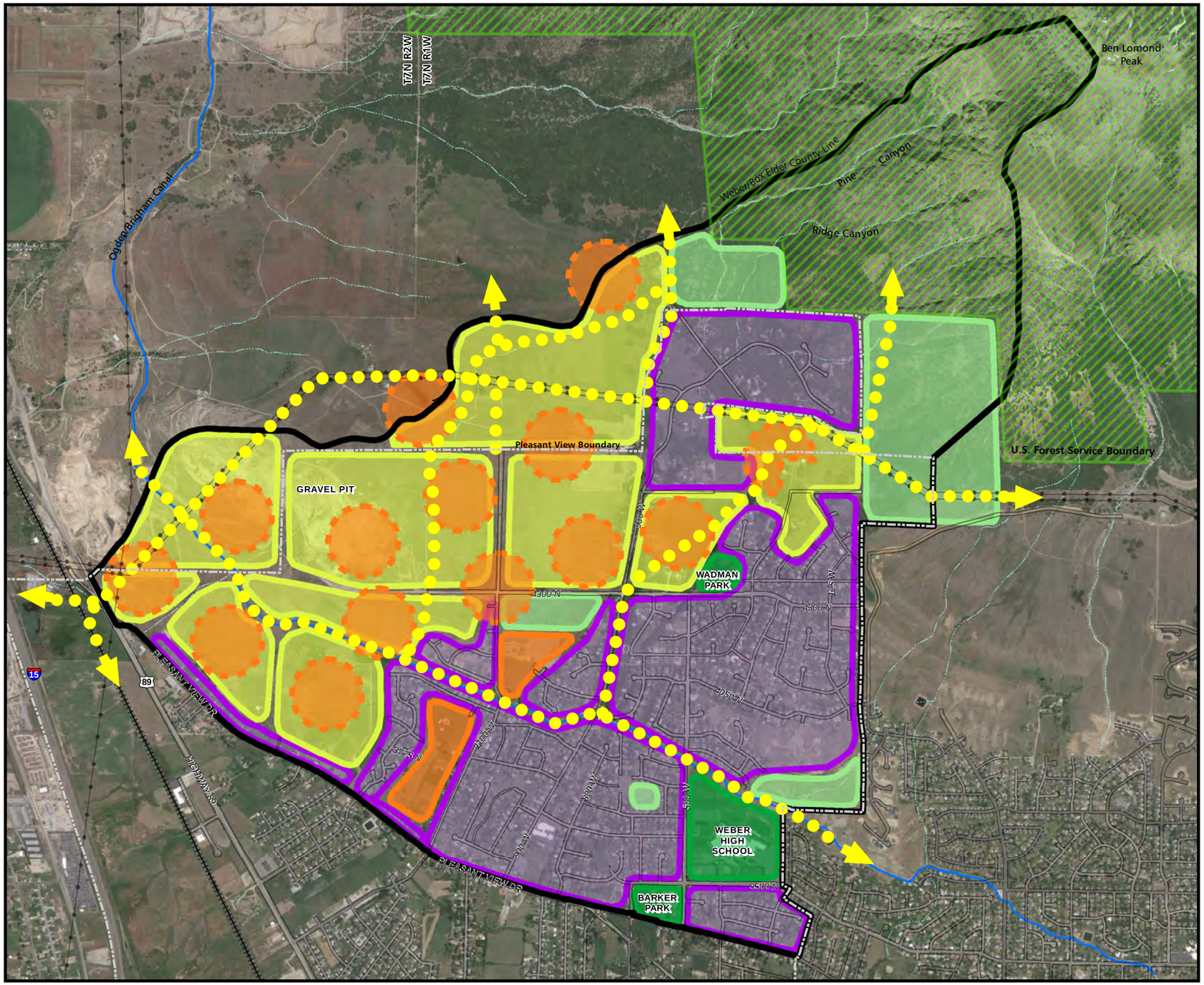

Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Forest Service Boundary
- Canal
- Intermittent Stream
- Power Transmision Line

Alternative Composite

- Existing and Potential Non-motorized Trails
- Existing Development Area
- Potential Development Area
- Existing Public Parks and Open Space
- Potential Public Parks and Open Space
- Potential Private Parks and Open Space

Map Date: 2/9/2016

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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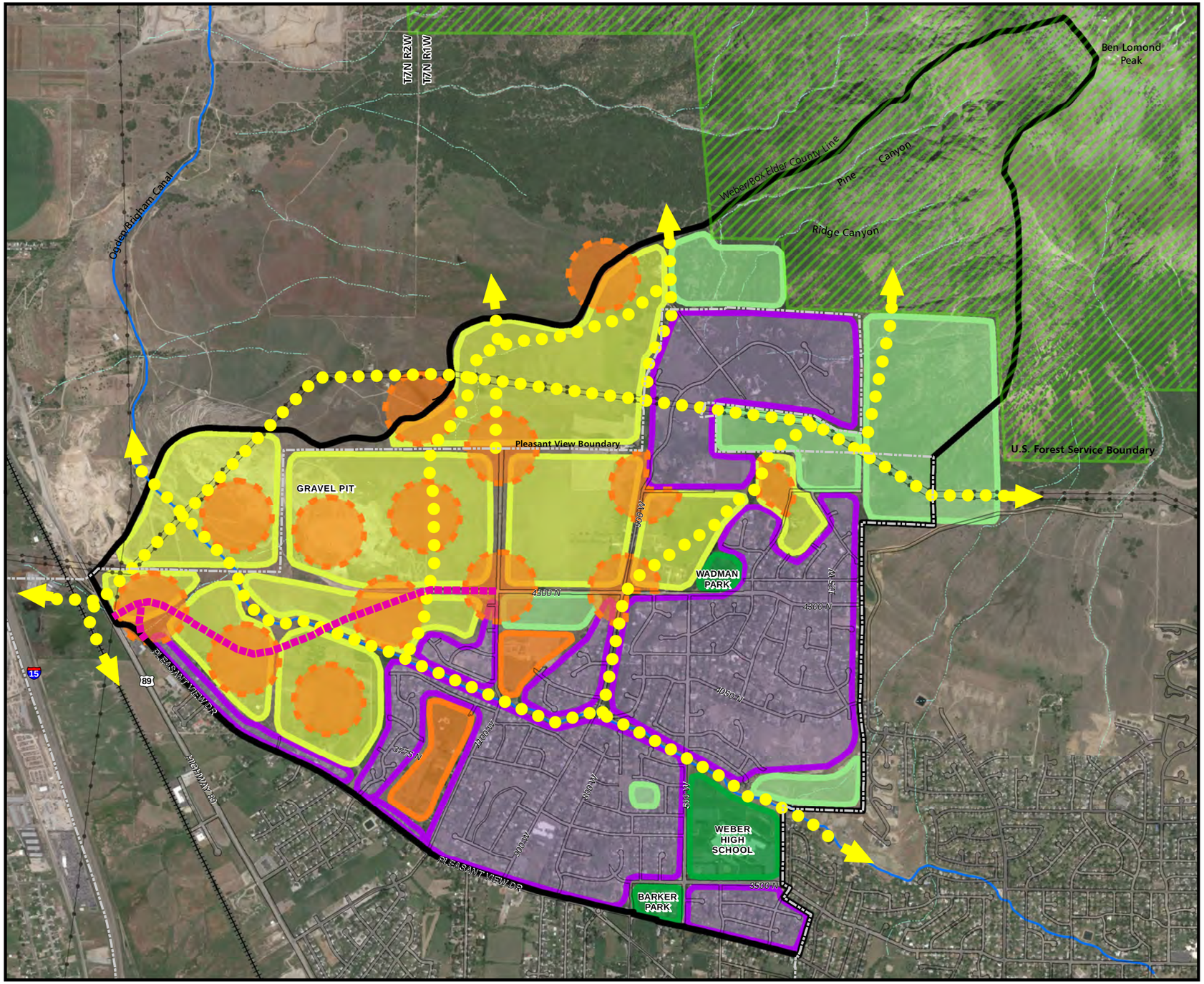
Pleasant View City

SCENARIO C: MAXIMUM OPEN SPACE CONCEPT

Q:\projects\1876_PleasantView\Pleasant_Concept_MaxOS.mxd



Pleasant View City Corporation Foothill Area Environmental Land Planning Study

Legend

- Study Area Boundary
- Current City Boundary
- Forest Service Boundary
- Canal
- Intermittent Stream
- Power Transmision Line

Alternative Composite

- Existing and Potential Non-motorized Trails
- Existing Development Area
- Potential Development Area
- Existing Public Parks and Open Space
- Potential Public Parks and Open Space
- Potential Private Parks and Open Space
- Future Skyline Drive Road

Map Date: 4/6/2016

Map Scale 1:24,000 1 inch = 2,000 feet

0 0.25 0.5 0.75 1 Miles

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Pleasant View City

DEVELOPMENT MASTER PLAN

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