Surface Water Delineation Work Plan

Arimol Group Inc. and Meadowbrook Cedar Inc. Properties

Lake Arrowhead, San Bernardino County

Lahontan Water Board Cleanup and Abatement Order #R6V-2013

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Final

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1 GOALS AND OBJECTIVES

Sometime around October 1 of 2011, construction activities disturbed surface water features on three parcels owned by Arimol Group, Inc. and Meadowbrook Cedar Inc.. These activities were conducted without Federal and State regulatory approvals for projects that impact streams and wetlands. This Work Plan is part of an effort to restore the affected surface waters. The restoration is required by Cleanup and Abatement Order No. R6V-2013 ("CAO") issued by the Lahontan Regional Water Quality Control Board ("Lahontan Water Board") and by Notice of Violation No. 1600-2011-0244-R6 ("NOV") issued by the California Department of Fish and Wildlife ("CDFW"). Among other technical studies, the CAO requires that the extent of impacted surface waters be delineated so that impacts of the construction activities on jurisdictional water features can be quantified. The delineation will also identify, in as much detail as can be supported by the data, the type(s) of water features that were affected and actions required for mitigation and restoration. Following this analysis, a restoration plan will be prepared for approval by the Lahontan Water Board and CDFW, and then implemented before the upcoming winter season according to the terms and conditions of the CAO.

The objective of this Work Plan is to describe delineation methods for determining the extent of jurisdictional water features that existed before Arimol and Meadowbrook took ownership of the parcels. The CAO defines these conditions as "pre-project conditions".

2 REVISIONS TO DRAFT PLAN IN RESPONSE TO COMMENTS

This Plan includes revisions to the August 14, 2013 version of the Plan requested by the Lahontan Water Board in their letter of August 22, 2013. In summary, these revisions consist of the following:

- Extension of two transects on the east side of Parcel 1, and addition of plots, to account for inconsistencies between topographic survey documents purported to represent pre-project conditions;

- Revision to Figure 1 to show the pre-project (2007) topographic survey map prepared by Chris Ehe;
- Addition of sections describing methods to address potential for soil compaction from equipment and safety hazards from open test pits; and
- Specification of additional content that will be included in the Surface Water Delineation Report in regard to sources of information and reference sites.

3 DELINEATION METHODS

Methods described in this Work Plan utilize applicable protocols from two Manuals: 1) the 1987 U.S. Army Corps of Engineers ("USACE") Wetlands Delineation Manual (USACE, 1987), following methods for Comprehensive Determinations for wetlands and other surface waters in Atypical Situations; and 2) the May 2010 Regional Supplement to the USACE Wetland Delineation Manual – Western Mountains, Valleys, and Coast Region Version 2.0 – Difficult Wetland Situations (USACE, 2010). Complexities of field observations may require additional references for detecting indicators of wetland soils (e.g., Richardson and Vepraskas, 2001).

3.1 Definition of Pre-Project Conditions

The Lahontan Water Board has stated that the construction activities of concern occurred on three of five parcels owned by the "dischargers". Reports available from the San Bernardino County Tax Assessor show acquisition dates for the three parcels by Arimol Group, Inc. and Meadowbrook Cedar, Inc. (Table 1). All dates are in the year 2011. Therefore site conditions that existed before 2011 will be defined as "pre-project" conditions for the purpose of delineating the extent of jurisdictional surface waters and wetlands that were impacted by the project.

3.2 Information Sources

We have completed the preliminary data gathering and synthesis steps required under the 1987 Comprehensive Protocols (Section B) for developing a field sampling design. These data include the following:

- Previous technical studies of the site: specifically, comments from the Lahontan Water Board on a previous consultant's April 2012 and July 2012 submittals of a Development Impacts Report and Surface Water Restoration Plan;
- U.S. Geological Survey ("USGS") quadrangle maps (Harrison Mountain – 1996 digital version from Terrain Navigator Pro imported into GIS; historical digital versions from historicaerials.com, imported into GIS);
- Topographic survey by Chris Ehe in 2007;
- Assessment of drainage patterns (from the USGS maps and field observation);
- National Wetlands Inventory maps ("NWI");
- Soil surveys (USDA-NRCS); and
- Remote sensing (aerial photographs). These photographs include ortho-rectified (i.e. corrected for flight angle and distortion) images obtained from ESRI that show the site prior to the surface water impacts, and other orthorectified historical images obtained from a vendor (historicaerials.com). These images are geo-referenced, with a scale appropriate for the site, and therefore were used to establish the sampling design and plot layout described in this Work Plan. Google Earth images (current and historical), which are not orthorectified, will also be used for qualitative visual reference, as needed to supplement the field investigation.

Copies of these data and reference to their sources (excluding the Water Board letters) used in the delineation of surface waters will be included in the Surface Water Delineation Report.

The following sections describe site-specific methods that will be used to assess presence of wetlands and other surface waters that existed prior to impacts. In addition, in their comment letter on the previous version of this Work Plan, the Lahontan Water Board requested an investigation of potential historical surface waters that may have existed beneath fill materials that pre-date 2011 ("ball field" area). Methods described below incorporate the 1987 protocols for Comprehensive Determinations (Section E) and Atypical Situations (Section F), as well as the Regional Supplement mentioned above (USACE, 2010).

3.3 Historical Review: Potential Extent of Impacted Surface Waters

The potential extent of impacted surface waters was researched to assist in developing a sampling design that would identify the boundaries of wetlands and other surface waters. Figure 1 shows a topographic map prepared by the dischargers' surveyor in 2007. Figure 2 shows aerial photographs taken on May 25, 2010, and in 1938. For a frame of reference, and using GIS we oriented both photographs to the same geographic coordinate system, applying overlays of property lines and flow lines that were estimated to have been impacted. The flow lines shown are for reference only in developing the sampling design. We recognize that these may not be the only features impacted. Their locations will be verified as part of the delineation. These photographs are shown here only as examples of what will be used as part of this investigation. Additional photographs and historical topographic maps will be used as needed to identify the pre-project extent of surface water features. These maps and photographs will be provided in the Surface Water Delineation Report.

To help determine the extent of impacted surface waters, Figure 2 provides an aerial photograph from 1938 that highlights some differences between conditions at that time and more recent (but pre-project) conditions. It is recognized that this site has a long history of disturbance, some of which pre-dates the Clean Water Act, and therefore the purpose of the older photographs

is to understand this history and distinguish those impacts from the dischargers' violations.

3.4 Transect and Plot Layout

Based on historical information described above, Figure 3 shows a layout of transects and plots. This layout is designed to delineate boundaries of pre-project wetlands and other surface waters. Table 2 summarizes the number and type of plots. Transect and plot locations were selected based on the estimated boundaries of the impacted surface waters, and the aerial photographs in Figure 2 that show pre-project and historical conditions.

While some transect and plot location criteria specified by the 1987 Manual (USACE 1987) and Supplement (USACE 2010) were referenced in establishing the layout, as requested by the Lahontan Water Board, other USACE criteria such as the number and spacing of observation points can only be used as a guide for the purpose of this delineation. The USACE criteria, even those for "atypical" situations, are uncomplicated by site conditions that exist in the current case, such as development, roads, and vegetation community boundaries that are artifacts of historical disturbance and landscaping. With the historical information available as described above, the layout shown in Figure 3 is intended to achieve an optimum combination of plot distribution, sample size, and sample depth to identify and delineate all impacted wetland and non-wetland surface waters. However, field observations could warrant additional transects and plots.

Note that the plot layout is intended to detect evidence of past surface waters (if present) beneath the "ball-field" area. Aerial photographs indicate this fill occurred prior to the dischargers' ownership of the properties and therefore the main purpose of including this area in the delineation is to assess potential for mitigation.

Plots will be located in the field using GPS coordinates obtained from the GIS map shown in Figure 3.

Due to anticipated complexities related to detection of soil and hydrologic indicators of surface waters in alluvial soils, soils will be characterized at locations within the estimated boundaries of the impacted surface water feature, and at locations outside of the estimated boundaries. In the field, data from these plots may warrant additional sampling to define the transition boundary between surface waters and non-jurisdictional areas. In this case, the additional locations will be noted in the field and included in the delineation report.

The depth of fill material in the surface waters is unknown. Therefore a backhoe will be used to excavate some test plots as listed in Table 2. A hand auger will be used where a backhoe is impractical or the fill depth is expected to be shallow. Auger plots will be at least two feet deep unless field observations indicate a different depth is warranted. Backhoe plots will be as deep as necessary to get below the fill material.

3.5 Determination of Wetland and Non-Wetland Surface Waters

The plot layout shown in Figure 3 is designed to detect wetland and non-wetland surface waters impacted by fill and past human disturbance. Presence/absence of three sets of indicators will be evaluated for each plot: hydrophytic vegetation, soil and substrate indicators of wetland and/or fluvial features, and hydrologic indicators of wetland and/or fluvial features. The USACE 1987 and 2010 protocols used to identify these features are not repeated verbatim here, but relevant aspects of these protocols are highlighted below. Data collection will include photographs of each plot.

It is anticipated that out of the three sets of parameters (vegetation, soil, and hydrology) used by the USACE 1987 and 2010 protocols, soil parameters will carry the greatest weight in determining the extent of surface water features. Examples of these parameters are described below. These examples are not intended to provide an exhaustive list of all parameters mentioned in the USACE 1987 and 2010 protocols, but rather summarize the types of features most likely to be encountered on the specific site in question.

3.5.1 Indicators of Wetland Surface Waters

During a site visit on July 17, 2013, it was observed that some vegetation has begun to recover from disturbances on site. Observations of remnant native vegetation on the parcels indicate that the pre-project vegetation community may have consisted of a willow overstory with a seasonally wet meadow community composed of herbaceous species. The willows can persist on shallow groundwater and do not necessarily indicate presence of a wetland. Therefore in this situation, as pointed out in the supplemental protocols (USACE, 2010), much of the wetland determination in this atypical situation will focus on the herbaceous understory and soil indicators that a meadow wetland was present. It is anticipated that detection of such a feature could be challenging because a meadow understory, consisting of shallow-rooted sedges, rushes, and forbs, can be transient, even under natural conditions. Unless they are in continual contact with groundwater, these herbaceous species depend on a combination of adequate rainfall and fine soils with high clay content that retain water through the growing season. Their stream association often derives from overbank deposits of fine sediments – soil that can take many years to develop during normal and dry years, only to be scoured and removed during wet years.

Therefore, based on the above considerations, soil composition, hydric soil indicators (e.g. redoxymorphic features, gleyed soil), and soil stratigraphy will be important in data collection. It is not known if the soil stratigraphy was disrupted by construction. The delineation must not only determine whether or not relic soil indicators of wetlands are present, it must determine whether high clay content and/or a water-retaining layer (aquitard) is still present and extensive enough to re-establish a meadow understory community with the willows. If an aquitard is not present, we will determine whether its absence is due to the project and, if so, how it can be restored.

3.5.2 Indicators of Non-Wetland Surface Waters

Impacted features buried under fill will be identified based on a variety of factors described in the USACE 1987 and 2010 protocols, including (but not necessarily limited to): color and shape of soil particles (to distinguish fill vs. natural sedimentation), presence/absence of organic debris, and stratigraphy (e.g. unsorted fill vs. distinct horizons or layers).

3.6 Reference Sites

Reference sites will serve three purposes: 1) provide data on vegetation, soil, and hydrology indicators in an undisturbed state, to which the study site data can be compared; 2) provide a plant species list appropriate for restoration; and 3) development of performance criteria for monitoring restoration success.

Unfortunately we could not locate any reference sites close to the project area. However, staff of the San Bernardino National Forest referred us to two candidate reference sites. One of these sites is located west of Lake Arrowhead, the other is located in Running Springs. Both sites are on Forest land. We will investigate these sites and their suitability for comparison to the project site as part of the wetland delineation. If interpretation of data collected on the project site proves to be problematic, and the reference site(s) are determined to be representative of pre-project conditions, the site(s) will be used to help resolve interpretation issues. At a later stage, as part of development of the restoration plan, the reference site(s) will also be used to prepare a plant palette and establish success criteria.

Detailed descriptions of the reference site(s) will be included in the Surface Water Delineation Report. These descriptions will include location map(s) and information regarding soils, vegetation, surface waters, size, topography, aspect, elevation, precipitation, and other data relevant to a determination that the site(s) are appropriate for comparison to the Meadowbrook site.

4 AVOIDANCE OF SENSITIVE RESOURCE IMPACTS

No impacts to surface waters are expected from this work and therefore no permits are expected to be required. The California Department of Fish and Wildlife has identified potential for one sensitive species to occur in the area: southern rubber boa. A survey for this species will be conducted prior to excavation of the sample plots.

5 AVOIDANCE OF FURTHER IMPACTS TO SURFACE WATERS

It is anticipated that a backhoe will be required to reach pre-project grade in several areas across the site. The following measures will be employed to avoid further impacts to surface waters from this equipment:

- Backhoe equipment will have rubber tires only;
- Travel across the site will be conducted only to the extent necessary for pit excavation;
- After they are backfilled, surface soils that are compacted from heavy equipment around test pits will be de-compacted with surface scrapes only to the depth of compaction; and
- A spill kit containing oil/lubricant cleanup materials will be kept on site when heavy equipment is present.

6 SAFETY MEASURES

It is anticipated that test pit depths will be in the range of two to nine feet, depending on location and expected depth of fill material. These pits can be a safety hazard. To prevent accidents, the following measures will be employed:

- Shallow pits excavated by auger and shovel will be backfilled immediately upon completion of soil data collection;
- Pits of moderate depth (three to five feet) will be marked with stakes and Caution tape. Unless we are directed otherwise, the Caution tape will remain and the pits will remain open for agency inspection, in the event that questions arise from the Surface Water Delineation Report – after

which each pit will be backfilled with the same soil that was excavated from the pit;
- Each pit with a depth of more than five feet (i.e. in the "ball-field" area of historical fill) will be backfilled with soil excavated from the pit, immediately upon completion of all soil data collection.

7 SCHEDULE

Per discussions with the Lahontan Board, the surface water delineation will be initiated by August 26, 2013, with the delineation report submitted by September 20, 2013. Field work will be coordinated with the Lahontan Water Board and California Department of Fish and Wildlife, with a minimum of 72 hours advance notification.

8 DOCUMENTATION AND REPORTING

Report content will include the following, at minimum:

- Description of all methods and indicators used in the delineation;
- Field data forms;
- Description, quantification, and illustration of the full extent of all surface waters in their pre-project condition;
- Scaled site plans illustrating pre-project surface and subsurface soils, hydrology, topography, surface waters, and vegetation;
- Scaled site plans illustrating current surface and subsurface soils, hydrology, topography, surface waters, and vegetation;
- Cross-section diagrams depicting lateral and vertical extent of all wetlands and other surface waters;
- Maps and detailed narratives describing reference site(s) and explanation why they are appropriate for comparison to the Meadowbrook site; and
- Deviations from this Work Plan and rationale for such deviations.

The Report will be certified by the Dischargers and the person who conducts the delineation. The Report will be submitted concurrently to the Lahontan Water Board, CDFW, USACE, and San Bernardino County Land Use Services.

9 REFERENCES

Richardson, J.L. and M.J. Vepraskas (editors), 2001. Wetland Soils: Genesis, Hydrology, Landscapes, and Classification. CRC Press, LLC.

U.S. Army Corps of Engineers (USACE), 1987. Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program Technical Report Y-87-1 (on-line edition). Environmental Laboratory, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS..

USACE, 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

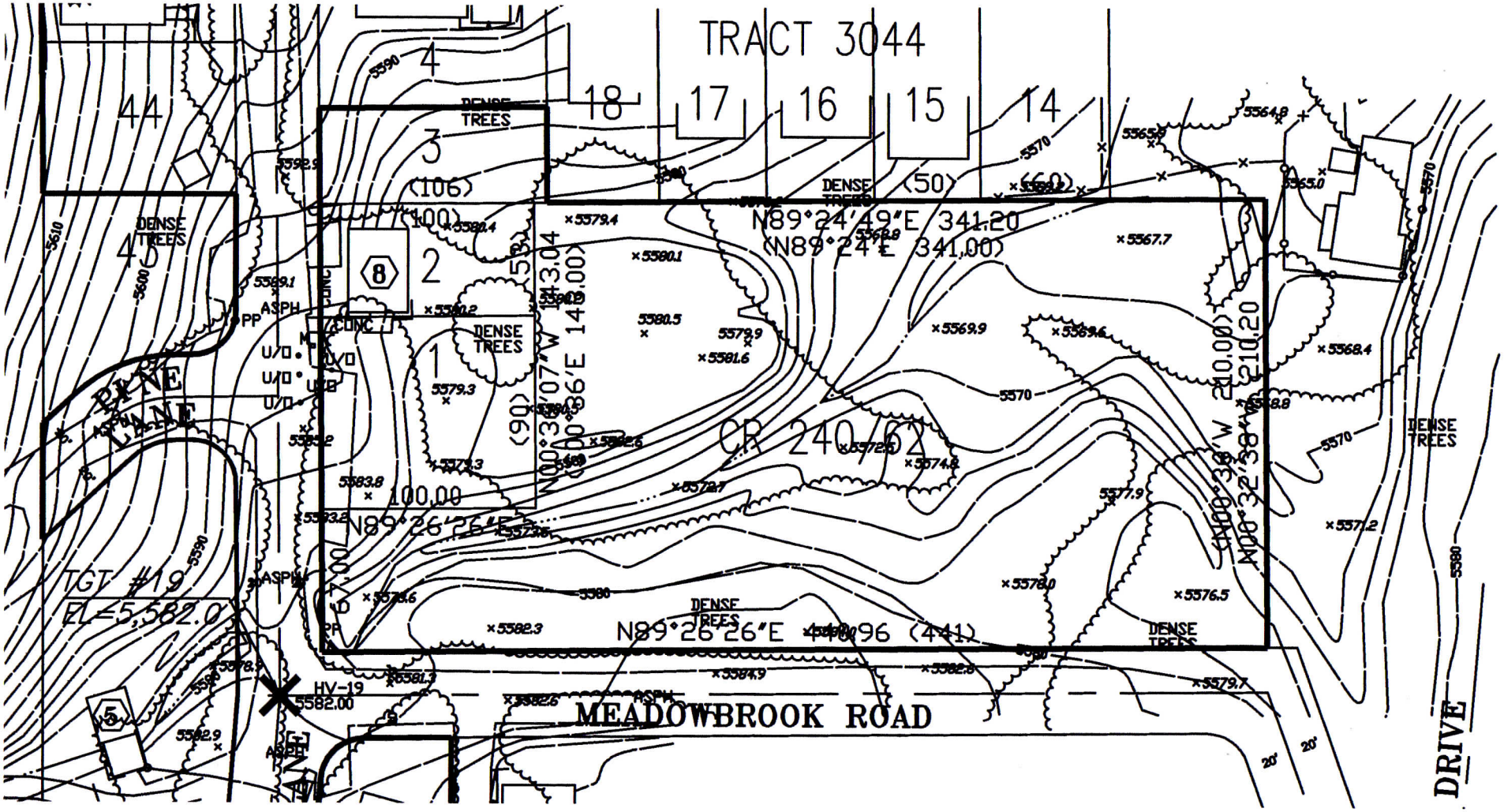


Figure 1. Surveyed Topography

Based on topographic survey by Chris Ehe, September 2007

Above: Estimated pre-project water flowlines, based on surveyor's map (Figure 1) and features visible in an aerial photograph taken in May of 2010.
Below: Historical aerial from 1938 with examples of some (not all) possible discrepancies from the above indicated with green arrows, to be investigated in the field. Flowlines and parcel boundaries have been overlaid for reference.

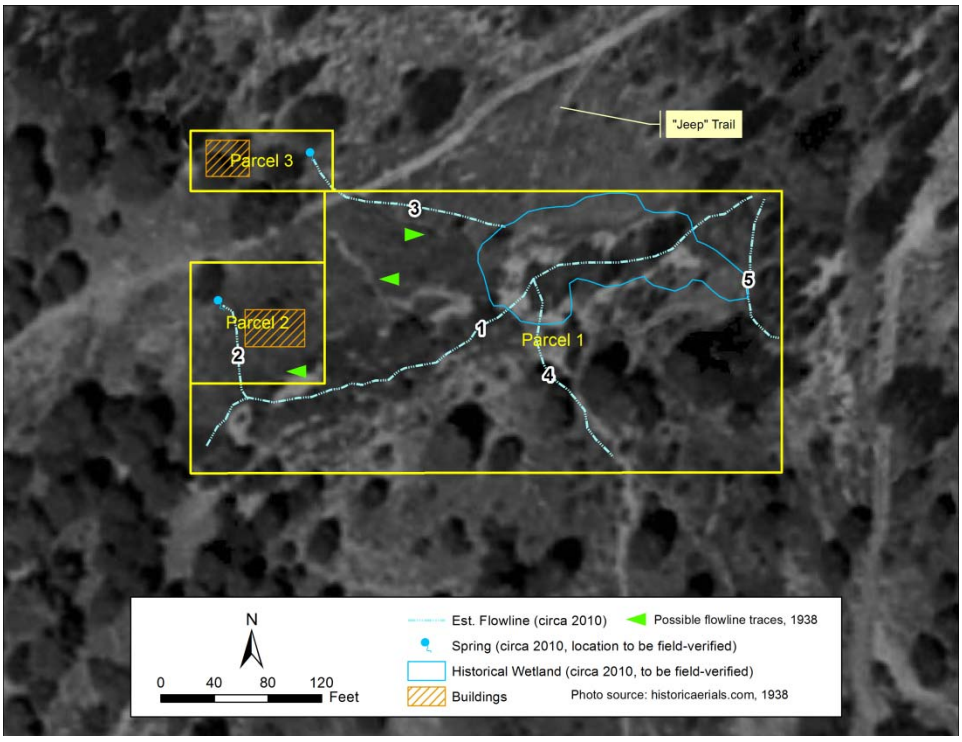
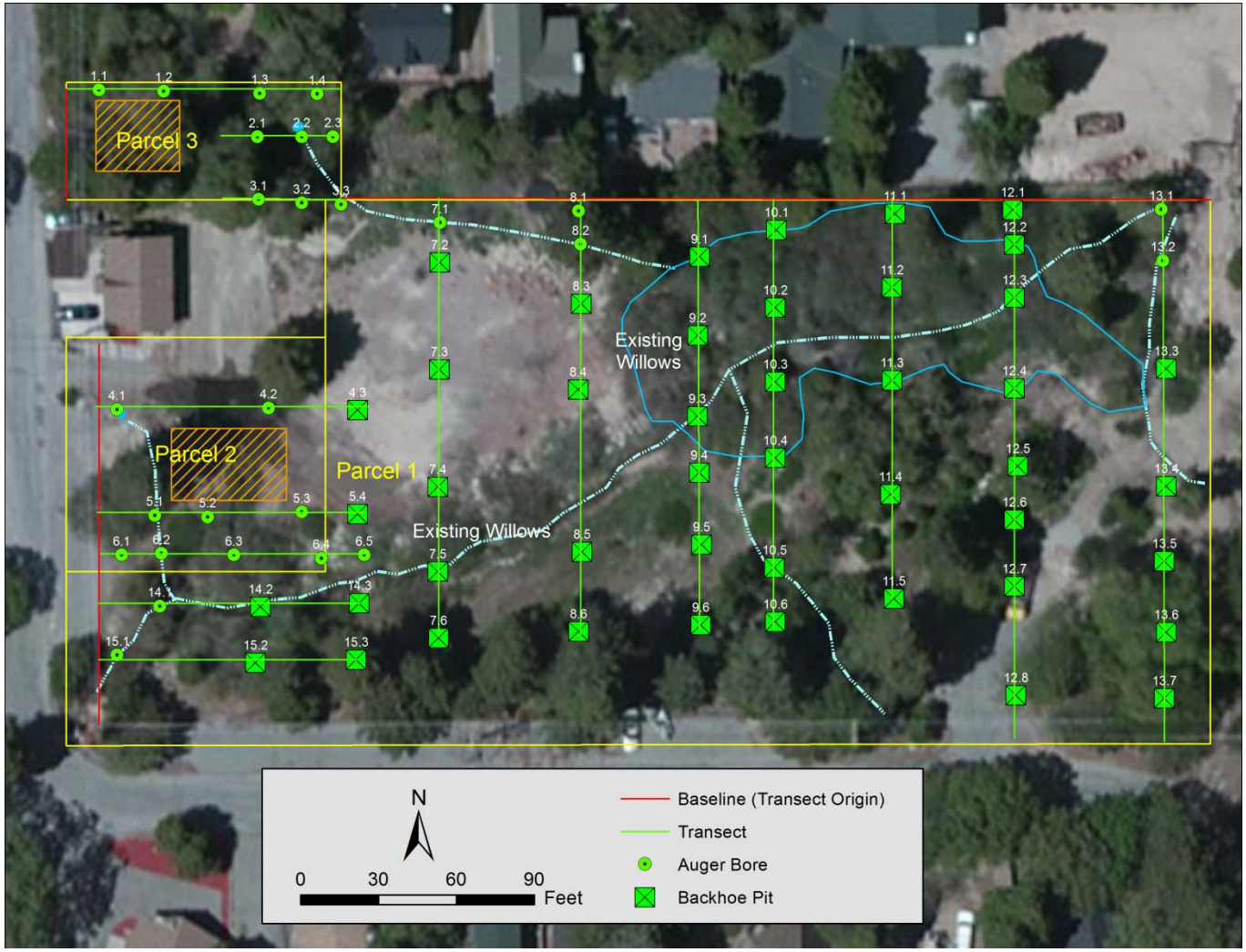


Figure 2. Historical Conditions



Note: selection of backhoe vs. auger is based on proximity of fixed structures (e.g. buildings) and anticipated depth of fill. Figure shows the minimum number of transects and plots. Given uncertainties in flowline and spring locations, the number of plots may be increased in the field, and locations adjusted, depending on observations.

Figure 3. Layout of Transects and Plots

Table 1. Property Acquisition Dates and Ownership

Parcel Address	San Bernardino County APN	Parcel Number (assigned by Lahontan Water Board)	Acquisition Date	Ownership
1031 Meadowbrook Road	0336-134-02-0000	Parcel 1	May 31, 2011	Arimol Group, Inc.
995 Meadowbrook Road	0336-134-03-0000	Parcel 2	May 31, 2011	Arimol Group, Inc.
			November 29, 2011	Meadowbrook Cedar, Inc.
			December 6, 2011	Arimol Group Inc.
977 Meadowbrook Road	0336-134-05-0000	Parcel 3	May 31, 2011	Arimol Group, Inc.
			December 6, 2011	Meadowbrook Cedar, Inc.

Table 2. Transects and Plots

Transect	Location	Minimum Number of Plots	Excavation Method
1	Parcel 3	4	hand auger
2	Parcel 3	3	hand auger
3	Parcel 3	3	hand auger
4	Parcels 1 and 2	3	hand auger (2), backhoe (1)
5	Parcels 1 and 2	4	hand auger (3), backhoe (1)
6	Parcels 1 and 2	4	hand auger
7	Parcel 1	6	hand auger (1), backhoe (5)
8	Parcel 1	6	hand auger (2), backhoe (4)
9	Parcel 1	6	backhoe
10	Parcel 1	6	backhoe
11	Parcel 1	5	backhoe
12	Parcel 1	8	backhoe
13	Parcel 1	7	hand auger (2), backhoe (5)
14	Parcel 1	3	hand auger (1), backhoe (2)
15	Parcel 1	3	hand auger (1), backhoe (2)