

March 21, 2024

Mendocino LAFCo
Ukiah Valley Conference Center
200 South School Street
Ukiah CA 95482

Re: 'Western Hills Annexation - Plan for Services'

To Whom It May Concern:

A recommendation was received to consolidate the plan for services from submitted application materials (e.g. Justification of Proposal, Development Agreement, etc.) into one document. This 'Plan for Service' document for the 'Western Hills Annexation & Sphere of Influence Amendment' includes written-descriptions, maps, graphics, and other information (Attachment 1) that will assist the Commission, public, and other agencies in understanding the existing and proposed services associated with the requested change in jurisdictional boundary.

Per Government Code Section 56653(b), the plan for providing services shall include the following information and any additional documentation required by the Commission or the executive officer:

- (1) An enumeration and description of the services currently provided or to be extended to the affected territory;
- (2) The level and range of those services;
- (3) An indication of when those services can feasibly be extended to the affected territory, if new services are proposed;
- (4) An indication of any improvement or upgrading of structures, roads, sewer or water facilities, or other conditions the local agency would impose or require within the affected territory if the change of organization or reorganization is completed;
- (5) Information with respect to how those services will be financed.

Below, the associated 'Plan for Services' is outlined for the 'Western Hills Annexation' request:

Electric: Presently, electrical service is not provided to any of the parcels identified for annexation but can be provided in conjunction with approved development. For Development Parcels #1-7 and #9-11, the electrical infrastructure shall be constructed by the developer, subject to the review and approval of the public utility providing the service. All utilities shall be installed underground within the identified easements, except for pad mount transformers. Per the development agreement, the following conditions of approval (Attachment 2) were applied by the City's Electric Utility Department:

- A 10-ft. utility easement for any underground distribution extended into the parcel beyond the existing PUE shall be required. Prior to recordation of the Lot Line Adjustment easements must be surveyed and deeded or defined on the map. Alterations to the 10-ft. utility easement shall be submitted to the COUEUD for approval.
- Upon individual parcel development, additional easements may be required to provide electric service. Future site improvements shall be submitted to the Electric Utility Department for review and comment. Construction requirements and associated developer costs will be determined to provide electric service.
- Developer shall incur all costs of project, to include labor, materials, and equipment.

As conveyed in the enclosed plans and maps of Attachment 1, electrical service is planned for Development Parcels #1-7. While Development Parcels #9-11 do not feature a plan for electrical service, easements along the proposed roadway have been provided via the associated purchase agreement. Detailed electrical infrastructure planning and analysis for these parcels will occur in concert with the associated discretionary permits required to facilitate residential improvements.

No development is proposed for any of the privately owned parcels associated with the annexation request beyond the identified Development Parcels. Those parcels featuring residential improvements that are split by the

City/County boundary were previously developed within the City's jurisdiction and are provided with electric services from the City of Ukiah.

Road & Trails: The areas identified for annexation currently feature a myriad of existing roads, trails and fire breaks. Enclosed with this summary in Attachment 1 are maps from the development and purchase agreements that clarify the location of access roads, as well as associated easements. The existing access road that extends from Redwood Avenue ranges in width from 16-20 feet and was previously compacted and improved with gravel. For Development Parcels #1-7, residential access will be provided along this extension of Redwood Avenue. This access road will be improved to allow for residential development. Road improvements include, but are not limited to, paving, storm drains, as well as other drainage facilities and utilities. The road improvements and utility infrastructure that support the residential development of these parcels shall comply with the applicable provisions of state and local law, including fire safety standards for state responsibility areas, meaning that fire suppression (e.g. fire hydrants, water storage tanks, etc.) shall be installed in required locations. All access improvements, roadways and residential development shall be reviewed by the Fire Prevention Division and adhere to all local, state and federal fire regulations relating to access and safety. Per the limited development agreement, the following conditions of approval were applied by the City's Public Work Department:

- Future residential development and site improvements (including road and access improvements) shall be reviewed by the Department of Public Works to identify site specific requirements.
- Construction projects that would disturb more than one acre of land, would be subject to the requirements of General Construction Activity Stormwater Permit (Construction General Permit Order 2009-0009-DWQ, also known as the CGP), which requires operators of such construction sites to implement stormwater controls and develop a Stormwater Pollution Prevention Plan (SWPPP) identifying specific BMPs to be implemented to reduce the amount of sediment and other pollutants associated with construction sites from being discharged in stormwater runoff.
- Applicable City water and sewer connection fees shall be paid at the time of building permit issuance.
- All work within the public right-of-way shall be performed by a licensed and properly insured contractor. The contractor shall obtain an encroachment permit for work within this area or otherwise affecting this area. Encroachment permit fee shall be \$45 plus 3% of estimated construction costs.

The purchase agreement allows for residential improvements to be constructed on Development Parcels #9-11, but does not include specific designs or proposals, nor does it grant any entitlements for new construction. With regard to access and trails, the purchase agreement conveys the following:

- The City released public access on the private drive segment of Redwood Avenue across the annexation area;
- The Developer grants the City additional trail easements, as conveyed in the purchase agreement, and detailed on the enclosed maps in Attachment 1.
 - The City does not propose any recreational facilities at this time. However, the City does aspire to develop trails and recreational open-space areas in the future as funds and resources become available.
- The project does not include road or utility improvements for the development of Parcels #9-11, as these considerations will be undertaken in concert with the required discretionary permits. Access to the parcels is established from an existing private drive from the extension of Redwood Avenue.

No development is proposed for any of the privately owned parcels associated with the annexation request beyond the identified Development Parcels. Those parcels featuring residential improvements that are split by the City/County boundary were previously developed within the City's jurisdiction and are provided access from existing public right-of-way or private roads.

Sewer & Water: Presently, water and sewer services are not provided to any of the parcels identified for annexation, although private wells do exist. Common sewer and water infrastructure for new residential development will be undertaken by the Developer. All common sewer and water infrastructure will be owned and

maintained by the accompanying Homeowner Association. In order to fulfill the Association's duty to create and maintain a water system, the Association reserves all water rights for each of the Development Parcels, whether it is surface water, spring water, or subterranean water. Nothing, however, shall prevent the Developer or Association from connecting the Development Parcels to public water or sewer utilities, upon application and permitting by governing agencies.

For Development Parcels #1-7, an existing shared well is intended to provide water for fire prevention and domestic uses. A water storage tank is identified for development along the existing road/access easement. The water system consists of a well, water-storage tank, pumps, and water pipelines to enable connection to individual lots. The proposed sewage disposal system includes holding tank(s), pumps, and other components to enable connection by individual lots to an effluent line along the access road, which will connect to a public sewer main operated by the City of Ukiah.

For Development Parcels #9-11, a shared well is intended to provide water for fire prevention and domestic uses. While the existing well will be located off-site, the Developer retains the associated water rights with access and utility easements for subsequent use in enhancing fire protection activities and provision of potable water to Development Parcels #9-11.

On September 18, 2020 GHD prepared a Tank Siting Memorandum to evaluate each of the four proposed tank sites based on the following criteria (Attachment 3):

- Water service pressure (60 psi to 100 psi)
- Proximity to existing water supply wells
- Proximity to roads for access
- Proximity to existing City water mains for interconnection

Following completion of the Tank Siting Study, the City requested that GHD to complete a planning study to evaluate the southern tank sites (Tank Sites #1, #2 and #3), develop a conceptual layout, evaluate tank material types and tank sizing, as well as connections to the City's water distribution system, hydraulic performance and planning level costs.

Upon annexation, the sewer system for Development Parcels #9-11 may consist of a private sewage disposal system in compliance with Division 4, Chapter 2, Article 4 of the Ukiah City Code. Alternatively, the Developer may install sewage holding tank(s), pumps, and other components to enable future connection to the individual residential lots for the treatment of sewage solids and an effluent line along the road or in another suitable location, which may connect to a public sewer main approved by the local government entity with jurisdiction over the main.

If fully built-out, the project is anticipated to use twenty (20) equivalent sanitary sewer units (ESSUs). The City's Wastewater Treatment Plant (WWTP) currently has available, between the City of Ukiah and the Ukiah Valley Sanitation District (UVSD), 1,571 ESSUs. The WWTP has capacity to serve this development and impacts would be less than significant.

Public Services: Police protection services for the entire City limits is provided by the Ukiah Police Department, while the Mendocino County Sheriff's Department provides police services for areas outside of the city limits, as well as specific services like the County Jail. Fire protection services in the Western Hills are provided by the Ukiah Valley Fire Authority and California Department of Forestry and Fire Protection (Cal Fire).

Although no residential development is proposed at this time, it is assumed that future development would result in construction and development of residential uses (up to 20 units). New homes in the City's jurisdiction would be served by the City's Police Department and the Ukiah Valley Fire Authority. This minimal increase in residential service area would not be considered significant, as the development would be staggered and undertaken on a parcel-by-parcel basis.

Per the associated Conditions of Approval, the Ukiah Valley Fire Authority required:

- All access improvements, roadways and residential development shall be reviewed by the Fire Marshall and adhere to all current local, state and federal fire regulations relating to access and safety, including but not limited to: California Building Code, Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure, including Wildland Urban Interface regulations); California Residential Code, Section R337 (Materials and Construction Methods for Exterior Wildlife Exposure); California Referenced Standards Code, Chapter 12-7A (Fire Resistive Standards); California Code of Regulations, Title 14, Division 1.5, Chapter 7, Subchapter 3 (Fire Hazard Reduction Around Buildings and Structures); and California Government Code, Section 51182 (Very High Fire Hazard Severity Zones).
- In addition, Public Resources Code Sections 4290 and 4291 contain additional requirements for lands within Very High Fire Severity Zones. These include the following in order to provide defensible space and fire protection for new construction and ensure adequate emergency access: increased property line setbacks for all applicable construction; on-site water storage for fire protection, driveway/roadway types and specifications based on designated usage; all weather driveway/roadway surfaces being engineered for 75,000lb vehicles; maximum slope of 16%; turnout requirements; gate requirements and setbacks, parking standards, fuels reduction regulations, etc.

An increasingly important and motivating factor for annexation of the Western Hills is to gain further control over fire mitigation activities, which the City is well-prepared to accommodate given the “Ukiah Valley and Mendocino Hazardous Fuels Reduction Project” that will allow for a crew of 11 people to conduct defensible space inspections, maintain current fuel breaks in shaded and non-shaded areas, perform defensible space work, conduct prescribed burns in appropriate areas to restore fire adapted ecosystems, conduct project assessments, and increase community fire resiliency in the Ukiah Valley.

As recreational improvements and public access opportunities are considered by the City of Ukiah, the Ukiah Valley Fire Authority, Community Services Department, and Ukiah Police Department will need to analyze existing maintenance equipment and response vehicles commiserate with the proposed recreational or open-space improvements. Presently, these Departments maintain an assortment of equipment, including motorized all-terrain vehicles, drones, and maintenance vehicles that are sufficient for accessing and monitoring the properties identified for annexation as presently utilized. As recreational opportunities and access are expanded, it will be incumbent for these entities to calibrate their equipment and personnel needs commiserate to the recreational improvements developed.

Future Development: Once established, none of the lots identified as Development Parcels shall be re-subdivided or split into lots of a lesser size than the size of the lot finally established. To manage, operate, improve, maintain, repair and replace the common improvements including private roads, streets or drives, water system, and related facilities, including personal property, in a safe, sanitary and attractive condition a Homeowner Association will be established. Every owner shall pay all utility charges, which are separately metered or billed, to the owner's lot. Every owner shall maintain installations specifically arranged to be maintained by the Association or utility companies, public or private.

Best Regards,



Jesse Davis, AICP
Chief Planning Manager
Department of Community Development



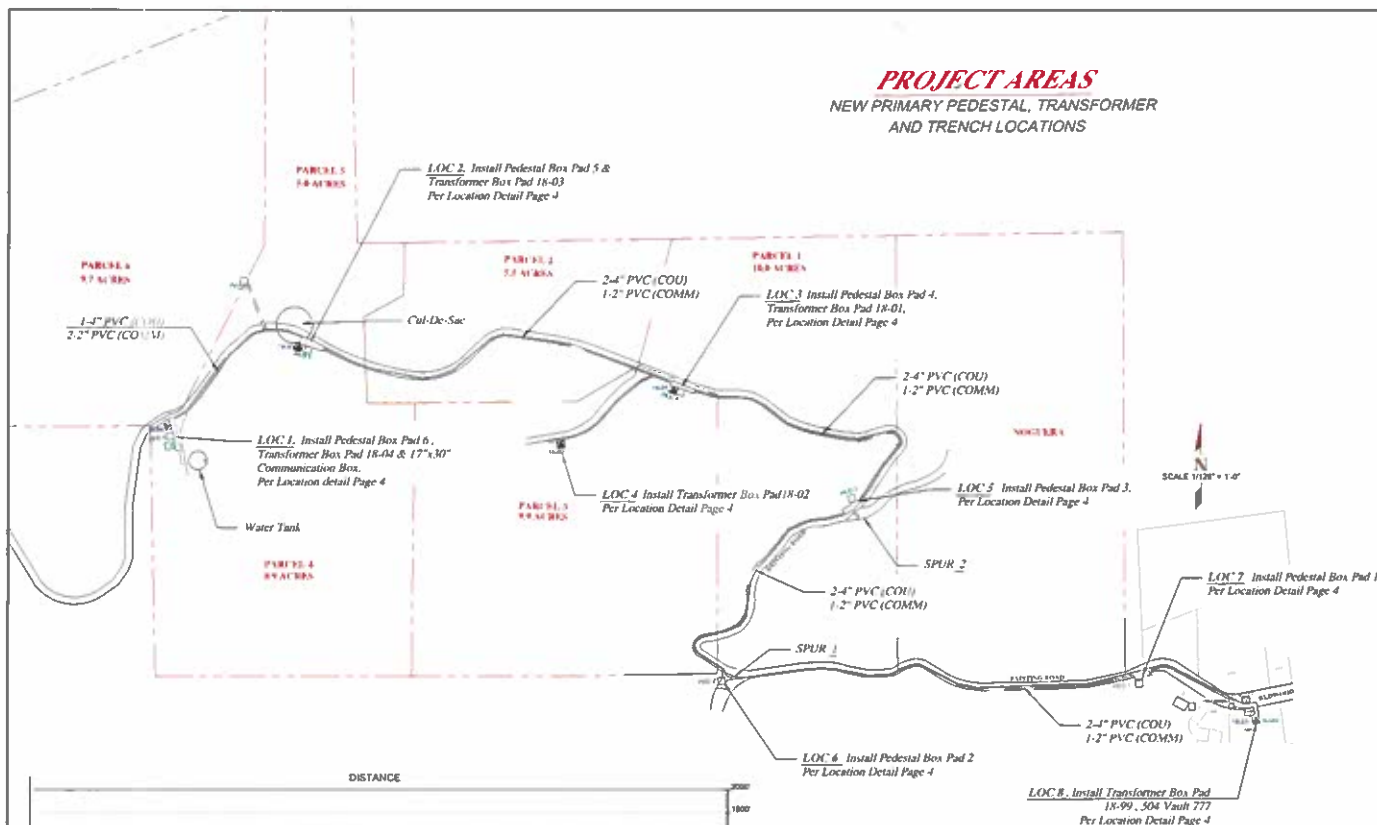
300 Seminary Avenue, Ukiah, CA 95482

P: 707.463.6207

www.cityofukiah.com/community-development

Enclosures: Attachment 1 – Associated Maps and Development Plans - Western Hills Annexation Area;
Attachment 2 - Final Conditions of Approval - Western Hills Annexation Area Amendment & Rezoning;
Attachment 3 - Technical Memorandum No. 2: City of Ukiah Water Tank Planning Study

PROJECT AREAS
NEW PRIMARY PEDESTAL, TRANSFORMER
AND TRENCH LOCATIONS



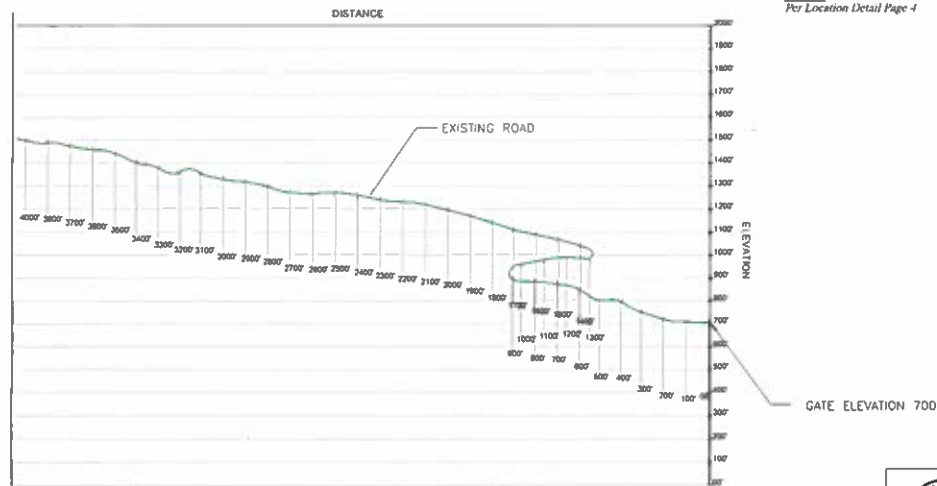
CONTRACTOR CONSTRUCTION/INSTALLATION OUTLINE

- **LOC 1 - (Electric)** Install Transformer Box Pad 18-04 & Pedestal Box Pad 6 per City of Ukiah specification, 922 5405, 922 5402 & ground spec 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 6 to PED 5 & 1-4" PVC Sch 40 Conduit to Transformer 18-04.
- **LOC 2 - (Electric)** Install Transformer Box Pad 18-03 & Pedestal Box Pad 5 per City of Ukiah specification, 922 5405, 922 5402 & GROUND SPEC 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 5 to PED 4 & 1-4" PVC Sch 40 Conduit to Transformer 18-03.
- **LOC 3 - (Electric)** Install Transformer Box Pad 18-01 & Pedestal Box Pad 4 per City of Ukiah specification, 922 5405, 922 5402 & GROUND SPEC 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 4 to PED 3, 1-4" Sch 40 PVC conduit to Transformer 18-02 & 1-4" PVC Sch 40 Conduit to Transformer 18-01.
- **LOC 3-1 - (Electric)** Install Transformer Box Pad 18-02 to be placed prior to construction on Parcel 3 - per City of Ukiah specification, 922 5402 & GROUND SPEC 317 2431. Trench and install 1-3" Sch 40 PVC service conduit stub.
- **LOC 5 - (Electric)** Install Pedestal Box Pad 3 per City of Ukiah specification, 922 5405 & GROUND SPEC 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 3 to PED 2.
- **LOC 6 - (Electric)** Install Pedestal Box Pad 2 per City of Ukiah specification, 922 5405 & GROUND SPEC 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 2 to PED 1.
- **LOC 7 - (Electric)** Install Pedestal Box Pad 1 per City of Ukiah specification, 922 5405 & GROUND SPEC 317 2431. Trench and install 2-4" PVC Sch 40 Conduits from PED 1 to Vault 777 on Redwood Ave.
- **LOC 8 - (Electric)** Install a 204 Vault 777 per City of Ukiah specification 922 5679 & 922 5683, also install transformer box pad 18-01 Back of Walk (BOW) per detail on page 4. Trench and install 1-4" Sch 40 PVC conduit from V-777 to transformer 18-01, then from transformer 18-01 install 1-4" Sch 40 PVC to rear up on pole 18REDWD01 and from the secondary side install 1-4" Sch 40 PVC conduit to the existing Primary Pull Box (PPB) in the sidewalk.

NOTE:

Pedestal box pads will always be installed to the LEFT of the transformer box pads.
Conduit traversing up the road to use COU Water Barrier for Sloped Trench Specification 311 3000
Service conduits shall be:
• 3" Sch 40 PVC for Electric from the Secondary side of the transformer.
• 2" Sch 40 PVC for Future Communication

The 1-2" Communication Conduits will be an Express Conduits that will rise up on Pole # 18REDWD01 on Redwood Ave and rise up into a 17'x30" Communication box at Location 1.



ROAD ELEVATION & DISTANCE
START POINT AT PROPERTY GATE

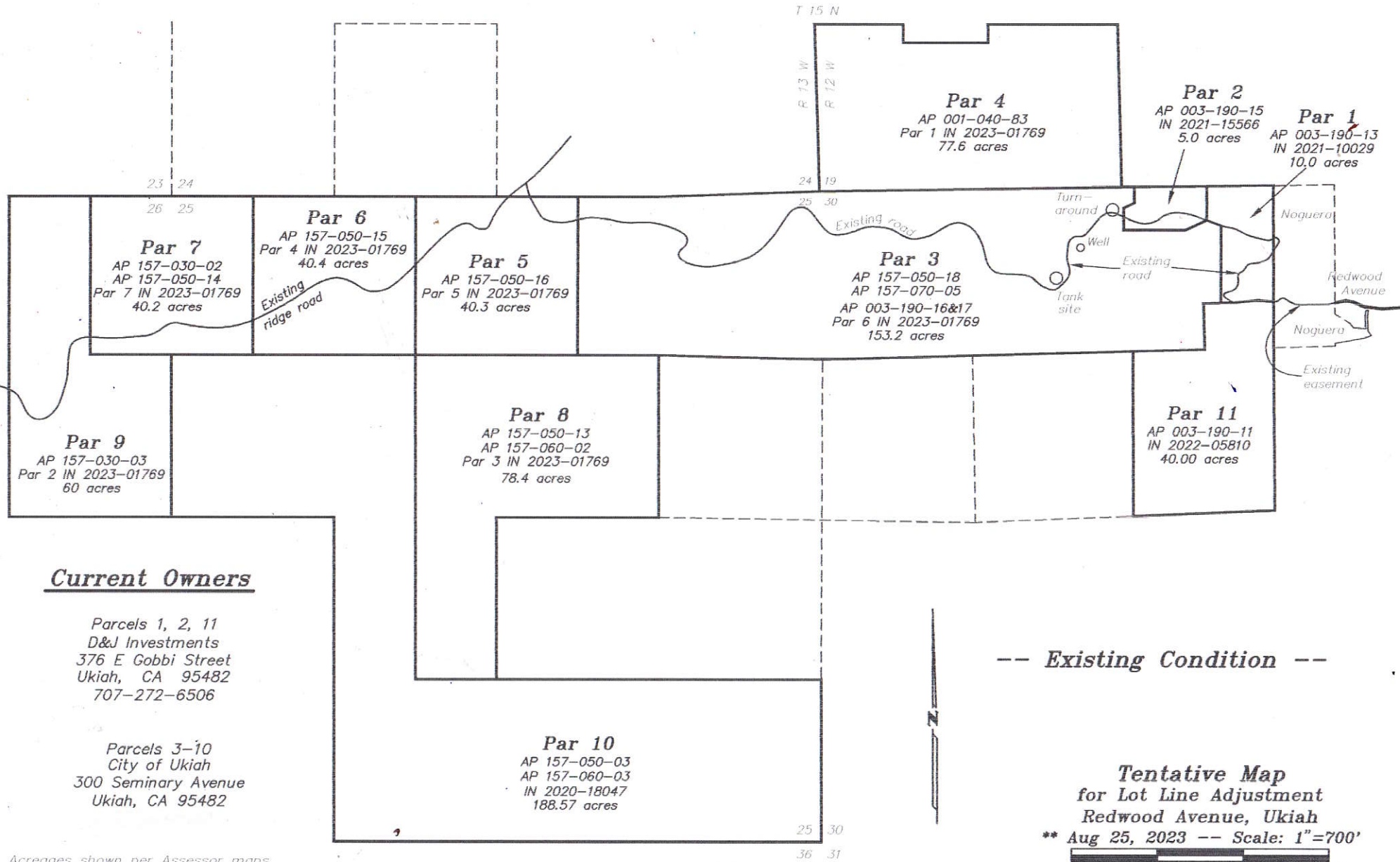
LEGEND:

- CITY OF UKIAH ELECTRIC**
- Transformer Box Pad
 - Pedestal Box Pad
 - Power Pole
 - PPB Primary Pull Box
 - Vault
 - Trench
 - Service Conduit
 - COM Communication Pull Box



CITY OF UKIAH ELECTRIC UTILITY DEPARTMENT				APPROVED BY:	
7/5/2022	SB	SB			3
DATE	DESIGNED	DRAWN	CHECKED	AS BUILT	REVISION

No.	REVISIONS	DATE	DES BY	BY	CHK	APPO
TITLE: WESTERN HILLS DEVELOPMENT PROJECT						
W.O. NUMBER						GRD 18
SCALE						N.T.S.
DWO No.						0601
SHEET						2 of 4



Current Owners

Parcels 1, 2, 11
D&J Investments
376 E Gobbi Street
Ukiah, CA 95482
707-272-6506

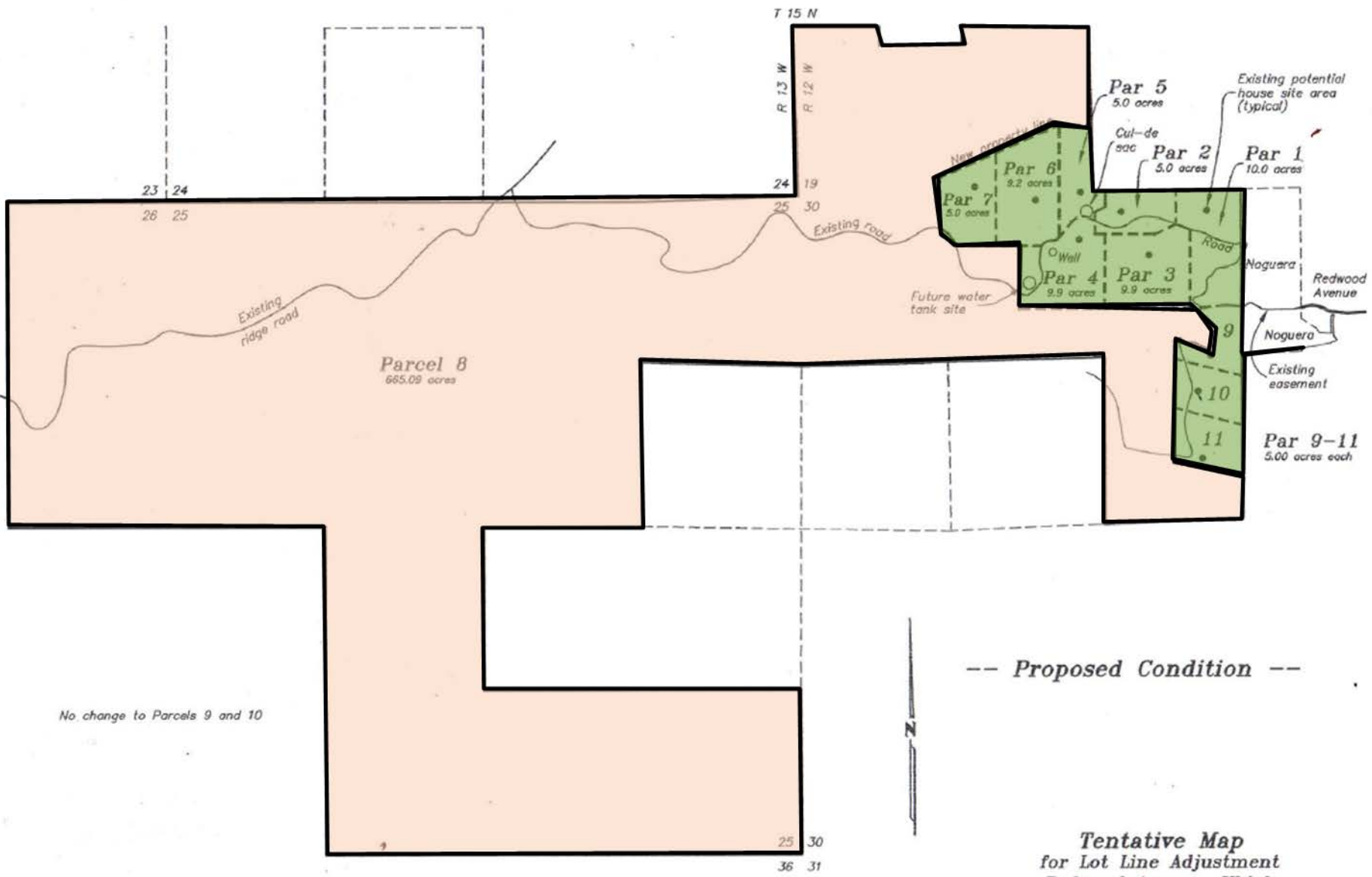
Parcels 3-10
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

-- Existing Condition --

Tentative Map
for Lot Line Adjustment
Redwood Avenue, Ukiah
** Aug 25, 2023 -- Scale: 1"=700'

0 700 1400 2100
** updated AP numbers
Added Parcel 11
Revised owners

Acreages shown per Assessor maps



No change to Parcels 9 and 10

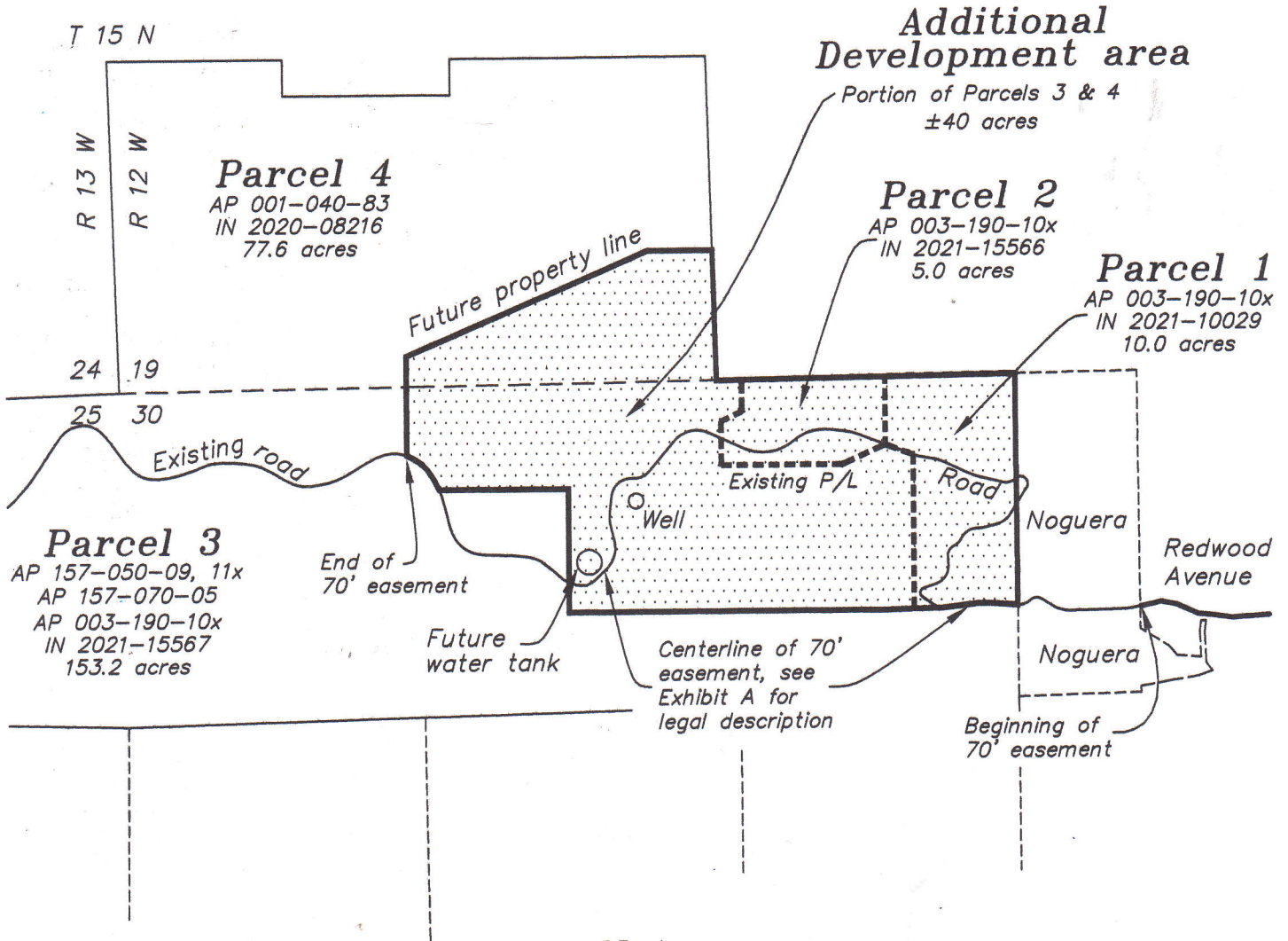
Proposed Rezoning Upon Successful Annexation

- Single-Family Residential-Hillside Overlay (R1-H)
- Public Facilities (PF)

-- Proposed Condition --

Tentative Map
 for Lot Line Adjustment
 Redwood Avenue, Ukiah
 ** Aug 25, 2023 -- Scale: 1"=700'
 0 700 1400 2100
 ** updated AP numbers
 Added Parcel 11

Exhibit C2

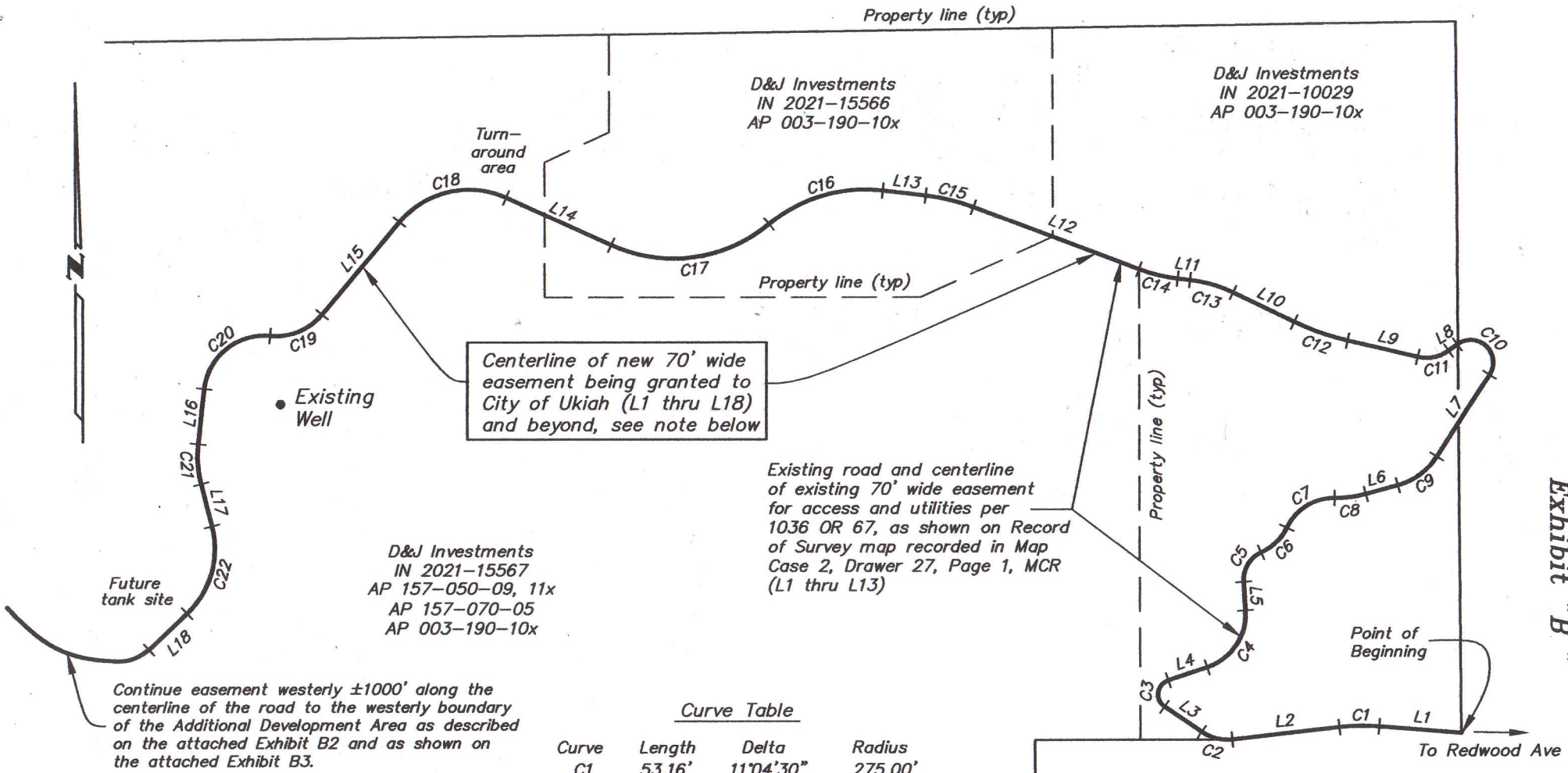


Note:

Shaded area = Residential Development Area
(aka Hull Residential Parcels)

**Road Easement
Residential Development Area
Redwood Avenue, Ukiah
Mar 22, 2022 -- Scale: 1"=700'**





Centerline of new 70' wide easement being granted to City of Ukiah (L1 thru L18) and beyond, see note below

Existing road and centerline of existing 70' wide easement for access and utilities per 1036 OR 67, as shown on Record of Survey map recorded in Map Case 2, Drawer 27, Page 1, MCR (L1 thru L13)

Continue easement westerly ±1000' along the centerline of the road to the westerly boundary of the Additional Development Area as described on the attached Exhibit B2 and as shown on the attached Exhibit B3.

Line Table

Line	Direction	Distance
L1	N85°26'00"W	109.50'
L2	S83°29'30"W	143.44'
L3	N55°35'00"W	59.56'
L4	N71°35'00"E	54.47'
L5	N03°34'30"W	38.02'
L6	N74°36'30"E	44.06'
L7	N32°40'00"E	129.99'
L8	S53°55'00"W	14.32'
L9	N76°52'30"W	95.68'
L10	N64°12'30"W	90.36'
L11	N83°11'30"W	16.34'
L12	N69°18'00"W	235.59'
L13	N83°10'00"W	57.57'
L14	N65°34'19"W	153.52'
L15	S39°54'06"W	160.58'
L16	S06°10'01"W	74.17'
L17	S14°18'06"E	57.98'
L18	S46°29'36"W	70.00'

Curve Table

Curve	Length	Delta	Radius
C1	53.16'	11°04'30"	275.00'
C2	42.86'	40°55'30"	60.00'
C3	44.39'	127°10'00"	20.00'
C4	98.38'	75°09'30"	75.00'
C5	48.52'	69°30'00"	40.00'
C6	48.83'	39°58'00"	70.00'
C7	79.05'	64°42'00"	70.00'
C8	42.02'	16°03'00"	150.00'
C9	65.88'	41°56'30"	90.00'
C10	83.12'	158°45'00"	30.00'
C11	42.94'	49°12'30"	50.00'
C12	75.17'	12°40'00"	340.00'
C13	59.64'	18°59'00"	180.00'
C14	53.34'	13°53'30"	220.00'
C15	65.35'	13°52'00"	270.00'
C16	162.21'	46°28'11"	200.00'
C17	223.63'	64°03'53"	200.00'
C18	156.09'	74°31'35"	120.00'
C19	77.59'	55°34'10"	80.00'
C20	124.69'	89°18'15"	80.00'
C21	53.59'	20°28'07"	150.00'
C22	127.33'	60°47'42"	120.00'

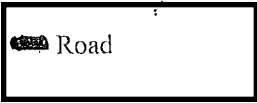
Ellison
AP 003-190-11

IN = Instrument Number,
Mendocino County Records

AP = Assessor Parcel

Plat Map
Redwood Avenue, Ukiah
Mar 22, 2022 -- Scale: 1"=200'

Exhibit "B"
(Noguera)

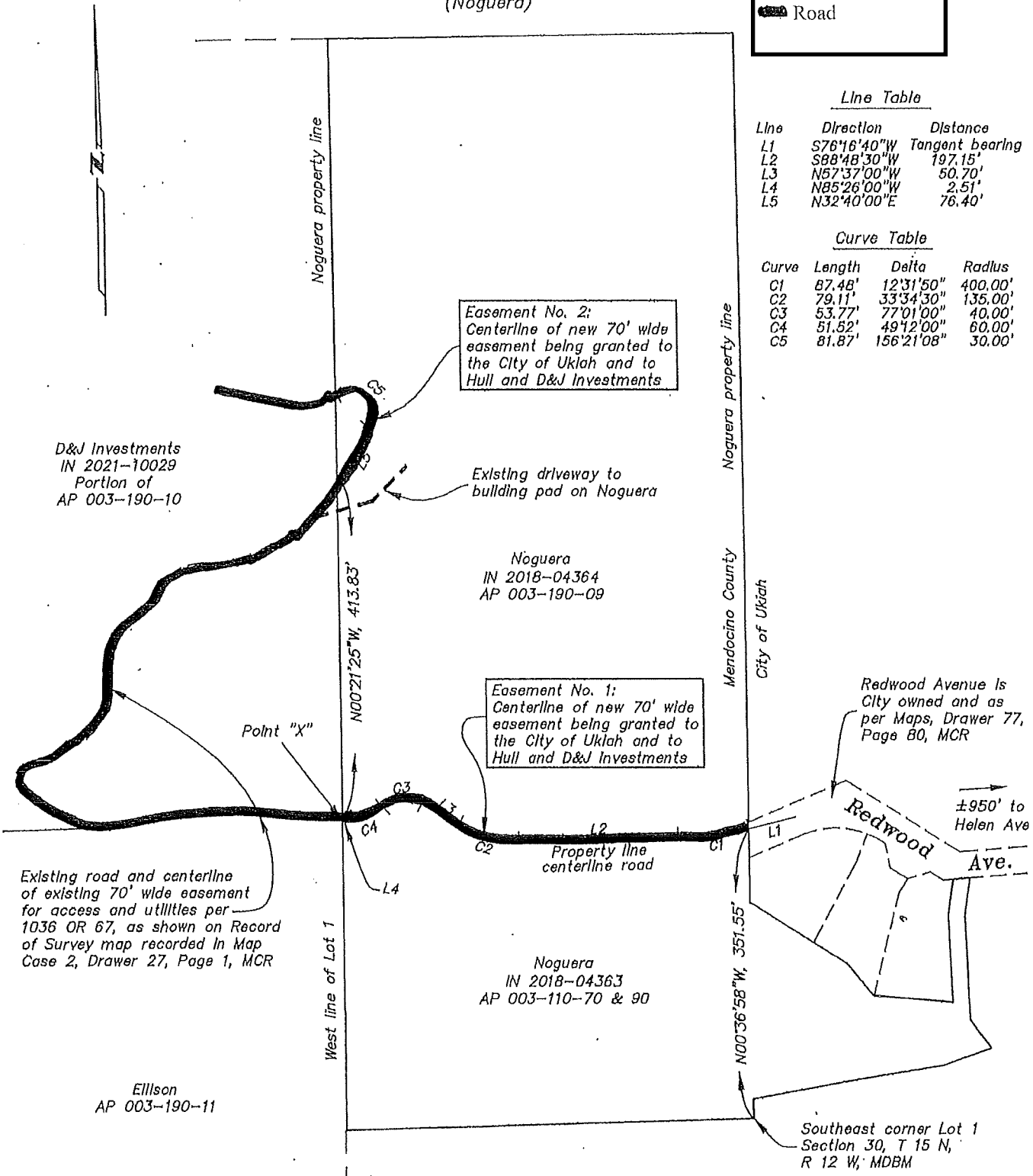


Line Table

Line	Direction	Distance
L1	S76°16'40"W Tangent bearing	
L2	S88°48'30"W	197.15'
L3	N57°37'00"W	50.70'
L4	N85°26'00"W	2.51'
L5	N32°40'00"E	76.40'

Curve Table

Curve	Length	Delta	Radius
C1	87.48'	12°31'50"	400.00'
C2	79.11'	33°34'30"	135.00'
C3	53.77'	77°01'00"	40.00'
C4	51.52'	49°12'00"	60.00'
C5	81.87'	156°21'08"	30.00'



D&J Investments
IN 2021-10029
Portion of
AP 003-190-10

Easement No. 2:
Centerline of new 70' wide
easement being granted to
the City of Ukiah and to
Hull and D&J Investments

Existing driveway to
building pad on Noguera

Noguera
IN 2018-04364
AP 003-190-09

Easement No. 1:
Centerline of new 70' wide
easement being granted to
the City of Ukiah and to
Hull and D&J Investments

Redwood Avenue is
City owned and as
per Maps, Drawer 77,
Page 80, MCR

±950' to
Helen Ave

Existing road and centerline
of existing 70' wide easement
for access and utilities per
1036 OR 67, as shown on Record
of Survey map recorded in Map
Case 2, Drawer 27, Page 1, MCR

Eillson
AP 003-190-11

Noguera
IN 2018-04363
AP 003-110-70 & 90

Southeast corner Lot 1
Section 30, T 15 N,
R 12 W, MDBM

IN = Instrument Number,
Mendocino County Records

AP = Assessor Parcel

Plat Map
Redwood Avenue, Ukiah
Dec 21, 2021 -- Scale: 1"=160'

Exhibit "B"

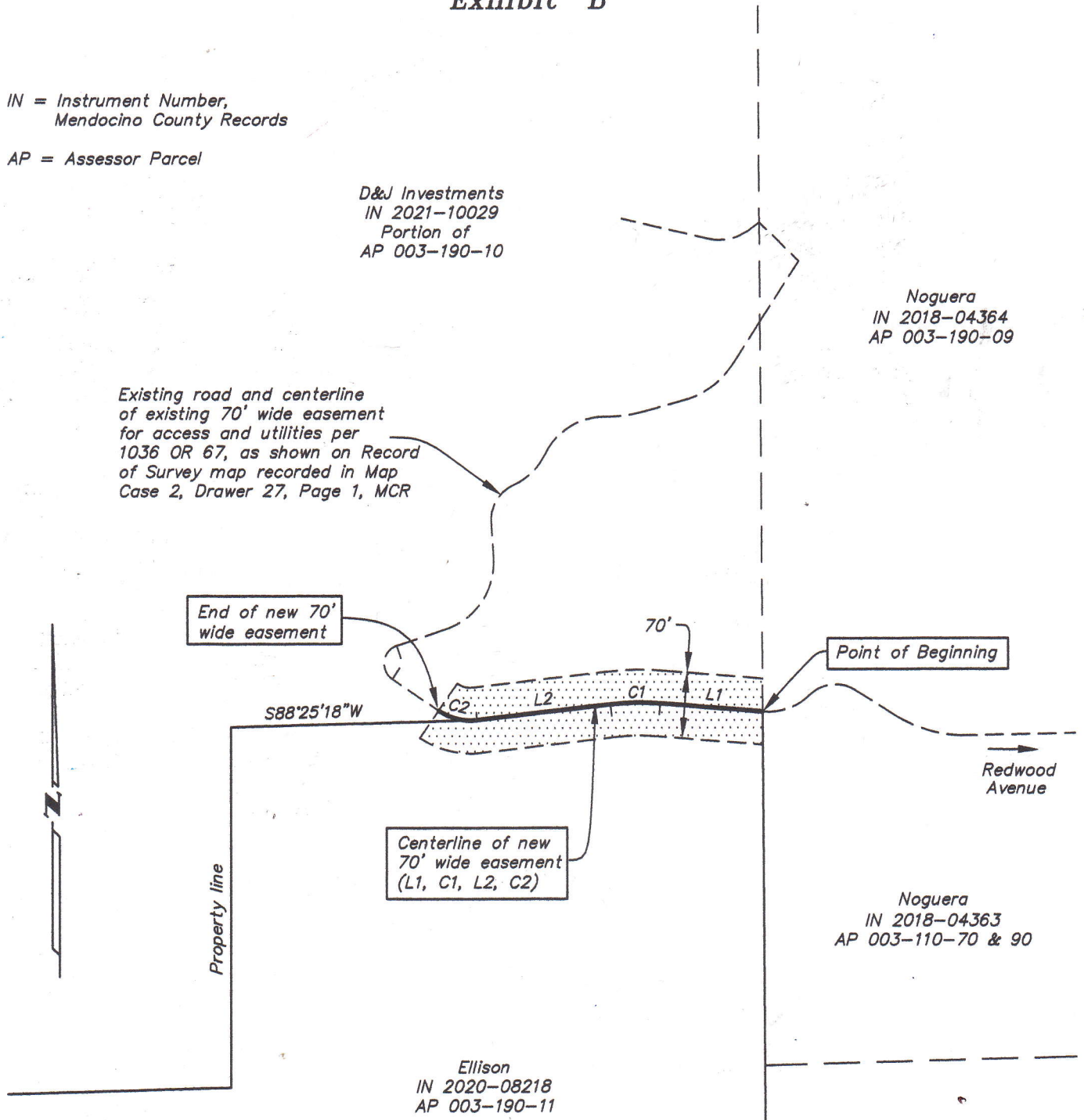
IN = Instrument Number,
Mendocino County Records

AP = Assessor Parcel

D&J Investments
IN 2021-10029
Portion of
AP 003-190-10

Noguera
IN 2018-04364
AP 003-190-09

Existing road and centerline
of existing 70' wide easement
for access and utilities per
1036 OR 67, as shown on Record
of Survey map recorded in Map
Case 2, Drawer 27, Page 1, MCR



End of new 70'
wide easement

Point of Beginning

S88°25'18"W

70'

Redwood
Avenue

Centerline of new
70' wide easement
(L1, C1, L2, C2)

Noguera
IN 2018-04363
AP 003-110-70 & 90

Ellison
IN 2020-08218
AP 003-190-11

Line Table

Line	Direction	Distance
L1	N85°26'00"W	109.50'
L2	S83°29'30"W	143.44'

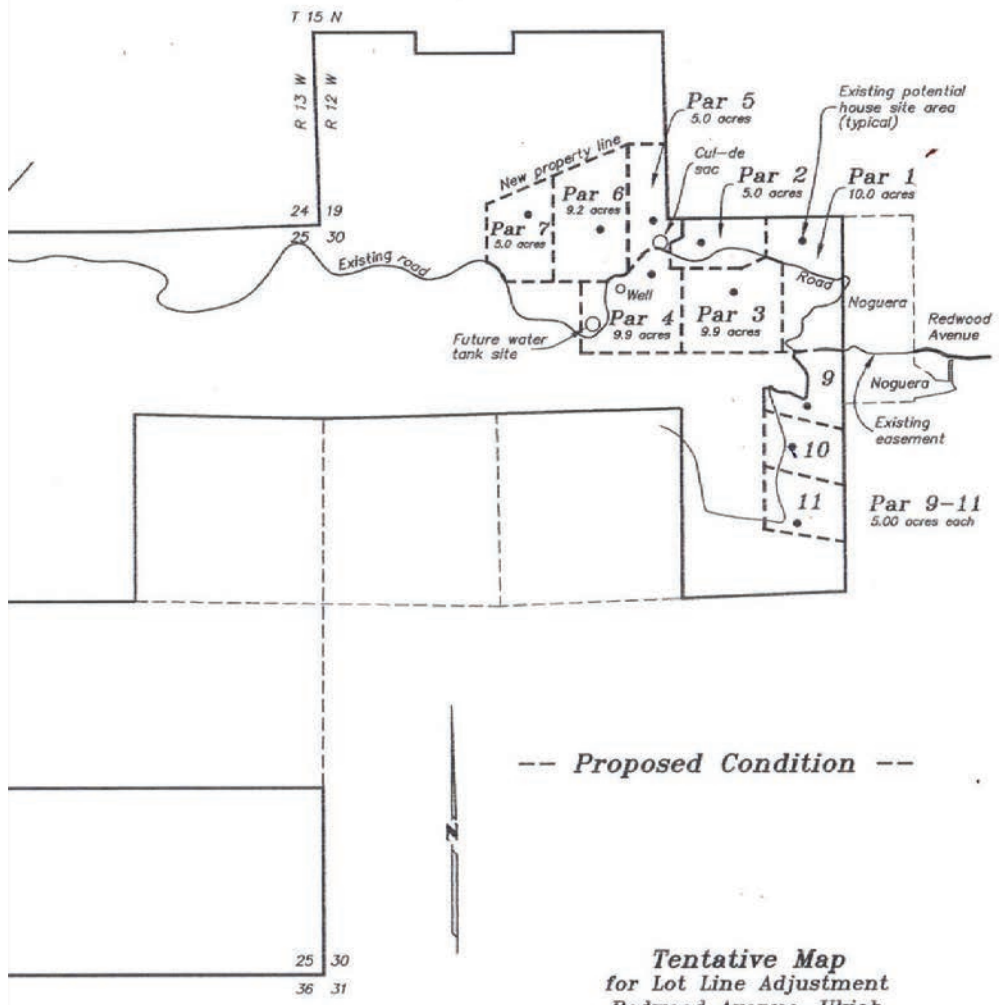
Curve Table

Curve	Length	Delta	Radius
C1	53.16'	11°04'30"	275.00'
C2	42.86'	40°55'30"	60.00'

Easement Plat Map
Redwood Avenue, Ukiah
Mar 23, 2022 -- Scale: 1"=160'



Proposed Parcels 9, 10, and 11 on Hull Portion.



-- Proposed Condition --

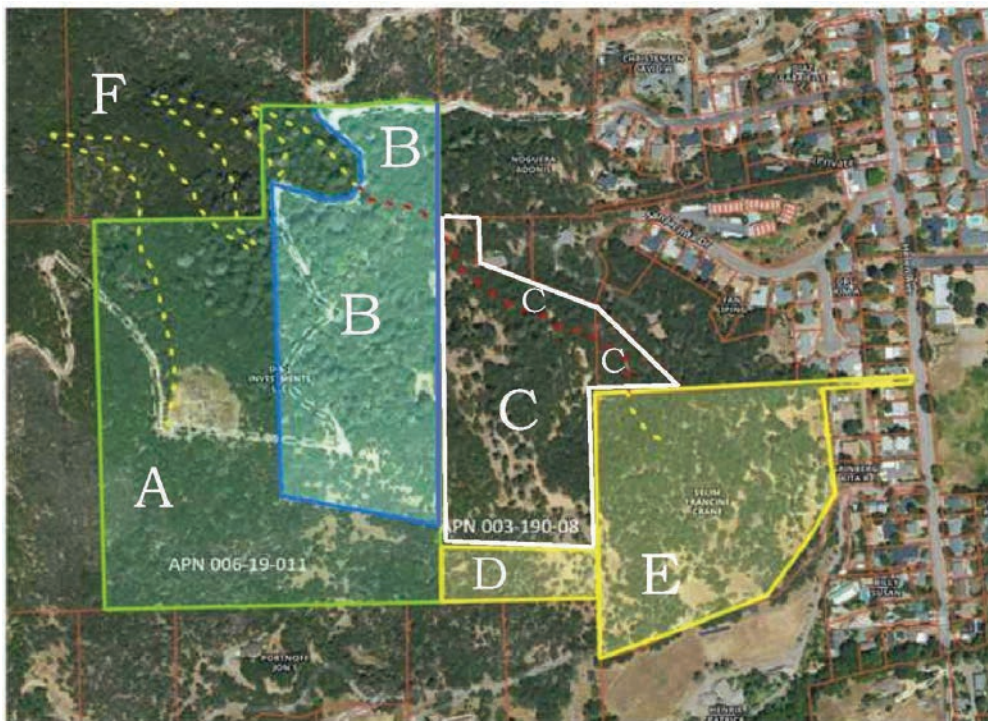


Tentative Map
for Lot Line Adjustment
Redwood Avenue, Ukiah
**** Aug 25, 2023 -- Scale: 1"=700'**
 0 700 1400 2100
 ** updated AP numbers
 Added Parcel 11

Ex. 4. Public Access Trail Easement; Map illustration

Hull Portion: The public access trail easement to be reserved by the City in the grant deed by which the City conveys the Hull Portion to Hull as required by this Agreement is shown as a red dotted line across the Hull Portion of APN 006-190-11 (labeled “B” below). The public access trail easement on the Hull Portion continues from the easement rights the City retained across the San Jacinta Property (APN 003-190-08) (labeled as both C and D below) from the earlier Property Purchase-Sale/Exchange and Development Agreement and Joint Escrow Instructions (Exchange Agreement) that is not yet recorded (described below in subsection (a)).

San Jacinta Property: The public access trail easement to be conveyed by Hull to the City across the San Jacinta Property (labeled as both C and D below) is: (a) shown as red dotted line across the northerly portions (labeled C below) of the San Jacinta Property; and, (b) also on a trail to be situated in the yellow shaded area (labeled D below and comprising approximately 1.5 acres or less) on the southernmost portion of the San Jacinta Property, which easement area is restricted to allow impacts from, but not to exceed, approx. 1,200 linear feet of trail crossing from Doolan Canyon Property (APNs 003-260-01-00 and 003-500-14-00) to City Portion of APN 003-190-11.



All maps and lines approximate.

Ex. 5. Non-Public Access Easements (City Easements and Hull Easements)

Hull Easements: The City Portion/ Green Area = 25 acre portion to be retained by City of the 40 acre Property. The location of the Hull Easements along the Roadway is illustrated with the solid red line.

City Easements: The Hull Portion/ Blue Area = 15 acre portion of the Property to be retained by Hull under the Agreement. The location of the City Easements along the Roadway is illustrated with the solid purple line.



All maps and lines approximate.

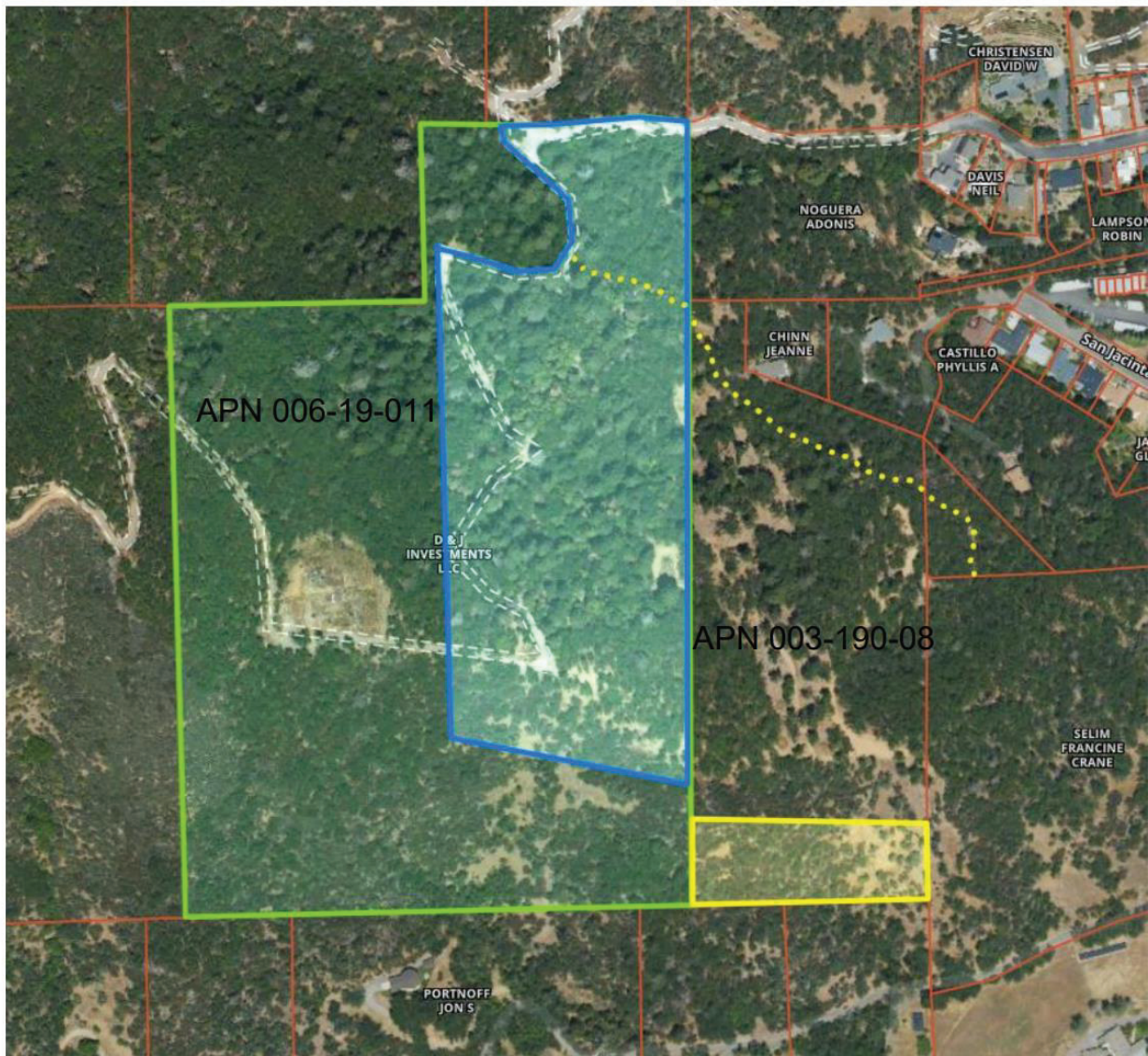
Ex. 6. Approximate agreed configuration of the City Portion and Hull Portion, including 3 lots on the Hull Portion.

APN 003-190-11, 40 acres delineated in green, with approximate agreed configuration of the City Portion (shaded green) and Hull Portion (shaded blue), including proposed three lots on the Hull Portion.

City Portion/ Green Area = 25 acre portion of the 40 acre parcel to be retained by the City

Hull Portion/ Blue Area = 15 acre portion to be retained by Dave Hull, including access road

All maps and lines approximate.



DRAFT CONDITIONS OF APPROVAL FOR THE WESTERN HILLS ANNEXATION AREA AMENDMENT, PREZONING, AND TO ADOPT AN ADDENDUM TO THE INITIAL STUDY/MITIGATED NEGATIVE DECLARATION APPROVED FOR THE UKIAH WESTERN HILLS OPEN LAND ACQUISITION & LIMITED DEVELOPMENT AGREEMENT PROJECT

The following Conditions of Approval shall be made a permanent part of the approvals associated with the Western Hills Annexation Area (now totaling 792 acres), associated with the Ukiah Western Hills Open Land Acquisition & Limited development Project. All original Conditions of Approval remain in effect, as applicable.

City of Ukiah Special Conditions

1. In accordance with LAFCo-adopted procedures, and as required under the Development Agreement, the City will submit a revised annexation application to the Mendocino County Local Agency Formation (LAFCo), after it acquires title to the Annexation Parcels, and upon City Council approval of the project.
2. An application for annexation and rezoning shall be approved by the Mendocino County Local Agency Formation Commission (LAFCo) prior to the rezoning becoming effective. Rezoning will also require a General Plan Map Amendment and Zoning Map Amendment, upon approval of the annexation application.
3. Upon approval of the annexation application, a copy of the final Lot Line Adjustment shall be provided to the City Engineer for final review before recordation. The final map shall conform to the Subdivision Map Act and Division 9, Chapter 1 of the Ukiah Municipal Code, as applicable. This includes, but is not limited to, providing a slope map and calculations consistent with R1-H lot size requirements. A copy of the recorded Lot Line Adjustment shall be submitted to the Community Development Department prior to submittal of a Use Permit for single family housing within the Development Parcels located within the City's jurisdiction.
4. In accordance with the terms described in the Development Agreement (2021), Hull shall have the option to withdraw the Hull Development Parcels from the City's annexation application, if LAFCo has failed to approve the annexation within one (1) year from the date the Executive Officer of LAFCo accepts the application as complete.
5. All mitigation measures within the 2021 Initial Study and Mitigated Negative Declaration prepared for the Project and the 2023 Addendum (SCH No. 2021040428) shall be applied to all future development described therein. The Mitigation Monitoring and Reporting Program is included in Attachment A.
6. This approval does not grant any entitlements. Future residential development of the Development Parcels shall be in accordance with the Hillside Overlay Zoning District regulations contained within UCC Sections 9135-9139. All future development shall require discretionary review and may require additional environmental review. Additional project-specific Conditions of Approval and CEQA analysis may be required upon review by City departments and applicable agencies.
7. Future development of the City-owned parcels shall comply with PF zoning regulations and may require additional dictionary review and analysis under CEQA.
8. All future development shall be in accordance with the terms described within the Development Agreement (2021) and Purchase Agreement (2023) between the City and the private property owner (Hull; D & J Investments), and all easements shall be maintained.

City of Ukiah Standard Conditions

9. City Council approval is not effective until the 10-day appeal period applicable to the project has expired without the filing of a timely appeal. If a timely appeal is filed, the project is subject to the outcome of the appeal and shall be revised as necessary to comply with any modifications, conditions, or requirements that were imposed as part of the appeal.
10. All use, construction and the location thereof, or occupancy, shall conform to the application and to any supporting documents submitted therewith, including any maps, sketches, or plot plans accompanying the application or submitted by applicant in support thereof.
11. Any construction shall comply with the "Standard Specifications" for such type of construction now existing or which may hereafter be promulgated by the Engineering Department of the City of Ukiah; except where higher standards are imposed by law, rule, or regulation or by action of the Planning Commission such standards shall be met.
12. The Applicant shall submit verification of all applicable permits or approvals in compliance with all local, state and federal laws to the Community Development Department prior to issuance of building permits.

Department of Public Works

13. Future residential development and site improvements shall be reviewed by the Department of Public Works to identify site-specific requirements.
14. Construction projects that would disturb more than one acre of land, would be subject to the requirements of General Construction Activity Stormwater Permit (Construction General Permit Order 2009-0009-DWQ, also known as the CGP), which requires operators of such construction sites to implement stormwater controls and develop a Stormwater Pollution Prevention Plan (SWPPP) identifying specific BMPs to be implemented to reduce the amount of sediment and other pollutants associated with construction sites from being discharged in stormwater runoff.
15. Applicable City water and sewer connection fees shall be paid at the time of building permit issuance.
16. All work within the public right-of-way shall be performed by a licensed and properly insured contractor. The contractor shall obtain an encroachment permit for work within this area or otherwise affecting this area. Encroachment permit fee shall be \$45 plus 3% of estimated construction costs.

Electric Utility Department

17. Utility easements shall be maintained and any modifications shall be submitted to the COUEUD for approval.
18. Upon individual parcel development, additional easements may be required to provide electric service.
19. Future site improvements shall be submitted to the Electric Utility Department for review and comment. Construction requirements and associated developer costs will be determined to provide electric service.
20. Developer shall incur all costs of project, to include labor, materials, and equipment.

Building Division

21. All development is required to submit plans and building permit application. Please submit four complete plan sets, two wet stamped and signed. All Conditions of Approval shall be printed on the first page of the Building Plans.
22. The design and construction of all site alterations shall comply with the current California Building Code, Plumbing Code, Electrical Code, California Mechanical Code, California Fire Code, California Energy Code, Title 24 California Energy Efficiency Standards, California Green Building Standards Code and City of Ukiah Ordinances and Amendments.

Ukiah Valley Fire Authority

23. All access improvements, roadways and residential development shall be reviewed by the Fire Marshall and adhere to all current local, state and federal fire regulations relating to access and safety, including but not limited to: California Building Code, Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure, including Wildland Urban Interface regulations); California Residential Code, Section R337 (Materials and Construction Methods for Exterior Wildlife Exposure); California Referenced Standards Code, Chapter 12-7A (Fire Resistive Standards); California Code of Regulations, Title 14, Division 1.5, Chapter 7, Subchapter 3 (Fire Hazard Reduction Around Buildings and Structures); and California Government Code, Section 51182 (Very High Fire Hazard Severity Zones).

In addition, Public Resources Code Sections 4290 and 4291 contain additional requirements for lands within Very High Fire Severity Zones. These include the following in order to provide defensible space and fire protection for new construction and ensure adequate emergency access: increased property line setbacks for all applicable construction; on-site water storage for fire protection, driveway/roadway types and specifications based on designated usage; all weather driveway/roadway surfaces being engineered for 75,000lb vehicles; maximum slope of 16%; turnout requirements; gate requirements and setbacks, parking standards, fuels reduction regulations, etc.

**UKIAH WESTERN HILLS OPEN LAND & LIMITED DEVELOPMENT AGREEMENT PROJECT
MITIGATION MONITORING REPORTING PROGRAM**

Potential Impact	Mitigation Measure	Implementation Responsibility	Monitoring & Reporting Responsibility	Timing	Date Implemented
Construction and ground disturbing activities could result in short-term impacts to air quality.	<p>AQ-1: Diesel Engines – Stationary and Portable Equipment and Mobile Vehicles:</p> <ol style="list-style-type: none"> Any stationary onsite diesel IC engines 50 horsepower or greater (i.e. large power generators or pumps) or any propane or natural gas engines 250 horsepower or greater may require a permit from the District. Portable diesel powered equipment that may be used during the proposed project are required to be registered with the state Portable Equipment Registration Program (PERP) or obtain permits from the District. Projects located adjacent to sensitive receptors (schools, child care facilities, health care facilities, senior facilities, businesses, and residences, etc.) during the construction phase of this project have the potential for exposure to diesel particulate. Heavy duty truck idling and off-road diesel equipment or other diesel engine idling is limited to less than 5 minutes. 	Developer	Developer	During construction and ground disturbing activities	
	<p>AQ-2: Grading Projects- During Construction-All grading activities must comply with the following fugitive dust mitigation measures in accordance with District Regulation 1, Rule 1-430:</p> <ol style="list-style-type: none"> All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions. All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 mph. 	Developer	Developer	During construction and ground disturbing activities	

	<ol style="list-style-type: none"> 3. Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed. 4. Asphalt, oil, water, or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise airborne dusts. 5. All earthmoving activities shall cease when sustained winds exceed 15 mph. 6. The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours. 7. The operator shall keep a daily log of activities to control fugitive dust. 8. For projects greater than one acre or one mile of road not located within a Naturally Occurring Asbestos Area, prior to starting any construction the applicant is required to: <ol style="list-style-type: none"> 1. Submit a Large Area Grading permit application to the District. 2. Obtain a final determination from the Air Quality Management District as to the need for an Asbestos Dust Mitigation Plan and/or Geologic Survey to comply with CCR sections 93106 and 93105 relating to Naturally Occurring Asbestos. 3. Obtain written verification from the District stating that the project is in compliance with State and Local regulations relating to Naturally Occurring Asbestos. 4. If the project is located within a Naturally Occurring Asbestos Area, additional mitigations shall be required. 				
	<p>AQ-3: Property Development-Prior to starting any construction, the applicant is required to:</p> <ol style="list-style-type: none"> a. Obtain a Property Development Permit from the District for any open outdoor burning. b. Obtain a Grading Permit, if applicable. c. Confirm whether the project is in a Naturally Occurring Asbestos Area, and follow additional MCAQMD recommendations, if applicable. 	Developer	Developer	Prior to construction	

	<p>d. Consider alternate means of disposal other than open burning, such as cutting the majority of the larger material up as firewood, and chipping smaller material, if feasible to mitigate impacts from open outdoor burning.</p> <p>e. Obtain written verification from the MCAQMD stating that the project is in compliance with State and Local regulations.</p>				
Biological Resources					
Construction and ground disturbing activities could result in impacts to sensitive plant species and sensitive woodland tree habitat	BIO-1: Sensitive Trees. If trees are proposed for removal, preconstruction surveys shall be conducted by a qualified biologist to identify Oregon white oak forest and woodland, as well as California bay forest and woodland habitat; removal of sensitive habitat shall be conducted in accordance with California Department of Fish and Wildlife (CDFW) regulations.	Qualified Biologist	Developer	Prior to ground disturbing activities	
Construction and ground disturbing activities could impact Red-belly newt, and other special status amphibians and their habitat	BIO-2: Sensitive Amphibian Species. A qualified biologist shall survey the area prior to any groundbreaking activities to determine the presence of Red-belly newt, or other sensitive amphibian species, and identify additional avoidance measures, if needed. A qualified biologist shall be on-site for any dewatering event to address the potential for the presence of sensitive amphibian species such as foothill yellow-legged frog (<i>Rana boylei</i>).	Qualified Biologist	Developer	Prior to ground disturbing activities	
Construction, vegetation removal, and ground disturbing activities could impact nesting birds and their habitat	BIO-3: Nesting Birds. Pre-construction surveys shall be conducted prior to any vegetation removal or ground disturbing activities occurring between March 1 and August 31 of any year. All active bird nests shall not be removed, relocated, or otherwise disturbed for any purpose until all fledglings have left the nest.	Qualified Biologist	Developer	Prior to vegetation removal or ground disturbing activities between	

				March 1 and August 31	
Construction and ground disturbing activities could impact special-status insects and their habitat	BIO-4: Special-Status Insects. A qualified biologist shall survey the area prior to any groundbreaking activities to determine the presence of special-status insect species and identify additional avoidance measures if needed. If a special-status insect nests are observed, active nests shall not be removed, relocated, or otherwise disturbed until the nest becomes inactive.	Qualified Biologist	Developer	Prior to ground disturbing activities	
Construction and ground disturbing activities could impact special-status mammals and their habitat	BIO-5: Special-Status Mammals. Pre-construction surveys shall be conducted prior to any vegetation removal or ground disturbing activities. If evidence of bat roosts is observed (i.e. bat guano, ammonia odor, grease stained cavities) around trees or structures, pre-construction bat surveys shall be conducted by a qualified biologist for activities that may affect bat roosting habitat and den sites.	Qualified Biologist	Developer	Prior to ground disturbing activities	
Cultural Resources and Tribal Cultural Resources					
Ground disturbing activities have the potential for accidental discovery of unknown, undiscovered cultural resources and tribal cultural resources	CUL-1: Unanticipated Discovery. If previously unidentified cultural, historic, paleontologic or archeologic resources are encountered during project implementation, altering the materials and their stratigraphic context shall be avoided and work shall halt immediately. A qualified professional archaeologist shall be contacted to evaluate the resource and methods necessary to protect it. Project personnel shall not collect, move, or disturb cultural resources. Prehistoric resources include, but are not limited to, chert or obsidian flakes, projectile points, mortars, pestles, and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic resources include stone or abode foundations or walls; structures and remains with	Qualified archaeologist	Developer	During ground disturbing activities	

	square nails; and refuse deposits or bottle dumps, often located in old wells or privies.				
Ground disturbing activities have the potential for accidental discovery of unknown Native American remains	CUL-2: Encountering Native American Remains. If human remains are encountered during ground disturbing activities, all work shall stop in the immediate vicinity of the discovered remains and the County Coroner and a qualified archaeologist shall be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission must be contacted by the Coroner so that a “Most Likely Descendant” can be designated and further recommendations regarding treatment of the remains will be provided.	Qualified archaeologist	Developer	During ground disturbing activities	
Geology and Soils					
Ground disturbing activities could result in impacts associated with erosion, the loss of topsoil and landslides if not properly designed	Incorporation of Mitigation Measure CUL-1	Qualified archaeologist	Developer	During ground disturbing activities	
	GEO-1: The Project shall comply with the erosion and design standards outlined in Chapter 7 of the Ukiah City Code. Prior to any ground disturbance, erosion and sediment control plans shall be submitted to the Public Works and Community Development Departments for review and approval. Said plans shall protect against soil erosion and runoff through the implementation of appropriate Best Management Practices (BMPs). Typical BMPs include the placement of straw, mulch, seeding, straw wattles, silt	Developer	Developer	Prior to any ground disturbance and throughout construction activities; ongoing as needed to control erosion	

	fencing, etc. No silt, sediment or other materials shall be allowed to flow from the project area.				
Hazards and Hazardous Materials					
Project construction could result in a hazard to the public or the environment if the incidental use of petroleum hydrocarbons (fuel, oil) in tools used during construction were to lead to accidental leaks or spills in or around the work area	<p>HAZ-1: The developer shall establish and implement construction site management practices that will prevent toxic materials and other debris from entering the City's storm drainage and waterway systems, including:</p> <ul style="list-style-type: none"> a) There shall be no storage of hazardous materials at the Project Site; b) The developer shall provide adequate materials management, including covering, securing, and segregating potentially toxic materials (grease, oils, fuel, solvents, etc.); and c) The developer shall maintain supplies on-hand to contain spills of oil and any other hazardous materials used on-site. 	Developer	Developer	During construction	
Construction of the Project may involve the use of gasoline-powered tools and equipment potentially introducing new temporary sources of ignition that could increase fire risk.	<p>HAZ-2: Should portable gasoline-powered equipment be used on site, the following firesafe precautions shall be taken:</p> <ul style="list-style-type: none"> a) Spark arresters are required on all portable gasoline-powered equipment. b) Equipment shall be maintained in good working condition, with exhaust systems and spark arresters in proper working order and free of carbon buildup. c) Fuel the equipment in a safe place where spills can be contained and a fire extinguisher is nearby. Use the recommended gas/oil mixture and do not top off. Use a funnel or spout for pouring. Wipe off any spills. d) Do not refuel running or hot equipment. Dispense fuel at least 10 feet from sources of ignition. 	Developer	Developer	During construction	

	<ul style="list-style-type: none"> e) Do not use equipment in areas of dry vegetation. Keep leaves and dry materials away from a hot muffler. f) No smoking or open flame allowed near gasoline-powered equipment. 				
Hydrology and Water Quality					
Ground disturbing activities and construction of the project would result in impervious surfaces that could impact water quality	Implementation of Mitigation Measures GEO-1 and HAZ-1	Developer	Developer	Prior to and during construction; ongoing as needed to control erosion	
Noise					
Ground disturbing activities and construction of the project would result in temporary noise impacts	<p>NOI-1: Prior to building permit or grading permit issuance, the developer shall comply with the following:</p> <ul style="list-style-type: none"> a. Construction contracts shall specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other state-required noise attenuation devices. b. Construction haul routes shall be designed to avoid or lessen impacts to noise-sensitive uses (e.g., residences, schools, convalescent homes), to the extent feasible. c. During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers. d. Per the City's Noise Ordinance, construction shall not take place outside of the hours of 7:00 a.m. to 7:00 p.m. 	Developer	Developer	Prior to issuance of building or grading permits, and during construction	
Utilities and Service Systems					

<p>City sewer, water and electric utilities would be extended to the area which could result in physical impacts to the environment</p>	<p>Implementation of BIO-1 through BIO-5, and GEO-1.</p>	<p>See BIO-1 through BIO-5 and GEO-1</p>	<p>See BIO-1 through BIO-5 and GEO-1</p>	<p>See BIO-1 through BIO-5 and GEO-1</p>	
<p>Wildfire</p>					
<p>Construction of the Project may involve the use of gasoline-powered equipment and machinery, potentially introducing new sources of ignition that could increase fire risk</p>	<p>Implementation of Mitigation Measure HAZ-2</p>	<p>Developer</p>	<p>Developer</p>	<p>During construction</p>	



Memorandum

December 10, 2020

To:	Tim Ericksen, PE	Ref. No.:	11217088
From:	Matt Kennedy, PE	Tel:	707.540.3376
CC:	Maya Simerson		
<hr/>			
Subject:	Technical Memorandum No. 2: City of Ukiah Water Tank Planning Study		

1. Introduction

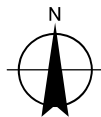
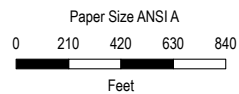
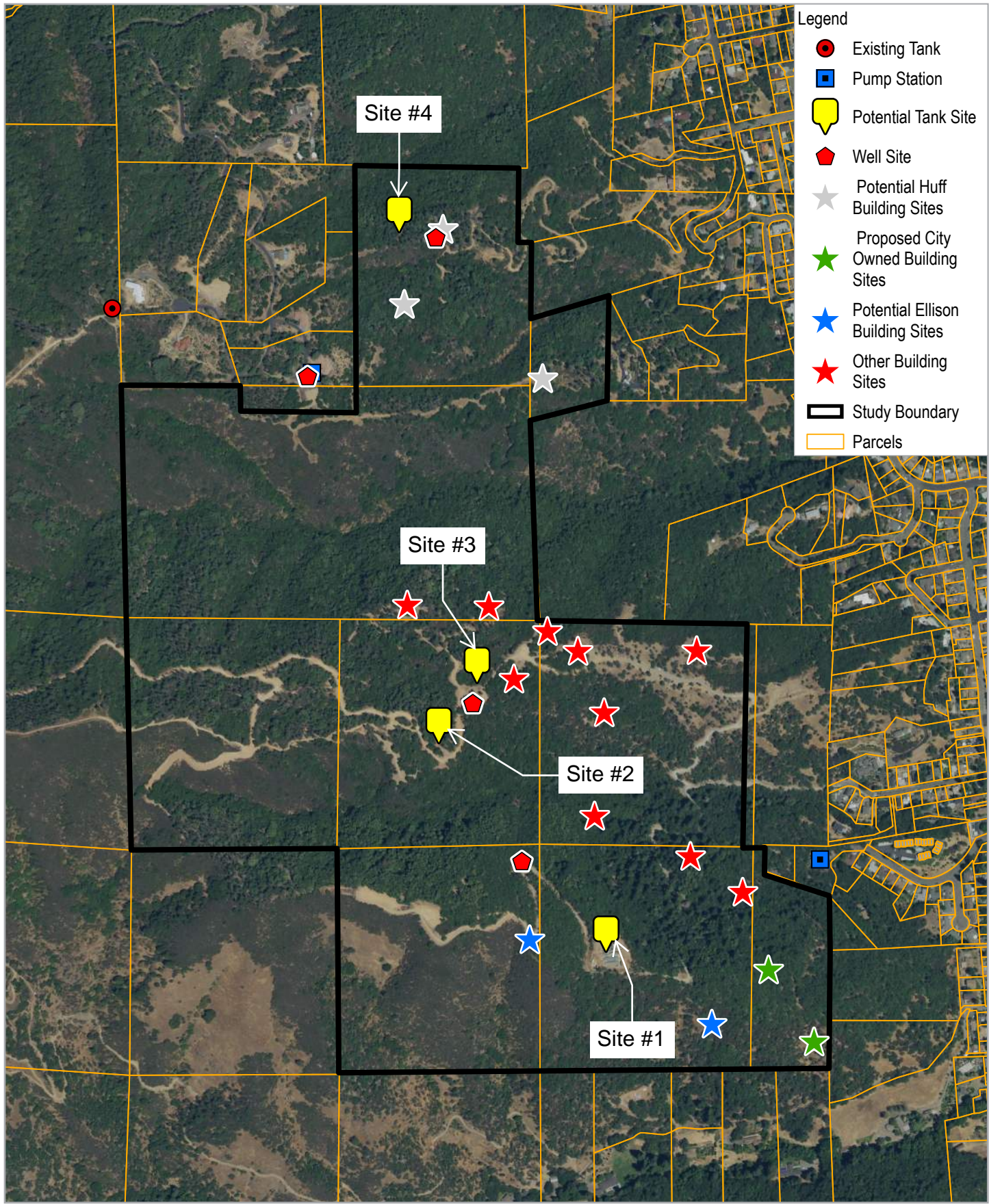
The City is considering property acquisition in hills west of the Ukiah City Limit and is investigating potential sites for water tanks to provide municipal water service and fire protection for proposed residential developments and areas of south Ukiah. Presently, all the City's storage tanks are in the northwest area of the City and within the boundary of the Ukiah Valley Golf Course. In addition to serving the proposed residential developments, the City desires to add new water storage and fire protection facilities in the southwest hills where storage does not currently exist and where more development is expected.

Four (4) potential tank sites are under consideration, and all are located south of the City's existing water tanks. Figure 1 shows the approximate locations of the four tank sites. Mr. David Hull, a landowner and residential developer, identified the potential tank sites to serve proposed residential developments. The sites are:

- Southern: Tank Site #1 is the southernmost site and is located west of San Jacinto Drive at an elevation of approximately 1,250 ft above mean sea level (msl).
- Central: Tank Sites #2 and #3 are located north of Site #1 and west of Observatory Avenue at an elevation of approximately 1,450-ft (msl) and 1,300-ft (msl), respectively. A tank would be located at only one of these sites.
- Northern: Tanks Site #4 is the northernmost site and is located west of Clay Street at an elevation of approximately 1,375-ft (msl).

On September 18, 2020 GHD prepared a Tank Siting Memorandum to evaluate each of the four proposed tank sites based on the following criteria:

- Water service pressure (60 psi to 100 psi)
- Proximity to existing water supply wells
- Proximity to roads for access
- Proximity to existing City water mains for interconnection.



City of Ukiah
Water Tank Planning Study

Project No. 11217088
Revision No. -
Date Dec 2020

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane California II FIPS 0402 Feet

Project Overview

FIGURE 1



The Tank Siting Memorandum found that the proposed tank sites would meet the water supply and fire protection needs of the proposed developments and areas of south Ukiah. Some of the proposed development sites are located outside of (below) the immediate pressure zone boundaries of each tank, and pressure-reducing valves (PRVs) would be required to reduce the pressure in the lower elevation service areas. Lowering the pressure would also be required where the new mains would connect the tanks to the City's existing water distribution system.

Water supply wells are located near the proposed tanks, and the City proposes to supply the tanks with water from the wells rather than constructing new booster pump stations to pump water up to the tanks from the City's existing wells. The City's existing wells are all located to the east and north at elevations around 600-ft (msl) and drawing water from the Ukiah Valley aquifer.

Following completion of the Tank Siting Study, the City requested that GHD to complete a planning study to evaluate the southern tank sites (Tank Sites #1, #2 and #3), develop a conceptual layout, evaluate tank material types and tank sizing, as well as connections to the City's water distribution system, hydraulic performance and planning level costs. This technical memorandum summarizes the results of the planning study, and is intended for use as a planning document that the City can use to make informed decisions regarding the design and construction of one or more new water storage tanks and interconnection with the City's water system.

2. Tank Sites

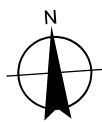
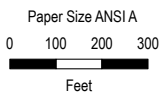
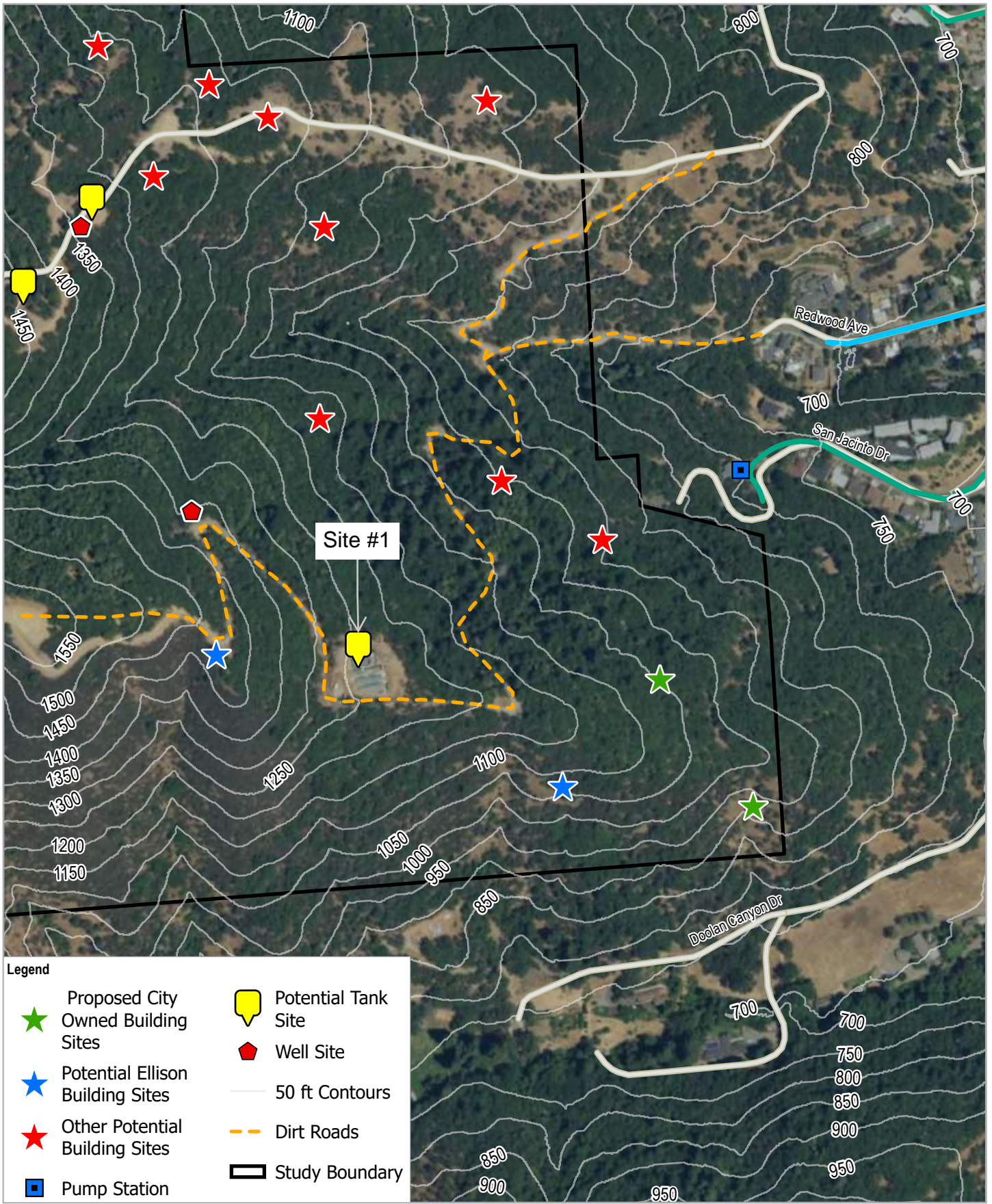
In this study, two of the potential tank sites are evaluated to determine more specific tank siting recommendations. Those are the southern tank site (Tank Site #1) and the central tank sites (Tank Site #2 and #3).

2.1 Tank Site #1

Tank Site #1 is located off a gravel road on private property accessed through a locked gate at the western end of Redwood Drive. This site was not visited during the development of this study. Figure 2 shows the location of this site. The site was previously cleared and used for another purpose. The elevation of the site ranges from about 1,275-ft (msl) to 1,310-ft (msl). A water supply well with a capacity of about 60 gallons per minute (gpm) is located about 700-750 feet from the site. Depending on the actual elevation across the site, some grading could be needed to provide a level pad for a tank with access all around. Most of the potential development in this area could be served with adequate pressure by a tank at this location.

2.2 Tank Site #2 and #3

GHD performed a site visit to Tank Site #2 and #3 on October 14, 2020. These sites are located off a gravel road on private property accessed through a locked gate at the western end of Redwood Drive. During the site visit, a third potential tank location (Site #2A) in the same area was also visited. Figure 3 shows the locations of these three sites. Photographs of each site are included as Attachment 1. The well that would supply water to a tank in this area is located at Site #3. Based on discussions with the property owner's representative, the capacity of the well is between 30 gpm and 35 gpm.



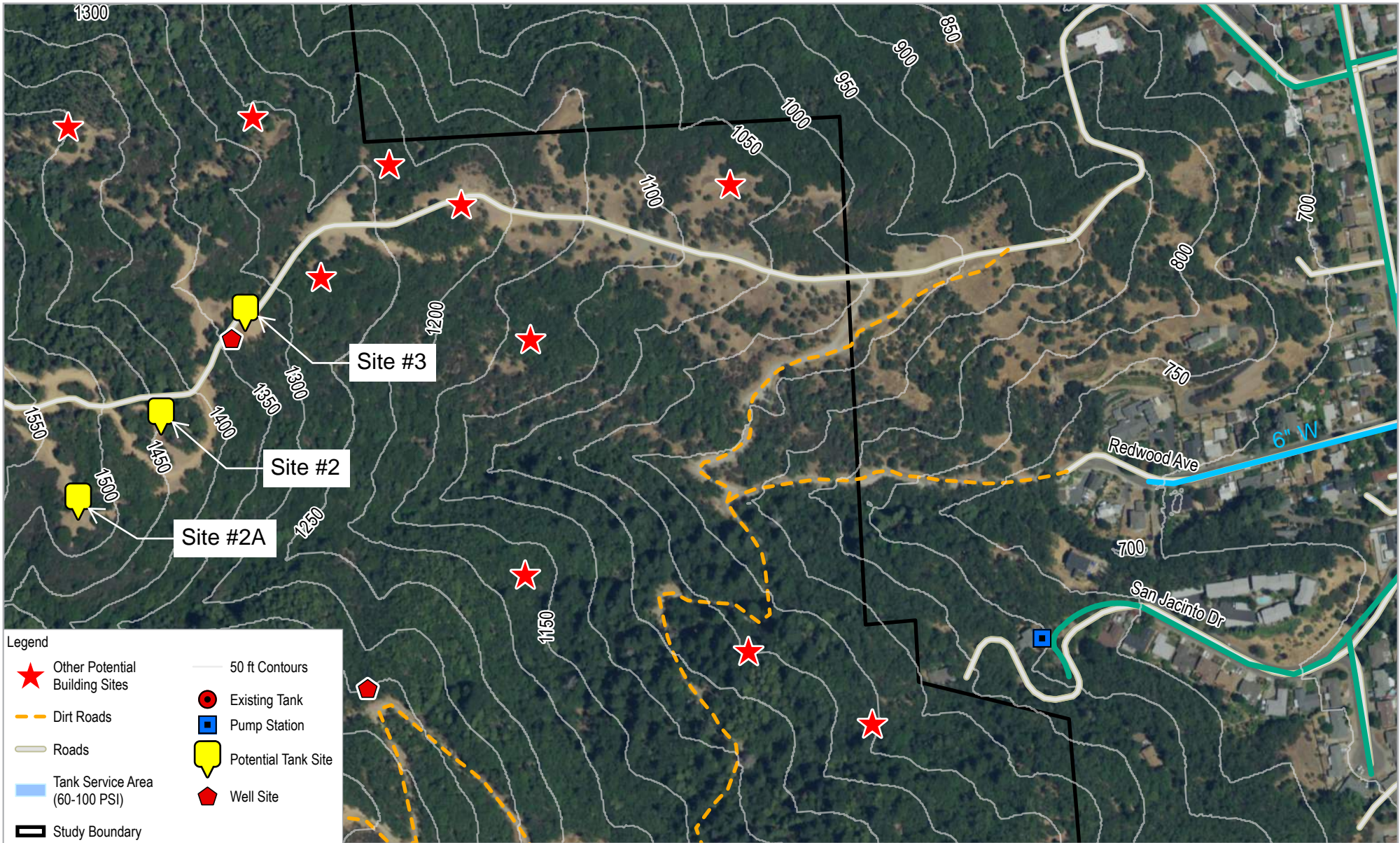
City of Ukiah
Water Tank Planning Study

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Map Projection: Lambert Conformal Conic
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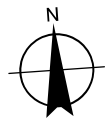
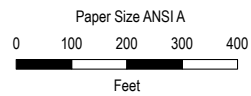
Tank Site #1 Location

FIGURE 2



Legend

- ★ Other Potential Building Sites
- 50 ft Contours
- Dirt Roads
- Existing Tank
- Roads
- Pump Station
- Callout Box Potential Tank Site
- Callout Box Well Site
- Shaded Area Tank Service Area (60-100 PSI)
- Study Boundary



Map Projection: Lambert Conformal Conic
 Horizontal Datum: North American 1983
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City of Ukiah
 Water Tank Planning Study

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Tank Site #2 and #3 Location

FIGURE 3



Tank Site #2A is located at the highest elevation of the three potential sites reviewed in this area, about 1,530-ft (msl). It is on a cleared knoll located about 300-ft south of the main access road. The site is relatively flat, about 50-60 feet wide, and the topography drops off steeply on all sides. Constructing a tank at this location will require earthwork to cut a level pad on the knoll large enough for a tank with the volume proposed in Section 3 and access all around. Most of the potential development in this area could be served with adequate pressure by a tank at this location. Approximately 700-750 feet of piping would be needed to connect the well to this tank.

Tank Site #2 is located at an elevation of about 1,470-ft (msl). It is off the access road at a sharp bend. The site is fairly clear of trees and generally level. Some tree removal and additional earthwork to further level the site would be needed. Most of the potential development in this area could be served with adequate pressure by a tank at this location. About 400-450 feet of piping would be needed to connect the well to this tank.

Tank Site #3 is located at an elevation of about 1,350-ft (msl). The site is graded level, although some additional grading work would likely be needed to enlarge the site for a tank with the volume proposed in Section 3 with access all around. This is also the location of the water supply well, which is advantageous because additional piping to connect the well to the tank would not be needed.

3. Tank Sizing

The estimated water storage volume was determined as the combination of operational storage (demands) and fire flow storage with a contingency. The determination of the recommended storage volume is discussed in the following sections.

3.1 Operational Storage volume (Demand)

Operation storage is the estimated volume of water required to meet the average day maximum month demand. For this study, the estimated demands considered are associated with existing use in the south Ukiah area and the new demands from developments in the hills around the proposed tank sites. A conceptual demand calculation was performed to estimate the demand that could be met by these tanks. The demand area considers existing development south of Gobbi Street and west of U.S. 101. The approximate number of residential dwelling units in this area were counted, and an allowance for existing commercial business demands was then applied. Approximately 1,350 residential units were counted. The number of apartment units were approximated and included in this count. For planning purposes, an occupancy of 3.5 persons per dwelling unit was used with a water demand of 100 gallons/person/day inclusive of irrigation:

$$\text{Daily Residential Demand} = \text{No. Dwelling Units} \times \text{Persons per Unit} \times \text{Unit Water Demand}$$

$$\text{Daily Residential Demand} = 1,350 \text{ dwelling units} \times \frac{3.5 \text{ persons}}{1 \text{ dwelling unit}} \times \frac{100 \text{ gallons}}{\text{person} - \text{day}}$$

$$\text{Daily Residential Demand} = 472,500 \text{ gallons/day}$$



For planning purposes, the daily water demand for commercial / businesses is estimated by applying a factor of 20% to the daily residential demand:

$$\text{Daily Commercial Business Demand} = 0.20 \times \text{Daily Residential Demand}$$

$$\text{Daily Commercial Business Demand} = 0.2 \times 472,500 \text{ gallons/day} = 94,500 \text{ gallons/day}$$

The total daily demand is the sum of the residential and commercial/business demands, which equals 567,000 gallons per day.

3.2 Fire Flow Storage Volume

The firewater storage is estimated based on Type V-B construction for a 9,500 square foot building. Based on Appendix B of the California Fire Code 2019 a flow rate of 2,750 gpm must be sustained for a 2-hour duration, resulting in a minimum fire water storage volume of 330,000 gallons.

3.3 Total Water Storage Volume

The total water storage volume is determined as the sum of the operational (demand) storage volume and the firewater storage volume. A factor of 10% is applied to account for peak day demands and modest growth. The resulting total water storage volume is:

$$\text{Total Storage} = 1.1 \times (\text{operational storage} + \text{fire flow storage})$$

$$\text{Total Storage} = 1.1 \times (567,000 + 330,000)\text{gallons}$$

$$\text{Operational Storage} = 986,700 \text{ gallons}$$

The recommended total water storage volume is 1,000,000 gallons. This storage volume could be met with two (2) 500,000 gallon water tanks, one located at Tank Site #1 and one located at either Tank Site #2A, #2 or #3.

4. Tank Materials

This section summarizes the evaluation and selection of the most appropriate water storage tank materials. The purpose of this evaluation is to select the most appropriate tank material for the recommended project. Based on the tank sizing analysis in Section 3, a storage volume of 500,000 gallons was used to evaluate individual tank costs. Tank pricing, manufacturer quotes and cost analyses were completed for recommendation of the appropriate tank material type for a new tank.

4.1 Tank Materials

Six different tank materials were considered for new tanks. These materials are:

1. Bolted stainless steel
2. Bolted epoxy coated
3. Cast-in-place concrete
4. Welded epoxy coated steel
5. Prestressed concrete
6. Bolted glass-fused to steel

Each tank material type has benefits and drawbacks, which are described below and evaluated using the tank material type criteria described later in this section.

4.2 Bolted Stainless Steel

Stainless steel tanks are typically used in the food and beverage industry and in wastewater treatment plants because of their durability and corrosion resistance. The color of stainless steel tanks is dull gray, and an example tank is shown in Figure 4. Stainless steel tanks have a lower capital cost than concrete tanks, and only a slightly higher capital cost than the epoxy-coated bolted steel. Stainless steel tanks also have a significantly lower operation and maintenance cost compared to all other tank types and do not require any special protective coating, cathodic protection and associated maintenance (unless needed to reduce visual impacts). The service life exceeds 40 years, and with proper maintenance can have up to an estimated 80-year life. Stainless steel tanks also have one of the longest useful life of the tank materials considered. Because stainless steel tanks have such a long life, excellent seismic performance and have very low maintenance requirements, they are a favorable material choice for water storage on the North Coast. Like other steel tanks, most of the cost is in the manufacturing and shipping of the steel panels, and may require certified installers from outside the local area.



Figure 4. Example of Type 316 stainless steel tanks (American Structures, Inc.)

Some advantages of bolted stainless steel tanks include a relatively high resale value for the stainless steel upon salvage, lower maintenance compared with other steel tank types, ease of relocation, quick installation and corrosion resistance. A 5-year warranty is also offered by the manufacturer we contacted.

4.3 Cast-in-Place and Prestressed Concrete

Both cast-in-place and prestressed concrete tanks have excellent seismic performance when designed to current California Building Code seismic standards. With an 80-year life, concrete, along with stainless steel tanks have the longest useful life of the tank materials considered. Because concrete tanks have such a long life, excellent seismic performance and have very low maintenance requirements, they are a favorable material choice for water storage on the North Coast. The North Marin Water District (NMWD) has seven cast-in-place concrete tanks in its western service area around Tomales Bay and Point Reyes and very near the San Andreas Fault. This tank material type is used specifically in their coastal and high seismic risk service area, while other tank materials are selected for their service areas to the east. Figure 5 below shows some examples of NMWD's cast-in-place concrete tanks.



Figure 5. Examples of cast-in-place concrete tanks (North Marin Water District)

During construction, a cast-in-place concrete tank only requires about 5 feet of temporary space around the tank, and a prestressed concrete tank requires 10 feet of temporary track from the outside face of the tank wall for the pre-stressing process. A welded or bolted epoxy coated mild steel tank typically requires a permanent 15-foot to 20-foot maintenance track around the exterior of the tank foundation for maintenance and future recoating work. In addition to their superior performance, concrete tanks can be made to match their surroundings by using color additives in the concrete mix and by texturing the concrete.



When the investment is made in a concrete tank, a large portion of the construction cost is sourced locally. The majority of the material and expense cost for construction of the concrete tank is from local sources including aggregate and concrete suppliers, and lumberyards, equipment rentals, and local labor. Most of the cost of a mild steel tank is in the manufacturing, coating and shipping of the steel plates with certified installers from outside the area required by the manufacturers.

Concrete tanks can be partially buried without adding significant cost. This type of installation can assist in balancing the sites excavated material thus reducing site work costs and material export. Partially burying the tank can also help reduce visual impacts. They can also be lower in height than steel tanks because the roof structure can be designed to resist wave sloshing. For large volume concrete tanks, prestressed types designed in accordance with AWWA D-110 Type I become cost effective, particularly in seismic regions where larger tanks may require base isolation and larger diameters may require alternative roof designs such as column supported and freestanding dome types. Pre-stressing can also reduce wall thickness allowing for taller tanks.

4.4 Bolted and Welded Epoxy Coated Mild Steel

Epoxy coated mild steel tanks, which includes bolted and welded types, require significantly higher operation and maintenance efforts particularly in coastal marine environments, including annual exterior coating inspections, regular coating system maintenance, sandblasting and exterior recoating at least every five years, interior inspections at least every two years, sandblasting and interior recoating at least every five years. Even with regular interior and exterior inspections, problems and failures can occur. Epoxy coated steel tanks must have cathodic protection systems when installed in corrosive marine environments, which require annual inspections and maintenance, and must be replaced every 15 to 20 years.

During construction, it is critical that all panel surfaces be thoroughly inspected for holidays (chips, coating bubbles, and other coating imperfections). Holidays can occur during the factory coating process, during shipping and handling, and during erection. Holidays must be sanded to bare metal, field primed and coated to ensure no areas of the metal panels are exposed to the air or water, which would accelerate corrosion. This construction inspection process is labor intensive and requires special equipment.

Even when properly constructed, maintained and regularly inspected, epoxy coated steel tanks have a much lower useful life of 40 years when compared with concrete and stainless steel. When not properly maintained, their service life can be significantly reduced. In some cases, catastrophic failure can occur even with proper maintenance and regular inspections, as not all corrosion can be visually identified.

In the spring of 2013, the catastrophic failure of a 42,000 gallon epoxy coated bolted steel tank occurred at the Pacific Reefs Water District near Albion, CA, just south of the Town of Mendocino. Figure 6 shows images of the failed tank taken by the Division of Drinking Water Mendocino District. During a discussion with the contract water treatment operator, Mr. Larry Miller, it was noted that the tank was approximately 40 years old and failed as a result of corrosion along the bolted seam causing the tank wall panel to split and buckle. The corrosion was not visible and was not noticed during regular inspections. When the tank failed it destroyed the water treatment building, which had been occupied hours earlier. Mr. Miller is also the contract water treatment operator for the Albion Mutual Water Company, in the town of Albion. They have a 70,000-gallon cast-in-place water tank that has been in service for over 45 years with no performance issues,

corrosion, leaks or other problems during that period. The tank is regularly inspected, and has required very little maintenance.



Figure 6. Failed epoxy coated bolted steel water tank (Pacific Reefs Water District)

4.5 Glass-fused Bolted Steel

Bolted glass-fused to steel tanks are less susceptible to corrosion and require less maintenance than other steel tanks, but can also have corrosion issues at the panel seams and with the bolts. They also require cathodic protection systems, especially in coastal marine environments. With an expected life of 50 years, glass-fused to steel tanks have slightly longer lives compared with other mild steel tanks. They also require annual cathodic protection system inspections, interior inspections at least every five years, and replacement of the cathodic protection system every 15 to 20 years.

During construction, it is critical that all panel surfaces be thoroughly inspected for damage and imperfections in the glass coating. Imperfections can occur during the factory coating process especially along the bolted seams, and damage can occur during shipping and handling during erection. Unlike epoxy coated steel tanks, damaged glass-fused to steel tank panels must be sent back to the factory for repair or replacement, as field coating touchup is not possible. Replacing panels during construction can delay a project and add construction administration and inspection costs.

Even when properly maintained, glass-fused steel tanks have a lower useful life when compared with concrete. In some cases, catastrophic failure can occur even with proper maintenance. Figure 7 shows a failed glass-fused bolted steel water tank owned by the Waddy Fire District in Kentucky, which catastrophically failed in 2014 after 32 years of service with regular maintenance and inspection. The failure was a result of corrosion along the vertical bolted seam causing the tank wall to split and buckle sending 100,000 gallons of water into a residential neighborhood and damaging a church. The tank had been inspected three years prior to the failure, and no corrosion was observed. It was not located in a corrosive or coastal environment.



Figure 7. Failed glass-fused bolted steel water tank (Waddy Fire District, Kentucky)

4.6 Tank Material Summary

Bolted stainless steel and concrete tanks (cast-in-place and prestressed) have the lowest operation and maintenance requirements of all of the tank materials considered. Maintenance is limited to periodic pressure washing of the exterior and occasional cleaning of sediments from the interior depending on water quality.

Bolted stainless steel tanks and concrete tanks do not require special coatings, cathodic protection, and other costly measures to maintain the performance over the life of the tank. Bolted stainless steel and concrete tanks offer very reliable, virtually maintenance free service for the life of the tank. This is compared with epoxy coated welded and bolted steel tanks which must be regularly maintained by sandblasting, and recoating. The costs to sandblast and paint continue to rise, and new regulations often result in a requirement to cover the entire tank during the process. By selecting a stainless steel or concrete tank, the MUSD will not be subjected to the cost and inconvenience of painting crews and will also not need to budget for significant future maintenance.

4.7 Tank Cost Comparison

Planning level capital costs for each tank material type were obtained from manufacturers or suppliers or developed from recent bids. These costs were developed for a smaller 250,000-gallon tank and were escalated up for a 500,000-gallon tank in combination with contractor and manufacturer quotes and Engineering News Record (ENR) Construction Cost Indices. A detailed estimate for a 500,000-gallon bolted stainless steel tank was obtained from a manufacturer. These planning level estimates were used to develop average estimated construction costs.

For the cast-in-place concrete tank option, one quote was obtained from a tank manufacturer (DN Tank), one estimate was escalated from a recent bid for a smaller tank (currently under construction for the North Marin Water District), and one opinion of probable construction cost was developed by GHD. Site work and other project costs indirectly associated with the tanks were excluded.



In addition to the consideration of initial capital cost, the Net Present Value (NPV) for each tank material for a baseline 500,000-gallon tank was determined to provide a relative cost comparison over the anticipated life of the tank. The NPV analysis is a prudent method of comparing and considering the true cost of each tank material option because it reflects not only the initial capital cost, but also ongoing operation and maintenance costs and replacement costs during the lifecycle period evaluated. When making financial-based decisions on assets that will last the MUSD 40 to 80 years or longer, it is important to consider the life-cycle cost of the asset because it reflects the real cost. If operation and maintenance are excluded from the decision making process, the owner or end user would be neglecting the potentially significant cost burden of operation, maintenance and periodic replacement.

The Net Present Value for a baseline 500,000-gallon tank over an 80-year period is summarized in Table 1. In this analysis, a discount rate of 3% is used. A period of 80 years was selected because it represents the anticipated life of a concrete tank or stainless steel tank, which have the longest useful lives of all materials considered. This analysis period provides the most equal comparison of tank materials. A shorter 20-year and 40-year NPV analysis of the tank materials was also performed. Table 2 and Table 3 show the cost comparisons for the various materials considered alternatives for a single 250K gallon tank over 40-year and 20-year periods, respectively.

The actual life of any tank is dependent on sound engineering design, quality construction and maintenance as required by the particular tank material.

4.8 Tank Material Type Comparison

The tank material type multi-criteria analysis considered six criteria. A maximum total score of 3.0 was used for the analysis. A score of 3.0 indicates the tank material is preferred for that criterion, whereas a score of 1.0 indicates it is not preferred for that criterion. Each criterion was assigned a weigh expressed as a percent, with the sum of the weights of each criteria totaling 100%. The total score for each tank material option was determined as:

$$Tank\ Option\ Score = \sum_{i=1}^6 (score \times weight)$$

Where i is the criteria.

The weights were established using professional engineering judgement and guidelines in Section 8 of the California Department of Public Health Proposition 50 Funding Program Project Technical Report Guidelines. The scores were assigned based on an evaluation of each criteria as it applies to each tank material type.



Table 1. Eighty (80) year present value cost comparison of Six (6) tank material types

Cost Element	CAST-IN-PLACE CONCRETE TANK				PRESTRESSED CONCRETE TANK				EPOXY COATED BOLTED TANK			
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value
Initial Construction	One Time	0	\$2,790,676	\$2,790,676	One Time	0	\$2,650,000	\$2,650,000	One Time	0	\$571,543	\$571,543
Inspection, Minor Maint.	Annual	Annually	\$200	\$6,040	Annual	Annually	\$200	\$6,040	Annual	Annually	\$5,000	\$151,004
Cathodic Protection System Maint.	Annual	Annually	\$0	\$0	Annual	Annually	\$0	\$0	Annual	Annually	\$5,000	\$151,004
Recoating, Resealing, and Repairs	Periodic	10	\$5,000	\$3,720	Periodic	10	\$5,000	\$3,720	Periodic	10	\$30,000	\$22,323
Recoating, Resealing, and Repairs	Periodic	20	\$5,000	\$2,768	Periodic	20	\$5,000	\$2,768	Periodic	20	\$30,000	\$16,610
Recoating, Resealing, and Repairs	Periodic	30	\$5,000	\$2,060	Periodic	30	\$5,000	\$2,060	Periodic	30	\$30,000	\$12,360
Routine Maint. or New Construction	Periodic	40	\$5,000	\$1,533	Periodic	40	\$5,000	\$1,533	Demolish/Replace*	40	\$596,543	\$182,874
Recoating, Resealing, and Repairs	Periodic	50	\$5,000	\$1,141	Periodic	50	\$5,000	\$1,141	Periodic	50	\$30,000	\$6,843
Recoating, Resealing, and Repairs	Periodic	60	\$5,000	\$849	Periodic	60	\$5,000	\$849	Periodic	60	\$30,000	\$5,092
Recoating, Resealing, and Repairs	Periodic	70	\$5,000	\$631	Periodic	70	\$5,000	\$631	Periodic	70	\$30,000	\$3,789
New Construction	Demolish/Replace*	80	\$2,840,676.37	\$266,959	Demolish/Replace*	80	\$2,700,000	\$253,738	Demolish/Replace*	80	\$596,543	\$56,061
TOTAL PRESENT WORTH				\$3,076,377				\$2,922,481				\$1,179,503
Cost Element	GLASS FUSED TO STEEL TANK				EPOXY COATED WELDED TANK				STAINLESS STEEL BOLTED TANK			
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value
Initial Construction	One Time	0	\$744,750	\$744,750	One Time	0	\$819,961	\$819,961	One Time	0	\$518,029	\$518,029
Inspection, Minor Maint.	Annual	Annually	\$1,000	\$30,201	Annual	Annually	\$5,000	\$151,004	Annual	Annually	\$1,000	\$30,201
Cathodic Protection System Maint.	Annual	Annually	\$2,500	\$75,502	Annual	Annually	\$5,000	\$151,004	Annual	Annually	\$0	\$0
Recoating, Resealing, and Repairs	Periodic	10	\$10,000	\$7,441	Periodic	10	\$25,000	\$18,602	Periodic	10	\$5,000	\$3,720
Recoating, Resealing, and Repairs	Periodic	20	\$10,000	\$5,537	Periodic	20	\$25,000	\$13,842	Periodic	20	\$5,000	\$2,768
Recoating, Resealing, and Repairs	Periodic	30	\$10,000	\$4,120	Periodic	30	\$25,000	\$10,300	Periodic	30	\$5,000	\$2,060
Routine Maint. or New Construction	Periodic	40	\$10,000	\$3,066	Demolish/Replace*	40	\$844,961	\$259,029	Periodic	40	\$5,000	\$1,533
Routine Maint. or New Construction	Demolish/Replace*	50	\$769,750	\$175,585	Periodic	50	\$25,000	\$5,703	Periodic	50	\$5,000	\$1,141
Recoating, Resealing, and Repairs	Periodic	60	\$10,000	\$1,697	Periodic	60	\$25,000	\$4,243	Periodic	60	\$5,000	\$849
Recoating, Resealing, and Repairs	Periodic	70	\$10,000	\$1,263	Periodic	70	\$25,000	\$3,157	Periodic	70	\$5,000	\$631
Recoating, Resealing, and Repairs	Periodic	80	\$10,000	\$940	Demolish/Replace*	80	\$844,961	\$79,407	Demolish/Replace*	80	\$543,029	\$51,032
TOTAL PRESENT WORTH				\$1,050,101				\$1,516,252				\$611,964
*Economic Life: Concrete & Stainless Steel = 80 Years, Mild Steel (all types) = 40 Years				Discount Rate: 3%								
*Demolition cost of \$50,000 for concrete tanks and \$25,000 for steel tanks included.												



Table 2. Forty (40) year present value cost comparison of Six (6) tank material types

Cost Element	CAST-IN-PLACE CONCRETE TANK				PRESTRESSED CONCRETE TANK				EPOXY COATED BOLTED TANK			
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value
Initial Construction	One Time	0	\$2,790,676	\$2,790,676	One Time	0	\$2,650,000	\$2,650,000	One Time	0	\$571,543	\$571,543
Inspection, Minor Maint.	Annual	Annually	\$200	\$6,040	Annual	Annually	\$200	\$6,040	Annual	Annually	\$5,000	\$151,004
Cathodic Protection System Maint.	Annual	Annually	\$0	\$0	Annual	Annually	\$0	\$0	Annual	Annually	\$5,000	\$115,574
Recoating, Resealing, and Repairs	Periodic	10	\$5,000	\$3,720	Periodic	10	\$5,000	\$3,720	Periodic	10	\$30,000	\$22,323
Recoating, Resealing, and Repairs	Periodic	20	\$5,000	\$2,768	Periodic	20	\$5,000	\$2,768	Periodic	20	\$30,000	\$16,610
Recoating, Resealing, and Repairs	Periodic	30	\$5,000	\$2,060	Periodic	30	\$5,000	\$2,060	Periodic	30	\$30,000	\$12,360
Routine Maint. or New Construction	Periodic	40	\$5,000	\$1,533	Periodic	40	\$5,000	\$1,533	One Time	40	\$596,543	\$182,874
TOTAL PRESENT WORTH	\$2,806,798				\$2,666,122				\$1,072,288			
Cost Element	GLASS FUSED TO STEEL TANK				EPOXY COATED WELDED TANK				STAINLESS STEEL BOLTED TANK			
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value
Initial Construction	One Time	0	\$744,750	\$744,750	One Time	0	\$819,961	\$819,961	One Time	0	\$518,029	\$518,029
Inspection, Minor Maint.	Annual	Annually	\$1,000	\$30,201	Annual	Annually	\$5,000	\$151,004	Annual	Annually	\$1,000	\$30,201
Cathodic Protection System Maint.	Annual	Annually	\$2,500	\$57,787	Annual	Annually	\$5,000	\$115,574	Annual	Annually	\$0	\$0
Recoating, Resealing, and Repairs	Periodic	10	\$10,000	\$7,441	Periodic	10	\$25,000	\$18,602	Periodic	10	\$5,000	\$3,720
Recoating, Resealing, and Repairs	Periodic	20	\$10,000	\$5,537	Periodic	20	\$25,000	\$13,842	Periodic	20	\$5,000	\$2,768
Recoating, Resealing, and Repairs	Periodic	30	\$10,000	\$4,120	Periodic	30	\$25,000	\$10,300	Periodic	30	\$5,000	\$2,060
Routine Maint. or New Construction	Periodic	40	\$10,000	\$3,066	One Time	40	\$844,961	\$259,029	Periodic	40	\$5,000	\$1,533
TOTAL PRESENT WORTH	\$852,901				\$1,388,311				\$558,311			
*Economic Life: Concrete & Stainless Steel = 80 Years, Mild Steel (all types) = 40 Years												
*Demolition cost of \$50,000 for concrete tanks and \$25,000 for steel tanks												
Discount Rate: 3%												



Table 3. Twenty (20) year present value cost comparison of Six (6) tank material types

Cost Element	CAST-IN-PLACE CONCRETE TANK				PRESTRESSED CONCRETE TANK				EPOXY COATED BOLTED TANK				
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	
Initial Construction	One Time	0	\$2,790,676	\$2,790,676	One Time	0	\$2,650,000	\$2,650,000	One Time	0	\$571,543	\$571,543	
Inspection, Minor Maint.	Annual	Annually	\$200	\$6,040	Annual	Annually	\$200	\$6,040	Annual	Annually	\$5,000	\$151,004	
Cathodic Protection System Maint.	Annual	Annually	\$0	\$0	Annual	Annually	\$0	\$0	Annual	Annually	\$5,000	\$115,574	
Recoating, Resealing, and Repairs	Periodic	10	\$5,000	\$3,720	Periodic	10	\$5,000	\$3,720	Periodic	10	\$30,000	\$22,323	
Recoating, Resealing, and Repairs	Periodic	20	\$5,000	\$2,768	Periodic	20	\$5,000	\$2,768	Periodic	20	\$30,000	\$16,610	
TOTAL PRESENT WORTH	\$2,803,205				\$2,662,529				\$877,054				
Cost Element	GLASS FUSED TO STEEL TANK				EPOXY COATED WELDED TANK				STAINLESS STEEL BOLTED TANK				
	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	Cost Type	Year	Amount	Present Value	
Initial Construction	One Time	0	\$744,750	\$744,750	One Time	0	\$819,961	\$819,961	One Time	0	\$518,029	\$518,029	
Inspection, Minor Maint.	Annual	Annually	\$1,000	\$30,201	Annual	Annually	\$5,000	\$151,004	Annual	Annually	\$1,000	\$30,201	
Cathodic Protection System Maint.	Annual	Annually	\$2,500	\$57,787	Annual	Annually	\$5,000	\$115,574	Annual	Annually	\$0	\$0	
Recoating, Resealing, and Repairs	Periodic	10	\$10,000	\$7,441	Periodic	10	\$25,000	\$18,602	Periodic	10	\$5,000	\$3,720	
Recoating, Resealing, and Repairs	Periodic	20	\$10,000	\$5,537	Periodic	20	\$25,000	\$13,842	Periodic	20	\$5,000	\$2,768	
TOTAL PRESENT WORTH	\$845,715				\$1,118,983				\$554,719				
*Economic Life: Concrete & Stainless Steel = 80 Years, Mild Steel (all types) = 40 Years					Discount Rate: 3%								
*Demolition cost of \$50,000 for concrete tanks and \$25,000 for steel													



1. Constructability (5%) – construction requirements (footprint), volume of Earthwork, lead time to construct.

This criterion is given a relatively low comparative weighting as there is no significant difference between the tank options considered. In all scenarios, the site will need to be cleared for the construction of the tank(s). Lead time for construction is not a significant driver for the tanks types considered.

2. Operation and maintenance (30%) – routine maintenance requirements and associated costs

It is recommended that a tank material is selected that requires low operation and maintenance requirements so the City is not burdened with the cost and effort to perform regular and scheduled operation and maintenance tasks typical of mild steel tank systems, such as cathodic protection and coating systems. Delaying or not performing key operation and maintenance events could impact the overall useful life and safe operation of the tank. Missing scheduled maintenance and inspection can, in extreme cases, result in catastrophic failure. Catastrophic failure of tanks is documented on the Northern California coast. As a result, this criteria was given a relatively high rating to reflect these risks.

3. Environmental and Social Impact (10%) – vegetation and grubbing footprint. Environmental and visual impacts. Sustainable or locally available materials. Frequency of service interruption for maintenance

The environmental and social impacts was included in the assessment to meet the requirements of Section 8 of the CDPH Proposition 50 Funding Program Project Technical Report Guidelines.

Environmental and social impacts were given a moderate rating to reflect that the construction would be occurring on an already disturbed/ cleared site and away from businesses, busy roads and densely populated areas. Each site requires a relatively similar construction footprint and as a result exhibits a relatively similar environmental impact.

The environmental and social impacts would be further investigated during the project's CEQA environmental review process.

4. Life Expectancy (10%) – Expected useful service life of the tank

This was given a moderate rating given that City is does maintain a water utility enterprise fund that could cover the cost for a replacement tank. However, it is preferred to install a tank with a long useful service life.

5. Warranty (5%) – Manufacturer warranty on system components

It is advantageous to have a warranty on all tank components. However, overall it is a minor contributor to the weighting for the tank because the life of a new tank is expected to be significantly longer than a contractor or manufacturer warranty.

6. Capital Cost (15%) & Net Present Value (25%)

The combined monetary "cost-effectiveness" rating of the project contributes 40% to the total multi-criteria analysis. This reflects the consideration of project cost as a key criteria, and places emphasis on lifecycle cost which reflects the true long-term cost of a particular option. Preference is given to the alternatives that



achieve the project goals at the least cost capital and lifecycle cost. In comparing the cost, initial capital costs, replacement cost and operation / maintenance are considered within the time periods evaluated.

4.9 Tank Material Type Evaluation

Table 4 compares the tank material type evaluation criteria considered in order to identify an appropriate tank type. The cost comparison reflected in Table 4 is based on the construction of a single 500,000-gallon tank to determine a baseline cost, and is used to select the best and most appropriate tank material.

4.10 Tank Material Type Recommendation

Upon objective review, comparison and analysis of tank material options, it is recommended that the new water storage tank be constructed of bolted stainless steel. Our research and the analysis presented in this section have demonstrated bolted stainless steel to be one of the highest performing and most cost effective tank materials (alongside concrete) considering the criteria evaluated. Bolted stainless steel tanks outperformed all other tank materials in the analysis, being easy to construct and with low operation and maintenance (O/M) requirements. Bolted stainless steel tanks manufactured by American Structures, Inc. are used in the remainder of this study for planning purposes.



Table 4. Comparison and analysis of tank materials

Criteria, Description & Weighting			Option 1: Cast-in-Place Concrete	Option 2: Prestressed Concrete	Option 3: Epoxy Coated Bolted Steel	Option 4: Epoxy Coated Welded Steel	Option 5: Bolted Glass-Fused-to-Steel	Option 6: Bolted Stainless Steel
Criteria	Description	Weighting						
Industry Standard	Adopted standards used for engineering design	N/A	ACI 350	AWWA D-110 Type 1	AWWA D103-09 NSF 61/NFPA 22	AWWA D100 NSF 61/NFPA 22	AWWA D103-09 NSF 61/NFPA 22	ANSI/NSF 61
Tank Size (Diameter x Height)	Dictates volume of tank	N/A	65'D x 23'H	65'D x 23'H	59'D x 29'H	59'D x 29'H	59'D x 29'H	59'D x 29'H
Constructability	Construction requirements (footprint), Volume of Earthwork, Lead Time to construct	5%	-10' temporary track -Minimum construction laydown area to form and pour concrete tank	-10' temporary track -Minimum construction laydown area to form and pour concrete tank	-Easily and quickly constructible. -12' wide permanent maintenance track	-Requires continuous special inspection during welding. -12' wide permanent maintenance track	-Easily and quickly constructible. -12' wide permanent maintenance track	-Easily and quickly constructible. -12' wide permanent maintenance track
Operation and Maintenance	Routine maintenance requirements and associated costs	30%	Annual power washing, maintenance, and inspection (~20 years)	Annual power washing, maintenance, and inspection (~20 years)	High Coating Upkeep, CP Maintenance (Internal/Tank Bottom)	High Coating Upkeep CP Maintenance (Internal/Tank Bottom)	Power washing, routine maintenance. Moderate Upkeep CP Maintenance (Internal/ Tank Bottom)	Annual power washing, routine maintenance, and inspection (~20 years)
Environmental & Social Impact	Vegetation clearing and grubbing footprint. Environmental/Visual impacts. Sustainable or locally available materials. Frequency of service interruption for maintenance	10%	Concrete can be colored and textured to blend into natural environment improving aesthetics. Tank can be constructed partially underground to reduce visual impact. Aggregate can be locally sourced	Concrete can be colored and textured to blend into natural environment improving aesthetics. Tank can be constructed partially underground to reduce visual impact. Aggregate can be locally sourced	Regular coating maintenance is needed to maintain visual appearance. Steel panels must be shipped from out of area. Requires regular maintenance effecting the continuous serviceability of the tank. Complete recoating and lining required every 20 years. Annual cathodic protection maintenance required	Regular coating maintenance is needed to maintain visual appearance. Steel panels must be shipped from out of area. Requires regular maintenance effecting the continuous serviceability of the tank. Complete recoating and lining required every 20 years. Annual cathodic protection maintenance required	Limited color selection for visual appeal. Steel panels must be shipped from out of the area. Cathodic protection maintenance required every 3-5 years. Recoating is not required	Steel panels must be shipped from out of the area. Can not be painted or coated to match surrounding environment. No cathodic protection system required.
Life Expectancy	Expected useful service life of the tank	10%	80 Years	80 Years	40 Years	40 Years	50 Years	80 Years
Warranty	Manufacturer Warranty on system components	5%	1 Year	1 Year	1 Year	1 Year	5 Years	5 Years
Capital Cost (\$M)	Initial fixed cost to construct and bring tank to an operable level	15%	\$3.35M	\$3.18M	\$686M	\$984M	\$894M	\$622M
80 Year Net Present Value (\$M)	Cost comparison method used to provide a relative comparison based on capital and O&M costs	25%	\$3.08M	\$2.92M	\$1.18M	\$1.05M	\$1.516M	\$692M
Scores	Note scoring is based on comparison of options from Best to Worst criteria assessment. Differences between options may be marginal for some criteria		* 2 Red * 2 Yellow * 3 Green	* 2 Red * 2 Yellow * 3 Green	* 3 Red * 2 Yellow * 2 Green	* 4 Red * 3 Yellow * 0 Green	* 0 Red * 5 Yellow * 2 Green	* 0 Red * 1 Yellow * 6 Green
Numerical Scores and weighting	High level numerical comparison * Red = 1 point * Yellow = 2 points * Green = 3 points		2.10	2.10	1.70	1.45	1.45	2.90



5. Preliminary System Layout

A preliminary system layout was developed as part of the hydraulic modeling effort describe in Section 6. One tank is located at Site #1 and one located at Site #3. The location of the tank at Site #1 is schematic as this site was not visited to evaluate a more precise location, but the site appears to have plenty of space for a 500,000 gallon tank. Site #3 is recommended over Site #2 and Site #2A because it is already graded level, and is the location of an existing water supply well, which is advantageous because additional piping to connect the well to the tank would not be needed. The cleared area is about 60-ft in diameter. Additional clearing and grading would likely be needed to provide a site with adequate space around the tank for general access and maintenance. Table 5 below summarizes the general sizes for an American Structures, Inc. bolted stainless steel tank that is approximately 500,000 gallons. Other sizes are also available and included in Attachment 2.

Table 5. 500,000 gallon bolted stainless steel tank sizing

Volume (gal)	Diameter (ft)	Height (ft)
525,201	52.31	32.57
519,597	55.39	28.83
502,022	58.46	25.00
519,316	64.62	21.17

For planning purposes a 52.31-ft diameter tank is assumed. To provide a recommended 12-ft of clear access around each tank, a cleared area of about 76 feet in diameter is required. Sufficient space at Site #1 is available for this clear area, and minor grading would likely be needed to provide a level site for the tank. Site #3 has a cleared area of about 60-ft. Additional clearing, earthwork and grading would be required to provide the recommended clearance around the tank.

Water for each tank would be provided by wells located nearby. As described in Section 2, a water supply well with a capacity of about 60 gpm is located about 700-750 feet from the tank at Site #1, and a water supply well with a capacity of about 30-35 gpm is located at Site #3.

Detailed site plans are not developed in this study, but it is anticipated that each tank site would include the following elements:

- Reinforced concrete foundation
- Tank drain and overflow with air gap discharging to an existing drainage gully or swale with energy dissipation
- 12-ft wide gravel surfacing around each tank sloped away to drain
- Isolation gate valve on outlet pipe



- Flow meter in a vault on outlet pipe
- Chlorination and control building for water quality monitoring, chlorination and flow monitoring.

The water lines leaving the tanks are proposed to be 8-inch nominal diameter. Several fire hydrants are also recommended along the access roads for fire protection. Pressure reducing valves (PRVs) are also needed as the waterline drops in elevation and pressures increase. As described in Technical Memorandum No. 1, a typical system operation pressure range between 60 psi and 100 psi should be maintained. This pressure range was used to estimate the number and approximate location and elevation of PRVs, which are summarized in Table 6.

Table 6. Pressure reducing valve and fire hydrant elevations and settings

PRV No.	Upstream Hydrant No.	Downstream Hydrant No.	Upstream Pressure (psi)	PRV Pressure Setting (psi)	Approximate Elevation (ft-msl)
PRV-1	H-1	H-2	109	60	1,100
PRV-2	H-3	H-4	100	61	1,000
PRV-3	H-5	H-6	98	60	900
PRV-4	H-7	H-8	102	60	800
PRV-5	H-9	H-10	99	40	1,050

The pressure setting on PRV-4, which is located before the connection to the existing City main in Redwood Avenue, should be adjusted to match the existing system pressure as closely as possible. The initial setting of 60 psi on PRV-4 results in a pressure of about 99 psi at the City system connection point.

The 8-inch water lines leaving each of the tanks are proposed to interconnect in the access road at the junction J-1 as shown in Figure 8. From this interconnection to the point of connection to the City distribution system in Redwood Avenue a 12-inch nominal diameter pipe is proposed. The pipe would connect to an existing 6-inch City main. This existing 6-inch main should be replaced with a larger main extending out to primary / larger distribution/transmission mains to provide adequate hydraulic capacity for supplemental fire protection.

6. Preliminary Hydraulic Analysis

Bentley WaterCAD V8i was used to develop a hydraulic model of the water system. The WaterCAD software is capable of simulating a variety of pipe materials, fittings, valves, pumps, reservoirs and tanks. It can also be used to simulate a range of system conditions, including time variable simulations, fire flow analysis and system logic controls. The model uses the Hazen-Williams formula to relate the flow of water in pipes with the physical properties of the pipe and pressure drop caused by friction losses in the pipe, valves and fittings.

A complete skeletonized model was developed for the system. The skeletonized model is shown on Figure 8. The system layout interconnects the two tanks at the location indicated as junction J-1. The water main size between each of the tanks and J-1 is 8-inch nominal diameter, and between J-1 and the connection to the City water system the main is 12-inch nominal diameter. The PRVs are sized to match the size of the mains.

A simple steady state analysis was performed for the system to determine approximate system hydraulic performance, including pipe velocities, system pressures and available fire flow from new hydrants that could be located along pipelines that connect the tanks to the City's distribution system. Material types were specified for each pipe in the model network, and the default C-factors (head loss coefficients) for the pipe and fittings were used. Polyvinyl Chloride (PVC) piping was the assumed pipe material. Other pipe materials are expected to have similar hydraulic performance.

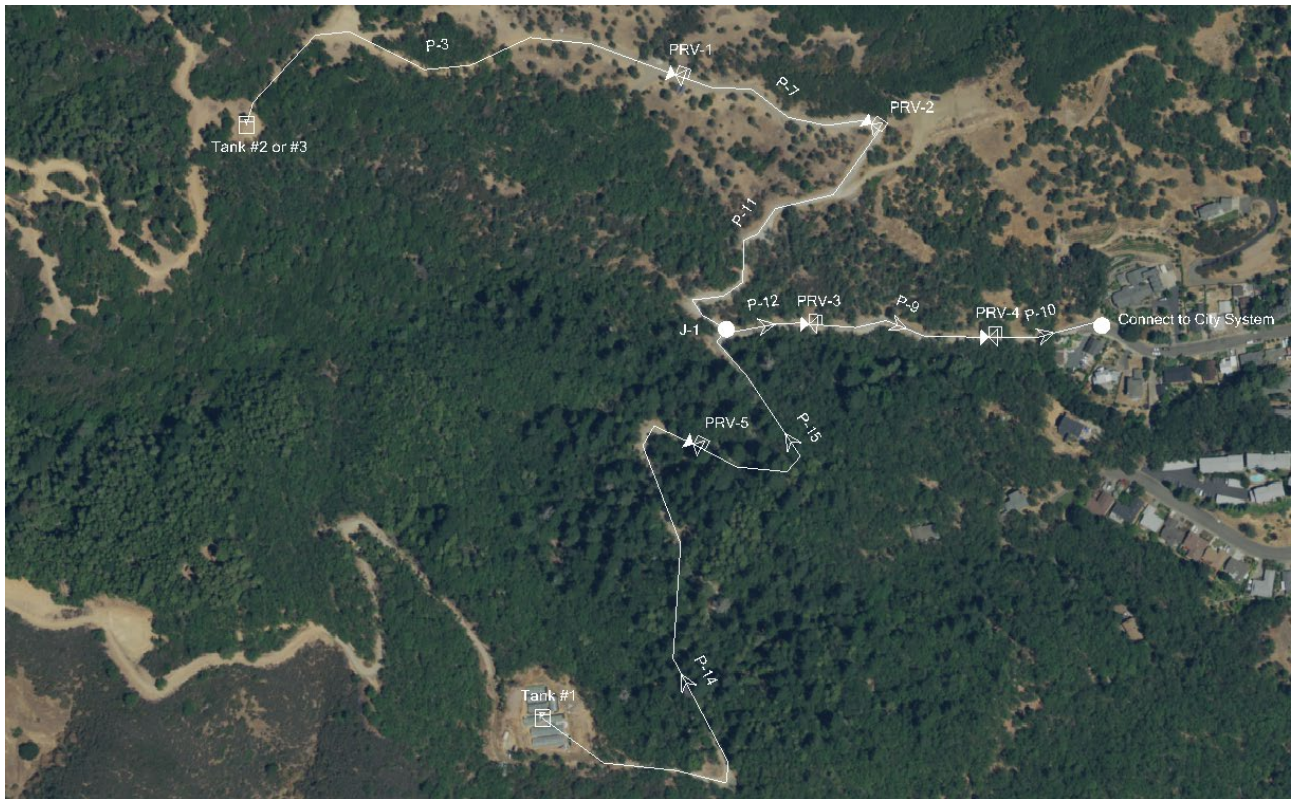


Figure 8. Skeletonized hydraulic model layout

Water demands were not included in the model at this time, as demands are generally expected to be low considering the limited number of proposed residential development sites that would be directly served by the new tanks. System hydraulics were reviewed by specifying a demand of 2,000 gpm at the connection to the City system to simulate a fire flow event. This demand enabled the hydraulic calculations, which was used to confirm water main sizes and establish the approximate locations and pressure settings for PRVs. At a 2,000 gpm flow velocities in the pipelines are between 5 feet per second (ft/s) and 7 ft/s, an acceptable

upper operating range. At velocities above 7 ft/s water becomes turbulent and headloss increases. The hydraulic analysis results for pipes and PRVs are summarized in Attachment 3.

The model was also used to determine the approximate location and number of PRVs required to maintain appropriate system pressures as the elevation decreases. The PRV locations are shown on Figure 8, and were sited to maintain system pressures generally between 60 psi and 100 psi. The PRVs and initial pressure settings are summarized in Table 6.

6.1 Fire Flow Analysis

As part of the evaluation of system hydraulic performance a fire flow analysis was performed. For this study, fire hydrants were located immediately upstream and downstream of each PRV to analyze the available flow on each pipeline segment. Table 6 lists the fire hydrants located upstream and downstream of each PRV. The fire hydrants are also shown on Figure 9. These locations are not the final recommended locations of new fire hydrants but were established primarily to understand the range of fire flow performance that could be expected from the system.

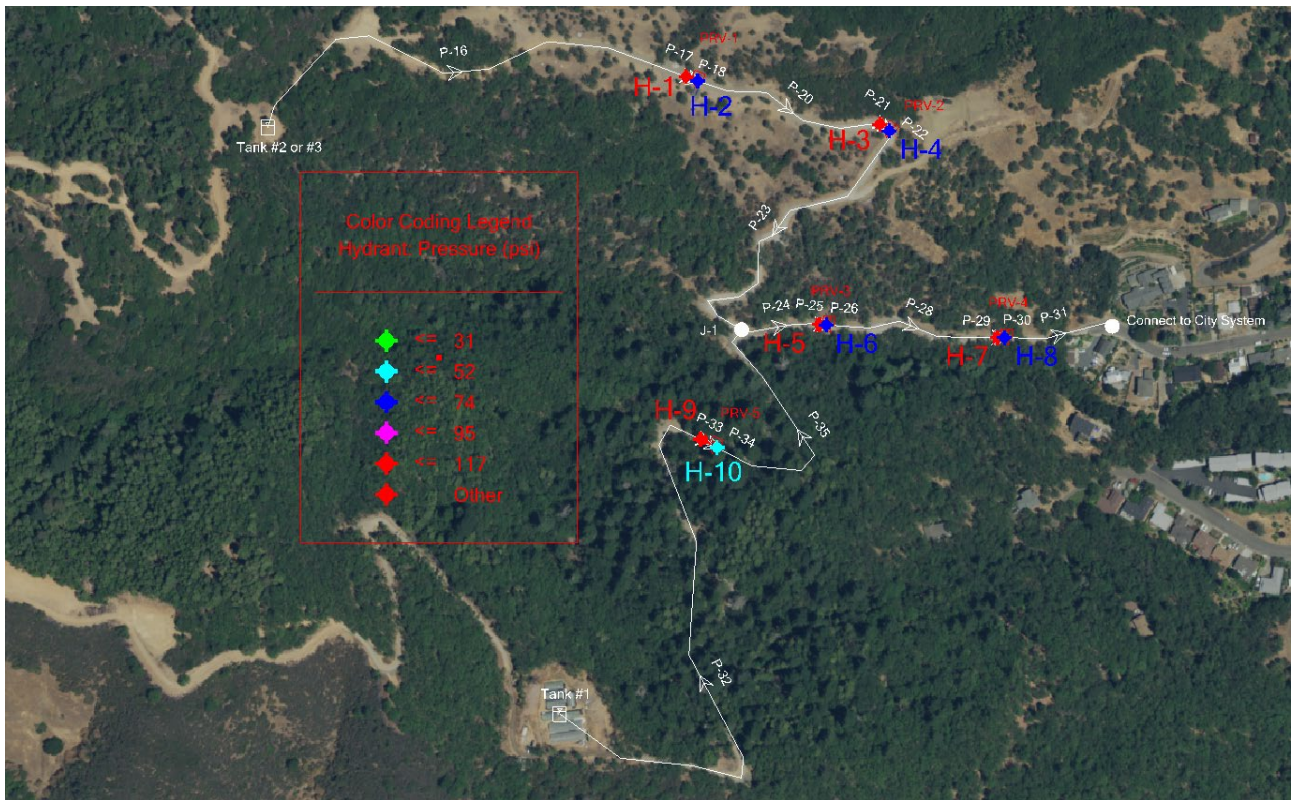


Figure 9. Hydrant locations for fire flow analysis

In general, fire hydrants should be located approximately every 1,000 feet or as required by the fire department, and the final number and locations should be approved by the fire marshal. The results of the



fire flow analysis are depicted graphically in Figure 10 and show that all fire hydrants are capable of supplying a minimum flow of 3,000 gpm with a residual pressure of at least 20 psi.

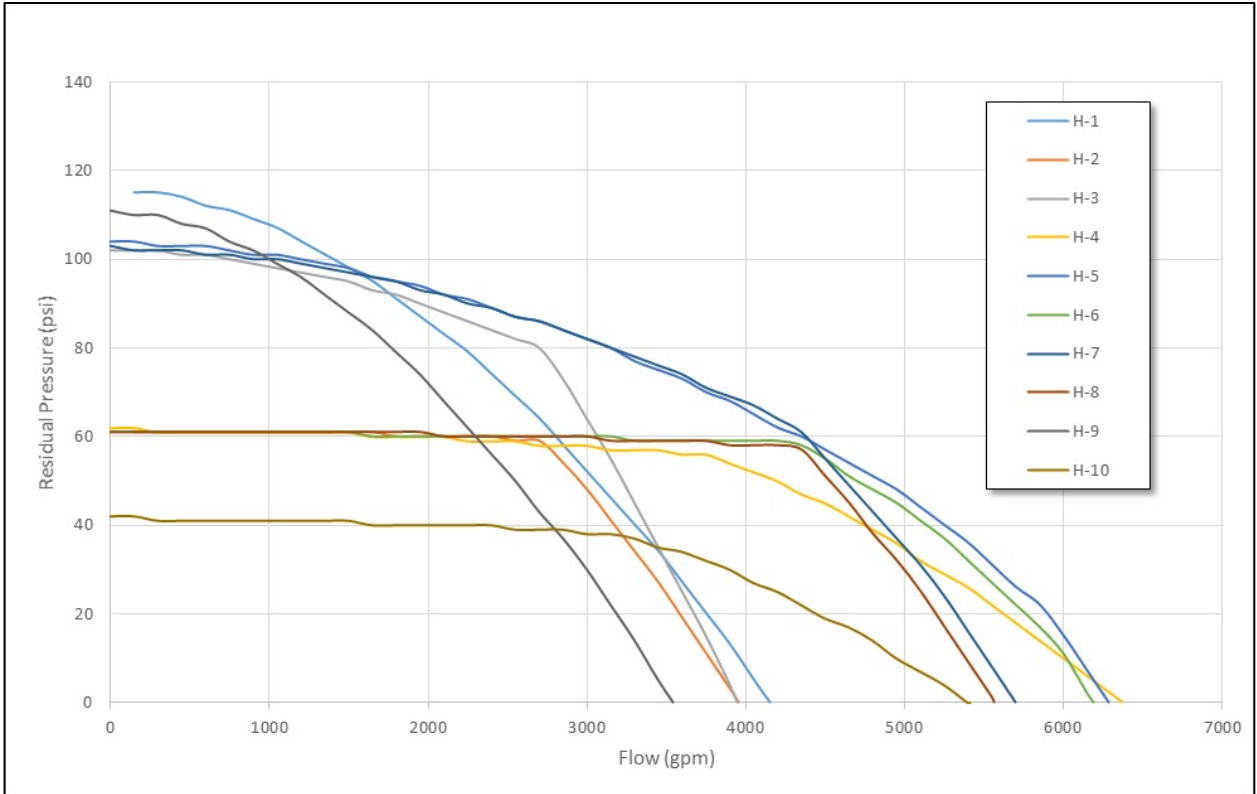


Figure 10. Fire hydrant flow curves

7. Recommended Project

The recommended project described in this section was based on the tank sizing described in Section 3, the tank materials analysis in Section 4, the preliminary system layout describe in Section 5, the preliminary hydraulic analysis described in Section 6 and discussions with the City. These improvements are recommended based on the plan to supply the tanks with water from nearby wells, to meet water demands of proposed residential developments in the area of the tanks, and to provide new storage in the south Ukiah area to meet water demands and enhance fire protection.

The recommended project includes the following components:

- Construct two (2) new 500,000 gallon bolted stainless steel storage tanks, one at Site #1 and one at Site #3. The tank roof would be a geodesic aluminum dome. Tank appurtenances should be stainless steel (Type 316 or Type 304) and include:
 - Side manway
 - Roof hatch (aluminum)



- Roof vent (aluminum)
 - Walkway to center roof vent
 - Exterior ladder, cage, lockout and step-off platform
 - Interior ladder
 - Exterior liquid level indicator
 - 8-inch outlet nozzle
 - 10-inch overflow and weir
 - 10-inch drain
 - Three (3) 1-inch threaded nozzles
- Construct new chlorination and water quality monitoring facilities with radio telemetry and integration with the City's SCADA system at each tank site. Include well pump controls, system flow monitoring and tank level, turbidity, pH and chlorine residual monitoring.
 - Construct new 8-inch and 12-inch water distribution mains from the tank sites connecting to the existing City main in Redwood Avenue.
 - Install five (5) PRVs along new water distribution mains between tanks and point of connection to existing City main in Redwood Avenue.
 - Install 5 to 6 new fire hydrants along the new main spaced at approximately 1,000 feet. The exact number will depend on the location of new residential developments and fire department requirements.

In addition, the City should consider upsizing the existing 6-inch main in Redwood Avenue to 12-inch extending out to the nearest primary distribution/transmission main to provide adequate hydraulic capacity for supplemental fire protection.

7.1 Fire Hydrants

Wet barrel type fire hydrants are recommended, such as a Clow Model 950 or 960, which includes two 2-1/2-inch hose outlets and one 4-1/2-inch pumper outlet. Fire hydrants should be equipped with break-off check valves and include a gate valve on the service for isolation from the main. The final fire hydrant model/type selection and features should be confirmed by the fire department during detailed design.

7.2 Monitoring and Controls

A new wood framed chlorination and control building is recommended at each tank site. The following controls and systems are recommended for existing wells and new water storage tanks:

- Well pump flow
- Water level sensor – ultrasonic level sensors.
- Magnetic flowmeter installed on the outlet pipe
- Chlorine analyzer with sample points on the tank and outlet of the tank for use in monitoring residual chlorine concentration before water enters the distribution system.
- Sodium hypochlorite system in the treatment building.



- Data logger for recording flow rate, tank level, pH and chlorine residual.
- Alarms including chlorine, tank level, low, high and overflow alarms.
- SCADA system with interconnection with SCADA system at City’s WTP.

8. Planning Level Costs

The planning level opinion of probable cost for the recommended project was developed for the proposed improvements described in Section 7. Because this project is currently at the conceptual / planning stage, a Class 4 Opinion of Probable Construction Cost was prepared, which is intended for project definition level of 1% to 15% for a preliminary feasibility study. The anticipated accuracy is from -20% to +30%. This cost estimating system was developed by the Association for Advancement of Cost Engineering International (AACEI) and is in common use in the general construction industry.

The planning level Opinion of Probable Cost is summarized in Table 7 below, and reflects the recommendation of installing two (2) new 500,000 gallon bolted stainless steel tanks and other system components summarized in Section 7. The detailed cost estimate is included as Attachment 4 with a budgetary cost provided by American Structures, Inc. for the bolted stainless steel tank. A 15% markup on the bolted stainless steel tank was applied. All unit prices include contractor overhead, administration and profit. An estimating contingency of 15% was applied to the construction subtotal to account for the conceptual nature of the estimates and account for cost escalation between the time the estimate was prepared and the time of construction, which is assumed to be 2022. This contingency should be reduced as the project is further refined and a detailed design is prepared. A construction contingency of 10% was applied to the construction subtotal + estimating contingency to account for potential change orders that may occur during construction due to unforeseen or changed conditions. Estimates for soft costs are also included, which are topographic survey, geotechnical investigation, engineering design, construction engineering, quality assurance testing, construction management and inspection, and project administration. The planning level Opinion of Probable Cost should be updated with each design submittal with appropriate reduction in the estimating contingency as additional detail is developed.

Table 7. Planning level construction cost summary for recommended project

	ITEM	COST
Construction Cost	Construction Subtotal	\$ 2,630,434
	Estimating Contingency (15%)	\$ 394,566
	<i>Subtotal</i>	<i>\$ 3,025,000</i>
	Construction Contingency (10%)	\$ 302,500
	Subtotal (Construction Cost)	\$ 3,327,500
Soft Costs	Survey, Geotechnical Investigation and Engineering (10%)	\$ 332,750
	Construction Engineering and Testing (1.5%)	\$ 49,913
	Construction Management & Inspection (12%)	\$ 399,300
	Project Administration (1.5%)	\$ 49,913
	Subtotal (Soft Costs)	\$ 831,876
	PROJECT TOTAL	\$ 4,159,376



For construction in California, experience shows the following general results for competitively bid projects, as a differential relative to pre-bid cost estimates:

Number of Bids	Percentage Differential
1	+25 to 100%
2-3	+10 to 25%
4-5	0 to +10%
6-7	0 to -10%
8 or more	-10 to -20%

Accordingly, it is important to ensure that a minimum of four to five valid bids are received, if possible. Since neither the City of Ukiah nor its consultants have control over the market conditions at the time of bid, there is no guarantee that bids will not vary significantly from the estimate, especially if there is not adequate competition among the available contractors.

Prepared by:

Matthew G. Kennedy, PE



Attachments:

1. Tank Site #2A, #2 and #3 Photographs
2. American Structures, Inc. Bolted Stainless Steel Tank Brochures
3. Water System Hydraulic Analysis Results
4. Planning Level Opinion of Probable Cost for Recommended Project



Attachment 1

Tank Site #2A, #2 and #3 Photographs



Photo 1. Tank Site #2A (upper)



Photo 2. Tank Site #2 (middle)



Photo 3. Tank Site #3 (lower)



Photo 4. Tank Site #3 well



Attachment 2

American Structures, Inc. Bolted Stainless Steel Tank Brochures

Stainless Steel is NSF Approved

Sustainable

Environmentally Friendly

Maintenance Free

Expandable

Stainless Steel does not corrode like other materials



Long Lasting

Moveable

No coating required

ANSI/ NSF 61

Stainless Steel is 100% Recyclable

Rust Free and Stain Resistant

Versatile for liquid or dry storage

Bolted Stainless Steel Tanks are Versatile

Bolted stainless steel storage tanks have been around for many years and are fast becoming the most viable solution to storage needs. Welded stainless tanks have been around for many, many years, primarily in the milk and food processing industry. Bolted stainless steel tanks are generally made of 304, 304L, 316, or 316L stainless, and in some applications 317 or duplex stainless is used. These tanks meet the ASTM, AWWA, as applicable, and API specifications as necessary.

Bolted stainless tanks are environmentally neutral as they are not shiny but a dull grey, which is very attractive in most settings. The stainless material comes in plates and sheets which may differ a little in color at first but within a couple of months the unpolished stainless passivates and becomes a dull grey.

Bolted, stainless steel tanks may cost a little more than the painted mild steel or factory-coated tanks, but have a very positive impact on the environment through the area of expandability and are nearly maintenance free (no need for sandblasting, painting, cleanup or concerns about contamination due to surface failures). Most bolted stainless tanks are designed to expand their size for a nominal fee by adding plates to the bottom and making the unit taller. Another area, and probably the most important to everyone, is the residual value, if the tank is no longer needed. Unlike the factory-coated, field-coated or concrete tanks, stainless has a high residual value in the recycling chain because it does not lose value and requires little, if any, intervention from federal or local agencies for cleanup.

Bolted stainless tanks are very easy to relocate or ship new via common carrier because they are shipped on pallets with hardware boxed separately. The tanks are accepted universally and are growing in popularity. They are very popular in water treatment from pre-treatment to potable water storage. These water tanks can be used in conjunction with composite water towers, reservoirs, standpipes or pretreatment tanks. They are also used in stormwater storage and management and waste treatment plants. Bolted stainless tanks are becoming very popular in the groundwater cleanup area, from collecting leachate from landfills to industrial site groundwater remediations.

They are used extensively in wastewater plants because of their durability in storage, processing and clarifying of the harsh products and vary in size from very small to very large. Examples of types of tanks are sludge storage, clarifiers, waste treatment, digester tanks, bio towers (trickling filter tanks) and more. They are and have been used for odor control, air pollution control and for their environmental appearances. These tanks have also been designed and used for methane generators.

Advantages of Bolted Stainless Steel Tanks

Advantages of Bolted Stainless Steel

Bolted stainless steel tanks have many unique qualities that make them an efficient and pragmatic choice for liquid and dry storage solutions.

- Bolted, stainless steel tanks provide lasting service without common corrosion problems, as the unique metallurgical properties of the metal provides a surface that heals itself.
- American Structures, Inc. commonly uses 304 and 316 austenitic stainless steel grades.
- 316 stainless steel has greater corrosion resistance in chloride-containing media and is usually preferred for long term service in aggressive industrial, chemical and seacoast atmospheres.
- Stainless steel is NSF approved
- Bolted, stainless steel tanks are cost effective to expand or move.
- Bolted, stainless steel tanks are 100% recyclable should the need for the tank no longer exist.
- Bolted, stainless steel tanks are virtually maintenance free. In the 40 plus years we have been in business we never had a tank failure.

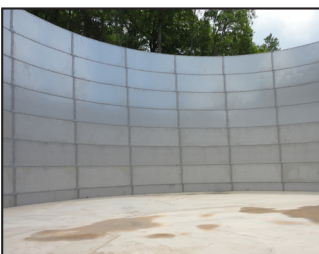
American Structures, Inc., Bolted Stainless Steel Tank Standard Materials

Our foundations, tanks and appurtenances meet or exceed most Water Storage Tank Standards.

- **Foundation:** Concrete footing and foundation with 4,000 psi mix and 60 ksi re-bar as to ACI Standards.
- **Tank Floor:** 4,000 psi mix and 60 ksi re-bar concrete floor *or* bolted, stainless steel floor of 304 stainless steel

Tank Materials

- **Side Sheets:**
Potable water tanks are typically 304, 316, or 201 stainless steel sheet steel. All sheet and plate thicknesses meet or exceed most standards for tank design. All sheet thicknesses are determined by tank size, location and specifications as per design needs.
- **Nuts, Bolts & Washers:** Stainless steel
- **Nozzles & Manways:** 150# flanged nozzles of stainless steel or hot dipped galvanized steel
- **Ladder, Cage, Lock Out and Step Off Platform:** Hot dipped galvanized steel, aluminum or stainless steel as required per design or to meet OSHA specifications.
- **Roofs, Vents and Hatches:** 304, 316, or 201 stainless steel or aluminum
- **Option:** Aluminum geodesic dome
- **Web Trusses:** Hot dipped galvanized steel or stainless steel
- **Tank & Appurtenances:** American Structures, Inc. tanks are designed and built to meet the specific requirements of each customer's storage needs
- **Sealant:** SIKA 1A meets ANSI/NSF 61 certification.



Reservoir Water Tanks

American Structures, Inc.

Bolted Stainless Steel Tanks
715-235-4225
ameristruc.com

Potable Water Storage Tanks

- Reservoirs
- Standpipes
- Clearwells
- Insulated Reservoir Tanks

These are examples of tanks that provide potable water storage options for a variety of containment applications in which the water stored can be consumed by humans, without concern for adverse health effects.



Location: Cape Girardeau, MO
Tank: Reservoir Water Tank
Size: 61.54' x 49.33'
Capacity: 1 Million Gallons
Customer: City of Cape Girardeau, Missouri
Floor: Concrete
Roof: Aluminum Geodesic Dome



Location: Dickinson, ND
Tank: Insulated Reservoir Water Tank
Size: 18.46' x 25'
Capacity: 50,101 Gallons
Customer: Target
Floor: Bolted Stainless Steel
Roof: 21.5° Knuckle Style Stainless Steel



Location: Watford, ND
Tank: Insulated Reservoir Water Tank
Size: 24.62' x 28.83'
Capacity: 68,150 Gallons
Customer: City of Watford, ND
Floor: Concrete
Roof: 21.5° Knuckle Style Stainless Steel



Location: Tioga, ND
Tank: Insulated Reservoir Water Tank
Size: 18.46' x 25'
Capacity: 50,100 Gallons
Customer: Tradesmen Construction
Floor: Bolted Stainless Steel
Roof: 21.5° Knuckle Style Stainless Steel



Location: Mansfield, PA
Tank: Reservoir Water Tank
Size: 67.69' x 37'
Capacity: 1 Million Gallons
Customer: University of PA Mansfield
Floor: Concrete Floor
Roof: Aluminum Geodesic Dome



Location: Owanka, SD
Tank: Reservoir Water Tank
Size: 24.63' x 28.83'
Capacity: 103,309 Gallons
Customer: City of Owanka, SD
Floor: Concrete
Roof: 21.5° Knuckle Style Stainless Steel



Location: Cassville, MO
Tank: Reservoir Water Tank
Size: 55.93' x 28.83'
Capacity: 519,597 Gallons
Customer: George's Foods
Floor: Concrete
Roof: Aluminum Geodesic Dome



Location: Spalding, NE
Tank: Reservoir Water Tank
Size: 30.77' x 17'
Capacity: 96,470 Gallons
Customer: City of Spalding, NE
Floor: Concrete
Roof: 21.5° Knuckle Style Stainless Steel

Reservoir Water Tanks



Location: Fairfield, ND
 Tank: Reservoir Water Tank
 Size: 43.07' x 21.17'
 Capacity: 60,000 Gallons
 Customer: ESCO
 Floor: Bolted
 Stainless Steel
 Roof: Aluminum
 Geodesic Dome



Location: Hyden, KY
 Tank: Reservoir Water Tank
 Size: 12.31' x 51.83'
 Capacity: 46,137 Gallons
 Customer: Hyden-Leslie County
 Water District
 Floor: Concrete
 Roof: 21.5° Knuckle Style
 Stainless Steel



Location: Prior Lake, MN
 Tank: (2) Reservoir Water Tanks
 Size: 3'6" x 7'
 Capacity: 500 Gallons
 Customer: SMSC Water
 Reclamation
 Floor: Welded Stainless Steel
 Roof: Welded Stainless Steel



Location: Kever Buttes, ND
 Tank: Reservoir Water Tank
 Size: 30.77' x 61.4'
 Capacity: 331,000 Gallons
 Customer: SCRWD Standpipe
 Floor: Bolted Stainless Steel
 Roof: 21.5° Knuckle Style
 Stainless Steel



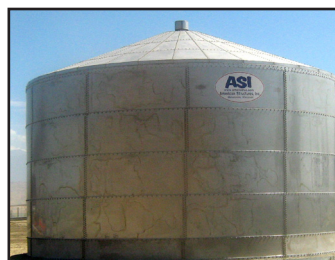
Location: Columbus
 Junction, IA
 Tank: Reservoir Water Tank
 Size: 27.69' x 28.83'
 Capacity: 129,577 Gallons
 Customer: Tyson Foods
 Floor: Bolted Stainless
 Steel
 Roof: 1:12 Pitch,
 Bolted Stainless
 Steel



Location: Village Mills, TX
 Tank: Reservoir Water Tank
 Size: 24.62' x 17.33'
 Capacity: 62,100 Gallons
 Customer: Wildwood
 Property Owners
 Floor: Bolted Stainless Steel
 Roof: 1:12 Pitch, Bolted
 Stainless Steel



Location: Wanblee, SD
 Tank: Reservoir Water Tank
 Size: 15.38' x 60'
 Capacity: 87,200 Gallons
 Customer: Oglala Sioux Nation
 Floor: Concrete
 Roof: 21.5° Knuckle Style
 Stainless Steel



Location: San Marcos, CA
 Tank: Reservoir Water Tank
 Size: 33.85' x 17.33'
 Capacity: 116,000 Gallons
 Customer: Hollandia Dairy
 Floor: Bolted Stainless Steel
 Roof: 21.5° Knuckle Style
 Stainless Steel

Reservoir Water Tanks



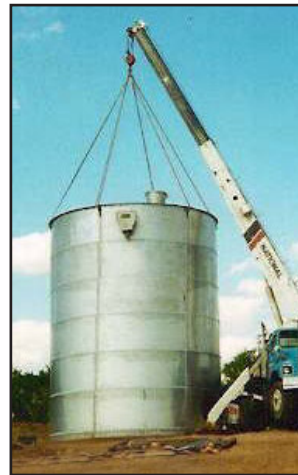
Location: Fort Collins, CO
Tank: Reservoir Water Tank
Size: 15.38' x 36.6'
Capacity: 51,000 Gallons
Customer: New Belgium Brewery
Floor: Bolted Stainless Steel
Roof: 1:12 Pitch, Bolted Stainless Steel



Location: Everson, WA
Tank: Reservoir Water Tank
Size: 15.38' x 90'
Capacity: 125,400 Gallons
Customer: Nooksack Indian Housing
Floor: Concrete



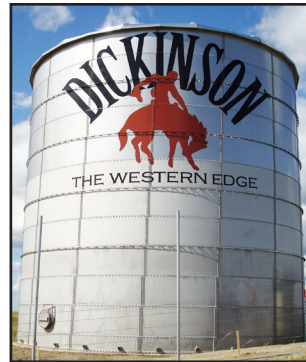
Location: Wakpala, SD
Tank: Reservoir Water Tank
Size: 30.77' x 58.5'
Capacity: 330,939 Gallons
Customer: Standing Rock Reservation
Floor: Bolted Stainless Steel
Roof: 21.5° Knuckle Style Stainless Steel



Location: Almont, ND
Tank: Reservoir Water Tank
Size: 18.46' x 23.5'
Capacity: 47,047 Gallons
Customer: City of Almont, ND
Floor: Bolted Stainless Steel
Roof: 1:12 Pitch, Bolted Stainless Steel



Location: Galesville, WI
Tank: Reservoir Water Tank
Size: 37.8' x 5'
Capacity: 8,500 Gallons
Customer: Rolling Dice
Floor: Concrete
Roof: Aluminum Geodesic Dome



Location: Dickinson, ND
Tank: Reservoir Water Tank
Size: 46.17' x 44'
Capacity: 525,000 Gallons
Customer: City of Dickinson, ND
Floor: Bolted Stainless Steel
Roof: Aluminum Geodesic Dome



Location: Bakersfield, CA
Tank: Reservoir Water Tank
Size: 21.54' x 28.83' and 24.62' x 32.66'
Capacity: 78,590 and 117,033 Gallons
Customer: Borba Farm
Floor: Bolted Stainless Steel
Roof: 1:12 Pitch, Bolted Stainless Steel



Location: Rapid City, SD
Tank: Reservoir Water Tank
Size: 15.38' x 32.8'
Capacity: 45,634 Gallons
Customer: Rolling Dice
Floor: Bolted Stainless Steel
Roof: 1:12 Pitch, Bolted Stainless Steel

Tank Sizes

Diameter	Gal./Ft.	C - In.	C - Ft.
6.15	222.2	232	19'-4"
9.23	500.6	348	29'
12.31	890.1	464	38'-8"
15.38	1,390	580	48'-4"
18.46	2,002	696	58'
21.54	2,726	812	67'-8"
24.62	3,583	928	77'-4"
27.69	4,494	1,044	87'
30.77	5,562	1,160	96'-8'
33.85	6,731	1,276	106'-4"
36.92	8,008	1,392	116'
40.0	9,399	1,508	125'-8"
43.07	10,898	1,624	135'-4"
46.15	12,513	1,740	145'
49.23	14,238	1,856	154'-8"
52.31	16,075	1,972	164'-4"
55.39	18,027	2,088	174'
58.46	20,078	2,204	183'-8"
61.53	22,242	2,320	194'-4"
64.61	24,524	2,436	203'
67.69	26,918	2,552	211'-8"
70.77	29,423	2,668	223'-4"
73.85	32,040	2,784	232'
76.92	34,760	2,900	241'-8"
80.0	37,599	3,016	251'-4"
83.07	40,540	3,132	261'
86.16	43,612	3,248	270'-8"
89.23	46,775	3,364	280'-4"
92.31	50,060	3,480	290'
95.39	53,445	3,590	299'-8"
98.46	56,953	3,712	309'-4"
101.54	60,572	3,828	319'
110.77	72,088	4,176	347'-8"
120.0	84,597	4,524	377'
129.23	98,118	4,872	406'
150.77	133,543	5,684	473'-8"
203.08	424,301	7,656	203'
209.23	257,182	7,888	657'-4"

Tank Volume Worksheet

TANK DIAMETER IN	TANK HEIGHT IN FEET									
	5.83	9.67	13.5	17.33	21.17	25	28.83	32.57	36.5	40.33
12.31	5,190	8,609	12,018	15,428	18,846	22,256	25,666	29,084	32,494	35,903
15.39	15,329	13,450	18,777	24,104	29,446	34,773	40,100	45,441	50,768	56,095
18.46	11,676	19,367	27,038	34,709	42,400	50,071	57,741	65,432	73,103	80,774
21.54	15,892	26,360	36,801	47,241	57,709	68,149	78,590	89,058	99,498	109,939
24.62	20,757	34,429	48,065	61,701	75,373	89,010	102,646	116,318	129,954	143,590
27.69	26,270	43,573	60,831	78,089	95,393	112,651	129,909	147,212	164,470	181,728
30.77	32,432	53,793	75,099	96,405	117,767	139,073	160,379	181,740	203,046	224,352
33.85	39,242	65,089	90,869	116,649	142,496	168,276	194,056	219,903	245,683	271,463
36.93	46,701	77,461	108,141	138,821	169,581	200,260	230,940	261,700	292,380	323,060
40.00	54,808	90,908	126,914	162,920	199,020	235,026	271,032	307,132	343,138	379,144
43.08	63,564	105,431	147,189	188,947	230,814	272,572	314,331	356,198	397,956	439,714
46.16	72,968	121,030	168,966	216,902	264,964	312,900	360,836	408,898	456,834	504,770
49.23	83,021	137,704	192,245	246,785	301,468	356,009	410,549	465,323	519,773	574,313
52.31	93,723	155,454	217,025	278,596	340,328	401,899	463,470	525,201	586,772	648,343
55.39	105,073	174,280	243,308	312,335	381,542	450,570	519,597	588,804	657,832	726,859
58.46	117,071	194,182	271,092	348,001	425,112	502,022	578,931	656,042	732,952	809,861
61.54	129,719	215,159	300,378	385,596	471,036	556,255	641,473	726,914	812,132	897,350
64.62	143,014	237,212	331,165	425,118	519,316	613,269	707,222	801,420	895,373	989,325
67.70	156,959	260,341	363,455	466,568	569,951	673,064	776,178	879,560	982,674	1,085,787
70.77	171,551	284,546	397,246	509,946	622,940	735,641	848,341	961,335	1,074,035	1,186,735
73.85	186,793	309,826	432,539	555,252	678,285	800,998	923,711	1,046,744	1,169,457	1,292,170
76.93	202,683	336,182	469,334	602,485	735,985	869,137	1,002,288	1,135,788	1,268,939	1,402,091
80.00	219,221	363,614	507,630	651,647	796,040	940,056	1,084,073	1,228,465	1,372,482	1,516,499
83.08	236,408	392,121	547,429	702,736	858,449	1,013,757	1,169,065	1,324,778	1,480,085	1,635,393
86.16	254,244	421,704	588,729	755,754	923,214	1,090,239	1,257,263	1,424,724	1,591,749	1,758,773
89.23	272,728	452,363	631,531	810,699	990,334	1,169,502	1,348,669	1,528,305	1,707,473	1,886,640
92.31	291,860	484,098	675,835	867,572	1,059,809	1,251,546	1,443,283	1,635,520	1,827,257	2,018,994
95.39	311,642	516,908	721,640	926,372	1,131,639	1,336,371	1,541,103	1,746,369	1,951,101	2,155,833
98.47	332,071	550,794	768,948	987,101	1,205,824	1,423,977	1,642,130	1,860,853	2,079,006	2,297,160
101.54	353,150	585,756	817,757	1,049,757	1,282,364	1,514,364	1,746,365	1,978,971	2,210,972	2,442,973
104.62	374,877	621,794	868,068	1,114,342	1,361,259	1,607,533	1,853,807	2,100,724	2,346,998	2,593,272

Tank Volume Worksheet (Continued)

TANK DIAMETER IN	TANK HEIGHT IN FEET									
	5.83	9.67	13.5	17.33	21.17	25	28.83	32.57	36.5	40.33
107.70	397,252	919,880	658,907	1,180,854	1,442,509	1,703,482	1,964,456	2,226,100	2,487,084	2,748,057
110.77	420,276	697,096	973,195	1,249,294	1,526,114	1,802,213	2,078,312	2,355,132	2,631,231	2,907,330
113.85	443,949	736,361	1,028,011	1,319,662	1,612,074	1,903,724	2,195,375	2,487,787	2,779,438	3,071,088
116.93	468,270	776,701	1,084,329	1,391,957	1,700,389	2,008,017	2,315,645	2,624,077	2,931,705	3,239,333
120.00	493,239	818,117	1,142,1149	1,466,181	1,791,059	2,115,091	2,439,123	2,764,001	3,088,033	3,412,065
123.08	518,857	860,609	1,201,471	1,542,332	1,884,084	2,224,946	2,565,808	2,907,559	3,248,421	3,589,283
126.16	545,124	904,177	1,262,294	1,620,412	1,979,464	2,337,582	2,695,699	3,054,752	3,412,870	3,770,987
129.24	572,039	948,820	1,324,619	1,700,419	2,077,200	2,452,999	2,828,798	3,205,579	3,581,379	3,957,178
132.31	599,603	994,539	1,388,446	1,782,354	2,177,290	2,571,197	2,965,105	3,360,040	3,753,948	4,147,855
135.39	627,816	1,041,334	1,453,775	1,866,279	2,279,735	2,692,176	3,104,618	3,518,136	3,990,578	4,343,019
138.47	656,676	1,089,204	1,520,606	1,952,007	2,384,535	2,815,937	3,247,338	3,679,866	4,111,268	4,542,669
141.54	686,186	1,138,151	1,588,938	2,039,726	2,491,691	2,942,478	3,393,266	3,845,231	4,296,018	4,746,806
144.62	716,344	1,188,173	1,658,772	2,129,372	2,601,201	3,071,801	3,542,401	4,014,229	4,484,829	4,955,429
147.70	747,151	1,239,270	1,730,108	2,220,947	2,713,066	3,203,905	3,694,743	4,186,862	4,677,701	5,168,539
150.77	778,606	1,291,444	1,802,946	2,314,449	2,827,287	3,338,789	3,805,292	4,363,130	4,874,632	5,386,135
153.85	810,709	1,344,693	1,877,286	2,409,879	2,943,862	3,476,455	4,009,048	4,543,032	5,075,624	5,608,217
156.93	843,462	1,399,018	1,953,127	2,507,237	3,062,793	3,616,902	4,171,011	4,711,011	5,280,677	5,834,786
160.01	876,862	1,454,418	2,030,470	2,606,522	3,184,078	3,760,130	4,336,182	4,913,738	5,489,790	6,065,842
163.08	910,912	1,510,895	2,109,315	2,707,736	3,307,719	3,905,139	4,504,560	5,104,543	5,702,963	6,301,384
166.16	945,610	1,568,447	2,189,662	2,810,877	3,433,714	4,054,929	4,676,145	5,298,982	5,920,197	6,541,412
169.24	980,956	1,627,074	2,271,510	2,915,946	3,562,065	4,206,501	4,850,937	5,497,055	6,141,491	6,785,927
172.31	1,016,951	1,686,778	2,354,861	3,022,943	3,692,770	4,360,853	5,028,936	5,698,763	6,366,845	7,034,928
175.39	1,053,594	1,747,557	2,439,713	3,131,868	3,825,831	4,517,987	5,210,142	5,904,105	6,596,260	7,288,416
178.47	1,090,887	1,809,412	2,526,067	3,242,721	3,961,747	4,677,901	5,394,556	6,113,081	6,829,736	7,546,390
181.54	1,128,827	1,872,343	2,613,922	3,355,502	4,099,017	4,840,597	5,582,176	6,325,692	7,067,271	7,808,851
184.62	1,167,416	1,936,349	2,703,280	3,470,210	4,239,143	5,006,074	5,773,004	6,541,937	7,308,867	8,075,798
187.70	1,206,654	2,001,431	2,794,139	3,586,846	4,381,624	5,174,331	5,967,039	6,761,816	7,554,524	8,347,231
190.78	1,246,540	2,067,589	2,886,500	3,705,411	4,526,460	5,345,370	6,164,281	6,985,330	7,804,241	8,623,151
193.85	1,287,075	2,134,823	2,980,363	3,825,903	4,673,650	5,519,190	6,364,730	7,212,478	8,058,018	8,903,558
196.93	1,328,259	2,203,132	3,075,727	3,948,323	4,823,196	5,695,791	6,568,387	7,443,260	8,315,855	9,188,451
200.01	1,370,090	2,272,517	3,172,594	4,072,670	4,975,097	5,875,174	6,775,250	7,677,677	8,577,753	9,477,830



Attachment 3
Water System Hydraulic Analysis Results



Table 1. Summary of hydraulic model pipes and analysis results at a system flow of 2,000 gpm

Label	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Minor Loss Coefficient (Derived)	Length (User Defined) (ft)	Flow (gpm)	Velocity (ft/s)
P-16	Tank #2 or #3	H-1	8	PVC	150	1.64	1275	918	5.86
P-17	H-1	PRV-1	8	PVC	150	1.64	15	918	5.86
P-18	PRV-1	H-2	8	PVC	150	0.75	16	918	5.86
P-20	H-2	H-3	8	PVC	150	0.75	489	918	5.86
P-21	H-3	PRV-2	8	PVC	150	0.75	14	918	5.86
P-22	PRV-2	H-4	8	PVC	150	2.09	14	918	5.86
P-23	H-4	J-1	8	PVC	150	2.09	801	918	5.86
P-24	J-1	H-5	12	PVC	150	0.05	216	2000	5.67
P-25	H-5	PRV-3	12	PVC	150	0.05	9	2000	5.67
P-26	PRV-3	H-6	12	PVC	150	0.30	8	2000	5.67
P-28	H-6	H-7	12	PVC	150	0.30	400	2000	5.67
P-29	H-7	PRV-4	12	PVC	150	0.30	7	2000	5.67
P-30	PRV-4	H-8	12	PVC	150	0.50	11	2000	5.67
P-31	H-8	Connect to City System	12	PVC	150	0.50	324	2000	5.67
P-32	Tank #1	H-9	8	PVC	150	1.96	1649	1082	6.90
P-33	H-9	PRV-5	8	PVC	150	1.96	26	1082	6.90
P-34	PRV-5	H-10	8	PVC	150	1.24	24	1082	6.90
P-35	H-10	J-1	8	PVC	150	1.24	691	1082	6.90



Table 2. Summary of hydraulic model PRVs and analysis results at a system flow of 2,000 gpm

Label	Elevation (ft)	Diameter (Valve) (in)	Pressure Setting (Initial) (psi)	Pressure (From) (psi)	Pressure (To) (psi)
PRV-1	1100	8	60	109	60
PRV-2	1000	8	61	100	61
PRV-3	900	12	60	98	60
PRV-4	800	12	60	102	60
PRV-5	1050	8	40	99	40



Attachment 4

Planning Level Opinion of Probable Cost for Recommended Project



City of Ukiah
 South Ukiah Water Storage Tank Project
 Engineer's Opinion of Probable Cost
 10-Dec-20

ENR CCI (DECEMBER 4, 2020)

11625.95

No.	Description	Quantity	Unit	Unit Price	Total
1	Mobilization and Demobilization (5% of Construction Subtotal)	1	LS	\$ 152,000.00	\$ 152,000
2	SWPPP Implementation (1% of Construction Subtotal)	1	LS	\$ 30,000.00	\$ 30,000
3	Traffic Control (1% of Construction Subtotal)	1	LS	\$ 30,000.00	\$ 30,000
4	Trench Sheet piling, Shoring and Bracing (Water, 3% of W Pipe)	1	LS	\$ 27,500.00	\$ 27,500
5	Tank #1 Site Clearing/Grubbing	1	LS	\$ 2,000.00	\$ 2,000
6	Tank #3 Site Clearing/Grubbing	1	LS	\$ 2,500.00	\$ 2,500
7	Tank #1 Site Earthwork	2,000	CY	\$ 60.00	\$ 120,000
8	Tank #3 Site Earthwork	1,000	CY	\$ 60.00	\$ 60,000
9	500k Gal Bolted Stainless Steel Tank and Foundation (includes 15% markup)	2	EA	\$ 466,966.70	\$ 933,933
10	Tank Site Gravel Surfacing	300	SY	\$ 40.00	\$ 12,000
11	Tank 8-Inch Ductile Iron Yard Piping (AWWA C151)	50	LF	\$ 160.00	\$ 8,000
12	Tank 8-Inch Gate Valve	2	EA	\$ 5,000.00	\$ 10,000
13	Tank 8-Inch Magnetic Flow Meter	2	EA	\$ 17,000.00	\$ 34,000
14	Tank 10-Inch Overflow/Drain Vault, Piping & Outfall	2	EA	\$ 15,000.00	\$ 30,000
15	Tank Site #1 Chlorination & Control Building (Wood Frame)	1	LS	\$ 80,000.00	\$ 80,000
16	Tank Site #3 Chlorination & Control Building (Wood Frame)	1	LS	\$ 80,000.00	\$ 80,000
17	Tank Site #1 Electrical/Instrumentation & SCADA	1	LS	\$ 50,000.00	\$ 50,000
18	Tank Site #3 Electrical/Instrumentation & SCADA	1	LS	\$ 50,000.00	\$ 50,000
19	8-Inch Water Main (Unimproved Surface Restoration)	5,014	LF	\$ 125.00	\$ 626,750
20	12-Inch Water Main (Unimproved Surface Restoration)	800	LF	\$ 140.00	\$ 112,000
21	12-Inch Water Main (AC Pavement Surface Restoration)	175	LF	\$ 170.00	\$ 29,750
22	8-Inch Gate Valve	6	EA	\$ 4,000.00	\$ 24,000
23	12-Inch Gate Valve	4	EA	\$ 5,500.00	\$ 22,000
24	8-Inch PRV in Vault	3	EA	\$ 10,000.00	\$ 30,000
25	12-Inch PRV in Vault	2	EA	\$ 15,000.00	\$ 30,000
26	Fire Hydrant	6	EA	\$ 7,000.00	\$ 42,000
27	Connect to Existing City Main (Redwood Avenue)	1	LS	\$ 2,000.00	\$ 2,000
SUBTOTAL					\$ 2,630,434
Estimating Contingency (15%)					\$ 394,566
SUBTOTAL					\$ 3,025,000
Construction Contingency (10%)					\$ 302,500
CONSTRUCTION SUBTOTAL					\$ 3,327,500
Survey, Geotechnical Investigation and Design (10%)					\$ 332,750
Construction Engineering and Testing (1.5%)					\$ 49,913
Construction Management & Inspection (12%)					\$ 399,300
Project Administration (1.5%)					\$ 49,913
CONSTRUCTION SUPPORT SUBTOTAL					\$ 831,876
PROJECT TOTAL COST ESTIMATE					\$ 4,159,376

Quote # 120820-0771

December 8, 2020

Matt Kennedy, P.E.
P.O. Box 7967
Santa Rosa, CA 95407
Cell: 707-540-3376

GHD
2235 Mercury Way, Suite 150
Phone: 707-540-9687
Email: matt.kennedy@ghd.com

RE: Budgetary Quote for Two Storage Tanks in Ukiah, CA

Dear Mr. Kennedy:

Thank you for the opportunity to provide you with a budgetary quote for the subject project. Based on your specifications, we have calculated the following tanks to meet your needs:

Two (2), 52.31' diameter x 32.67' high tank of 316-stainless steel, with a working capacity of 501,000 gallons at a liquid depth of 31.17 feet, an aluminum dome roof, an embedded starter ring, and the following appurtenances:

- (1)-32" Stainless steel side manway
- (1)-Aluminum dome roof
- (1)-Aluminum roof vent
- (1)-Aluminum roof hatch
- (1)-Hot-Dipped Galvanized (HDG) ladder, cage, lockout, and step-off platform
- (1)-Full travel liquid level indicator
- (1)-10" Stainless steel SCH 10 overflow pipe
- (1)-Stainless steel weir
- (1)-Set of stainless steel pipe support brackets
- (3)-1" Stainless steel, single, 150# flanged nozzles
- (1)-2" Stainless steel, single, 150# flanged nozzle
- (1)-4" Stainless steel, single, 150# flanged nozzle
- (3)-10" Stainless steel, single, 150# flanged nozzles
- (1)-American Structures, Inc. Tank Logo
- P.E. Stamp for the State of California
- Freight to the job site is included




Bolted Stainless Steel Tanks

Phone: 715-235-4225
Fax: 715-235-6212

Quote # 120820-0771

- Labor to build the tank is included
- Labor to set the starter ring is included
- Hydro test is included (owner to supply and dispose of the water)
- Foundation design is included (2,500 psf soil bearing capacity will be assumed unless a Geotech report is provided)
- Includes a five-year warranty on the tank and appurtenances, only manufactured by American Structures, Inc.
- Quote is based on a prevailing wage

We propose to supply, deliver, and erect the above-described tanks and appurtenances, for a total of **\$406,058.00 for each tank and \$812,116.00 for both tanks.**

Note: This quote is valid for 30 days following the date of this quote.

EXCLUSIONS TO THIS QUOTE: site work, excavation, backfill, process piping, electrical, concrete, concrete labor, state and local taxes, permits, and off-loading.

Our Payment Terms: 40% due with the purchase order
 30% due upon delivery of the tank
 30% due upon completion of the tank
 Net 10 days for all invoices

If you have any questions or concerns regarding the information presented in this budgetary quote, please feel free to call or email me at alex@ameristruc.com at your convenience. Thank you for contacting American Structures, Inc. with your storage needs.

Sincerely,

Alex J. Peterson
Estimator/Production Manager

AJP/esh

Note: These prices quoted this date to be adjusted for any increase or decrease after this date at the time of order and do not include any fees, permits, duties or applicable taxes. Tax-exempt certificate is required upon ordering and the customer shall pay any fees, permits, duties, and sales or use tax due.

