

## **Preliminary Hydrology Report**

Proposed 5-Lot Residential Subdivision  
APN: 511-031-018  
1050 Myers Road  
McKinleyville, CA 95519

Prepared for:  
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McKinleyville, CA 95519

Prepared by:  
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610 9th Street  
Fortuna, CA  
02/14/2025

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## Acronyms and Abbreviations

|                 |                                                 |
|-----------------|-------------------------------------------------|
| APN             | Assessor's Parcel Number                        |
| DMA             | Drainage Management Area                        |
| INC             | Incorporated                                    |
| NOAA            | National Oceanic and Atmospheric Administration |
| WDR             | Waste Discharge Requirement                     |
| cfs             | Cubic Feet Per Second                           |
| ft              | feet                                            |
| ft <sup>2</sup> | square feet                                     |
| ft <sup>3</sup> | Cubic feet                                      |
| hr              | hour                                            |
| in              | inch                                            |
| in/hr           | inch/hour.                                      |
| LF              | Linear Feet                                     |
| T <sub>c</sub>  | Time of Concentration                           |

## 1 Existing Site Conditions

The project site consists of a single concurrent parcel located at 1050 Myers Road, McKinleyville, CA (APN:511-031-018). The existing site is a relatively flat, 1.10-acre area with two existing residences with gravel driveways, and the rest of the property is covered in groomed, grass lawn. There is an additional gravel driveway south off of Myers Road the eastern lawn. (See Appendix A: Existing Site Conditions).

The existing project site generally slopes to the southwest corner of the site at slopes of approximately 0.5%-1%. Stormwater runoff remains onsite and infiltrates into the existing lawn and gravel coverage. Existing residences' downspouts are disconnected and are routed to the surrounding pervious surface coverage.

## 2 Proposed Site Conditions

The proposed project consists of the subdivision of the existing parcel into 5-separate for future single-family residential homes. The existing residences will be separated into two residential lots with a single residence on each parcel. The 3 new residential parcels will remain undeveloped until the current or future owners wish to build a new single-family residences. The proposed subdivision includes new sidewalks with a green planting strip, concrete gutter along the southern edge of Myers Road and the western edge of Halfway Avenue. Access to the existing residences is maintained by new concrete driveways and aprons. An asphalt driveway off of Myers Road (+/- 180 LF) provides access to the proposed southwest parcel. This driveway includes stone lined swales on each side of the driveway to infiltrate water in place. Halfway Avenue and Myers Road will both be widened to match the existing improved sections to the west and north of the subdivision. New utilities for all future residences including both a sewer and water lateral will be installed and capped for future usage. The total area of each proposed parcel and their proposed surface coverage are included in Table 1 and Table 2 below.

*Table 1: Proposed Parcel Area*

|          | <b>Total Area (ft<sup>2</sup>)</b> | <b>Total Area (Acre)</b> |
|----------|------------------------------------|--------------------------|
| Parcel 1 | 6843                               | 0.16                     |
| Parcel 2 | 6297                               | 0.14                     |
| Parcel 3 | 14547                              | 0.33                     |
| Parcel 4 | 7713                               | 0.18                     |
| Parcel 5 | 12168                              | 0.28                     |
| Total    | 47568                              | 1.09                     |

*Table 2: Existing and Proposed ground cover areas due to Proposed Subdivision*

| Ground Cover Type | Total Area (ft <sup>2</sup> ) |                   | Total Area (Acre) |                   |
|-------------------|-------------------------------|-------------------|-------------------|-------------------|
|                   | Pre-Construction              | Post-Construction | Pre-Construction  | Post-Construction |
| Grass/Pasture     | 43869                         | 30483             | 1.01              | 0.70              |
| Asphalt Paving    | 1945                          | 5859              | 0.04              | 0.13              |
| Pervious Paving   | 0                             | 0                 | 0.00              | 0.00              |
| Concrete Paving   | 0                             | 5773              | 0.00              | 0.13              |
| Rooftop           | 1754                          | 1754              | 0.04              | 0.04              |
| Total             | 47568                         | 47568             | 1.09              | 1.09              |

## 2 Runoff Calculations

Time of concentration of a given site is calculated using the Kerby Method, as follows:

$$T_c = 0.828(r * L/S^{0.5})^{0.467} \quad (1)$$

Where:

$T_c$  = time of concentration (min)

$r$  = roughness coefficient (dimensionless)

$L$  = flow length (ft)

$S$  = slope (ft/ft)

Runoff flow rate is calculated using the Rational Method in conjunction with the Time of Concentration. The Rational method is as follows.

$$Q = C * i * A \quad (2)$$

Where:

$Q$  = flow rate of runoff (cfs)

$C$  = Rational Method Runoff coefficient (dimensionless)

$i$  = rainfall intensity (in/hr)

$A$  = site area (acre)

Runoff coefficients represent the percentage of precipitation that will runoff of a given ground cover type. The runoff coefficients are found in Appendix C.

Using the project site drainage areas, in combinations with the weighted runoff coefficients generated using the coefficients from the California State Water Resources Control Board (SWRCB), Equation 3 is used to calculate the flowrate of runoff resulting from the design storms.

$$Q_{pre/post} = C_{1,pre/post} * i * A_{1,pre/post} \dots + C_{n,pre/post} * i * A_{n,pre/post} \quad (3)$$

Where:

$Q_{pre/post}$  = runoff flowrate pre/post construction (cfs)

$C_{n,pre/post}$  = runoff coefficient for the  $n^{th}$  surface type pre/post construction

$i$  = rainfall intensity (in/hr)

$A_{n,pre/post}$  = area of the  $n^{th}$  surface type pre/post construction (acres)

The volume is then calculated for the post development conditions based on the impervious area and a higher runoff coefficient for the developed site using Equation 4.

$$V_{pre/post} = Q_{pre/post} * t \quad (4)$$

Where:

$V_{pre/post}$  = runoff volume pre/post-construction (ft<sup>3</sup>)

$t$  = duration of storm (seconds)

Alternatively, volumetric runoff can be calculated using project site drainage areas, weighted runoff coefficients, and design storm rainfall depth, as shown in Equation 5.

$$V_{pre/post} = A_{1,pre/post} * C_{1,pre/post} * d \dots + A_{i,pre/post} * C_{i,pre/post} * d \quad (5)$$

Where:

$A_{pre/post}$  = area of the  $n^{th}$  surface type pre/post construction (ft<sup>2</sup>)

$C_{n,pre/post}$  = runoff coefficient for the  $n^{th}$  surface type pre/post construction

$d$  = rainfall depth (in)

The increase in volume of runoff is calculated as follows in Equation 6.

$$V_{increase} = V_{post} - V_{pre} \quad (6)$$

## 2.1 Manning's Equation

Manning's equation is used to determine the maximum flow rate possible through an open channel or pipe given a velocity of flow and a cross-sectional area.

$$Q = VA = \left(\frac{1.49}{n}\right) AR_h^{\frac{2}{3}} \sqrt{S} \quad (7)$$

Where

Q = Flow Rate (CFS)

v = Velocity (ft/s)

A = Flow Area (ft<sup>2</sup>)

n = Manning's Roughness Coefficient

R<sub>h</sub> = Hydraulic Radius (ft)

S = Channel Slope (ft/ft)

This equation requires several other equations to calculate the flow rate through a trapezoidal open channel or circular pipe, including a specific equation for hydraulic radius and flow area. These equations are automatically calculated within FlowMaster.

## 3 Stormwater Runoff Analysis

Stormwater runoff analysis for this project was conducted per Humboldt County and the McKinleyville General Plan requirements. This project requires that post-construction runoff volumes do not exceed pre-construction conditions for a 100-year storm and stormwater peak flows do not increase from pre-construction conditions occurring during the 25-year storm.

### 3.1 Pre- and Post-Development Runoff Volume

The pre- and post- development site conditions were investigated and values for times of concentration (T<sub>c</sub>) were determined using Equation 1 (See Table 3). The pre-development rainfall intensity was then interpolated from NOAA rainfall intensity values for the site (See Table 4). Equations 2 through Equations 5 were used to calculate runoff volumes for both Pre- and Post-development conditions using these interpolated rainfall intensities, ground cover types, areas, and runoff coefficients. These values are shown in Table 4.

**Table 3: Time of Concentration for Pre- and Post-Development Site Conditions**

| Site Condition                  | Time of Concentration (min) |
|---------------------------------|-----------------------------|
| Pre-Development                 | 60.07                       |
| DMA 1 – Residential Lots        | 59.50                       |
| DMA 2 – Improved Halfway Avenue | 1.30                        |

The rational method requires a minimum storm length of 10-minutes. As Such the 10-minute storm was used for calculations where the time of concentration fell under the 10-minute threshold.

**Table 4: Rainfall Intensity based on and interpolated from NOAA Data. \*Denotes interpolated value.**

| Rainfall Intensity (in/hr) |      |
|----------------------------|------|
| 25-Year, 10-Minute Storm   | 2.19 |
| 100-Year, 10-Minute Storm  | 2.91 |

See Appendix D: NOAA Rainfall data for values listed in Table 4.

**Table 5: Pre/Post Construction Runoff Flowrates for 25-year and 100-year design storms.**

|                   | 25-Year Runoff (cfs) |          | 100-Year Runoff (cfs) |          |
|-------------------|----------------------|----------|-----------------------|----------|
|                   | Pre-Dev              | Post-Dev | Pre-Dev               | Post-Dev |
| <b>DMA 1</b>      | 0.31                 | 0.68     | 0.41                  | 0.55     |
| <b>DMA 2</b>      | 0.11                 | 0.24     | 0.15                  | 0.32     |
| <b>Whole Site</b> | 0.42                 | 0.92     | 0.56                  | 0.87     |

**Table 6: Pre/Post Construction Runoff Volumes**

|                   | 100-Year Runoff Volume (ft <sup>3</sup> ) |          |
|-------------------|-------------------------------------------|----------|
|                   | Pre-Dev                                   | Post-Dev |
| <b>DMA 1</b>      | 365.31                                    | 818.83   |
| <b>DMA 2</b>      | 134.62                                    | 398.11   |
| <b>Whole Site</b> | 499.93                                    | 1216.94  |



## 4 Conclusion

- The project consists of the subdivision of a parcel into 5-separate parcels based both on splitting the two existing residences and providing 3 new single family residential parcels.
- New residences are shown on plans only as a proof of concept. No new residences are proposed within this project.
- Proposed improvements include new sidewalks along Myers Road and Halfway Avenue. Both roads will also be widen to match the existing roadway sections to the north on Halfway Avenue, and to the west on Myers Road
- Each of the 5 residential parcels will include a new concrete apron to provide access to the parcel from their respective adjacent roadways. This includes an extended asphalt driveway for the southwest parcel (Parcel 3).
- Sewer and water laterals are installed for future residential homes.
- The project results in the post-construction conditions including approximately 13,386 ft<sup>2</sup> of impervious paving and 30,483 ft<sup>2</sup> of pervious landscaping.
- The stormwater on site is separated into two DMAs based on whether water will be infiltrating in place or ultimately being routed into the existing storm drainage system beneath Halfway Avenue.
- DMA 1 includes the proposed residential areas within the bounds of the newly proposed sidewalks including the existing residences, and the pervious lawn coverage to remain until future single-family residences are built.
- DMA 2 includes the expanded roadways and gutters up to the center line of the existing roads, and the new sidewalks graded to route runoff to the gutters and storm drainage system.
- The DMA 1 pre-construction, 25-year storm event results in an estimated runoff flowrate of 0.31 cfs and a post-construction runoff flowrate of 0.68 cfs.
- The DMA 2 pre-construction, 25-year storm event results in an estimated runoff flowrate of 0.11 cfs and a post-construction runoff flowrate of 0.33 cfs.
- The DMA 1 pre-construction, 100-year storm event results in an estimated stormwater runoff volume of 365 ft<sup>3</sup> and a post-construction runoff volume of 819 ft<sup>3</sup>.
- The DMA 2 pre-construction, 100-year storm event results in an estimated stormwater runoff volume of approximately 135 ft<sup>3</sup> and a post-construction runoff volume of 398 ft<sup>3</sup>.
- DMA 1's increased stormwater flow rate and volume can be sequestered on site and infiltrated in place with the excess of pervious surface coverage. This has been confirmed via the Humboldt County Regulated Project Stormwater Calculator.
- DMA 2's increased stormwater flow rate and volume can be sequestered on site and infiltrated in place with overflows connected to the existing storm drainage beneath Halfway Avenue.
- There is approximately 550 ft<sup>2</sup> of pervious landscaping in DMA 2. These areas can be depressed a 1.5' to attain a storage volume of 550 ft<sup>3</sup> to adequately the increased stormwater with a 0.5' freeboard.
- Overflow from a larger than typical design storm will enter the existing storm drainage system.



Whitchurch Engineering, Inc.  
Jeffrey and Sadie Alves 6-Lot Residential Subdivision  
Preliminary Hydrology Analysis  
ALV2401

Please do not hesitate to contact this office with any questions or concerns regarding this preliminary hydrological analysis. This analysis will be revised for final design upon approval of the proposed subdivision application and before applying for the final building permits.

  
Engineer of Record Signature



2-24-2025  
Date



Whitchurch Engineering, Inc.  
Jeffrey and Sadie Alves 5-Lot Residential Subdivision  
Preliminary Hydrology Analysis  
1050 Myers Road, McKinleyville, CA 95519  
ALV2401

## Appendix A: Existing Site Conditions

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TOPOGRAPHIC SURVEY NOTES

1. THIS TENTATIVE MAP PROPOSED THE SUBDIVISION OF AN EXISTING 1.09 ACRE PARCEL INTO 5 PARCELS  
2. WATER AND SEWER SERVICES ARE AVAILABLE FROM THE MCKINLEYVILLE COMMUNITY SERVICES DISTRICT.  
3. DATUM: NAVD 88 PER ONSITE OPUS SOLUTION.  
4. PROPERTY LINE INFORMATION: CALCULATED PROPOERTY LINES ARE SHOWN. A BOUNDARY SURVEY IS CURRENTLY IN PROGRESS.  
5. THE PROPERTY MAY BE ENCUMBERED BY THE FOLLOWING RECORDED INSTRUMENTS.  
BOOK 66 DEEDS, PAGE 174 - EASEMENT FOR A RIGHT OF WAY GRANTED TO HENRY MEYER - SHOWN HEREON.  
ALL EASEMENTS OF RECORD ARE SHOWN ON THE TATNIVE MAP AND WILL APPEAR ON TEH RECORDED PARCEL MAP.  
6. ADDRESS: 1050 METERS ROAD, MCKINLEYVILLE, CA 95519  
7. ZONING: RS-5/AP.N  
8. GROSS PARCEL AREA IS THE ENTIRE PARCEL. NET PARCEL AREAS EXCLUDE ROAD RIGHTS OF WAY AND ROAD EASEMENT AREAS.

LEGEND

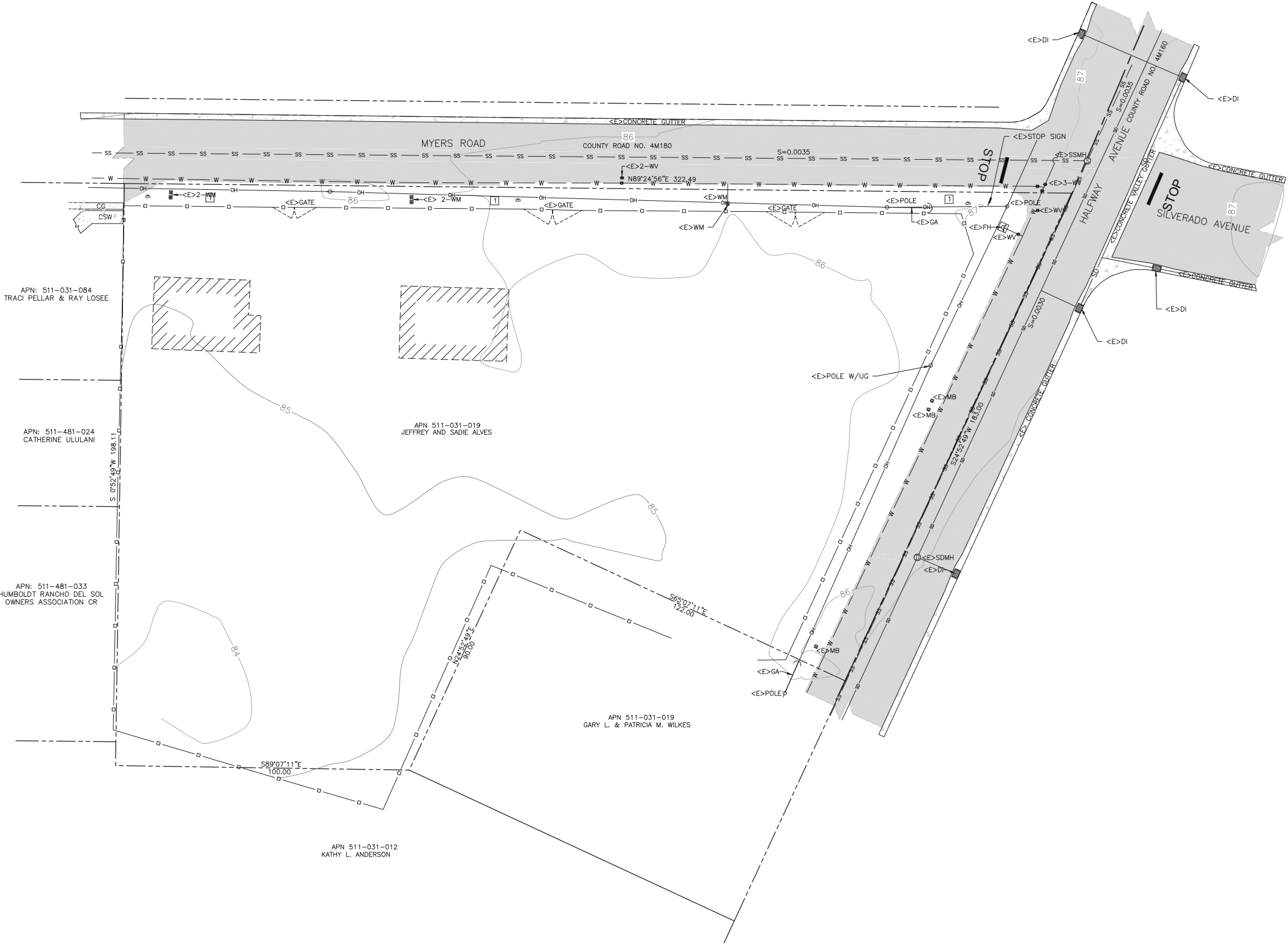
- △ SURVEY CONTROL POINT  
⊙ EXISTING SANITARY MANHOLE  
⊕ EXISTING SANITARY SEWER CLEAN OUT  
⊕ EXISTING STORM DRAIN MANHOLE  
▢ EXISTING STORM DRAIN INLET  
⊕ EXISTING WATER VALVE  
⊕ EXISTING FIRE HYDRANT  
⊕ EXISTING WATER METER  
⊕ EXISTING UTILITY METER BOX  
⊕ EXISTING UTILITY POLE  
⊕ EXISTING GUY ANCHOR  
▨ EXISTING BUILDING  
▨ EXISTING CONCRETE  
▨ EXISTING ASPHALT PAVING  
▨ EXISTING EDGE OF PAVEMENT  
▨ EXISTING FENCELINE  
▨ EXISTING UNDERGROUND SANITARY SEWER  
▨ EXISTING UNDERGROUND STORM DRAIN  
▨ EXISTING UNDERGROUND WATER LINE  
▨ EXISTING OVERHEAD UTILITY  
200 EXISTING MAJOR CONTOUR AT 5' INTERVALS  
201 EXISTING MINOR CONTOUR AT 1' INTERVALS  
▨ EXISTING PROPERTY LINE  
▨ EXISTING CENTERLINE OF ROAD WAY

ABBREVIATIONS

- AC ASPHALT CONCRETE  
APN ASSESSOR'S PARCEL NUMBER  
BLDG BUILDING  
BLDGCRN BUILDING CORNER  
BOW BACK OF WALK  
CC CONCRETE  
CF CONCRETE FOOTING  
CMP CORRUGATED METAL PIPE  
CP CONTROL POINT  
CS CONCRETE SLAB  
CTL CENTERLINE  
CUFT CUBIC FEET  
CYD CUBIC YARD  
CW CONCRETE WALL  
DI DROP INLET  
DWY DRIVEWAY  
EX EXISTING  
EB ELECTRICAL BOX  
ELV ELEVATION  
EM ELECTRICAL METER  
EP EDGE OF PAVEMENT  
EPAN ELECTRICAL PANEL  
FC FACE CURB  
FF FINISHED FLOOR  
FL FLOWLINE  
FOW FRONT OF WALK  
G GAS  
GAL GALLON  
GPAN GAS PANEL  
GM GAS METER  
GRD GROUND  
GV GAS VALVE  
HB HOSE BIB  
INV INVERT  
IP IRON PIPE  
L LENGTH  
LID LOW IMPACT DESIGN  
MON MONUMENT  
MT MULTITRUNK  
NEW NEW  
OG ON GRADE  
OH OVER HEAD  
OIP OPEN IRON PIPE  
P> PROPOSED  
PVC POLYVINYL CHLORIDE PIPE  
R RADIUS  
RB REBAR  
SD STORM DRAIN  
SS SANITARY SEWER  
SSCO SANITARY SEWER CLEANOUT  
SSMH SANITARY SEWER MANHOLE  
STL STEEL  
SQFT SQUARE FEET  
TBM TEMPORARY BENCHMARK  
TC TOP CURB  
TOE TOE OF SLOPE  
TOP TOP OF SLOPE  
TR TREE  
W WATER  
WM WATER METER  
WV WATER VALVE

PLAN CHECK ONLY  
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THESE PLANS ARE ORIGINALLY  
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EXISTING SITE CONDITIONS PLAN

SCALE: 1"=20'



This drawing or drawing set shall not be used for construction unless a jurisdictional stamp (County, City, State, Federal) has been issued on the drawing, stating "FOR PERMIT" or similar verbiage, a wet signed professional engineer's stamp, and permit documents have been issued for the project.

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Phone (707) 444-1420

ALVES SUBDIVISION AND UTILITY IMPROVEMENTS

1050 MYERS STREET, MCKINLEYVILLE, CA 95519 APN: 511-031-018

EXISTING SITE CONDITIONS

For: JEFFREY ALVES 1050 MYERS ROAD, MCKINLEYVILLE, CA 95519

|        |            |
|--------|------------|
| Date   | JAN 08 '25 |
| Scale  | AS NOTED   |
| Design | NTN        |
| Drawn  | NTN        |
| Job    | ALV2401    |
| Sheet  | C2.0       |



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Preliminary Hydrology Analysis  
ALV2401

## Appendix B: Subdivision Site Plan

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LEGEND

- ▲ SURVEY CONTROL POINT  
⊙ EXISTING SANITARY MANHOLE  
⊕ EXISTING SANITARY SEWER CLEAN OUT  
⊙ EXISTING STORM DRAIN MANHOLE  
⊕ EXISTING STORM DRAIN INLET  
⊕ NEW STORM DRAIN INLET  
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⊕ EXISTING GUY ANCHOR  
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▨ EXISTING BUILDING  
▨ EXISTING CONCRETE  
▨ EXISTING ASPHALT PAVING  
▨ FUTURE BUILDING  
▨ NEW CONCRETE  
▨ NEW ASPHALT PAVING  
▨ NEW LANDSCAPING  
▨ NEW TRUNCATED DOME MAT  
▨ EXISTING EDGE OF PAVEMENT  
▨ EXISTING PROPERTY LINE  
▨ 200 EXISTING MAJOR CONTOUR AT 5' INTERVALS  
▨ 201 EXISTING MINOR CONTOUR AT 1' INTERVALS  
▨ PROPERTY LINE SETBACK  
▨ NEW EDGE OF PAVEMENT  
▨ NEW FENCELINE  
▨ NEW FLOWLINE  
▨ NEW PROPERTY LINE  
▨ NEW CENTERLINE OF ROAD WAY

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DI DROP INLET  
DWY DRIVEWAY  
E EXISTING  
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EM ELECTRICAL METER  
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EPAN ELECTRICAL PANEL  
F FUTURE  
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FF FINISHED FLOOR  
FL FLOWLINE  
FOW FRONT OF WALK  
G GAS  
GAL GALLON  
GPAN GAS PANEL  
GM GAS METER  
GRD GROUND  
GV GAS VALVE  
HB HOSE BIB  
INV INVERT  
IP IRON PIPE  
L LENGTH  
LID LOW IMPACT DESIGN  
MON MONUMENT  
MT MULTITRUNK  
NEW NEW  
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OH OVER HEAD  
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PVC POLYVINYL CHLORIDE PIPE  
R RADIUS  
RB REBAR  
SD STORM DRAIN  
SS SANITARY SEWER  
SSCO SANITARY SEWER CLEANOUT  
SSMH SANITARY SEWER MANHOLE  
STL STEEL  
SFT SQUARE FEET  
TBM TEMPORARY BENCHMARK  
TC TOP CURB  
TOE TOE OF SLOPE  
TOP TOP OF SLOPE  
TR TREE  
W WATER  
WL WATER LINE  
WM WATER METER  
WV WATER VALVE

LOT LAYOUT/SITE PLAN

SCALE: 1"=20'



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810 9th Street Fortuna, California 95540  
716 Morris Street Eureka, California 95501

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LOT LAYOUT/SITE PLAN

For: JEFFREY ALVES 1050 MYERS ROAD, MCKINLEYVILLE, CA 95519

|        |            |
|--------|------------|
| Date   | JAN 08 '25 |
| Scale  | AS NOTED   |
| Design | NTN        |
| Drawn  | NTN        |
| Job    | ALV2401    |
| Sheet  | C3.0       |

## Appendix C: Drainage Calculation Tables of Coefficients

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*Table 7: Runoff Rational Method coefficients for surface conditions on site post-construction*

| Surface Type           | Runoff Coefficient |
|------------------------|--------------------|
| Unimproved/Grass Areas | 0.2                |
| Concrete               | 0.9                |
| Asphalt                | 0.9                |
| Pervious Pavement      | 0.5                |
| Roof                   | 0.9                |





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ALV2401

## Appendix D: NOAA Rainfall Data

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Please refer to NOAA Atlas 14 document for more information.