



August 30, 2024
Job No.: 3856-000

PRELIMINARY HYDROLOGY ANALYSIS
100 WOOD HOLLOW DRIVE
NOVATO, CALIFORNIA

SCOPE OF STUDY: Analyze pre- and post-development peak stormwater flows and determine preliminary pipe sizes.

PROJECT DESCRIPTION: The 100 Wood Hollow Drive project is located north of Wood Hollow Drive and to the west of Highway 101 at the intersection of Wood Hollow Drive and Meadow Crest Road in the City of Novato, Marin County, California. The overall property boundary is approximately 12.9 ac, however the disturbed area is just approximately 6.1 ac. The project is not located in a Special Flood Hazard Area. Existing and proposed grades vary between elevations 19 and 64 (NVGD 29) within the development footprint, however existing hillsides to the north reach up to elevation 198.

EXISTING DRAINAGE CONDITION: The existing site is largely covered in grass, some small shrubbery, and trees to the north of the development footprint. Within the development footprint, there are existing office buildings and parking areas / drive aisles. Existing grades slope north to south and west to east. Drainage ditches convey stormwater from the hillside at the northern portion of the project boundary around the perimeter of the existing buildings/parking lots. Additionally, runoff within the parking area is conveyed through an existing storm drain system that connects to an existing catch basin at the intersection of Wood Hollow Drive and Meadow Crest Road. An existing storm drain network in Meadow Crest Road and Wood Hollow Drive convey all stormwater from the project area to the southeast via an existing 36" storm drain pipe, which ultimately drains further east towards Redwood Blvd.

PROPOSED DRAINAGE CONDITION: The project will install Low Impact Design facilities as Best Management Practices to treat all stormwater from created/replaced impervious areas. These facilities will comprise of bioretention basins located within landscaped areas adjacent to impervious areas, which will treat the stormwater from the source. Bioretention basins have been sized using the 4% method (Simplified Sizing Approach) per BASMAA guidelines.

Runoff from private streets and sidewalks will sheet flow and be captured by the proposed storm drain network. Roof runoff will be conveyed via downspouts and routed to drain to the streets and ultimately be treated by the respective bioretention basins. The project will construct two large bioretention basins on-site which will treat all stormwater on-site, which drains to/from the basins via gravity. Treated stormwater will then be discharged to drain to the existing City of Novato storm drain facilities in Wood Hollow Drive and Meadow Crest Road.

PEAK FLOW MANAGEMENT: As shown below, the project will decrease the total impervious area within the development footprint. All existing roof, parking, and sidewalk areas will be removed within the project boundary. The existing site is approximately 76% impervious within the disturbed area, and the proposed site is approximately 65% impervious. In addition, the existing site drains via an existing storm drain system which directly connects to facilities in Wood Hollow Drive without first entering a LID treatment facilities. The proposed project will install large bioretention basins that will both treat 100% of the stormwater on-site and mitigate for peak flow management. Therefore, the project is not subject to hydromodification requirements.

PRE-DEVELOPED CONDITIONS FOR 10-YEAR EVENT

Site Area (Disturbed Area)	6.08	AC
Impervious Area	4.62	AC
Pervious Area	1.46	AC
Impervious Surface C Value	1.0	
Pervious Surface C Value*	0.7	
Weighted C Value	0.93	

* Per the County of Marin Hydrology Manual (8/2/2000), assumes saturated conditions.

POST-DEVELOPED CONDITIONS FOR 10-YEAR EVENT

Site Area (Disturbed Area)	6.08	AC
Impervious Area	3.97	AC
Pervious Area	2.11	AC
Impervious Surface C Value	1.0	
Pervious Surface C Value*	0.7	
Weighted C Value	0.90	

* Per the County of Marin Hydrology Manual (8/2/2000), assumes saturated conditions.

PRELIMINARY PIPE SIZING:

Flow Rate Calculation (Rational Method)	Q = Peak Flow (cfs)
Q = CiA	C = runoff coefficient (unitless)
	i = 10-year storm rainfall intensity (in / hr)
	A = Area (AC)

Time of Concentration (Tc):

Assume 5 min roof to gutter flow = length of pipe flow/flow velocity.

Assume pipe flow velocity = 2 feet per second.

L = 665 ft

$$T_c = 5 + 665/2/60 = 10.5 \text{ min}$$

Per NOAA Atlas 14, i (10 min, 10 year)=2.11 in/hr

C=0.90

A=3.3 ac (max area, i.e. DMA 2)

$$Q_{10} = 0.90 * 2.11 \text{ in/hr} * 3.3 \text{ ac} = 6.3 \text{ cfs}$$

Diameter (D)	=	18" (1.5 ft)
Slope (S)	=	0.0050 ft/ft (min)
Roughness Coefficient (n)	=	0.013
Depth of Flow (d)	=	1.06 ft
$\frac{d}{D}$	=	$\frac{1.06}{1.50} = 71\% \text{ Full}$

Therefore, proposed system will utilize an 18" diameter pipe to convey project runoff flows with a minimum slope of 0.50%.

A detailed hydrology/hydraulic study for all proposed site storm drainage improvements will be prepared as a part of the final project design and submitted for review and approval with final construction drawings.