



INNOVATIVE DESIGN. CLASSIC RESULTS.

PRELIMINARY DRAINAGE REPORT

**WATERSIDE TOWNHOMES
(Waterside Condominiums Subdivision)**

JULY 2022

PCD Filing No.: PUDSP229

Prepared for:
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9540 FEDERAL DRIVE
COLORADO SPRINGS, CO 80921

Prepared by:
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Job no. 2588.00



**PRELIMINARY DRAINAGE REPORT FOR WATERSIDE TOWNHOMES
(Waterside Condominiums Subdivision)**

DRAINAGE REPORT STATEMENT

DESIGN ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

Kyle R. Campbell, Colorado P.E. #29794

Date

OWNERS/DEVELOPER'S STATEMENT:

I, the owner/developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: Lake Woodmoor Holdings, LLC

Date

Title: _____

Address: 9540 Federal Drive

Colorado Springs, CO 80921

EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code, as amended.

Joshua Palmer, P.E.
County Engineer / ECM Administrator

Date

Conditions:



PRELIMINARY DRAINAGE REPORT FOR WATERSIDE TOWNHOMES (Waterside Condominiums Subdivision)

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PURPOSE

This document is the Preliminary Drainage Report for Waterside Townhomes. The purpose of this report is to identify general onsite and offsite drainage patterns, conceptual storm sewer, inlet locations, and areas tributary to the site, and to safely route developed storm water runoff to adequate stormwater facilities, in accordance with all applicable area drainage plans. This report is required to accompany the proposed PUD Development Plan / Preliminary Plan that is proposed to replace the prior approved and platted “Waterside Condominiums Subdivision” community.

A Final Drainage Report will be provided when the Final Plat and Construction Drawings details are processed for review.

GENERAL DESCRIPTION

The overall Waterside Townhomes development is a 7.53-acre residential community within the south half of Section 11, Township 11 South, Range 67 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located on the east side of Woodmoor Drive just south of Deer Creek Road. Existing Lake Woodmoor sits directly east of the site. The development includes a total of 52 townhome residences that will be developed as a single phase.

The average soil condition of the entire site and tributary area to the proposed ponds reflects Hydrologic Group “B” (Pring Coarse Sandy Loam and Tomah-Crowfoot loamy sands) as determined by the “Soil Survey of El Paso County Area,” prepared by the National Cooperative Soil Survey (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

The site is located within the Dirty Woman Creek Drainage Basin. This site was previously studied in the “Drainage Report and Plan – Waterside Condominiums Subdivision”, by Leigh Whitehead. This currently proposed residential community is proposed to replace the previously platted but not



constructed condominium community. Also consulted for this report was the “Preliminary and Final Drainage Report – North Bay at Lake Woodmoor”, by Kiowa Engineering, dated February 21, 2020.

This report detailed a similar sized development parcel located just east of this site. At this Preliminary Drainage Report level, the Kiowa Report was used as a comparable community related to detention facility discussions.

The site is predominantly covered in native grasses, with various disturbed areas (notably at the northwest corner). Existing trees are sporadically located along the south boundary and southeast boundary. The existing ground slopes in a south and south easterly direction as depicted on the Existing Conditions Drainage Map in the Appendix. An existing roadside grass swale is located along the west boundary that does not contain any flows from this site. Other than the far south area that sheet flows south into the existing entry drive aisle and adjacent lot, all existing site flows drain directly into Lake Woodmoor.

A more detailed summary of the existing conditions is as follows:

Basin A – H flows ($Q_5 = 0.7$ cfs, $Q_{100} = 4.6$ cfs) are comprised of 2.52-acres of existing grasslands that travel in a southeasterly direction as concentrated swale flows into Lake Woodmoor.

Basin B – H flows ($Q_5 = 0.8$ cfs, $Q_{100} = 5.6$ cfs) are comprised of 2.77-acres of existing grasslands that travel in an easterly direction into Lake Woodmoor.

Basin C – H flows ($Q_5 = 1.1$ cfs, $Q_{100} = 4.8$ cfs) are comprised of 2.25-acres of southerly directed existing grasslands flows that enter the existing southwesterly shared entrance and southerly lot.

DEVELOPED DRAINAGE CONDITIONS

Based upon City/County Drainage Criteria, the drainage approach for this development now reflects current criteria for stormwater quality (on-site) and Full Spectrum Detention (Lake Woodmoor) requirements. The attached “Proposed Conditions Drainage Map” contains the preliminary, anticipated approach to drainage.

The majority of the site is comprised of Basin A ($Q_5 = 7.0\text{cfs}$, $Q_{100} = 16.8\text{ cfs}$), 4.77-acres of proposed private roadways, townhome units, parking and sidewalk areas. At this preliminary stage of analysis, it is anticipated that all developed flows will be intercepted on-site in a proposed private storm system and then directed toward the proposed Sand Filter Basin for stormwater quality treatment. The ultimate release of all stormwater flows will be directly into Lake Woodmoor via the proposed stormwater facility. The existing grass roadside swale will remain north of the main site entry, and be relocated south of the entry. The far easterly edge of the site will continue to sheet flow east as predominantly unconcentrated sheet flow directly into Lake Woodmoor as reflected in Basin B ($Q_5 = 1.2\text{ cfs}$, $Q_{100} = 7.7\text{ cfs}$), 2.48 acres of proposed vegetated and undeveloped (except for trail) area that travels as unconcentrated sheet flow into Lake Woodmor. Other than the proposed gravel trail, no developed flows will be directly released east all rear yard and developed flows to be collected in a private landscape drainage storm system and routed to the proposed sand filter basin (with rear year roof drain flows). All townhome unit roof drains will be required to be directed to the street side of the townhomes where they will be ultimately transferred to the proposed private stormwater quality facility.

Existing southerly directed sheet flows will be redirected as well toward the stormwater quality facility. It is anticipated that a series of small private landscape drains will assist in directing site flows to the pond. A much smaller southerly directed area Basin C = ($Q_5 = 0.9\text{ cfs}$, $Q_{100} = 1.6\text{ cfs}$), 0.21 arce of the existing paved shared entrance will continue to directly the significant reduced amount of flow towards the existing southwesterly shared entrance, at a rate less than existing conditions.

The subsequent Final Drainage Report will provide a much higher level of detail for this proposed storm system and facilities, including private street capacity analysis, inlet calculations and pipe sizing analysis.

All proposed storm facilities within the private street tracts will be private with ownership and maintenance by the homeowners' association.

LAKE WOODMOOR DETENTION

Lake Woodmoor will provide 100-year detention storage for the developed runoff from the site. The DBPS assumed a land use of residential with 2 lots per acre for the area that encompasses the Waterside Townhomes site (see Appendix). The assumed land use would have a 25 percent imperviousness resulting in a 0.5 ac-ft of only detention volume requirement. The anticipated composite percent imperviousness for the proposed site is 42 percent. Based upon Basin A containing 2.77 acres of preliminary designed building, roads walls and other impervious improvements within the 4.77-acre basin. A more detailed analysis will be provided in the impending Final Drainage Report to verify or update all site calculations. 42% imperviousness was also used in the preliminary stormwater quality sizing spreadsheet. This equates to a preliminary detention volume requirement of 0.7 ac-ft. The net increase in detention volume to Lake Woodmoor from what was assumed in the DBPS is 0.2 ac-ft. Given the approximately 46-acre surface area of Lake Woodmoor (over 6 times larger than the proposed 7.53-acre site), the increase in detention volume would cause an increase of 0.04 inches in the lake's water surface elevation. Lake Woodmoor therefore has sufficient capacity to accept the additional runoff volume, and no improvements are recommended for the reservoir. With the Final Plat and Final Drainage Report submittal, the Woodmoor Water and Sanitation District (WWSD) will be requested to provide a letter stating that they will allow the use of their facility (Lake Woodmoor) for this site's flood storage. Additional drainage coordination with the North Bay Development will also be present in the future Final drainage Report, including an analysis if both sites move forward.

STORMWATER QUALITY

This site adheres to this **Four Step Process** as follows:

1. **Employ Runoff Reduction Practices:** Proposed impervious areas (roof tops, patios) will sheet flow across landscaped yards and through open space areas to slow runoff and increase time of concentration prior to being conveyed to the proposed private streets. This will minimize directly connected impervious areas within the project site.

2. **Stabilize Drainageways:** After developed flows utilize the runoff reduction practices through the yards, these flows will travel via curb and gutter within the private streets and eventually private storm systems. These collected flows are then routed directly to the proposed stormwater quality facility on-site and ultimately released into Lake Woodmoor.
3. **Provide Water Quality Capture Volume (WQCV):** Runoff from this development will be treated through capture and slow release of the WQCV in the proposed private on-site water quality facility designed per current El Paso County drainage criteria.
4. **Consider need for Industrial and Commercial BMPs:** No industrial or commercial uses are proposed within this development. However, a site-specific storm water quality and erosion control plan and narrative will be submitted along with the grading and erosion control plan. Details such as site-specific source control construction BMP's as well as permanent BMP's were detailed in this plan and narrative to protect receiving waters. BMP's will be constructed and maintained as the development has been graded and erosion control methods employed.

Based upon the requirement to provide stormwater quality capture volume for the development area, a proposed sand filter basin is proposed in the southeast area of the site. Per the preliminary calculations in the Appendix, a 0.059 ac-ft capture volume is needed with a media surface area of 1,465 SF. The details of this stormwater facility will be provided in the subsequent Final Drainage Report, including treatment of all disturbed areas, less any excluded areas.

HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014. Individual on-site developed basin design used for inlet sizing and storm system routing was calculated using the Rational Method. Full-Spectrum detention pond modeling developed using UD-Detention spreadsheet ver. 3.07, Urban Drainage and Flood Control District.



The City of Colorado Springs/El Paso County DCM requires the Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainage ways, and implementing long-term source controls. The Four Step Process pertains to management of smaller, frequently occurring storm events, as opposed to larger storms for which drainage and flood control infrastructure are sized. Implementation of these four steps helps to achieve storm water permit requirements.

FLOODPLAIN STATEMENT

A portion of this site is located within a FEMA floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C0276G, with effective dates of December 7, 2018 (See Appendix). All existing floodplain areas are proposed to be contained within Tract A, and no proposed lots are impacted by the existing floodplain.

EROSION CONTROL PLAN

The Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate be submitted with the Final Drainage Report. We respectfully request that the Erosion Control Plan and cost estimate be submitted in conjunction with the Overlot Grading Plan and construction assurances posted prior to obtaining a grading permit. Early grading is not being requested with this application.

DRAINAGE & BRIDGE FEES

This site lies within the Dirty Woman Creek Drainage Basin. As this site was previously platted as Waterside Condominiums, no drainage or bridge fees will be required to be paid. Confirmation of prior platting and inclusion or exclusion in the Drainage Basin Planning Study will be provided in the Final Drainage Report to justify that no fees are required.



SUMMARY

This proposed development remains consistent with the previously anticipated drainage patterns for the site. The proposed stormwater quality facility meets current criteria. The proposed development will not adversely impact surrounding developments.

A future Final Plat application will include Construction Drawings and a Final Drainage Report to provide further Final Design details associated with the more detailed design.

PREPARED BY:

Classic Consulting



Kyle R. Campbell, P.E.

Division Manager

db/258800/REPORTS/Preliminary Drainage Report/ PDR

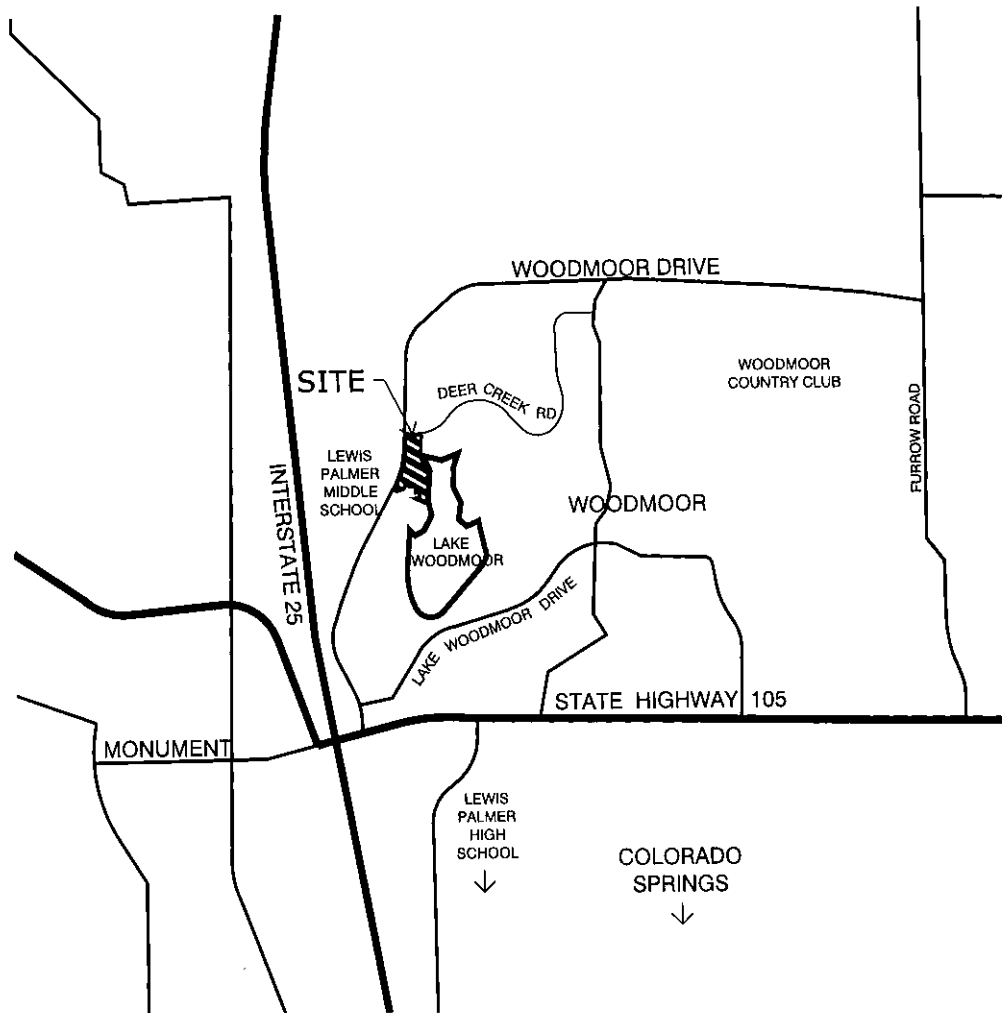
REFERENCES

1. City of Colorado Springs/County of El Paso Drainage Criteria Manual dated October 1991.*
2. "Drainage Report and Plan – Waterside Condominiums Subdivision", by Leigh Whitehead.
3. Drainage Criteria Manual (Volume 3) latest revision April 2008, Urban Drainage and Flood Criteria District.
4. El Paso County Engineering Criteria Manual, Resolution No. 20-222, June 23, 2020 (Supp. No.2).

*EPC Board Resolution NO. 15-042 (El Paso County adoption of Chapter 6 and Section 3.2.1 Chapter 13 of the City of Colorado Springs Drainage Criteria manual dated May 2014, hydrology and full-spectrum detention)

APPENDIX

VICINITY MAP

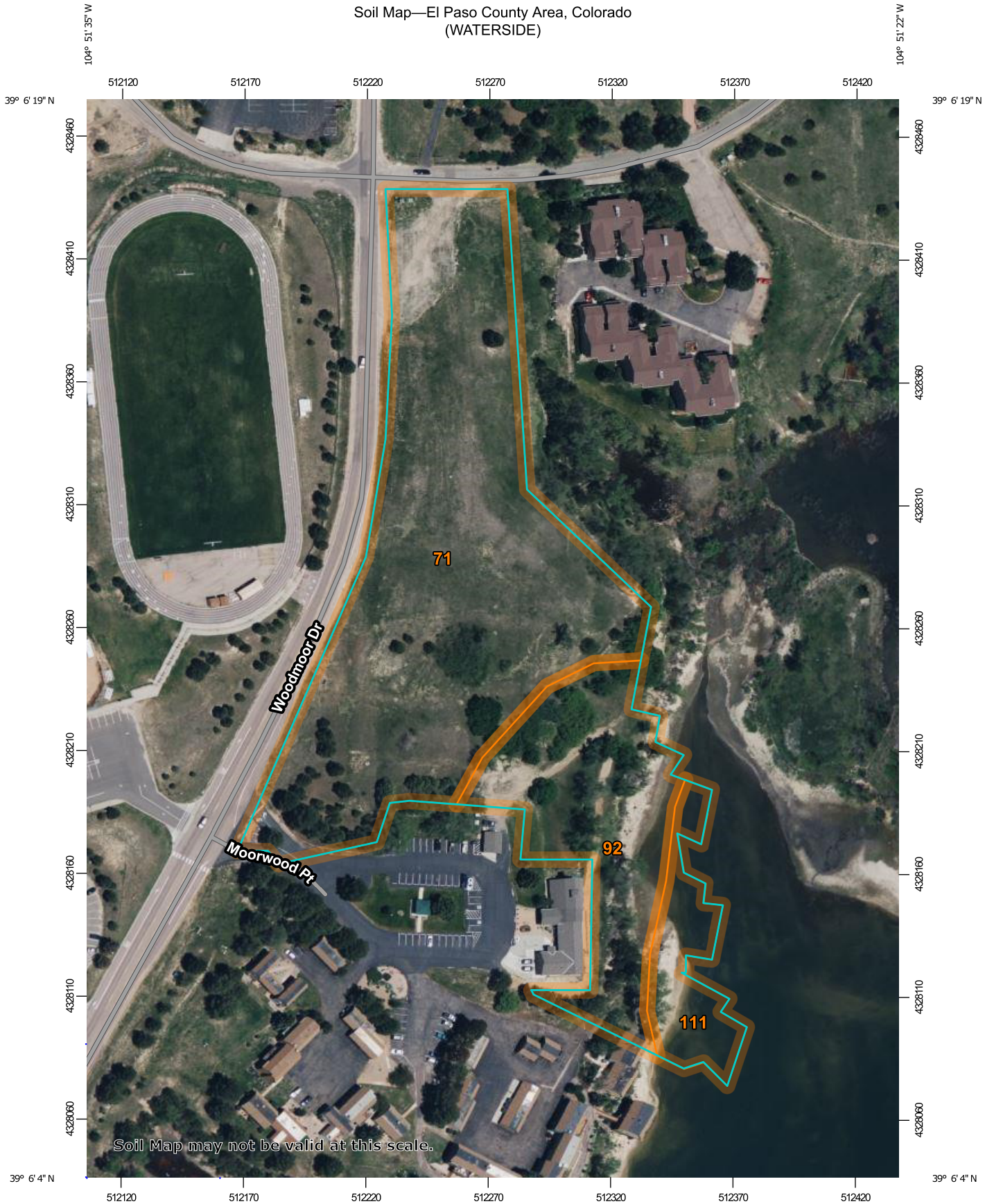


VICINITY MAP

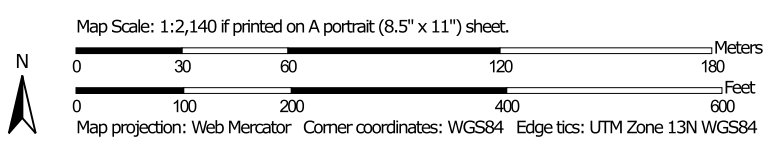


SOILS MAP (S.C.S SURVEY)

Soil Map—El Paso County Area, Colorado
(WATERSIDE)




Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------------|----------------|
| 71 | Pring coarse sandy loam, 3 to 8 percent slopes | 5.0 | 68.1% |
| 92 | Tomah-Crowfoot loamy sands, 3 to 8 percent slopes | 1.7 | 23.7% |
| 111 | Water | 0.6 | 8.2% |
| Totals for Area of Interest | | 7.3 | 100.0% |

El Paso County Area, Colorado

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k

Elevation: 6,800 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam

C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High
(2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: R048AY222CO - Loamy Park

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 19, Aug 31, 2021

El Paso County Area, Colorado

92—Tomah-Crowfoot loamy sands, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 36b9

Elevation: 7,300 to 7,600 feet

Farmland classification: Not prime farmland

Map Unit Composition

Tomah and similar soils: 50 percent

Crowfoot and similar soils: 30 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tomah

Setting

Landform: Hills, alluvial fans

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from arkose and/or residuum weathered from arkose

Typical profile

A - 0 to 10 inches: loamy sand

E - 10 to 22 inches: coarse sand

Bt - 22 to 48 inches: stratified coarse sand to sandy clay loam

C - 48 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R049XY216CO - Sandy Divide

Hydric soil rating: No

Description of Crowfoot

Setting

Landform: Alluvial fans, hills
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 12 inches: loamy sand
E - 12 to 23 inches: sand
Bt - 23 to 36 inches: sandy clay loam
C - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY216CO - Sandy Divide
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

El Paso County Area, Colorado

111—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 19, Aug 31, 2021

F.E.M.A. MAP

National Flood Hazard Layer FIRMette

104°51'47"W 39°56'27"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN
- Area of Minimal Flood Hazard *Zone X*
- Effective LOMRMs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

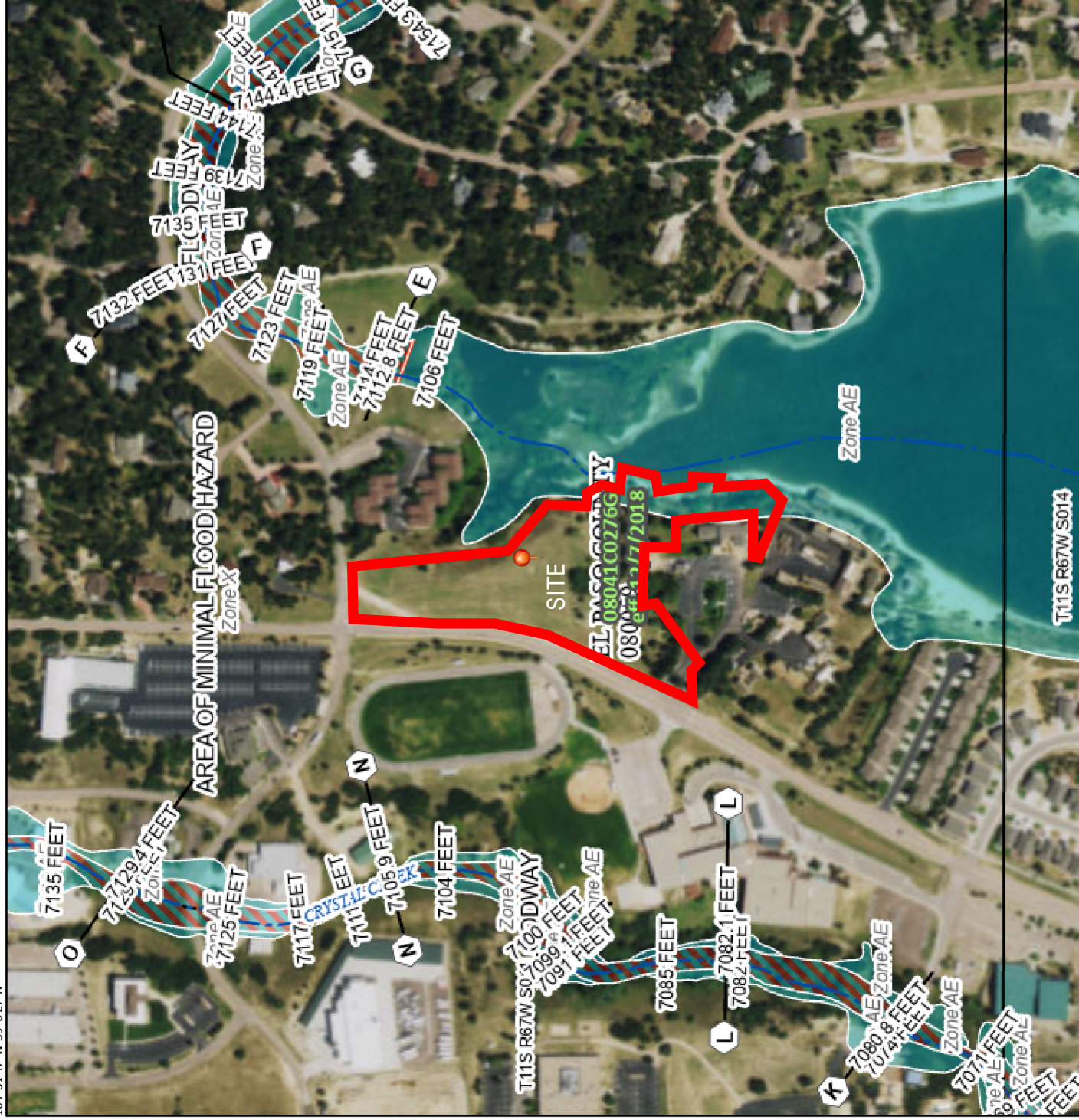


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **6/30/2022 at 11:25 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



104°51'10"W 39°55'59"N

Feet 0 250 500 1,000 1,500 2,000 1:6,000

Basemap: USGS National Map; Orthoimagery: Data refreshed October, 2020

REFERENCE MATERIAL FROM PRIOR STUDIES

Kiowa Engineering Corporation
 419 W. Bijou Street
 Colorado Springs, Colorado
 80905-1308

DIRTY WOMAN CREEK & CRYSTAL CREEK
 DRAINAGE BASIN PLANNING STUDY
 PROPOSED LAND USE MAP

| | |
|--------------|----------|
| Project No.: | 91-07-17 |
| Date: | 12/91 |
| Drawn: | EAK |
| Checked: | ROW |
| Reviewed: | |

FIG 3



HYDROLOGIC / HYDRAULIC CALCULATIONS

JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/06/22
 CALCULATED BY: KRC

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | DEVELOPED AREA/IMPERVIOUS AREA | | | | LANDSCAPE/UNDEVELOPED AREAS | | | | WEIGHTED | | | WEIGHTED CA | | |
|-------|-----------------|--------------------------------|------|------|--------|-----------------------------|------|------|--------|----------|------|--------|-------------|-------|---------|
| | | AREA (AC) | C(2) | C(5) | C(100) | AREA (AC) | C(2) | C(5) | C(100) | C(2) | C(5) | C(100) | CA(2) | CA(5) | CA(100) |
| A-H | 2.52 | 0.00 | 0.89 | 0.90 | 0.96 | 2.52 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.23 | 0.91 |
| B-H | 2.77 | 0.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.25 | 1.00 |
| C-H | 2.25 | 0.18 | 0.89 | 0.90 | 0.96 | 2.07 | 0.03 | 0.09 | 0.36 | 0.10 | 0.15 | 0.41 | 0.22 | 0.35 | 0.92 |
| A | 4.77 | 2.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.39 | 0.43 | 0.61 | 1.86 | 2.05 | 2.92 |
| B | 2.48 | 0.00 | 0.89 | 0.90 | 0.96 | 2.48 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.07 | 0.22 | 0.89 |
| C | 0.21 | 0.18 | 0.89 | 0.90 | 0.96 | 0.03 | 0.03 | 0.09 | 0.36 | 0.77 | 0.78 | 0.87 | 0.16 | 0.16 | 0.18 |

JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/05/22
 CALC'D BY: KRC

| Return Period | 1-Hour Depth |
|---------------|--------------|
| 2 | 1.19 |
| 5 | 1.50 |
| 10 | 1.75 |
| 25 | 2.00 |
| 50 | 2.25 |
| 100 | 2.52 |

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L}}{S^{0.33}}$$

$$V = C_v S_w^{0.5} \quad T_c = LV$$

Table 6-7. Conveyance Coefficient, C_v

| Type of Land Surface | C_v |
|---|-------|
| Heavy meadow | 2.5 |
| Tillage/field | 5 |
| Riprap (not buried)* $t_c = \frac{L}{180} + 10$ | 6.5 |
| Short pasture and lawns | 7 |
| Nearly bare ground | 10 |
| Grassed waterway | 15 |
| Paved areas and shallow paved swales | 20 |

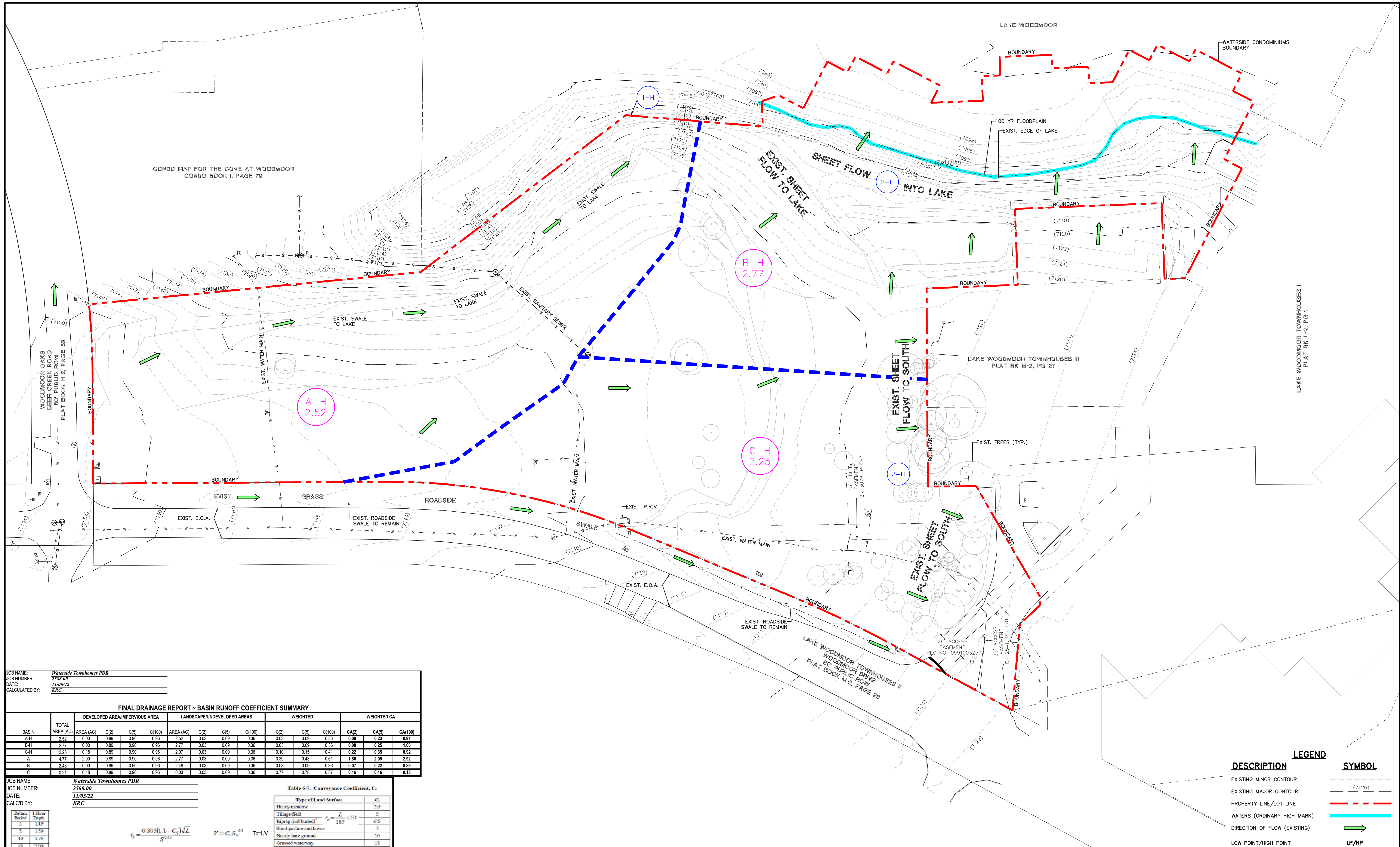
*For buried riprap, select C_v value based on type of vegetative cover.

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED | | | OVERLAND | | | | STREET / CHANNEL FLOW | | | | Tc TOTAL (min) | INTENSITY | | | TOTAL FLOWS | | |
|-------|----------|-------|---------|----------|----------------|----------------|-------------|-----------------------|--------------|-------------------|-------------|----------------------|-----------------|-----------------|-------------------|---------------|---------------|-----------------|
| | CA(2) | CA(5) | CA(100) | C(5) | Length (ft) | Height (ft) | Tc (min) | Length (ft) | Slope (%) | Velocity (fps) | Tc (min) | | I(2) (in/hr) | I(5) (in/hr) | I(100) (in/hr) | Q(2) (cfs) | Q(5) (cfs) | Q(100) (cfs) |
| A-H | 0.08 | 0.23 | 0.91 | 0.09 | 300 | 10 | 21.2 | 0 | 0.0% | 0.0 | 0.0 | 21.2 | 2.40 | 3.00 | 5.04 | 0.2 | 0.7 | 4.6 |
| B-H | 0.08 | 0.25 | 1.00 | 0.08 | 300 | 20 | 17.1 | 0 | 0.0% | 0.0 | 0.0 | 17.1 | 2.66 | 3.33 | 5.59 | 0.2 | 0.8 | 5.6 |
| C-H | 0.22 | 0.35 | 0.92 | 0.09 | 300 | 12 | 20.0 | 0 | 0.0% | 0.0 | 0.0 | 20.0 | 2.47 | 3.09 | 5.19 | 0.5 | 1.1 | 4.8 |
| A | 1.86 | 2.05 | 2.92 | 0.09 | 100 | 2 | 14.5 | 300 | 3.0% | 3.5 | 1.4 | 16.0 | 2.74 | 3.43 | 5.76 | 5.1 | 7.0 | 16.8 |
| B | 0.07 | 0.22 | 0.89 | 0.09 | 36 | 12 | 3.4 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.3 | 1.2 | 7.7 |
| C | 0.16 | 0.16 | 0.18 | 0.09 | 0 | 0 | 0.0 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.7 | 0.9 | 1.6 |

SWQ CALCULATIONS

**EXISTING CONDITIONS
DRAINAGE MAP**



JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/06/22
 CALCULATED BY: KRC

FINAL DRAINAGE REPORT - BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | DEVELOPED AREA/IMPERVIOUS AREA | | | | LANDSCAPE/UNDEVELOPED AREAS | | | | WEIGHTED | | | WEIGHTED CA | | |
|-------|-----------------|--------------------------------|------|------|--------|-----------------------------|------|------|--------|----------|------|--------|-------------|-------|---------|
| | | AREA (AC) | C(2) | C(5) | C(100) | AREA (AC) | C(2) | C(5) | C(100) | C(2) | C(5) | C(100) | CA(2) | CA(5) | CA(100) |
| A-H | 2.52 | 0.00 | 0.89 | 0.90 | 0.96 | 2.52 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.23 | 0.91 |
| B-H | 2.77 | 0.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.25 | 1.00 |
| C-H | 2.25 | 0.18 | 0.89 | 0.90 | 0.96 | 2.07 | 0.03 | 0.09 | 0.36 | 0.10 | 0.15 | 0.41 | 0.22 | 0.35 | 0.92 |
| A | 4.77 | 2.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.39 | 0.43 | 0.61 | 1.86 | 2.05 | 2.92 |
| B | 2.40 | 0.00 | 0.89 | 0.90 | 0.96 | 2.40 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.07 | 0.22 | 0.89 |
| C | 0.21 | 0.18 | 0.89 | 0.90 | 0.96 | 0.03 | 0.03 | 0.09 | 0.36 | 0.77 | 0.78 | 0.87 | 0.16 | 0.16 | 0.18 |

JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/03/22
 CALCD BY: KRC

Table 6-7. Conveyance Coefficient, C_v

| Type of Land Surface | C _v |
|--------------------------------------|----------------|
| Heavy meadow | 2.5 |
| Tillage/field | 5 |
| Riprap (not buried) | 180 |
| Short pasture and lawns | 7 |
| Nearly bare ground | 10 |
| Grassland/waterway | 15 |
| Paved areas and shallow paved swales | 20 |

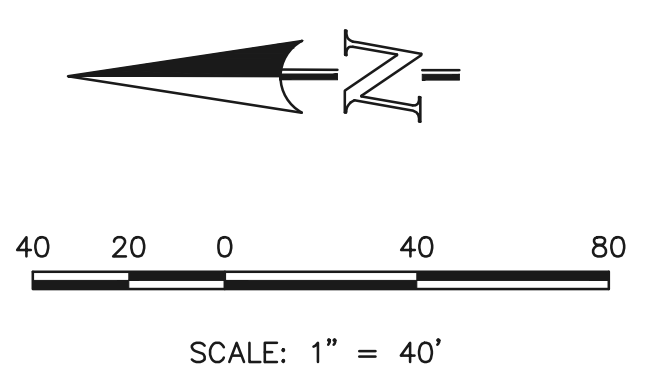
$$r_s = \frac{0.395(1.1 - C_v) \sqrt{L}}{S^{0.33}} \quad V = C_v S_w^{0.5} \quad T_c = LV$$

FINAL DRAINAGE REPORT - BASIN RUNOFF SUMMARY

| BASIN | CA(2) | CA(5) | CA(100) | OVERLAND | | | STREET / CHANNEL FLOW | | | Tc (min) | INTENSITY | | | TOTAL FLOWS | | | | |
|-------|-------|-------|---------|----------|-------------|-------------|-----------------------|-----------|----------------|----------|-----------|--------------|--------------|----------------|------------|------------|--------------|------|
| | | | | C(5) | Length (ft) | Height (ft) | Length (ft) | Slope (%) | Velocity (fps) | | Tc (min) | I(2) (in/hr) | I(5) (in/hr) | I(100) (in/hr) | Q(2) (cfs) | Q(5) (cfs) | Q(100) (cfs) | |
| A-H | 0.08 | 0.23 | 0.91 | 0.09 | 300 | 10 | 21.2 | 0 | 0.0% | 0.0 | 0.0 | 21.2 | 2.40 | 3.00 | 5.04 | 0.2 | 0.7 | 4.6 |
| B-H | 0.08 | 0.25 | 1.00 | 0.08 | 300 | 30 | 17.1 | 0 | 0.0% | 0.0 | 0.0 | 17.1 | 2.65 | 3.33 | 5.59 | 0.2 | 0.8 | 5.6 |
| C-H | 0.22 | 0.35 | 0.92 | 0.09 | 300 | 12 | 20.0 | 0 | 0.0% | 0.0 | 0.0 | 20.0 | 2.47 | 3.08 | 5.19 | 0.5 | 1.1 | 4.8 |
| A | 1.96 | 2.05 | 2.92 | 0.09 | 100 | 2 | 14.5 | 300 | 3.0% | 3.5 | 1.4 | 16.0 | 2.74 | 3.43 | 5.76 | 5.1 | 7.8 | 16.8 |
| B | 0.07 | 0.22 | 0.89 | 0.09 | 36 | 12 | 3.4 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.3 | 1.2 | 7.7 |
| C | 0.16 | 0.16 | 0.18 | 0.09 | 0 | 0 | 0.0 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.7 | 0.9 | 1.6 |

LEGEND

| | |
|------------------------------|---------------|
| DESCRIPTION | SYMBOL |
| EXISTING MINOR CONTOUR | (7126) |
| EXISTING MAJOR CONTOUR | (7126) |
| PROPERTY LINE/LOT LINE | --- |
| WATERS (ORDINARY HIGH MARK) | — |
| DIRECTION OF FLOW (EXISTING) | → |
| LOW POINT/HIGH POINT | LP/HP |



CLASSIC CONSULTING

WATERSIDE TOWNHOMES MONUMENT, CO
 FINAL DRAINAGE REPORT
 EXISTING CONDITIONS DRAINAGE MAP

| | | |
|------------------|---------------------|-----------------|
| DESIGNED BY: JDP | SCALE: (H) 1" = 40' | DATE: 11/8/22 |
| DRAWN BY: JDP | (V) 1" = N/A | SHEET 1 OF 1 |
| CHECKED BY: KRC | | JOB NO. 2588.00 |

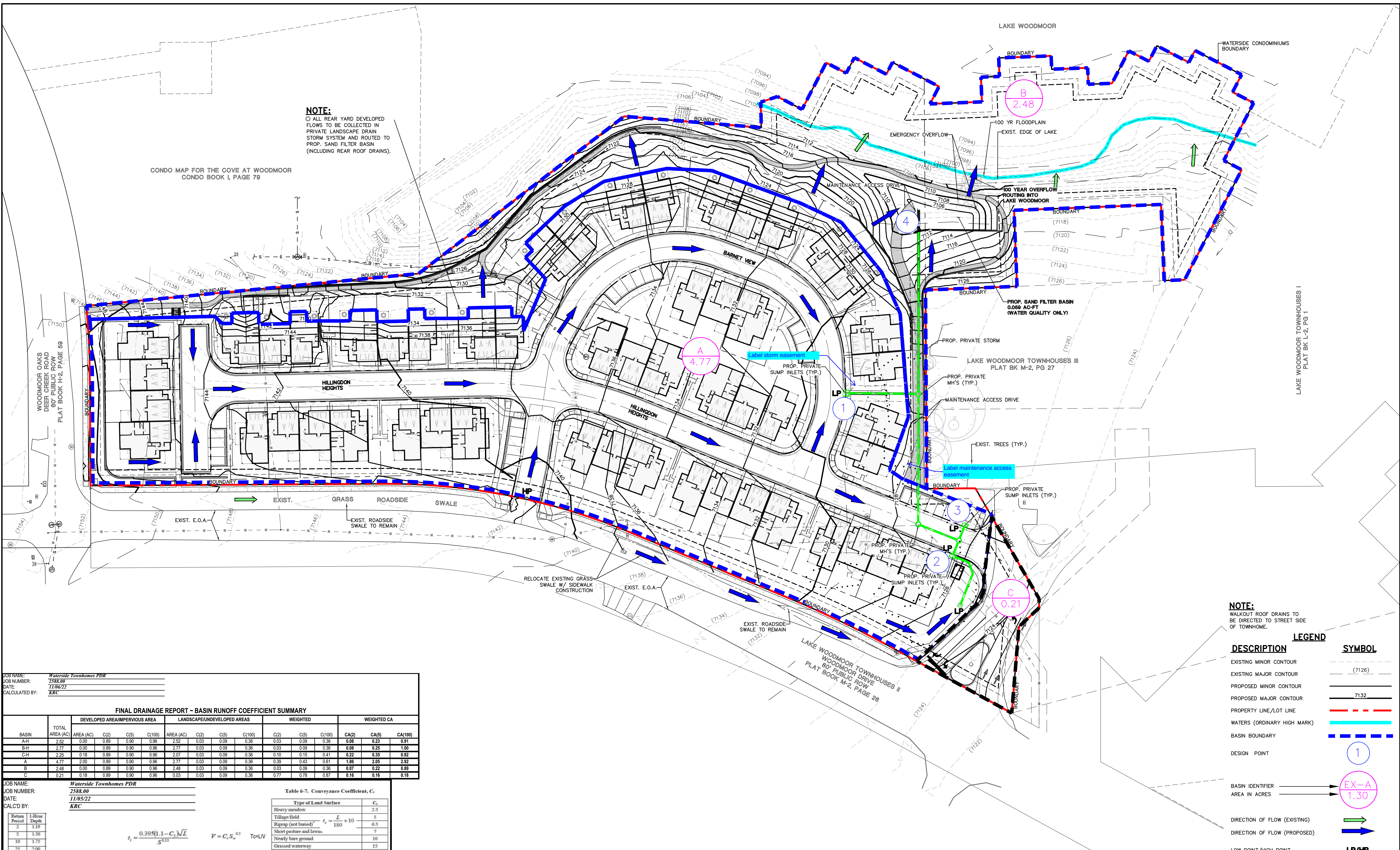
619 N. Cascade Avenue, Suite 200 (719) 785-0790
 Colorado Springs, Colorado 80903 (719) 785-0799 (Fax)

PROPOSED CONDITIONS

DRAINAGE MAP

NOTE:
 ALL REAR YARD DEVELOPED FLOWS TO BE COLLECTED IN PRIVATE LANDSCAPE DRAIN STORM SYSTEM AND ROUTED TO PROP. SAND FILTER BASIN (INCLUDING REAR ROOF DRAINS).

CONDO MAP FOR THE COVE AT WOODMOOR
 CONDO BOOK 1, PAGE 79



JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/06/22
 CALCULATED BY: KRC

FINAL DRAINAGE REPORT - BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | DEVELOPED AREA/IMPERVIOUS AREA | | | | LANDSCAPE/UNDEVELOPED AREAS | | | | WEIGHTED | | | WEIGHTED CA | | |
|-------|-----------------|--------------------------------|------|------|--------|-----------------------------|------|------|--------|----------|------|--------|-------------|-------|---------|
| | | AREA (AC) | C(2) | C(5) | C(100) | AREA (AC) | C(2) | C(5) | C(100) | C(2) | C(5) | C(100) | CA(2) | CA(5) | CA(100) |
| A-H | 2.52 | 0.00 | 0.89 | 0.90 | 0.96 | 2.52 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.23 | 0.91 |
| B-H | 2.77 | 0.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.08 | 0.25 | 1.00 |
| C-H | 2.25 | 0.18 | 0.89 | 0.90 | 0.96 | 2.07 | 0.03 | 0.09 | 0.36 | 0.10 | 0.15 | 0.41 | 0.22 | 0.35 | 0.92 |
| A | 4.77 | 2.00 | 0.89 | 0.90 | 0.96 | 2.77 | 0.03 | 0.09 | 0.36 | 0.39 | 0.43 | 0.61 | 1.86 | 2.92 | |
| B | 2.48 | 0.00 | 0.89 | 0.90 | 0.96 | 2.48 | 0.03 | 0.09 | 0.36 | 0.03 | 0.09 | 0.36 | 0.07 | 0.22 | 0.99 |
| C | 0.21 | 0.18 | 0.89 | 0.90 | 0.96 | 0.03 | 0.03 | 0.09 | 0.36 | 0.77 | 0.78 | 0.87 | 0.16 | 0.16 | 0.18 |

JOB NAME: Waterside Townhomes PDR
 JOB NUMBER: 2588.00
 DATE: 11/05/22
 CALCD BY: KRC

Table 6-7. Conveyance Coefficient, C_c

| Type of Land Surface | C _c |
|--------------------------------------|----------------|
| Heavy meadow | 2.5 |
| Tillage/field | 5 |
| Riprap (not buried) | 180 |
| Short pasture and lawns | 7 |
| Nearly bare ground | 10 |
| Grassed waterway | 15 |
| Paved areas and shallow paved swales | 20 |

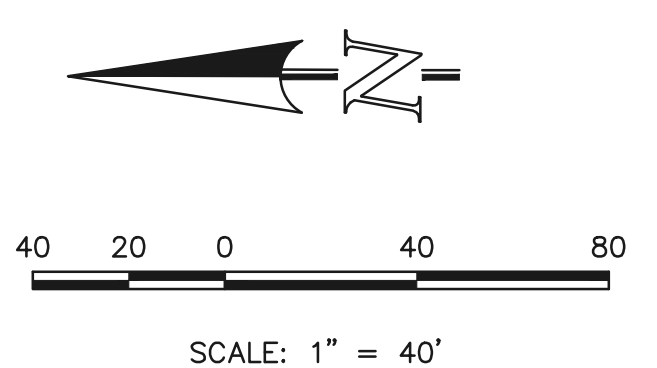
FINAL DRAINAGE REPORT - BASIN RUNOFF SUMMARY

| BASIN | CA(2) | CA(5) | CA(100) | OVERLAND | | | STREET / CHANNEL FLOW | | | Tc (min) | INTENSITY | | | TOTAL FLOWS | | | | |
|-------|-------|-------|---------|----------|-------------|-------------|-----------------------|-----------|----------------|----------|--------------|--------------|----------------|-------------|------------|--------------|-----|------|
| | | | | C(5) | Length (ft) | Height (ft) | Length (ft) | Slope (%) | Velocity (fps) | | I(2) (in/hr) | I(5) (in/hr) | I(100) (in/hr) | Q(2) (cfs) | Q(5) (cfs) | Q(100) (cfs) | | |
| A-H | 0.08 | 0.23 | 0.91 | 0.09 | 300 | 10 | 21.2 | 0 | 0.0% | 0.0 | 0.0 | 21.2 | 2.40 | 3.00 | 5.04 | 0.2 | 0.7 | 4.6 |
| B-H | 0.08 | 0.25 | 1.00 | 0.08 | 300 | 30 | 17.1 | 0 | 0.0% | 0.0 | 0.0 | 17.1 | 2.66 | 3.33 | 5.59 | 0.2 | 0.8 | 5.6 |
| C-H | 0.22 | 0.35 | 0.92 | 0.09 | 300 | 12 | 20.0 | 0 | 0.0% | 0.0 | 0.0 | 20.0 | 2.47 | 3.08 | 5.19 | 0.5 | 1.1 | 4.8 |
| A | 1.96 | 2.05 | 2.92 | 0.09 | 100 | 2 | 14.5 | 300 | 3.0% | 3.5 | 1.4 | 16.0 | 2.74 | 3.43 | 5.76 | 5.1 | 7.8 | 16.8 |
| B | 0.07 | 0.22 | 0.89 | 0.09 | 36 | 12 | 3.4 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.3 | 1.2 | 7.7 |
| C | 0.16 | 0.16 | 0.18 | 0.09 | 0 | 0 | 0.0 | 0 | 0.0% | 0.0 | 0.0 | 5.0 | 4.12 | 5.17 | 8.68 | 0.7 | 0.9 | 1.6 |

NOTE:
 WALKOUT ROOF DRAINS TO BE DIRECTED TO STREET SIDE OF TOWNHOME.

LEGEND

| DESCRIPTION | SYMBOL |
|------------------------------|--------|
| EXISTING MINOR CONTOUR | (7126) |
| EXISTING MAJOR CONTOUR | (7132) |
| PROPOSED MINOR CONTOUR | (7126) |
| PROPOSED MAJOR CONTOUR | (7132) |
| PROPERTY LINE/LOT LINE | (7132) |
| WATERS (ORDINARY HIGH MARK) | (7132) |
| BASIN BOUNDARY | (7132) |
| DESIGN POINT | (1) |
| BASIN IDENTIFIER | EX-A |
| AREA IN ACRES | 1.30 |
| DIRECTION OF FLOW (EXISTING) | (7132) |
| DIRECTION OF FLOW (PROPOSED) | (7132) |
| LOW POINT/HIGH POINT | LP/HP |



CLASSIC CONSULTING

WATERSIDE TOWNHOMES
 MONUMENT, CO
 FINAL DRAINAGE REPORT
 PROPOSED CONDITIONS DRAINAGE MAP

DESIGNED BY: JDP SCALE: (H) 1" = 40' DATE: 11/8/22
 DRAWN BY: JDP (V) 1" = N/A SHEET: 1 OF 1
 CHECKED BY: KRC JOB NO.: 2588.00

619 N. Cascade Avenue, Suite 200 (719) 785-0790
 Colorado Springs, Colorado 80903 (719) 785-0799 (Fax)

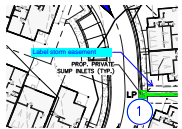
V3_Master Development Drainage Plan (MDDP).pdf Markup Summary

Callout (3)

osed gravel trail, no
to [yard?]ected in a
basin (with rear year
to the street side of

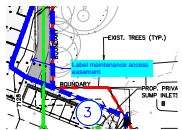
Subject: Callout
Page Label: 6
Author: CDurham
Date: 12/14/2022 5:04:35 PM
Status:
Color: ■
Layer:
Space:

yard?



Subject: Callout
Page Label: 25
Author: CDurham
Date: 12/14/2022 5:19:57 PM
Status:
Color: ■
Layer:
Space:

Label storm easement



Subject: Callout
Page Label: 25
Author: CDurham
Date: 12/14/2022 5:20:32 PM
Status:
Color: ■
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Space:

Label maintenance access easement