

RAINGARDEN CONSTRUCTION SPECIFICATIONS

Chapter 5. Environmental Site Design Nonstructural and Micro-Scale Practices

M-7. Rain Gardens

A rain garden is a shallow, excavated landscape feature or a saucer-shaped depression that temporarily holds runoff for a short period of time. Rain gardens typically consist of an absorbent-planted soil bed, a mulch layer, and planting materials such as shrubs, grasses, and flowers. An overflow conveyance system is included to pass larger storms. Captured runoff from downspouts, roof drains, pipes, swales, or curb openings temporarily ponds and slowly filters into the soil over 24 to 48 hours.

Applications:

Rain gardens can be primary or secondary practices on residential, commercial, industrial, or institutional sites. This practice is typically used to treat runoff from small impervious areas like rooftops, driveways, and sidewalks. Rain gardens can also be used in retrofitting and redevelopment applications and in areas where existing slopes require energy dissipation.

Performance:

The P_t values determined by Equation 5.3 may be applied to the ESD sizing criteria when rain gardens are designed according to the guidance provided below. R_e requirements are also met when the P_t from Equation 5.3 meets or exceeds the soil specific recharge factor listed in Section 2.2.

Constraints:

The following constraints are critical when considering the use of rain gardens to capture and treat stormwater runoff:

- Topography:** Rain gardens require relatively flat slopes (< 5%) to accommodate runoff filtering through the system. Some design modifications can address this constraint through the use of infiltration trenches, terracing, and/or block retaining walls on moderate slopes.
- Soils:** Clayey soils or soils that have been compacted by construction equipment greatly reduce the effectiveness of this practice. Loosening of compacted soils may improve drainage capability.
- Drainage Area:** The drainage area to a rain garden should be relatively small, typically less than 2,000 square feet.
- Infrastructure:** The location of existing and proposed buildings and utilities (e.g., water supply wells, sewer, storm drains, electricity) will influence rain garden design and construction. Landscape designers should also consider overhead electrical and telecommunication lines when selecting trees to be planted.

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Mayland. Neatly trimmed shrubs, a crisp lawn edge, stone retaining walls, and other devices can be used to keep a rain garden neat and visually appealing.

Construction Criteria:

The following items should be addressed during the construction of projects with rain gardens:

- Erosion and Sediment Control:** Rain gardens shall not be constructed until the surrounding drainage area is stabilized. During construction, runoff should be diverted and the use of heavy equipment avoided to minimize compaction.
- Planting Soil:** Planting soil should be mixed on-site prior to installation. If poor soils are encountered beneath the rain garden, a four-inch layer of washed gravel (1/2 to 3/4 inch preferred) may be used below the planting soil mix.
- Landscape Installation:** The optimum planting time is during the Fall. Spring planting is also acceptable but may require watering.

Inspection:

- Regular inspections shall be made during the following stages of construction:
 - During excavation to subgrade and placement of planting soil.
 - Upon completion of final grading and establishment of permanent stabilization.

Maintenance Criteria: The following items should be addressed to ensure proper maintenance and long-term performance of rain gardens:

- Privately owned practices shall have a maintenance plan and be protected by easement, deed restriction, ordinance, or other legal measures preventing its neglect, adverse alteration, and removal.
- Rain garden maintenance is generally no different than that required of other landscaped areas.
- The top few inches of the planting soil should be removed and replaced when water ponds for more than 48 hours. Silts and sediment should be removed from the surface of the bed as needed.
- Where practices are used to treat areas with higher concentrations of heavy metals (e.g., parking lots, roads), mulch should be replaced annually. Otherwise, the top two to three inches should be replaced as necessary.
- Occasional pruning and replacement of dead vegetation is necessary. If specific plants are not surviving, more appropriate species should be used. Watering may be required during prolonged dry periods.

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PLANT SCHEDULE (TYPICAL)

Code	Quantity	Scientific Name/Common Name	Size	Condition	Spacing
ANA/P	4	Aster novae angliae/Purple Dome New England Aster	1Gal	Container	18" O.C.
CA	2	Calamagrostis x acutiflora/Karl Forester's Feather Reed Grass	1Gal	Container	5' O.C.
IP	5	Iris pseudacorus/Yellow Flag Iris	1Gal	Container	18" O.C.
PA	4	Pennisetum alopecuroides/Hardy Fountain Grass	1Gal	Container	30" O.C.
PC/R	1	Panicum virgatum/Red Switch Grass	1Gal	Container	30" O.C.

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Location:

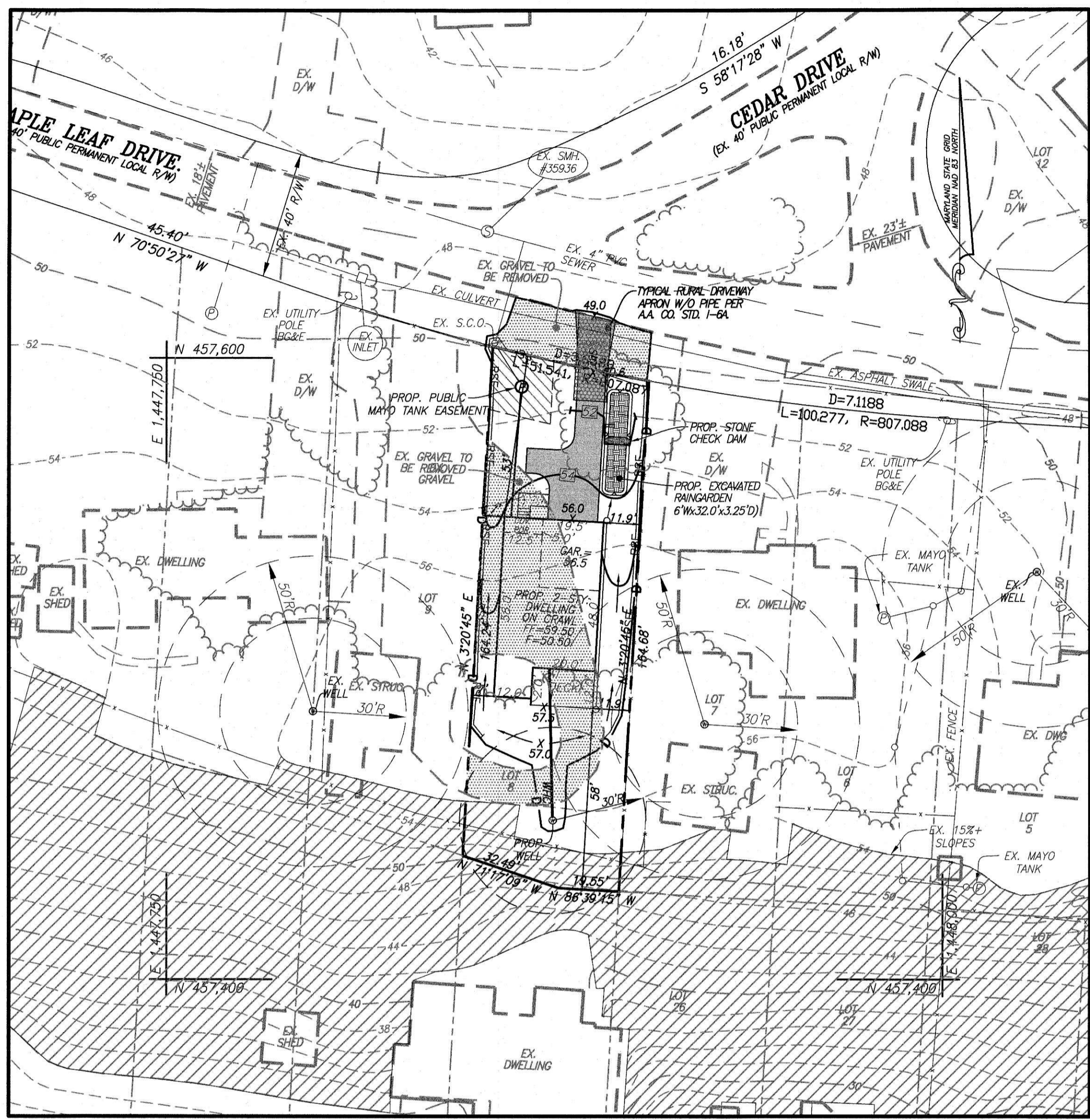
- Last-but not least, use of rain gardens is not recommended in residential subdivisions due to removal by homeowners. If used on a lot-by-lot basis, educating the homeowners will be needed to prevent removal.
- Rain garden excavation in areas with heavy tree cover may damage adjacent tree root systems.

Design Guidance:

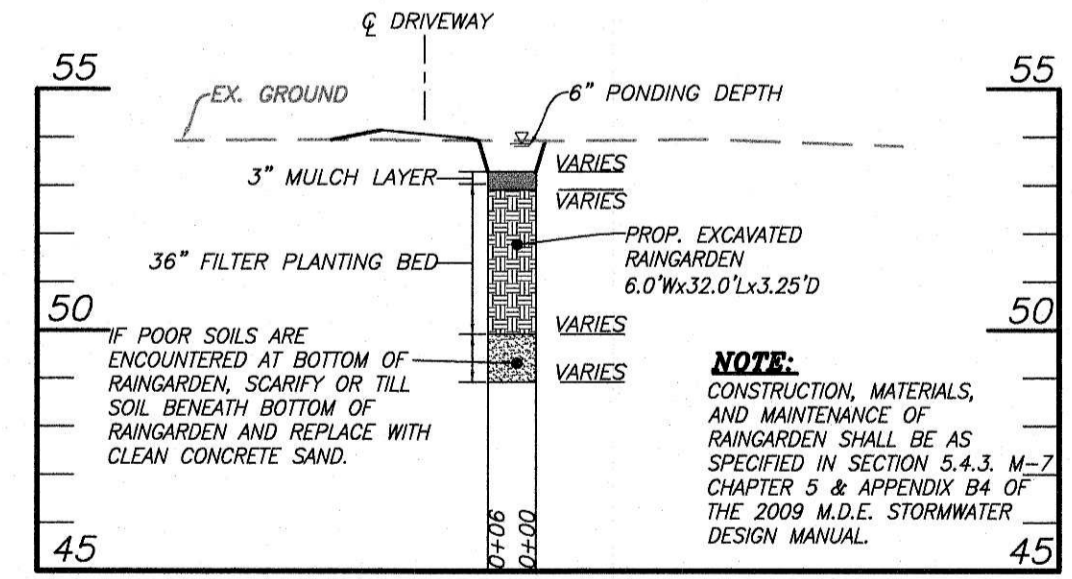
The following conditions should be considered when designing rain gardens:

- Conveyance:** Runoff shall enter, flow through, and exit rain gardens in a safe and non-erosive manner. Energy dissipation shall be provided for the downspout discharges using a plunge area, rocks, splash blocks, stone dams, etc. Runoff shall enter a rain garden at the surface through grass swales and/or a gravel bed. A minimum internal slope of one percent should be maintained and a shallow berm surrounding the rain garden is recommended to avoid short-circuiting. For sloped applications, a series of rain gardens can be used as "scalped" terraces to convey water non-erosively.
- Treatment:** Rain gardens shall meet the following conditions:
 - The drainage area to a rain garden serving a single lot in a residential subdivision shall be 2,000 ft^2 or less. The maximum drainage area to a rain garden for all other applications shall be 10,000 ft^2 . Micro-bioretenion (M-6) or bioretention (F-6) should be considered when these requirements are exceeded.
 - The surface area (A_p) of rain gardens shall be at least 2% of the contributing drainage area. A P_t value based on Equation 5.3 shall be applied to the contributing drainage area. Temporary storage of the ESD, may be provided above the facility with a surface ponding depth of 6 inches or less.
 - $P_t = 10^{-4} \times \frac{A_p}{DA}$ (Equation 5.3)
 - Excavated rain gardens work best where HSG A and B are prevalent. In areas of HSG C and D, at-grade applications or soil amendments should be considered.
 - A minimum six to twelve-inch layer of planting soil shall be provided.
 - A mulch layer two to three inches deep shall be applied to the planting soil to maintain soil moisture and to prevent premature clogging.
 - The planting soil and mulch shall conform to the specifications found in Appendix B.4.
- Landscaping:** Landscaping plans shall clearly specify how vegetation will be established and managed. A rain garden should be located in full to partial sun, at least two feet above the seasonal high water table and be 12 to 18 inches deep. Plants selected for use in a rain garden should tolerate both saturated and dry conditions and be native or adapted to

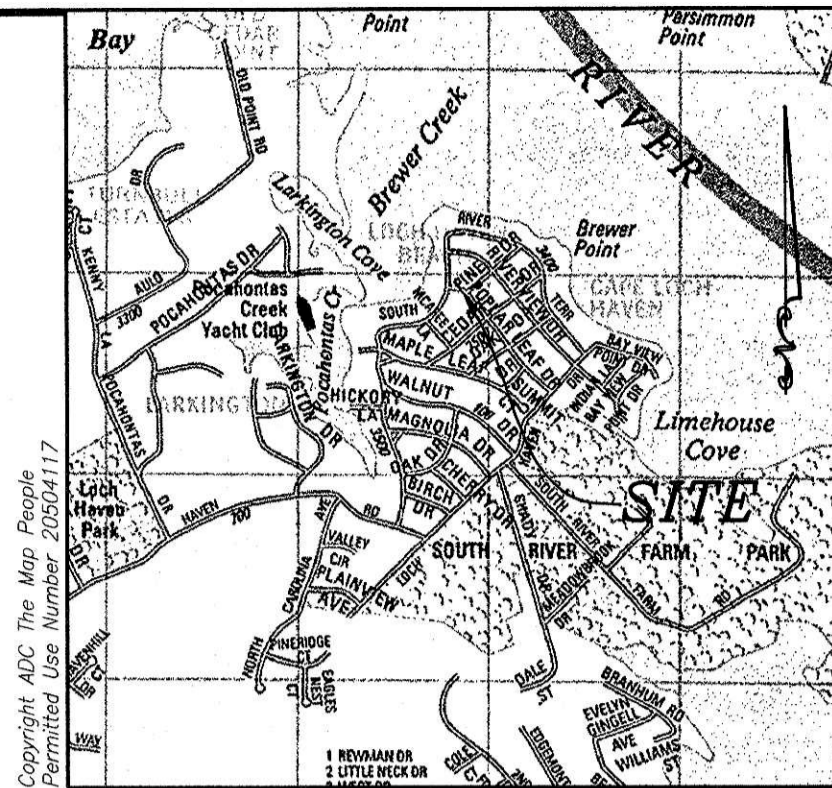
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DEVELOPMENT PLAN VIEW
SCALE: 1" = 30'



RAINGARDEN CROSS-SECTION
SCALE: 1" = 4' (V)
1" = 40' (H)



VICINITY MAP
SCALE: 1" = 2000'

- GENERAL NOTES**
- Notify the Anne Arundel County Department of Planning and Code Enforcement, Environmental Programs, (410)222-7784 (48) forty-eight hour before beginning the work shown on these plans.
 - The existing utilities and obstructions shown are from the best available records and shall be verified by the contractor prior to construction. Necessary precautions shall be taken by the contractor to protect existing services and mains, and any damage to them shall be repaired immediately at his own expense.
 - It shall be distinctly understood that failure to mention specifically any work which would normally be required to complete the project shall not relieve the contractor of his responsibility to complete such work.
 - Temporary sediment control measures shall be maintained until all contributing areas are graded and stabilized.
 - The property and topographic information shown herein is based on field surveys performed by Boyd & Dowgiallo, P.A. and the A.A.Co. GIS Site.
 - All disturbed areas shall be seeded or better as per plans.
 - The user is responsible to verify all information shown on these plans.
 - The contractor shall note that in case of a discrepancy between the scaled and the computed dimensions shown on these plans: the computed dimensions shall govern.
 - Fill dirt on the high side of the trench during utility construction.
 - The grading quantities shown herein are for permit purposes only and should not be used for bidding purposes.
 - All construction shall be in conformance with the "2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control."
 - For exact building dimensions, see Architectural Plans, by others.
 - All easements, irrespective of public or private disposition, are to be permanent unless otherwise labeled. All private easements have been labeled as such.
 - All roof drains shall be directed to the proposed SWM facilities as shown on sheet 3 of these plans.
 - This project is located within the South River Watershed.
 - The boundary lines, bearings, and distances as shown hereon for all adjacent parcels, rights-of-way, etc. are taken from deed platting's only. This drawing does not represent a field run survey of any parcel except Tax Map 60 Block 4 Parcel 22, Lot 8 as shown hereon.
 - The property shown hereon is not located within a Flood Hazard Zone, as shown on the FEMA Flood Insurance Maps. See F.E.M.A. Flood Map 240300242F, dated February 18, 2015.
 - For most recent title, see L 37036, F 256.

LEGEND

- Existing Curb
- Existing Contour
- Existing Wire Fence
- Existing Wood Fence
- Existing Woods Line
- Existing Telephone Line
- Existing Electric Line
- Existing Stormdrain Inlet
- Existing Stormdrain Manhole
- Existing Sewer Manhole
- Existing Sewer Cleanout
- Existing Telephone Manhole
- Existing Utility Pole
- Existing Guy Wire
- Existing Zoning Line
- Existing Soils Line
- Critical Area Line
- Proposed Contour
- Proposed Reinforced Silt Fence
- Proposed Limit of Disturbance
- Ex. Gravel to be Removed

SITE ANALYSIS

Zoning	R5
Critical Area Classification	LDA
Total Site Area	8,127 Sq.Ft.±

CRITICAL AREA TABULATION

Zoning	R5
Critical Area Classification	LDA
Total Site Area	8,127 Sq.Ft.±
Total Critical Area	8,127 Sq.Ft.±
Existing Developed Woodlands (Within C.A.)	3,960 Sq.Ft.±
Maximum Clearing Allowed (Within C.A.)	N/A
Proposed Clearing (Within C.A.)	2,032 Sq.Ft.±
Reforestation Required (Prop. Clearing x 1.0)	2,032 Sq.Ft.±
Afforestation Threshold	N/A
Afforestation Provided	N/A
Existing Lot Coverage	2,724 Sq.Ft.
Existing Lot Coverage to be Removed	2,724 Sq.Ft.
Maximum Lot Coverage	2,540 Sq.Ft. (31.25%)
Proposed Lot Coverage	2,384 Sq.Ft.± (1,656 Sq.Ft.± Dwelling + 673 Sq.Ft. D/W + 55 Sq.Ft. S/W/Sloop)

BUILDING PERMIT SITE DATA

Lot	Area (Sq. Ft.)	Prop. Cover (Bldg)	Prop. Cover (Impervious)	Prop. Total (Prop. Bldg Hgt.)
8	8,127 Sq.Ft.	1,656 Sq.Ft.±	2,384 Sq.Ft.± or (29.3%)	See Arch Plans

BUILDING PERMIT #B0240

BUILDING PERMIT & SITE DEVELOPMENT PLAN

LOT 8, BLOCK Q, LOCH HAVEN BEACH

JOB NO. 20-167
SHEET NO. 1 OF 1
DRAWN BY: LAK/JTFJ
CHECKED BY: JET
DATE: JULY, 2022
PERMIT #G0201

FIRST DISTRICT

PLAT BOOK 19 PAGE 47
TAX MAP 60, BLOCK 4, PARCEL 22
ZONED R5

ANNE ARUNDEL COUNTY, MD 21037

DEVELOPER
REAL ESTATE GENERAL, LTD
2137 Defense Highway
Crofton, Maryland 21114
(410) 721-9230

BOYD & DOWGIALLO, P.A.
ENGINEERS*SURVEYORS*PLANNERS
412 Headquarters Drive, Suite 5
Millersville, Maryland 21108
(410) 729-1234

NO.	DATE	BY	REVISION	APPROVED	DATE