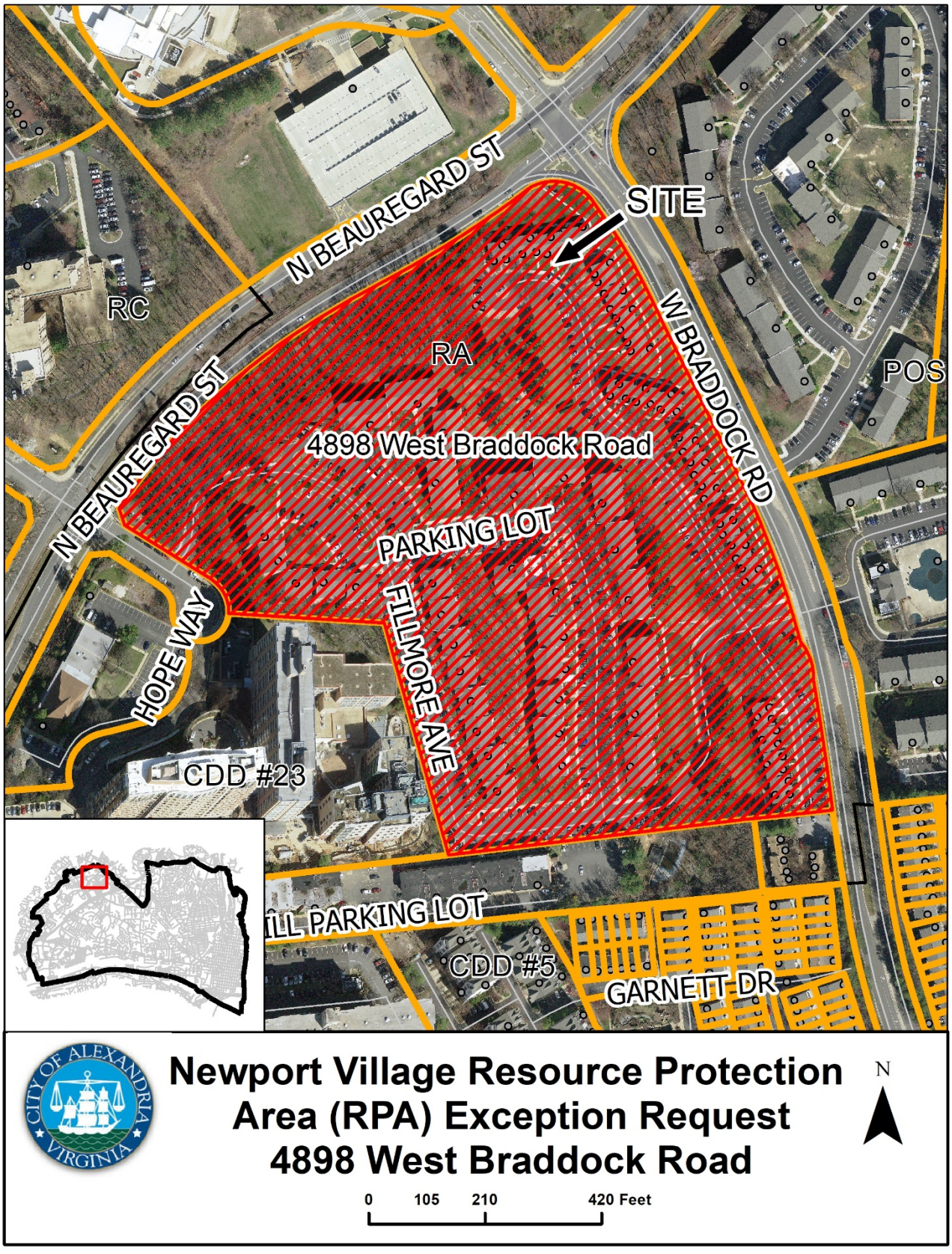
DOCKET ITEM #13
Resource Protection Area Exception Request
4898 West Braddock Road - Newport Village

Application	**General Data**	
Public Hearing and consideration of a request for an exception, pursuant to Zoning Ordinance Section 13-119, to allow a new encroachment of up to 4,791 square feet of impervious surface in a Resource Protection Area (RPA) in connection with the future redevelopment of a multifamily residential property	**Planning Commission Hearing:**	February 4, 2020
	City Council Hearing:	N/A
Address: 4898 West Braddock Road	**Zone:**	RA/Multifamily
Applicant: UDR, represented by Kenneth W. Wire, attorney	**Small Area Plan:**	Alexandria West

Staff Recommendation: DENIAL
Staff Reviewers: Jesse Maines, Stormwater Management Division Chief, T&ES, jesse.maines@alexandria.va.gov Melanie Mason, Principal Planner, T&ES, melanie.mason@alexandriava.gov Maya Contreras, Principal Planner, P&Z, maya.contreras@alexandriava.gov

Environmental Policy Recommendation:
At the December 16, 2019, Environmental Policy Commission (EPC) meeting, the members of the Commission voted 6-5 to support the staff recommendation to deny the exception request at 4898 W. Braddock Road.


N BEAUREGARD ST
SITE
RC
RA
W BRADDOCK RD
POS
N BEAUREGARD ST
4898 West Braddock Road
PARKING LOT
FILLMORE AVE
HOPE WAY
CDD #23
ILL PARKING LOT
CDD #5
GARNETT DR
CITY OF ALEXANDRIA VIRGINIA
Newport Village Resource Protection Area (RPA) Exception Request
4898 West Braddock Road
N
0 105 210 420 Feet

I. SUMMARY

A. Recommendation

Staff recommends ***DENIAL*** of the UDR (applicant) request for an exception to the requirements of Article XIII of the Alexandria Zoning Ordinance for a new encroachment of 4,791 square feet of new impervious surface in a Resource Protection Area (RPA) associated with DSUP2018-0018 for the Newport Village redevelopment. The proposed layout provided in the request for exception does not satisfy requisite criteria in the Zoning Ordinance to grant the exception as discussed below.

B. General Description

The applicant has proposed to redevelop a portion of its existing multifamily residential community, known as Newport Village, with two new multifamily buildings and an underground garage on a portion of the property addressed as 4898 W. Braddock Road (the "site") near the corner of North Beauregard Street and West Braddock Road. The redevelopment plans are in the early stages of City staff's review and have not progressed to public hearings before the Planning Commission or City Council. While the draft Concept 2 plan showing the proposed encroachment has not been formally submitted to the City for review, select sheets were submitted to the City for consideration of the Water Quality Impact Assessment (WQIA), as required for the request for an exception.

A natural, perennial stream is located within the median of North Beauregard Street near the future project site. On each side of this stream, encompassing Beauregard Street and portions of adjacent properties, is a previously identified 100-foot RPA buffer. The RPA buffer is depicted on the City's 2004 RPA map consistent with the Chesapeake Bay Act and attendant regulations as incorporated into Article XIII of the Zoning Ordinance, given that the City is located within the Chesapeake Bay watershed. The RPA extends approximately 39-59 feet into the subject property.

The applicant is requesting an exception to the following section of the Zoning Ordinance:

- 13-107 - Development, redevelopment, and uses permitted in RPAs.

II. BACKGROUND

A. Procedural Background

The City has been delegated as the authority by the Commonwealth of Virginia to safeguard natural areas through the application of the Chesapeake Bay Preservation Act ("Bay Act") and attendant regulations through incorporation of these requirements into Article XIII of the Alexandria Zoning Ordinance, the Environmental Management Ordinance (EMO).

RPA Definition

RPAs are required under Virginia Administrative Code Chapter 9VAC25-830: Chesapeake Bay Preservation Area Designation and Management Regulations and the Bay Act. The overarching goal of the Bay Act is to protect RPAs to the maximum extent practicable and prevent substantial damage to the water quality of the Chesapeake Bay and its tributaries.

Per Section 13-105, RPAs consist of sensitive land that has either an intrinsic water quality value due to the ecological and biological processes such land performs or that is sensitive to uses or activities such that the use results in significant degradation to the quality of state waters. In their natural condition, these lands provide for the removal, reduction, or assimilation of nonpoint source pollution entering the bay and its tributaries. An area of land that includes any one of the following land types shall be considered to be within the RPA:

(1) Tidal wetlands;
(2) Tidal shores;
(3) Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow;
(4) Water bodies with perennial flow.
(5) A buffer area of 100 feet (measured from top of bank) located adjacent to and landward of the components listed above and along both sides of any water body with perennial flow, to include the environmental feature, constitutes the RPA.

In this case, the RPA feature is attributed to the perennial stream located in the median of North Beauregard and its associated 100-foot buffer.

Allowable Redevelopment within the RPA

Per Section 13-107(C)(2), redevelopment may be allowed provided that the following criteria are met:

(1) There is no increase in impervious surface cover;
(2) There is no further encroachment within the RPA; and
(3) The proposed redevelopment is consistent with the city master plan.

Certain activities such as trails, utility work and roads are permitted in the RPA provided any impervious area is restricted to the minimum amount necessary for the activity.

Exception Request Review Process

The Zoning Ordinance allows for the filing of requests with the City for exceptions to RPA provisions. Consistent with Section 13-119 (B), the Department of Transportation & Environmental Services (T&ES) reviews such exception requests based on criteria included therein and renders a recommendation. Per Section 13-119(G), requests for an exception to the RPA provisions of the EMO are first heard by the Environmental Policy Commission (EPC). The EPC can recommend support, denial or modification of the exception. The EPC recommendation, along with T&ES staff recommendation, are then brought to the Planning Commission, which is the body that will make the formal determination on the request.

Exception Criteria to be Considered

To grant an exception to the RPA provisions, Section 13-119(B)[1] of the EMO, the reviewing body must find that the applicant has proven each of the following criteria by a preponderance of the evidence:

(1) Granting the exception will not confer upon the applicant any special privileges that are denied to other property owners in the CBPA [Chesapeake Bay Preservation Area] overlay district;
(2) The exception is not based upon conditions or circumstances that are self-created or self-imposed, nor does the exception arise from conditions or circumstances either permitted or noncomplying that are related to adjacent parcels;
(3) The exception is the minimum necessary to afford relief;
(4) The exception will be consistent with the purpose and intent of the overlay district, and not injurious to water quality, the neighborhood or otherwise detrimental to the public welfare;
(5) Reasonable and appropriate conditions are imposed, as warranted, to prevent the allowed activity from causing degradation of water quality.

Economic hardship alone is not sufficient reason to grant an exception per Section 13-119(C). The above criteria are the only ones that may be considered when reviewing the merits of an exception request.

B. Site Context

The site of the future new redevelopment consists of 4.19 acres and is located southeast of the intersection of North Beauregard Street and Braddock Road. A natural, perennial stream is located nearby within the median of North Beauregard Street with portions being previously piped. This portion of the stream channel averages 9 feet wide, is approximately 850 total linear feet, and is a tributary of Four Mile Run. On the north and south banks, the stream is bound by North and South Beauregard Street. On each side of this stream there is a 100' RPA buffer measured from the top of bank spanning Beauregard Street and extending into the adjacent properties, with the RPA extending approximately 39-59 feet into the Newport Village redevelopment site. As it exists today, that site consists of garden style apartments, an access road and parking lot, sidewalks, and apartment amenities. The area of total RPA on the site is approximately 30,492 square feet and currently consists of 432 square feet of impervious area, 9,583 square feet of pervious area, and 20,473 square feet of forested area.

C. Exception Description

Per the EMO, redevelopment may be only allowed in the RPA if there is no increase in impervious surface cover, there is no further encroachment within the RPA, and the proposed redevelopment is consistent with the city master plan.

[1] The provisions of the EMO are based upon the regulations found in 9VAC25-830-150 of the Virginia Administrative Code.

The applicant has requested an exception to Section 13-107 of the Alexandria Zoning Ordinance to allow a new encroachment in the RPA and an increase in impervious surface cover.

The proposed new encroachment would consist of 4,791 square feet of new impervious surface for a total encroachment (including existing impervious surface) in the RPA of 5,226 square feet of impervious surface. The existing building that is partially located in the RPA was constructed in 1968, prior to the existing RPA protection requirements for perennial streams enacted in 2004. The total proposed disturbance in the RPA in connection with the redevelopment, including earthwork, utility work, tree removal, and the previously mentioned new and existing impervious surface area (consisting of buildings and sidewalks) would be approximately 15,681 square feet.

III. STAFF ANALYSIS

A. Compliance with Environmental Management Ordinance

The requested exception does not meet the criteria outlined in Section 13-119 of the EMO, and therefore does not meet the requirements for approval.

The request for an additional 4,791 square feet of new impervious surface in an RPA is considered an extremely large exception request. In general, exceptions are intended to be used only for very small areas where no other option for development is available.

The applicant has also stated that the encroachment is necessary for development because it is not economically feasible to develop the site outside of the RPA. However, economic hardship alone cannot be the only reason for an exception to be approved. No other reason has been given as to why the encroachment is necessary for development.

Exception Criteria (1). The exception must be the minimum necessary to afford relief.

Projects proposing encroachments into the RPA must demonstrate that the project is only considering the minimum encroachment necessary to afford relief. According to state guidance on exceptions, when considering the minimum necessary to afford relief, the size of the structure, the types of proposed structures, and the placement of the structures in relation to the size, layout and location of the lot or parcel must be considered. If alternative location, sizing, or orientation options to avoid the need for an exception are available, then the finding of "minimum necessary to afford relief" has not been met.

The existing site is already developed with a much smaller encroachment in the RPA constructed prior to Bay Act requirements which demonstrates that the site has the ability to be developed with a smaller footprint in the RPA. In addition, multiple iterations of different layouts for the redevelopment should have been provided for consideration to demonstrate that this draft Concept 2 configuration included in the request for exception is the minimum amount of impervious surface needed for development. No such layouts have been provided as part of the official exception request; however, in previous concept submissions, the applicant provided

layouts that removed the existing building from the RPA and added no new impervious area to the RPA. The existence of these layouts in previous submissions clearly demonstrates it is possible to develop the site without additional encroachments.

In addition, in a letter dated September 5, 2019 ("RPA Waiver Request") to Karl Moritz and Yon Lambert, Kenneth Wire, the attorney for UDR stated: "If the EPC finds that is cannot recommend support of the proposed encroachment, UDR will proceed with a slightly revised project layout which removes all additional encroachments from the RPA".

Information contained in the applicant's own documents therefore clearly demonstrate that the requirement for the "minimum necessary to afford relief" has not been met.

Although the applicant has sought justification for the encroachment in part through the removal of the traffic "slip lanes" on West Braddock Road outside of the project site, the actual new encroachment in the RPA constitutes only the new building area. The existing road encroachment is in a different area constituting a separate encroachment, on public property, and as a public street is allowed in the RPA per Section 13-123 of the EMO without the requirement for an exception approval. A new building encroachment of 4,791 square feet on private property is not allowable in the RPA without an exception approval. In addition, this amount of proposed new encroachment is considered an extremely large increase in impervious area and a large loss of RPA buffer. Finally, the removal of impervious surface associated with the "slip lanes" constitutes a separate, allowable encroachment in a different area of the RPA and is not a factor in the approval of a new encroachment when considering the criteria of minimum necessary to afford relief.

Exception Criteria (2). The exception must not be based upon conditions or circumstances that are self-created or self-imposed, nor can the exception arise from conditions or circumstances either permitted or noncomplying that are related to adjacent parcels.

The property owner created the need for the exception by proposing construction within the RPA when there are development options that do not require an encroachment in the RPA. The applicant previously submitted a concept plan to the City with no new encroachments in the RPA clearly demonstrating the proposed layout associated with this request is self-created.

The applicant has stated that the proposed layout is necessary for emergency vehicle access. However, the applicant has not provided any documentation to justify that this is the only acceptable layout for access.

In addition, the adjacent properties are all developed with buildings outside of the RPA. This site is the only one with an existing encroachment in this RPA. Approving a larger RPA encroachment would be inconsistent with the existing conditions of the adjacent parcels.

Exception Criteria (3). Granting the exception must not confer upon the applicant any special privileges that are denied to other property owners in the CBPA overlay district.

This criterion is intended to ensure that an exception request does not give the applicant something that has been denied to others in similar situations. While there exists a very small

number of minor encroachments that have been approved in other nearby local jurisdictions, these are not only inconsistent in scale to this exception request but are also of a different nature. The City has never approved an exception within its CBPA overlay district since the ordinance update in 2004 demonstrating these privileges have been denied to other property owners within the City of Alexandria.

Although no other exception requests have been formally submitted by other property owners in the City of Alexandria, numerous applicants have submitted initial concept plans for review with additional encroachments located within the RPA. It is standard City practice to work with developers during the site plan submittal process to avoid any new encroachments or the need to seek a formal exception. In addition, City practice also encourages the removal of existing encroachments and typically requires their removal and new plantings to help restore the RPA to a natural state.

For example, DSUP2018-00006, Public Storage, initially submitted a site plan utilizing the existing impervious area footprint located on the site for redevelopment. Through the site plan review process staff worked with the applicant to find a more suitable layout for the property that respected the RPA. Ultimately, a plan was approved that stipulates removal all existing impervious area from the RPA, removal all invasive species, replanting the RPA with native vegetation, and dedicating the land to the City.

The applicant has sought to justify the proposed encroachment in their application by asserting that the removal of the slip lanes on West Braddock Road in the RPA constitutes an overall smaller encroachment. However, this is an inaccurate description of a new encroachment. Individual encroachments are separated by area. In this case the new encroachment request is for 4,791 square feet of building area. The slip lanes are a separate, existing encroachment that is not part of the site and is not related to this new encroachment request.

Granting this exception would confer special privileges to the applicant that have been denied to other property owners in the City. In this case, it would set a precedent in the City that could allow for future new encroachments in the RPA.

Exception Criteria (4). The exception must be consistent with the purpose and intent of the overlay district, and not injurious to water quality, the neighborhood or otherwise detrimental to the public welfare.

This exception is not consistent with the intent of the CPBA overlay district defined in Section 13-105. Per Section 13-101 of the Zoning Ordinance, the purpose of the overlay district is to safeguard the waters of the Commonwealth from pollution and to prevent any increase in pollution of state waters. As shown in the submitted WQIA, the development proposes a total of 5,226 square feet of impervious surface in the RPA, an 1,100% increase. Impervious areas are a documented source of stormwater pollution and allowing such a sizable increase in impervious area in a buffer zone that exists to protect water quality would be detrimental to the public welfare.

Applicant has stated that stormwater treatment should be considered in their application. However, all redevelopment projects are required to treat stormwater runoff using stormwater Best Management Practices (BMPs). The proposed BMPs for stormwater treatment are a requirement of the development regardless of whether or not an encroachment is allowed within the RPA.

Exception Criteria (5). Reasonable and appropriate conditions are imposed, as warranted, to prevent the allowed activity from causing degradation of water quality.

This criterion is intended to ensure that conditions are imposed to, among other things, protect water quality and the functionality of an RPA as if it were undisturbed. This criterion must be considered as a whole with the previous four required criteria for approval as all five must be met to meet the approval threshold. In addition, proposed mitigation is not a reason to approve an exception, it is a condition imposed to alleviate the damage to water quality should an exception be found to meet the exception criteria and subsequently be approved. An applicant may propose extensive amounts of mitigation and still not meet the four preceding criteria, resulting in an exception request that does not meet the requirements for approval. Although the applicant has proposed mitigation that would provide a benefit to water quality, it does not justify the addition of a large new encroachment in the RPA, especially given that the request does not satisfy the preceding criteria one through four.

The applicant has submitted several options for mitigation; however, they do not equate to the function of an undisturbed RPA or the loss of RPA buffer. The mitigation options proposed by the applicant are discussed below.

<u>Stream Bank Restoration</u>
The City recently completed the *Phase III Stream Assessment: Stream Restoration and Outfall Stabilization Feasibility Study (February 2019)* to identify area for future restoration. While Strawberry Run and Taylor Run were identified as the top two priority sites and are currently in the design phase, this study did not identify this stream reach as a candidate for restoration.

In response to this exception request, staff worked with the City's consultant to determine if the proposed stream restoration would be feasible and beneficial to perform. The consultant with extensive stream restoration knowledge that include Rosgen techniques of natural channel design visited the site to perform the assessment.

Using the *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (Schueler and Stack, 2014) developed by the Chesapeake Bay Program for restoration projects to achieve Bay pollution reductions and completing a Bank Assessment for Non-point source Consequences of Sediment (BANCS) assessment, the consultant determined there was a potential to reduce approximately 16.5 lbs./year of phosphorous that may be achieved if a stream restoration project was feasible. This is a very low amount of phosphorus removal for a stream restoration project. By comparison, the City's Strawberry Run Stream Restoration Project that is currently in design to restore approximately 900 linear feet of stream is slated to remove over 340 lbs./year of phosphorus using the BANCS assessment when completed.

There are numerous site and anticipated engineering and construction constraints that could affect the feasibility of a stream restoration or the costs for design and construction that includes the following: (1) given the steep banks and location of North Beauregard Street, access to the stream is limited and would require lane closures and would preclude construction of a suitable floodplain for natural channel restoration and (2) removal of individual mature trees and their critical root zones would likely compromise the adjacent road slope stability.

Finally, the estimated cost of a stream restoration for this reach far exceeds a cost benefit ratio that would be considered for a stream restoration project. The City's consultant provided an anticipated design and construction cost of $1.78 million to restore this 850 linear foot stretch. This estimate is somewhat consistent with other stream restoration projects in the City; however, the site constraints would increase the cost estimate greatly. Therefore, the City would consider this cost to likely be lower than a cost estimate developed after the completion of a feasibility study and concept design using the City's CIP project estimating approach. Given that the project may reduce approximately 16.5 lbs./year of phosphorus, the cost per pound would be nearly $108,000 to remove one pound of phosphorus. The Virginia Department of Environmental Quality (VDEQ) has a threshold of $50,000 per pound of phosphorus to even consider a project. Additionally, the City's Strawberry Run Stream Restoration Project (which includes an $800,000 state matching grant for a total project cost of $1,600,000) is projected to remove 340 lbs./year of phosphorus at a cost of just over $5,000 to remove one pound of phosphorus. UDR's exception request letter (November 13, 2019) commits $800,000 for a "stream bank restoration" while Exhibit C of the letter proposed $500,000 which is inconsistent. Either way, this estimate is less than half of a reasonable cost estimate for such a project. Mitigation in another location of the City, in a different local watershed, does not equate to mitigation for disturbance to the RPA as proposed for this project. Mitigation should occur in for the proximate RPA to prevent degradation of water quality in the protected stream reach.

Given the issues with feasibility, site constraints, and cost; and the previous study conducted by the City that did not identify this location as a candidate for stream restoration, the City does not feel that this stream is a suitable candidate for a stream restoration.

Reforestation

The proposed reforestation does not consider that the project proposes to remove 118 of 183 existing mature trees currently on the site. The area proposed for reforestation would be planted with seedlings, many of which will not survive, and is much further away from the RPA than the mature trees that would be removed if this exception is granted with the development. The phosphorous removal gained from any replanting will be negated by the additional phosphorous generated by the loss of 118 mature trees on the site.

Pet Waste Plan

The option to create pet waste plans are not considered mitigation for RPAs. The overwhelming majority of multifamily residential properties contain pet waste mitigation regardless of location in keeping with best practices to support cleanliness for the private property. In addition, the City cannot count any private pet waste plans for meeting any permit requirements.

Removing Slip Lanes
Finally, the applicant has included the removal of slip lanes at West Braddock Road and N. Beauregard as mitigation for the proposed RPA encroachment. However, T&ES Transportation Planning staff intends to require the removal of the slip lanes for traffic planning purposes regardless of whether the RPA encroachment is approved. There is no additional benefit beyond what would be proposed without the encroachment for the loss of the slip lanes.

The proposed mitigation options do not negate the permanent loss of additional buffer area in the RPA and the introduction of new impervious surface that would negatively impact water quality. The adjacent perennial stream is not suitable for stream restoration, the reforestation does not add additional benefit beyond mitigating what will be lost from the removal of the existing mature trees, the pet waste plan is not a valid buffer mitigation option, and the slip lanes will be required to be removed even if the encroachment is denied.

IV. CONCLUSION

In conclusion, in order to grant an exception, the request must meet all five exception criteria. Staff has evaluated this exception request and has found that it does not meet any of the exception criteria listed in the ordinance, let alone all five criteria as required for approval. Contrary to the applicant's assertion, the request for exception must meet these criteria irrespective of proposed mitigation measures, as these measures would only be applicable if the request first meets the criteria as required. As a result, when evaluating this request against the required exception criteria in the EMO, the application does not meet the criteria by a preponderance of the evidence as required under the Zoning Ordinance in order to be granted. Therefore, this exception should be denied.

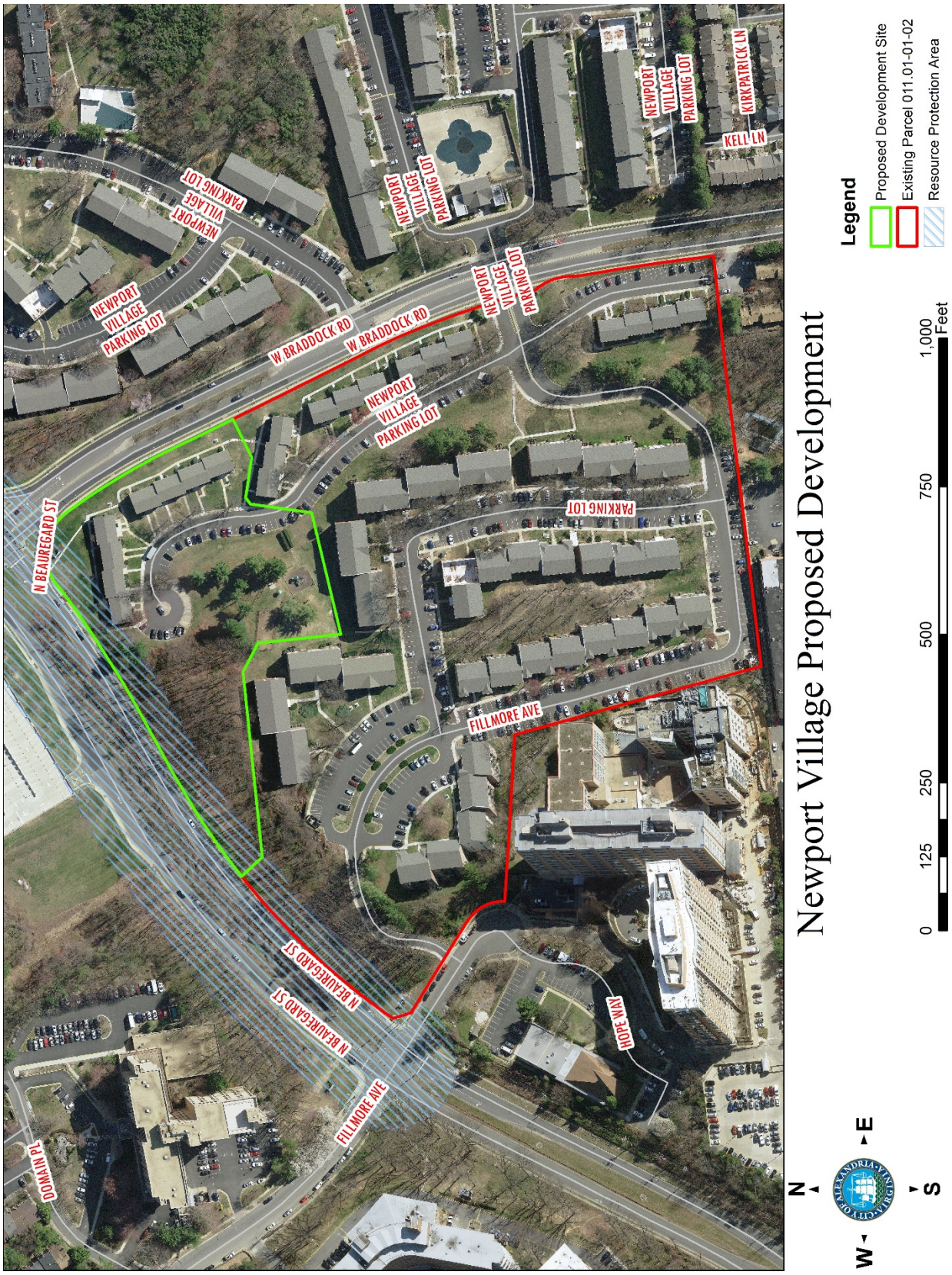
Further, the approval of this exception would be in conflict with the principles of the Eco-City Alexandria Charter and Environmental Action Plan. In addition, allowing such a large new encroachment in the RPA that fails to meet the criteria for approval sets a precedent in the City that would make it difficult to deny future exception requests.

V. STAFF RECOMMENDATIONS

Staff recommend **denial** of the exception request.

VI. ATTACHMENTS

Attachment 1: Exception Request Letter
Attachment 2: Encroachment and Mitigation Exhibit
Attachment 3: Mitigation Chart
Attachment 4: Water Quality Impact Assessment
Attachment 5: Existing Conditions
Attachment 6: Select Pages from the Concept 2 Site Plan
Attachment 7: Original Exception Request Letter dated September 5th
Attachment 8: Concept 2 plan revised


Newport Village Proposed Development
Legend
Proposed Development Site
Existing Parcel 011.01-01-02
Resource Protection Area
0
125
250
500
750
1,000
Feet
N
E
S
W
W BRADDOCK RD
N BEAUREGARD ST
FILLMORE AVE
HOPE WAY
DOMAIN PL
KELL LN
KIRKPATRICK LN
NEWPORT VILLAGE PARKING LOT
PARKING LOT

ATTACHMENT #1

WIRE GILL LLP

Kenneth W. Wire
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703-677-3129

November 16, 2019

VIA EMAIL TO yon.lambert@alexandriava.gov

Yon Lambert, Director
Department of Transportation and Environmental Services
301 King Street, Suite 4100
Alexandria, Virginia 22314

RE: Newport Village
4898 W. Braddock Road (the "Property")

Dear Mr. Lambert,

On behalf of my client, UDR, I am submitting this hearing request for approval of an encroachment into the Resource Protection Area ("RPA") along the eastern side of Beauregard Street for the above referenced property. UDR requests this exception to Zoning Ordinance Section 13-107 as permitted by Zoning Ordinance Section 13-119. As shown on the attached exhibits, the total improvements to the Property will increase the impervious area within the RPA with offsets proposed by removing City impervious area associated with travel lanes at this intersection and replanting other areas. This exception is appropriate because 1) the Property's extreme topography precludes any other viable redevelopment scenario; 2) the existing RPA is separated from the stream itself by several lanes of Beauregard Street; 3) the overall water quality will be significantly improved by the proposed mitigation; and 4) the proposed building line will create a better interaction between the building façade and the future BRT station.

I. Project Background

UDR is the owner of the Newport Village Apartments (the "Property") and has worked with City staff over the past several months to determine a viable redevelopment strategy for a portion of the Property located at the south western intersection of Beauregard Street and Braddock Road. UDR's initial concept was to demolish the three smaller scale buildings located at this intersection and redevelop their footprint with a larger multi-family building with below grade parking. One of these buildings currently encroaches in the RPA in the same location of the requested exception. *See* Existing Conditions, *attached* as Exhibit A.

As you may know, the grade of the Property is very steep as it rises significantly to the south. During the initial design phase, the UDR team obtained updated construction pricing associated with pushing the new building into the grade which proved to be extremely inefficient and costly. UDR and its team spent the past few months redesigning the new development

proposal to move the new building out from the steep slope and save one of the existing buildings by revisiting the proposed project's footprint. *See* Proposed Plan, *attached* as Exhibit B.

UDR and its team worked with the City to also design a better interaction of the new building with the proposed BRT stop at Beauregard Street and orient the active uses within the building towards the BRT stop. The team also proposes shifting a portion of the building slightly further into the RPA to enhance the pedestrian experience at the intersection and remove the City's existing impervious slip lanes. UDR is supportive of this approach and requests a positive EPC recommendation for the encroachment.

II. Existing RPA Conditions

The proposed redevelopment site is located at the south-west corner of N. Beauregard Street and W. Braddock Road. There is an RPA associated with the stream that runs in the Beauregard median. The stream in the RPA is in poor condition with heavily eroding slopes and invasive species. The RPA extends between 39 feet and 59 feet into the redevelopment site on the western side. There are existing improvements located within the RPA including the N. Beauregard travel lanes, sidewalks and a very small corner of the northwest building. Proposed within the redevelopment site, there is a portion of a building and its associated concrete walkways located within the RPA. UDR and its team recently field verified the RPA which begins at the top of bank for the stream in the middle of Beauregard. The total on-site impervious area currently within the RPA is approximately 5,135 s.f. (0.12 Ac). *See* Exhibit A.

III. Required vs. Proposed RPA Mitigation

The proposed redevelopment consists of the demolition of two existing buildings, associated walkways/sidewalks, parking, drive aisles and utilities, and the construction of a new multifamily building with associated walkways, drive aisles and utilities. If the RPA did not exist, the proposed building would comply with current stormwater requirements and no additional mitigation. The attached Chart demonstrates the difference between the no additional mitigation scenario and the proposed additional mitigations that would be provided if this exception is granted. *See* Chart, *attached* as Exhibit C. We have also attached a Water Quality Impact Assessment Report ("WQIA"), *attached* as Exhibit D.

Section IV below, addresses each of the factors that must be addressed granting any RPA exception. We note, however, that the very purpose of the RPA regulations is to protect water quality within the Chesapeake Bay Watershed. Exhibit A shows that there would be approximately 5,135 s.f. (0.12 Ac) of existing impervious area that will be removed from the RPA for the proposed improvements. Approximately 5,100 s.f. of the proposed building and associated walkways are proposed within the RPA. Therefore, the total on-site impervious area proposed within the RPA would be shifted landward and *reduced* by 35 s.f.

In order to mitigate the impacts of the proposed improvements within the RPA, the owner is proposing the following (*See Chart and summary* attached Exhibit C):

1. **Stream Bank Stabilization—**The stabilization of the stream bank of 800 linear feet is estimated to allow for removal of at least 24.5 lbs. of phosphorus, which far exceeds any other mitigation strategy, and alone mitigates the impacts of the proposed development by 10-fold.

   Specifically, the stream bank stabilization/restoration includes removal of debris and invasive plants/trees; the implementation of imbricated boulders; and in-stream step pools to address high velocities, bed and bank shear stress, and erosion. Pursuant to Virginia DEQ Guidance Memo No 15-2005 interim rates, after implementing these practices, the estimated pollutant of concern ("POC") reduction credit may be up to 30.6 pounds of TP, 33.75 pounds of TN, and 3,656 pounds of TSS. However, to be conservative we are proposing a lower estimate of 24.5 pounds of TP, 23.16 lbs of TN and 2,509 pounds of TSS. Credit for POC's is determined after a Bank Assessment for Non-Point Consequences of Sediment (BANCS) has been completed and verified by DEQ. UDR agrees to participate in the DEQ verification process.

2. **Removal of the existing slip lanes at the intersection of North Beauregard and West Braddock -** In order to reduce the impervious surface within the RPA, the two existing slip lanes at the intersection will be removed. The removal of the existing slip lanes will remove approximately 4,500 s.f. (0.10 Ac) of impervious area from the RPA. With the removal of the slip lanes, vehicular contact areas will be removed from the RPA and replaced with pervious cover. This will reduce the amount of high-concentration pollutants (0.14 lbs of phosphorous) generated by surface runoff being conveyed into the RPA.

3. **Reforestation** – Reforestation using native species will be provided within the RPA (approximately .40 Ac or 17,420 s.f. is proposed). 0.15 lbs of phosphorus will be removed in implementing this strategy.

4. **Pet Waste Plan** – UDR is also proposing a pet waste management system to reduce pet waste intrusion into the water shed.

With each of the above mitigation measures, the granting of this exception conditioned on the implementation of each of these measures will improve water quality by **27.54 lbs of total phosphorus removal per year** or 24.8 lbs of phosphorus above the baseline amount that would otherwise be achieved by not granting this exception.

IV. Section 13-119 – Exceptions

This proposed exception will greatly improve water quality and is eligible for the exception under Section 13-119. Under Section 13-119 – Exceptions, the Director of T&ES shall review the request for an exception and may grant the exception with such conditions and safeguards as deemed necessary to further the purpose and intent of this Article XIII "Environmental Management" if the Director of T&ES finds that an applicant has demonstrated by a preponderance of the evidence that the following criteria are met. UDR's response to each criterion is stated below in italics.

(1) Granting the exception will not confer upon the applicant any special privileges that are denied to other property owners in the CBPA overlay district;

Granting an exception in this case would not confer special privileges to UDR that have previously been denied to other property owners primarily because the proposed amount of encroachment in the RPA is slightly reduced from the existing encroachment of the building and slip lanes and the proposal includes a significant amount of mitigations that other property owners likely have not been willing to provide. Additionally, UDR's project is different from other properties and developments because of its unique characteristics inherent to the Property and the imposition of more onerous conditions to greatly improve water quality than would be possible by not granting the exception.

Unique characteristics of the Property include the steep topography, the urbanized setting whereby the stream is in the center of a four-lane major thoroughfare, and the removal of existing impervious area (5,135 s.f.) that currently encroaches within the RPA boundary.

Unique elements of the proposed development plan include: mitigations that will increase water quality beyond the quality that exists; the limited size of the proposed development within the RPA; and in total, the project will add significant levels of housing located adjacent to the City's BRT, the use of which will reduce single-occupancy vehicle trips (SOVs).

(2) The exception is not based upon conditions or circumstances that are self-created or self-imposed, nor does the exception arise from conditions or circumstances either permitted or noncomplying that are related to adjacent parcels;

The steep topography of the Property and limits on reasonable development costs of construction type are conditions and circumstances that are not self-created. After performing feasibility analysis, it has been determined that no other plan is feasible. Additionally, this exception does not arise from conditions or circumstances permitted or noncomplying that are related to adjacent parcels.

(3) The exception is the minimum necessary to afford relief;

The proposed development within the RPA is 5,100 s.f. and the existing impervious area that will be removed from the RPA is 5,135 s.f. UDR's proposed project clearly makes the existing condition no worse, and in fact is slightly better since 35 s.f. smaller. UDR and their design team attempted other designs that are not realistically feasible considering the steep topography. The area proposed to develop is in fact the minimum area to develop a building, given the constraints of topography, building height limits of the construction type and retention of the existing buildings to remain on the Property. Any other alternative plan is not reasonably feasible given the unique characteristics of the Property, namely the topography whereby pushing the building into the grade exponentially increases the construction costs and requires demolition of existing buildings to remain.

The proposed encroachment is also only for a portion of the building fronting on Beauregard. Of the 395 linear feet of building frontage on Beauregard only 197 linear feet is requested to encroach into the RPA.

(4) The exception will be consistent with the purpose and intent of the overlay district, and not injurious to water quality, the neighborhood or otherwise detrimental to the public welfare;

UDR has committed to mitigations stated above which include stream bank restoration, valued at $500,000, and removes at least 24.5 lbs. of phosphorus alone; removal of impervious area of the existing slip lanes; and reforestation—all of which are consistent with the purpose and intent of the overlay district. As stated in 13-1010, the purpose of the overlay zone is: minimizing the potential pollution from stormwater runoff and erosion and sedimentation; the reduction of the introduction of harmful nutrients and toxins into state waters; and the maximization of rainwater infiltration while protecting groundwater. With the proposed mitigations, the development will be consistent with the ultimate policy goal of increasing the water quality beyond its existing levels, which promotes the general welfare.

(5) Reasonable and appropriate conditions are imposed, as warranted, to prevent the allowed activity from causing degradation of water quality.

UDR agrees to reasonable and appropriate conditions including the proposed mitigations and future monitoring, in order to prevent the proposed development from causing degradation of water quality.

For each of these reasons, we respectfully request a hearing by the Environmental Policy Committee for an exception to Zoning Ordinance Section 13-107 for the proposed encroachments and improvements within the RPA.

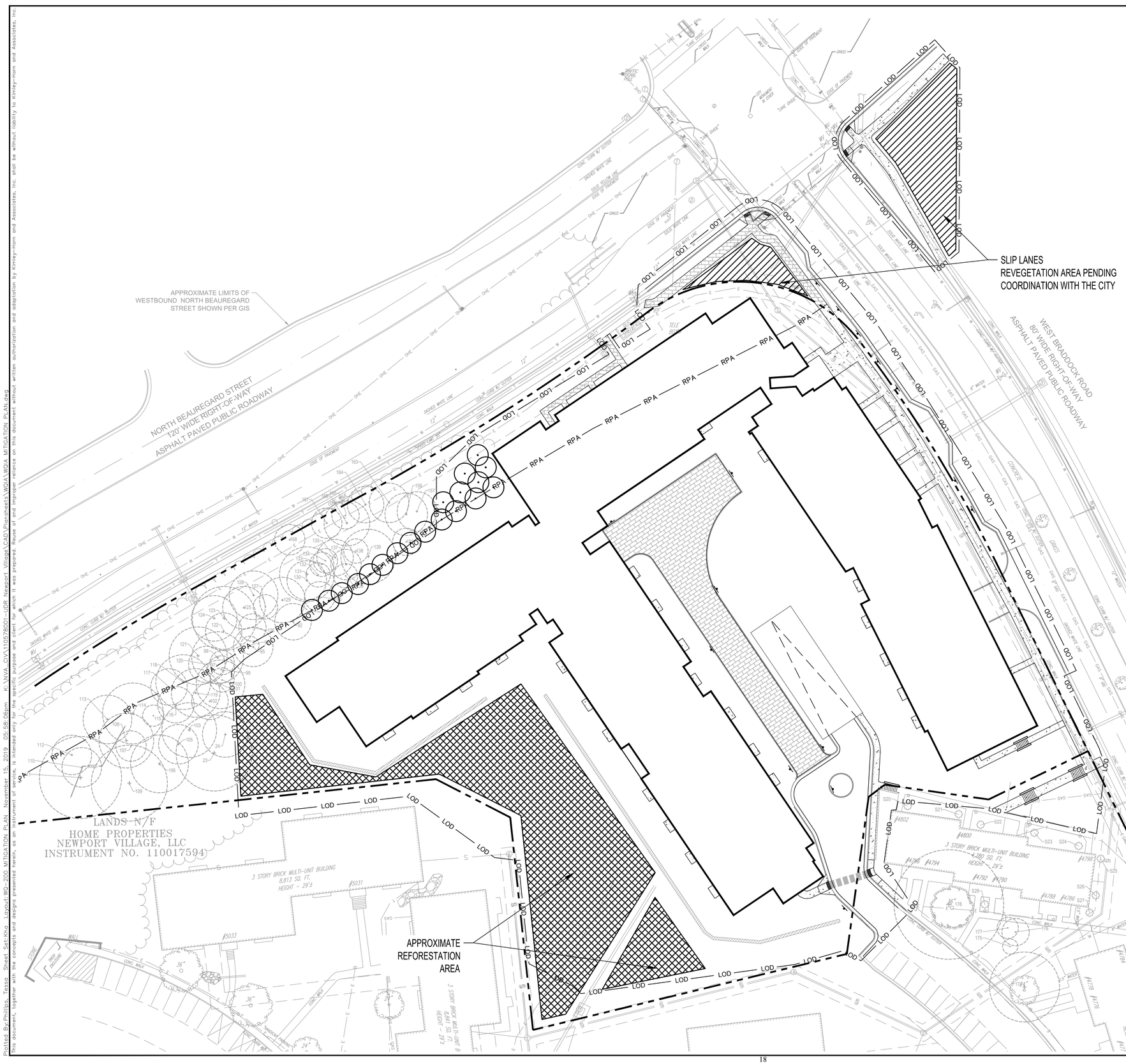
Sincerely,

By:_____
Kenneth W. Wire

Enclosures

CC: Praveen Kathpal, Chair, Environmental Policy Commission
Karl Moritz, Director, Department of Planning and Zoning

4842-8514-9356, v. 1



NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

MITIGATION PLANT SCHEDULE

	MITIGATION CANOPY TREES	19
	ACER RUBRUM / RED MAPLE	1.5"-2" CAL.
	QUERCUS BICOLOR / SWAMP WHITE OAK	1.5"-2" CAL.
	QUERCUS LYRATA / OVERCUP OAK	1.5"-2" CAL.

NOTE:
ALL PERMEABLE DISTURBED AREAS WITHIN THE RPA NOT OTHERWISE COVERED WITH LANDSCAPE MATERIAL SHALL BE SEEDED WITH:
ERNST SEEDS - *VA NORTHERN PIEDMONT RIPARIAN BUFFER MIX*
ITEM #: ERNMX-852
RATE: 0.46 LBS PER 1,000 SF
WEB: WWW.ERNSTSEED.COM
TEL #: 1-800-873-3321

Tree Mitigation Tabulations	
Total Caliper (inch) of Trees Removed within the RPA	69
Trees required per 4" of tree caliper removed:	19
Canopy Trees Provided in RPA:	19

NOTE: THE TOTAL NUMBER OF TREES ON THE EXISTING SITE IS 183. OF THE 183 TREES ON THE SITE, 141 TREES ARE LOCATED OUTSIDE OF THE RPA. OF THE 141 TREES OUTSIDE OF THE RPA, 111 OF THESE TREES WILL BE REMOVED. ACCORDING TO PAGE D-7 OF THE RIPARIAN BUFFERS MODIFICATION & MITIGATION GUIDANCE MANUAL, THE FORESTED AREA WILL BE REPLANTED WITH BARE ROOT SEEDLINGS OR WHIPS AT A RATE OF 1,210 STEMS PER ACRE APPROXIMATELY 6' X 6' ON CENTER. REFER TO THE WQIA REPORT DATED NOVEMBER 2019 FOR DETAILS ON PLANTINGS.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn

11400 COMMERCE PARK DRIVE, SUITE 400, RESTON, VA 20191
PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

KHA PROJECT	110578001
DATE	11/14/2019
SCALE	AS SHOWN
DESIGNED BY	WDW
DRAWN BY	WDW
CHECKED BY	WDW

MITIGATION PLAN

NEWPORT VILLAGE
PREPARED FOR
UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER
WQ-200

ATTACHMENT #3

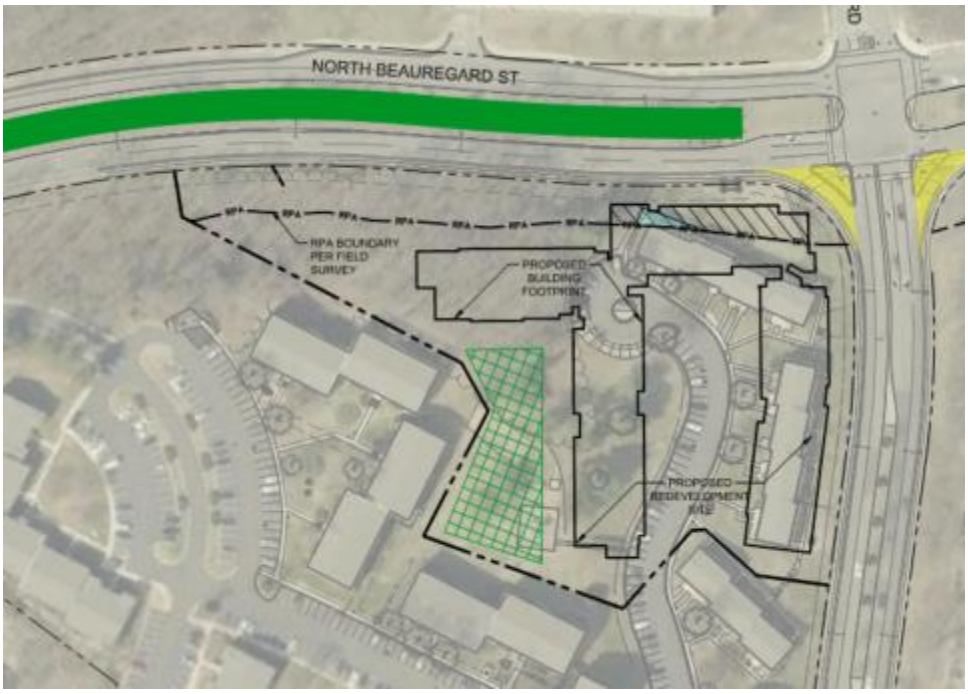
Exhibit C - RPA Water Quality Additional Mitigation Chart and Summary

	EXISTING	REQUIRED	PROPOSED	% OVER REQUIREMENTS
OPEN SPACE	75%	40%	54%	34%
VEGETATED CANOPY COVERAGE ***(Does not include reforestation proposal below)***	35%	25% of Site	25%	0%
STORMWATER MANAGEMENT				
Stormwater outfall volume (10YR Dischage Volume)	22.01	22.01	21.16	4%
SWM Best Management Practice Summary*		2.75 lbs TP	2.81 lbs TP*	
Permeable Pavement			0.37 lbs TP	
Urban Biorentention			1.23 lbs TP	
Vegetated Roof			0.35 lbs TP	
DC Sand Filter			0.71 lbs TP	
Filtering Device			0.17 lbs TP	
BMP Subtotal*		***2.75 lbs TP***	***2.81 lbs TP****	***2%***
*Based on conceptual level SWM design, subject to change pending final design. Minimum requirement will be met.				
EXCESS TMDL REMOVAL STRATEGIES				
REFORESTATION	N/A	Not Currently Required	Up to 0.40 Acres On-Site. The phosphorus removal has been calculated based on the Chesapeake Bay TMDL Guidance - Table V.H.1 – Land Use Change Conversion Efficiency Table for pervious land converted to forested.	Please see table below
STREAM BANK STABILIZATION PROJECT	N/A	Not Currently Required	The stream bank stabilization/restoration may include removal of construction debris, invasive plants/trees and the implementation of imbricated boulders, and in-stream step pools to address high velocities, bed and bank shear stress and erosion. Using the interim rates from the Virginia DEQ Guidance Memo No 15-2005, the estimated pollutant of concern (POC) reduction credit after implementing these practices may be up to 30.6 pounds of TP, 33.75 pounds of TN and 3,656 pounds of TSS. Credit for these POC's is determined after a Bank Assessment for Non-Point Consequences of Sediment (BANCS) has been completed and verified by DEQ. Since the total amount of credit is uncertain, UDR is proposing a target of 24.5 lbs of TP removal. UDR proposes 800 linear feet of stream bank stabilization or an alternate of $500,000 towards TMDL Credits.	Please see table below
SLIP LANE REMOVAL AND REPLACEMENT WITH PERVIOUS PAVERS AND OPEN SPACE	N/A	Not Currently Required	Removal of 0.1 acres of high vehicle contact areas and shifting of impervious areas landward. Replacing the impervious concrete with pervious pavement and plantings will reduce pollutants and will contribute towards City of Alexandria's reduced TMDL goals. The phosphorus removal has been calculated based on the Chesapeake Bay TMDL Guidance - Table V.H.1 – Land Use Change Conversion Efficiency Table for impervious land converted to pervious.	Please see table below
PET WASTE PILOT PROGRAM FOR E. COLI MNGMT	N/A	Not Currently Required	The unnamed tributary of Lucky Run is part of the Four Mile Run Watershed which is subject to a Bacteria TMDL. Additionally, the Pet Waste Pilot Program will help the City accomplish their "Minimum Control Measure #1" for their CBPA TMDL Plan. This pilot program will be implemented in all of UDR's Newport Village including the proposed new building and the existing, surrounding multi-family community. The Owner pledges to do the following as part of this program: •Develop written materials (pamphlets) and distribute to tenants •Install pet waste stations and use social media to document and promote •Agree to be part of an educational, speaking engagement •Pilot requiring residents to register their pets in a DNA database and then fine violators who do not clean up pet waste.	N/A

TMDL IMPACT OF PROPOSED WATER QUALITY IMPROVEME	TOTAL PHOSPHORUS REDUCTION (LB/YR)	TOTAL NITROGEN REDUCTION (LB/YR)	TOTAL SUSPENDED SOLIDS REMOVAL (LB/YR)
Required Stormwater Management	2.75	15.27	1,290.30
Reforestation	0.15	1.04	70.38
Streambank Stabilization Project	24.50	23.16	2,509.02
Land Use Change - Slip Lane	0.14	0.97	65.69
Total	**27.54**	**40.43**	**3,935.39**
% over requirement	***1001%***	***265%***	***305%***

Newport Village Phase II

Water Quality Impact Assessment



Prepared By:

Kimley»Horn

November 2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 Introduction

This water quality impact assessment (WQIA) has been prepared for the redevelopment of a 4.19-acre parcel within the Newport Village Development (Site) located along the southern side of Beauregard Street and the western side of Braddock Road in the City of Alexandria, Virginia. The owner/operator entity is Newport Village, LLC. (UDR) and currently consists of garden style apartments, is proposed to redevelop into higher density apartment complex.

The intent of this WQIA is to identify major impacts for development or redevelopment within resource protection areas (RPA), or under an exception that involves more than 5,000 square feet of land disturbance within an RPA or for any development or redevelopment within a resource management area (RMA) which involves more than 5,000 square feet of land disturbance adjacent to an RPA. The proposed redevelopment within the 4.19-acre Newport Village parcel will encroach into the RPA and more than 5,000 square feet of disturbance is proposed adjacent to the RPA within the RMA. This WQIA will show how the proposed redevelopment will impact the RPA and adjacent RMA.

The existing and proposed use will not change from multi family residential and the use with the RPA will remain forested/pervious. The RPA on site (and off site) has already been impacted by the development of Beauregard Street and the existing Newport Village development. The proposed use will disturb 0.36 acres within the RPA and will add 0.11 acres of impervious area for a total of 0.12 impervious acres within the RPA post redevelopment (see Table 8 Land Cover Change for an land cover area summary). The areas within the RPA that will be impacted from the proposed use/redevelopment are will be treated with water quality BMPs to prevent further impact to the RPA and its environmentally sensitive areas.

The proposed redevelopment will fully meet water quality requirements through implementation of seven (7) BMPs. Newport Village, LLC. (UDR) will provide additional mitigation options to enhance water quality in the City. These other options are discussed in Section 4.

2.0 Existing Conditions

The existing Site is 4.19 acres and is located southwest of the intersection of Beauregard Street and Braddock Road. An unnamed, perennial, tributary to Lucky Run is located north of the Site, in Beauregard Street's median and flows west to east. Beauregard Street, a two (2) lane road and its sidewalks, run west to east in the unnamed tributaries RPA. The impervious area from Beauregard Street contributes significant uncontrolled stormwater runoff to the unnamed tributary of Lucky Run. The Site itself consists of garden style apartments, an access road and parking lot, sidewalks, and apartment amenities. The RPA that does come onto the Site is approximately 0.70 acres and consists of 0.01 acres of impervious area, 0.22 acres of pervious area and 0.47 acres of forested area. Table 1 summarizes the RPA land cover on site. Below is more information regarding the existing conditions for the Site.

2.1 Environmental Site Assessment

The Environmental Site Assessment (ESA) was completed in accordance with 13-112 of the City Code. Approximately 2.36 acres of the site contains slopes 15% or more. Of the 2.36 acres approximately 0.50 acres of the site is located within the RPA and contains slopes 15% or more. The following items are not present on the Site.

- No intermittent streams contained with a natural channel.
- No highly erodible (K factor >0.28) and highly permeable soils as available from existing public documents
- No known areas of contamination
- No springs, seeps, and related features
- No wetland permits are required
- No dredging or disposal of dredging materials is proposed as part of this project within the project limits or outside of the project limits
- No impacts on adjacent shellfish bed, submerged aquatic vegetation and fish spawning areas are expected as part of this project

A wetland delineation for the adjacent perennial stream was performed consistent with current procedures promulgated by the U.S. Army Corps of Engineers and the Environmental Protection Agency. The site-specific evaluation of the RPA boundary was determined from this wetland delineation. See the ESA sheet for location of the above referenced items.

2.2 Land Cover

The existing Site consists of 0.99 acres of impervious area (building, road, sidewalk), 1.73 acres of pervious area (grass) and 1.47 acres of forested area. The landcover within the RPA on the existing Site consists of 0.01 acres of impervious area, 0.22 acres of pervious area and 0.47 acres of forested area. Table 1 provides a summary below and Sheet C-100 shows the existing site conditions and land cover in the RPA.

Table 1
Existing Land Cover Summary

Existing Land Cover on Site		Existing Land Cover in RPA
Land Cover	Area (Acres)	Area (Acres)
Impervious	0.99	0.01
Pervious	1.73	0.22
Forest	1.47	0.47
Total	4.19	0.70

2.2 Topography

The topography within the 4.19-acre site varies from 1% slope to the 50%+ slope. The existing developed area consisting of approximately 1.5 acres generally does not exceed 15% slope. The existing buildings are designed with apartments that walk out onto Beauregard and Braddock. To allow for this the buildings have been graded with a 15%+ slope. Approximately 2.36 acres of the Site has a slope of 15%+ including most of the RPA.

2.3 Hydrology

An unnamed perennial tributary to Lucky Run is located north of the Site within Beauregard Street's median and flows southwest to northeast. The perennial stream flows into a 48" RCP adjacent to the Beauregard and Braddock intersection and continues downstream to Lucky Run. This stream is the source of the RPA that extends onto the Site. Approximately 0.59 acres of RPA south of this stream consists of road and sidewalk (Beauregard Street) and 0.70 acres extending onto the northern side of the Site. Sheet C-400 shows the land cover located in the RPA that extends on Site.

The site is divided into two (2) points of analysis (POA). The first POA is located within an island southeast of the intersection of Beauregard and Braddock and drains approximately 2.97 acres, has an 86 curve number (CN) and a time of concentration (TOC) of 5 minutes. An existing 18" RCP and an existing 15" tie into an existing 15" (upsized to 24"), running southeast to northwest and located on the eastern side of Braddock Road. The second POA is located at the 48" concrete headwall conveying the existing perennial stream and drains approximately 1.22 acres, has a 79-curve number (CN) and a time of concentration (TOC) of 9.9 minutes. POA #2 drains to the existing 48" concrete headwall through an existing yard inlet located along Beauregard Street. The yard inlet captures flow generated from the western portion of the site and drains it through an existing 18" RCP that flows south to north under Beauregard Street. Sheet C-401 through C-404 provides hydrology information for the existing site.

2.4 Pollutant Loads

Using the Virginia Runoff Reduction Method (VRRM) new development spreadsheet the estimated uncontrolled pollutant load generated from the existing Site is 1.58 lbs. of phosphorus

2.5 BMPs

No existing water quantity or water quality BMPs are located within the Site to attenuate peak flows and treat stormwater runoff generated from the existing Site. Storm runoff is collected onsite and discharge through RCP to the adjacent unnamed tributary to Lucky Run.

2.6 Soils

The NRCS web soil survey shows two (2) soils on the Site: Sassafras-Marumsco complex, 7 to 15 percent slopes (91C) and the Urban land-Kingstowne complex (100).

The Sassafras portion of the Sassafras-Marumsco complex (91C) generally consists of slopes that are 7 to 15 percent. This component is on terraces, coastal plains. The parent material consists of fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

The Marumsco portion of the Sassafras-Marumsco complex (91C) generally consists of slopes that are 7 to 15 percent. This component is on terraces on coastal plains. The parent material consists of fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is high. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 15 inches during January, February, March, November, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

The Urban Land portion of the Kingstowne complex (100) generally consists of miscellaneous soils. The Kingstowne portion of the Kingstowne complex (100). Generally consists of slopes that are 0 to 45 percent. This component is on marine terraces on coastal plains. The parent material consists of Earthy fill of fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth

of 60 inches (or restricted depth) is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 40 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

A soils report completed by ECS Mid Atlantic, LLC. On December 7, 2018 indicates the presences of marine clays underlying, manmade fill and naturally occurring alluvial soils and consisted of gravel, sand, silt and clay. The soil report indicated that there are slope stability issues on site. Mitigation measures were provided by the geotechnical engineer and will be incorporated into the proposed redevelopment plans. Per the Virginia Department of Environmental Quality (DEQ) VEGIS web maps, accessed on August 13, 2018, no on-site contamination is known.

2.7 Geology

According to the Geologic Atlas of the City of Alexandria, Virginia the underlying geology within the site is Lincolnia Silty Clay. Lincolnia Silty Clay can generally be described as massive to slabby-bedded silty clay and clayey silt, moderately sandy in many places. Color typically light green-gray or bluegray where fresh and red-brown where weathered; commonly mottled near the water table. Clay fraction dominated by expandable lattice types. Small to medium sized lenses and channel-like bodies of fine to medium arkosic sand are common near contacts with the Winkler and Cameron Valley sand members. Thickness typically 50-60 feet, but may exceed 100 feet beneath parts of Lincolnia. Fine, wavy laminations and sandy partings occasionally present in slabby-bedded units. Probably deposited as overbank sediment on a broad, stable floodplain. The Lincolnia silty clay appears to be in a large scale lateral facies relationship with the upper part of the Cameron Valley sand (Kpcv, below). The Barcroft diamicton (Kpb) occurs discontinuously at or near the base of the Lincolnia silty clay. It contains pebbles, cobbles, and boulders up to 18 inches long embedded in a dense, massive to crudely layered, red-brown to green-gray clayey to loamy matrix with incipient soil horizonation and organic layers. Clasts include vein quartz, sandstone, and skolithos-bearing quartzites; some are faceted, pitted, and resemble ventifacts. Maximum observed thickness is about 18 feet

2.8 Vegetation

Kimley Horn performed a tree survey to identify trees 6” and greater in diameter at breast height (DBH) and located a total of 183 trees on the Site including 42 trees located in the RPA. 141 trees are not located in the RPA. Kimley Horn also identified 28 shrubs. None of those shrubs are located in the RPA. The existing trees and shrubs consist of native hardwood typically found in the mid-Atlantic region and include Pine, Oak, Maple, Cherry, Redbud, and Birch. Approximately 19 of the 183 trees were dead and or dying including one (1) tree dead or dying tree in the RPA. Five (5) trees were 30” or more DBH. Approximately 135 trees are 18” DBH or lower and approximately 70% of the species found were oak. Most of the existing vegetation is located in the Site’s northwestern corner and western boundary. The existing vegetation contributes approximately 0.47 acres of forested canopy in the RPA. The existing vegetation is shown on sheet WQ-100 and summarized on WQ-110 and species are summarized in Table 2 below.

Table 2 Existing Vegetation Species		
Species	**Quantity**	**Percentage**
Maple	22	12.02%
Birch	1	0.55%
Redbud	2	1.09%
Hawthorn	2	1.09%
Crape Myrtle	7	3.83%
Pine	15	8.20%
Cherry	3	1.64%
Oak	129	70.49%
Locust	2	1.09%
Total	**183**	**100.00%**

Approximately 118 of the 183 existing trees and 19 of the existing 28 shrubs will be removed including seven (7) trees in the RPA. No existing shrubs in the RPA will be removed as part of the proposed development. The total caliper for the trees removed in the RPA is 69" (see Table 6 for each tree's caliper) and the total canopy area removed in the RPA is 2,650 square feet (0.06 acres). Approximately 84 trees are 18" DBH or lower and approximately 66% of the species proposed to be removed are oak. The trees and shrubs proposed to be removed are shown on sheet WQ-100 and summarized on sheet WQ-11 species are summarized in Table 3 below.

Table 3 Existing Vegetation Species Removed				
Species	**Quantity**	**Percentage**	**Located in RPA**	**% in RPA**
Maple	12	10.17%		
Birch	1	0.85%		
Redbud	2	1.69%		
Hawthorn	2	1.69%	2	29%
Crape Myrtle	4	3.39%	3	43%
Pine	15	12.71%	1	14%
Cherry	2	1.69%		
Oak	78	66.10%	1	14%
Locust	2	1.69%		
Total	**118**	**100.00%**	**7**	**100.00%**

Given the existing site and the existing vegetation on the proposed redevelopment will preserve to the greatest extent possible any significant trees and vegetation on the Site and will provide maximum erosion and overland flow benefits from vegetation.

2.9 Sanitary Sewer

An existing 10" gravity sanitary sewer main flows southeast to northwest parallel to Braddock Road and provides service to the existing 4.19-acre Site. The existing sanitary sewer peak flow is 0.38 MGPD and the total average daily flow is 0.095 MGPD. No septic tanks or drain fields are located on the Site. The existing sanitary sewer is shown on sheet C-100.

3.0 Proposed Redevelopment

The proposed redevelopment consists of the construction of high-density multifamily apartments, parking, sidewalks, roads, retaining walls, and stormwater BMPs. Approximately 3.87 acres of the 4.19-acre (92%) Site will be disturbed during the construction including 0.36 acres in the RPA (9% of total land disturbance). Disturbance on site and in RPA primarily consists of earthwork, redevelopment and tree removal. As shown in Table 4, a total of 0.12 impervious acres will be located in the RPA after redevelopment has been completed. To address water quality during this land disturbance, erosion and sediment control devices will be installed to prevent sediment from escaping onto any impervious surfaces or into the storm drains. The post construction BMPs have been designed to treat stormwater runoff before being discharged to an adequate outfall. Below is more information regarding the anticipated proposed conditions for the site.

3.1 Land Cover

The proposed Site consists of approximately 4.19 acres of high-density apartments with 2.23 acres consisting of impervious area (building, road, sidewalk), 1.06 acres consisting of pervious area (grass) and 0.90 acres consisting of forested area. Table 4 provides a summary of the proposed land cover.

Table 4
Proposed Land Cover

Proposed Land Cover		Proposed Land Cover in RPA
Land Cover	**Area (Acres)**	**Area (Acres)**
Impervious	2.23	0.12
Pervious	1.06	0.08
Forest	0.9	0.50
Total	**4.19**	**0.70**

3.2 Topography

The proposed topography within the 4.19-acre Site will continue to vary from 1% slope to the 50%+ slope. The proposed development is about 2.5 acres and will not exceed 5% slope. The new building will extend into the 15%+ slope located on the western side of the Site. Constructing these buildings on the western side of the site will require excavation of the slope and installation 10' – 20' retaining walls along the western property boundaries. The topography in the north western portion of the Site will be preserved to the maximum extent practical to preserve the 15%+ slopes. Slopes 10% to 15%+ will be graded around the buildings where needed to adequately tie in grades. Sheet C-300 shows the proposed grading on the Site.

3.3 Hydrology

The proposed Site will be divided into five (5) drainage areas (DA). DA-A drains 0.17 acres has a CN of 98 and a TOC of 5 minutes. It will tie into the existing Yard Inlet and underlying 18" RCP located at the northern portion of the Site at along Beauregard Street that eventually drains to POA#2 discussed in the existing hydrology section. DA-B drains 0.29 acres, has a CN of 98 and a TOC of 5 minutes. DA-C drains 0.40 acres has a CN of 98 and a TOC of 5 minutes. DA-D drains 1.59 acres has a CN of 98 and a TOC of 5 minutes. DA-E drains 0.53 acres has a CN of 98 and a TOC of 5 minutes. DA-A, DA-C through DA-E is collected via yard inlets, drop inlets and underdrains and ties into the proposed 15" RCP south of the Site and drains to the existing 15" RCP across Braddock Road and eventually POA #1 discussed in the existing hydrology section. The proposed development and storm drain design will not impact Waters of the United States (WOUS), will not result in significant degradation of water quality that could adversely affect aquatic vegetation or life, and the propose development will not result in significant disruption of hydrology on the site. Attachment C-401 shows hydrology information for the proposed site.

3.4 Pollutant Loads

Using the Virginia Runoff Reduction Method (VRRM) redevelopment spreadsheet the estimated treatment provided through the implementation of the BMPs on the Site is 2.81 lbs of phosphorus. This exceeds the required treatment loads by 0.06 pounds of phosphorus. Sheet C-406 shows the provided BMP credit.

3.5 Proposed BMPs

All BMPs proposed for this Site will be designed in accordance with the Virginia Department of Environmental Quality (DEQ) BMP Clearinghouse standards and specifications. BMPs have been designed to effectively treat water generated from the 4.19-acre Site and tie into the proposed storm sewer infrastructure and eventually tie into the existing storm sewer infrastructure and analyzed to POA #1 and POA #2. The proposed BMP design will not impact WOUS, will not result in significant degradation of water quality that could adversely affect aquatic vegetation or life, and the proposed development will not result in significant disruption of hydrology on the site.

A conceptual level stormwater management design has been provided with this document. As shown on the Virginia Runoff Reduction Methodology (VRRM) spreadsheet on sheets C-405 and C-406, a total of 0.84 acres of pervious area and 2.14 acres of impervious area is being treated, providing a total phosphorus reduction of 2.81 lbs. Table 5, shown below, summarizes the current SWM BMP plan for each drainage area.

Drainage Area A is providing treatment of 0.17 acres of impervious area through SWM #1 - Vegetated roof, and receiving 0.17 lbs of phosphorus credit. Drainage Area B is providing treatment of 0.29 acres of impervious area through SWM #2 - permeable pavement and receiving 0.37 lbs of phosphorus credit. Drainage Area C is providing treatment of 0.40 acres of impervious area through SWM #3 - Urban bioretention and receiving 0.48 lbs of phosphorus credit. Drainage Area D consists of multiple treatment trains as detailed out on Sheet C-405 and calculated on Sheet C-406. In summary, Drainage Area D is providing treatment of 0.75 acres of impervious area and 0.84 acres of pervious area through SWM #4 - Vegetated roof, SWM #5 - Urban bioretention, SWM #6 – Sand Filter and SWM #7 – Sand Filter and receiving 1.63 lbs of phosphorus credit. Drainage Area E is providing treatment of 0.53 acres of impervious area through SWM #8 - manufactured treatment device (hydrodynamic separator), and receiving 0.17 lbs of phosphorus credit. The total pervious and impervious area treated through these BMPs is 0.84 acres and 2.14 acres respectively. The total pounds of phosphorus removed is 2.81. Stormwater management BMP locations are shown on sheet C-405 and SWM calculations are shown on Sheet C-406.

Table 5 BMP/SWM Summary					
Drainage Area	**SWM #**	**BMP Type**	**Pervious Area (AC)**	**Impervious Area (AC)**	**Phosphorus Credit (lbs)**
A	1	Vegetated Roof	0	0.17	0.17
B	2	Permeable Pavement	0	0.29	0.37
C	3	Urban Bioretention	0	0.4	0.48
D	4	Vegetated Roof	0	0.18	0.18
	5	Urban Bioretention	0	0.53	0.75
	6 & 7	Filtering Practice #1 (Sand Filter)	0.84	0.04	0.71
E	8	MTD - Hydrodynamic	0	0.53	0.17
Total			**0.84**	**2.14**	**2.81**

3.6 Soils

The soils in the western portion of the site may be impacted through earthwork activities. The remaining soils onsite have already been impacted through the existing development. No further impacts to soils within the existing developed area are expected. A surplus of fill material should be available from the cut operations on the western portion of the Site. As a result, any necessary fill material for the remaining portions of the Site will be sourced from those cut operations. Should additional fill material be needed, the contractor will provide a source of all fill material and biological, chemical, and suitability testing should be conducted prior to construction. Cut and fill shall be minimized to maximum extent practical based on the existing site constraints and proposed redevelopment.

3.7 Vegetation

The proposed vegetation for the Site has been developed in accordance with the Riparian Buffers Modification & Mitigation Guidance Manual. The proposed vegetation in the RPA is based upon the tree caliper removed. According to Appendix D-5 a 1.5” – 2” tree is required for every 4” of tree DBH removed in the RPA. A total of 7 trees within the RPA will be removed. The total caliper for these trees is 69" According to Vegetation Replacement Rates on page D-5 the total number of 1.5" - 2" caliper trees to replace the trees removed in the RPA is 19. Table 6 provides a summarizes the proposed vegetation calculations.

Table 6				
RPA Tree Removal & Tree Replacement				
Tree No.	**Species**	**In RPA**	**DBH (Inch)**	**Trees Required Per 4" Caliper Removed**
155	Oak	Yes	9	3
161	Pine	Yes	19	5
162	Crape Myrtle	Yes	7	2
169	Hawthorn	Yes	7	2
170	Crape Myrtle	Yes	12	3
171	Hawthorn	Yes	8	2
172	Crape Myrtle	Yes	7	2
Total				19

The proposed plant schedule shown in Table 7 below provides canopy trees in accordance with the recommendations of the Riparian Buffers Modification & Mitigation Guidance Manual as required to mitigate for the trees removed in the RPA. The replanting schedule is also provided on sheet WQ-200.

Table 7 **Planting Schedule**				
Vegetation Type	**Quantity**	**Size**	**Species**	
Canopy Trees	19	1.5" - 2" Caliper	Acer rubrum	Red Maple
			Quercus bicolor	Swamp White Oak
			Quercus lyrata	Overcup Oak

In addition to the proposed canopy trees, understory trees and small shrubs, the Virginia Northern Piedmont Riparian Mix is proposed within the disturbed areas of the RPA (0.46 acres including 0.10 acres for slip lanes) to assist in providing native seeding for all the disturbed areas. Approximately 508 bare root seedlings or whips will be planted in accordance with page D-7 of the Riparian Buffers Modification & Mitigation Manual for the proposed 0.42-acre reforestation area. The remaining portions of the Site to be landscaped will be planted in accordance with the City of Alexandria 2019 Landscape Guidelines and will highlight native vegetation that will supplement the RPA buffer in a manner that provides for pollutant removal, erosion, and runoff control. The development will not result in unnecessary destruction of plant material on Site. The proposed vegetation will provide maximum erosion and overland flow benefits possible.

3.8 Sanitary Sewer

The existing 10” sanitary sewer gravity main will remain in place. The proposed structures on the Site will tie into the existing sanitary sewer on the Site approximately one hundred feet (100’) south of the southwest corner of the intersection of Beauregard Street and Braddock Road. According to a preliminary sanitary

sewer adequate outfall analysis, the receiving sanitary sewer system has capacity for the proposed Newport Village redevelopment. The sanitary sewer connection is shown on Sheet C-500.

3.9 Erosion and Sediment Control

Approximately 3.87 acres of the 4.19-acre Site (92%) is proposed to be disturbed as part of this project. Erosion and sediment (E&S) controls will be designed in accordance with the minimum standards and specifications found in the Virginia Erosion and Sediment Control Handbook (VESCH) and the City of Alexandria Erosion and Sediment Control Ordinance. The intent of the Erosion and Sediment control plan is to minimize the extent of the cleared area, install perimeter controls, reduce runoff velocities, and install measures to stabilize disturbed areas. Perimeter controls may include construction entrance and wash rack, sediment traps and basins, diversion dikes, inlet protection, silt fence, and super silt fence. These devices will be installed after the preconstruction meeting and prior to any major earthwork activities. Other erosion and sediment control devices may be installed within the Site to achieve the required reductions in runoff and prevent off-site transport of sediment during and after construction. The limits of clearing based on all anticipated improvements, including buildings, drives and utilities is shown on sheet C-300.

3.10 Anticipated Permits

- City of Alexandria Building & Site Permits
- VSMP Permit

3.11 Anticipated Construction Schedule

Final construction schedule and phasing to be determined pending final permit approval. Estimated total construction duration of 30 months, including:

- Abatement and Demolition: 2 months
- Utilities: 4 months total (not continuous)
- Retaining Walls/Soil Stability/SOE/Excavation: 6 months
- Vertical Construction: 12 months
- Finishes thru Turnover: 12 months

4.0 Discussion

4.1 RPA Encroachment

The proposed RPA disturbance will be approximately 0.36 acres and will consist of earthwork, the construction of the proposed building, sidewalks, necessary utility and storm tie ins, tree removal and tree planting, and turf installation. The proposed RPA disturbance will be in an untreated pervious area that is unusable, previously encroached and disturbed. The post construction encroachment will be 0.12 acres of impervious area (building and sidewalks) and 0.06 acres of pervious (grass). The building will be constructed of material consistent with traditional high-density apartment buildings including brick, concrete block, steel, wood and various energy efficient materials. The sidewalk will be constructed of permeable pavement. The entire encroached area will be treated through stormwater management BMPs and pedestrian circulation will be improved. The pervious area will be stabilized with non-invasive grasses native to the mid-Atlantic region. The existing forested area within the RPA will be preserved and supplemented with an additional 0.03 acres of tree planting. Trees planted within the RPA will consist of locally native, non-invasive trees and will be planted to mimic the existing condition within the RPA.

The land cover area change within the RPA is +0.11 acres for impervious area, -0.14 acres for pervious area and +0.03 acres for forested area. The land cover percent change for the proposed development within the RPA and for the entire site is summarized in Table 8.

Table 8
Land Cover Change

Land Cover Analysis					RPA Land Cover Analysis			
Cover Type	**Ex.**	**Prop.**	**Area Change**	**% Change**	**Ex.**	**Prop.**	**Area Change**	**% Change**
Impervious	0.99	2.23	1.24	125%	0.01	0.12	0.11	1100%
Pervious	1.73	1.06	-0.67	-39%	0.22	0.08	-0.14	-64%
Forested	1.47	0.9	-0.57	-39%	0.47	0.5	0.03	6%

The proposed encroachment and post construction land cover is shown on sheet C-300.

4.2 Water Quality

The stormwater runoff generated on the existing Site flows uncontrolled and conveys an estimated 1.58 pounds of phosphorus into the adjacent unnamed tributary of Lucky Run. Beauregard Street, which is located directly adjacent to the unnamed tributary of Lucky Run, in the RPA, currently flows uncontrolled into the stream conveying an unquantifiable pollutant load into the stream.

The proposed redevelopment will generate an estimated 2.75 pounds of phosphorus. Seven (7) BMPs have been implemented into the proposed redevelopment and will provide 2.81 pounds of phosphorus load reduction, exceeding the requirement minimum load reduction by 0.06 pounds. See the Table 4 above for a summary of the BMPs implemented on the Site. All impervious areas onsite will be routed through a water quality BMP for quality control and peak flow attenuation before being discharged downstream. The load generated from the Site will be completely mitigated before leaving the site.

The RPA will also be replanted with native, non-invasive trees and grasses that will also provide an unquantifiable runoff reduction through evapotranspiration, and filtering for all stormwater runoff generated in this area.

No direct impacts to wetlands or waters of the U.S. are proposed as part of this project. As a result, no mitigation for WOUS should be required. Onsite stormwater will be collected into BMPs through storm drainage conveyances. The stormwater BMPs will attenuate the 10-year peak flow and discharge predevelopment flow into the adjacent wetlands, streams, lakes rivers or other water bodies after it has been treated in accordance with local, state and federal regulations. Predevelopment flow will provide adequate supply of water to the downstream wetlands, streams, lakes, rivers or other water bodies. As a result, no disruption or reductions in the supply of water to wetlands, streams, lakes, rivers or other water bodies is expected as part of this project. No dredging or disposal of dredging materials is proposed as part of this project within the project limits or outside of the project limits. No drain fields are located on the existing Site. No direct impacts to wetlands or waters of the U.S. are proposed as part of this project. Quantity and quality BMPs have been implemented onsite to treat stormwater discharging to the adjacent stream. As a result, no impacts on adjacent shellfish beds, submerged aquatic vegetation and fish spawning areas are expected as part of this project. The proposed development is not water-dependent.

The development will not result in unnecessary destruction of plant material. It is assumed that plant material within the limits of disturbance will be removed.

4.3 Additional Water Quality Measures

As documented above, the proposed redevelopment meets the minimum requirements for water quality. As additional mitigation to offset the proposed encroachment into the RPA, the Owner will construct or contribute resources to construct additional water quality measures to demonstrate their commitment to enhance water quality in the City of Alexandria. Those measures include:

- Reforestation (on/off site)
- Streambank Stabilization/Restoration (off site)
- Removal of Slip Lanes (Land Use Change – off site)
- Pet Waste Pilot Program

Preliminary POC reduction credit calculations indicate that implementing these measures will provide significant water quality credit that can be applied to the City's TMDL. The Pet Waste Pilot Program can be used to help achieve Minimum Control Measure #1 of the City's TMDL Program Plan. The final program and design is pending City approval.

5.0 Conclusion

The redevelopment to the Newport Village Phase II community will provide a high density, multi family apartments that will be walkable, provide a boost to the local economy through taxes and residents spending locally, and will be environmentally friendly through BMP implementation, POC load reduction, invasive species management, and the implementation of native, non-invasive vegetation throughout the Site, including reforestation of the RPA. The entire RPA where the encroachment is proposed has been disturbed through the development of the existing Site and the construction of Beauregard Street and its sidewalks. The proposed encroachment plans to utilize the previously disturbed area on Site and within the RPA to better the on-Site conditions with a new structure, site stabilization, implementation of water quality BMPs, POC load reduction, and the implementation of native, non-invasive vegetation. These improvements will improve water quality on a site where no previous water quality BMPs were implemented. Furthermore, no WOUS are on the Site, so no impacts to WOUS, SAV, fish, shellfish or any other aquatic species are expected.

The proposed redevelopment has demonstrated that it can fully meet the minimum VSMP requirements. The Owner has committed to going above and beyond to effectively provide additional water quality measures to benefit the City's Chesapeake Bay TMDL POC reduction credits.

This WQIA is based on preliminary information from the Concept Phase 2 Plan Set. This signature and seal certifies that the information contained herein is accurate only to the degree that the conceptual set of plans is accurate at this stage in design and is not based on construction level or final documents.

Signed: John L. Kauppila, P.E.

Dated: November 18, 2019

Signed: Karl Mertig - Virginia Certified Professional Wetland Delineator #000089.

Dated: November 18, 2019

NORTH

NORTH IS BASED ON
NAD 83 VIRGINIA
STATE PLANE NORTH
ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 15 30 60

LEGEND

- CRITICAL ROOT ZONE
- TREE NUMBER
- TRUNK LOCATION
- EXISTING TREE TO BE REMOVED
- EXISTING SHRUB
- EXISTING SHRUB TO BE REMOVED
- LOD — LIMITS OF DISTURBANCE
- RPA — RESOURCE PROTECTION AREA (RPA)

NOTE:
SEE SHEET WQ-110 TO DETAILED TREE INFORMATION

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn

11400 COMMERCE PARK DRIVE, SUITE 400, RESTON, VA 20191
PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

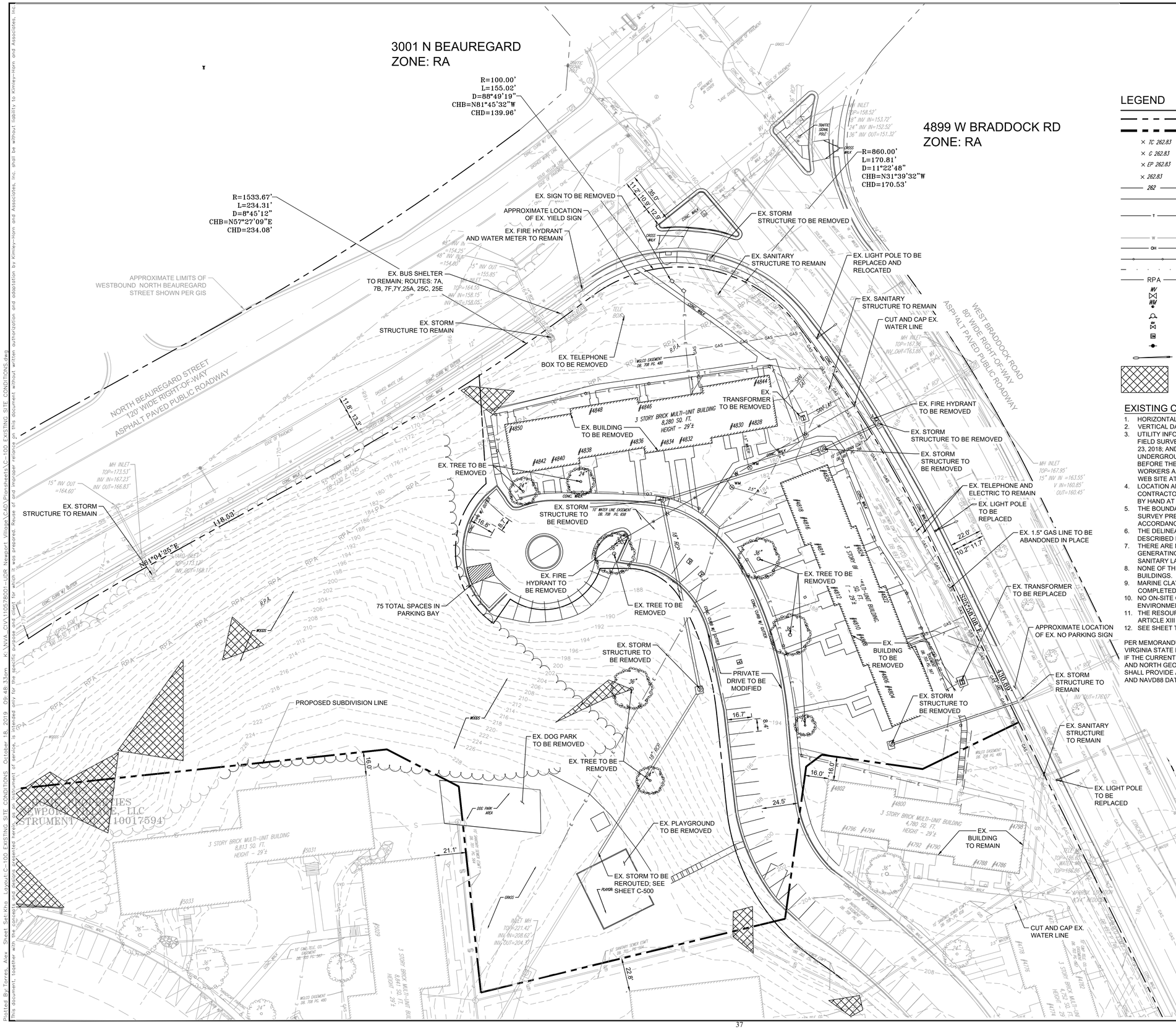
KHA PROJECT 110578001
DATE 11/14/2019
SCALE AS SHOWN
DESIGNED BY WDW
DRAWN BY WDW
CHECKED BY WDW

EXISTING CONDITIONS

NEWPORT VILLAGE
PREPARED FOR
UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER
WQ-100



LEGEND

- PROPERTY LINE
- PROPOSED SUBDIVISION LINE
- × TC 262.83 — TOP OF CURB ELEVATION
- × G 262.83 — FLOWLINE ELEVATION
- × EP 262.83 — EDGE OF PAVEMENT ELEVATION
- × 262.83 — SPOT ELEVATION
- 262 — EXISTING CONTOUR
- APPROX. LOC. UNDERGROUND APPROY. ELECTRIC
- APPROX. LOC. UNDERGROUND TELEPHONE
- W — APPROX. LOC. WATER LINE
- OH — OVERHEAD WIRES
- METAL OR WOOD FENCE
- WIRE FENCE
- RPA — RPA LINE
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- GAS VALVE
- GAS METER
- UTILITY POLE
- UTILITY POLE WITH LIGHT
- SLOPES GREATER THAN 50% (2H:1V)
- GUY WIRE
- TELE — TELEPHONE PEDESTAL
- T — TRANSFORMER
- AREA LIGHT
- SIGN
- BOLLARD
- TREE (W/SIZE)
- BUSH
- TREE LINE
- GRATE INLET
- SANITARY MANHOLE
- TELEPHONE MANHOLE
- STORM DRAIN MANHOLE
- CLEAN OUT
- DENOTES PARKING COUNT
- TITLE EXCEPTION
- BENCHMARK
- PAINTED ARROWS
- WHEEL STOP
- HANDICAP PARKING
- STOP — STOP BAR

EXISTING CONDITIONS SURVEY NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM OF 1983, NAD83
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88
3. UTILITY INFORMATION, AS SHOWN ON THIS PLAN, IS TAKEN FROM THE RECORDS AND/OR FIELD SURVEY COMPLETED BY GRS GROUP, DATED AUGUST 27, 2018, REVISED OCTOBER 23, 2018; AND CANNOT BE GUARANTEED. FOR EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES, NOTIFY "MISS UTILITY" AT 1-800-257-7777 AND 811 72 HOURS BEFORE THE START OF ANY EXCAVATION OR CONSTRUCTION. THE CONSTRUCTION WORKERS AND CONTRACTOR(S) ARE ENCOURAGED TO VISIT DOMINION VIRGINIA POWER WEB SITE AT WWW.DOM.COM (KEYWORD SAFETY) FOR ADDITIONAL SAFETY INSTRUCTIONS.
4. LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR/ENGINEER SHOULD DIG TEST PITS BY HAND AT ALL UTILITY CROSSINGS TO VERIFY EXACT LOCATION.
5. THE BOUNDARY INFORMATION FOR THE SUBJECT SITE IS BASED ON A CURRENT FIELD SURVEY PREPARED BY GRS GROUP, DATED AUGUST 27, 2018, REVISED OCTOBER 23, 2018 IN ACCORDANCE WITH THE REQUIREMENTS OF VIRGINIA ASSOCIATION OF LAND SURVEYORS.
6. THE DELINEATED RESOURCE PROTECTION AREA (RPA) ADHERES TO THE REQUIREMENTS DESCRIBED IN ARTICLE XIII OF THE ZONING ORDINANCE.
7. THERE ARE NO KNOWN UNDERGROUND STORAGE TANKS, AREAS WITH POTENTIAL OF GENERATING COMBUSTIBLE GASES, OR AREAS LOCATED WITHIN 1,000 FEET OF A FORMER SANITARY LANDFILL, DUMP, OR DISPOSAL AREA.
8. NONE OF THE BUILDINGS SHOWN ARE LISTED ON THE ALEXANDRIA LIST OF 100-YEAR OLD BUILDINGS.
9. MARINE CLAY SOILS ARE KNOWN TO BE PRESENT ON SITE PER GEOTECHNICAL REPORT COMPLETED ECS MID-ATLANTIC, LLC DATED DECEMBER 7TH, 2018.
10. NO ON-SITE CONTAMINATION IS KNOWN PER THE VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY WEB MAP ACCESSED ON AUGUST 13, 2018.
11. THE RESOURCE PROTECTION AREA (RPA) DELINEATION SATISFIES THE REQUIREMENTS OF ARTICLE XIII OF THE CITY OF ALEXANDRIA ZONING ORDINANCE.
12. SEE SHEET T-100 FOR MAJOR EXISTING TREE AND SHRUB DIMENSIONS.

PER MEMORANDUM TO INDUSTRY, JULY 20, 2005: THE PLAN SHALL BE PREPARED USING VIRGINIA STATE PLANE (NORTH ZONE) COORDINATES BASED ON NAD83 AND NAVD88; HOWEVER, IF THE CURRENT DRAWINGS ARE PREPARED USING NORTH AMERICAN DATUM OF 1927 (NAD27) AND NORTH GEODETIC VERTICAL DATUM OF 1929 (NVGD29) THEN THE AS-BUILT DRAWINGS SHALL PROVIDE A CONVERSION TABLE OF SANITARY AND STORM SEWER DATA IN THE NAD83 AND NAVD88 DATUMS.

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
Know what's Call below. before you dig.

APPROVED
SPECIAL USE PERMIT NO. _____
DEPARTMENT OF PLANNING & ZONING
DIRECTOR _____ DATE _____
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR _____ DATE _____
CHAIRMAN, PLANNING COMMISSION _____ DATE _____
DATE RECORDED _____
INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn

11400 COMMERCE PARK DRIVE, SUITE 400, RESTON, VA 20191
PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

50% SD SET

KHA PROJECT 110578001
DATE 10/18/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

EXISTING SITE CONDITIONS

NEWPORT VILLAGE
PREPARED FOR UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER C-100

NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 15 30 60

R=100.00'
L=155.02'
D=88°49'19"
CHB=N81°45'32"W
CHD=139.96'

R=1533.67'
L=234.31'
D=8°45'12"
CHB=N57°27'09"E
CHD=234.08'

R=1268.13'
L=564.64'
D=25°30'41"
CHB=S48°19'05"W
CHD=559.99'

R=860.00'
L=170.81'
D=11°22'48"
CHB=N33°39'32"W
CHD=170.53'

APPROXIMATE LIMITS OF WESTBOUND NORTH BEAUREGARD STREET SHOWN PER GIS

NORTH BEAUREGARD STREET
120' WIDE RIGHT-OF-WAY
ASPHALT PAVED PUBLIC ROADWAY

WEST BRADDOCK ROAD
80' WIDE RIGHT-OF-WAY
ASPHALT PAVED PUBLIC ROADWAY

APPROXIMATE LOCATION OF EXISTING YIELD SIGN

PROP. CURB RAMP (TYP)

PROP. PLAZA

ACCESS TO BRADDOCK RD VIA STAIRS FOR RESIDENTS

PROPOSED COBRA HEAD LED STREETLIGHT (TYP.)

LEASING OFFICE AND LOBBY AREA

PROPOSED 12' ROW DEDICATION

PROPOSED 30' ROW DEDICATION

3 HR FIRE WALL

BUILDING A
PROPOSED 5 STORY MULTIFAMILY BUILDING (TYPE IIIA) OVER 4 LEVEL GARAGE PODIUM (TYPE IA)

PROPOSED PARCEL
ZONE: CRMU-H

AMENITY COURTYARD. SEE LANDSCAPE ARCH. PLANS FOR COURTYARD DESIGN.

SWM #7: STORMWATER MANAGEMENT VAULT ON LEVEL P1

6.0' SIDEWALK
6.0' AMENITY ZONE

PROP. PARKING

SIGNAGE ALONG PROP. PARKING TO BE DETERMINED DURING FINAL SITE PLAN

SITE ENTRANCE RAMP TO LEVEL P2

RIGHT-IN RIGHT OUT TURNING MOVEMENTS ONLY

LOADING AREA ON LEVEL P2

22' EVE

PROPOSED FIRE LANE SIGN (TYP.)

3 HR FIRE WALL

ACCESS RAMP TO LEVEL P3

TRUCK BACK UP AREA ON LEVEL P2

PROPOSED "DO NOT ENTER SIGN"

BUILDING B
PROPOSED 5 STORY MULTIFAMILY BUILDING (TYPE IIIA) OVER 3 LEVEL MULTIFAMILY (TYPE IA)

PROPOSED RETAINING WALL ±0'-20' IN HEIGHT

PROPOSED SAFETY FENCE OR BARRIER ABOVE RETAINING WALL

PROPOSED RETAINING WALL ±0'-20' IN HEIGHT

LANDS N/F
HOME PROPERTIES
NEWPORT VILLAGE, LLC
INSTRUMENT NO. 110017594

EXISTING PARCEL
ZONE: RA

3 STORY BRICK MULTI-UNIT BUILDING
8,813 SQ. FT.
HEIGHT - 29'±

3 STORY BRICK MULTI-UNIT BUILDING
4,780 SQ. FT.
HEIGHT - 29'±

PROPOSED COBRA HEAD LED STREETLIGHT (TYP.)

SITE ENTRANCE

PRIVATE DRIVE

201.28 TW
196.09 BW
196.73 BW
197.51 BW
211.31 TW
214.91 TW
198.99 BW
199.13 BW
202.87 TW
202.21 TW
195.67 BW
195.62 BW
195.05 BW
199.00 BW
200.05 TW
212.39 BW
215.42 TW
215.18 TW

SITE PLAN LEGEND

- EXISTING PROPERTY LINE
- PROPOSED SUBDIVISION LINE
- PROPOSED ROW DEDICATION
- LOD — LIMITS OF DISTURBANCE (4.04 AC)
- PROPOSED BUILDING FOOTPRINT
- UNDERGROUND STRUCTURE
- BUILDING BREAK LINE
- GARAGE ACCESS RAMPS
- RPA — RPA — EXISTING RPA LIMITS
- CURB & GUTTER
- RETAINING WALL
- CONCRETE SIDEWALK
- PERMEABLE PAVEMENT

NOTES

1. SITE BOUNDARY, TOPOGRAPHY, UTILITY AND ROAD INFORMATION TAKEN FROM A SURVEY BY GRS GROUP, LLC PREPARED ON AUGUST 27, 2018, REVISED ON OCTOBER 23, 2018.
2. RIGHT OF WAY DEDICATION PENDING FINAL CITY OF ALEXANDRIA DESIGN.
3. FUTURE PARKING RESTRICTION SIGNAGE TO BE DETERMINED.
4. NO REQUIRED SETBACKS FOR CRMU-H ZONING.
5. DISTURBANCE ACTIVITIES WITHIN THE EXISTING RPA ARE TO INCLUDE A 20 FOOT AREA ALONG THE RPA BOUNDARY LINE TO ALLOW CONSTRUCTION STAGING AND EQUIPMENT ACCESS, SUPPORTS FOR EXCAVATION, INSTALLATION OF A STORM PIPE, AND INSTALLATION OF AN ELECTRICAL DUCT BANK.
6. SEE SHEETS SD11-SD15 FOR PARKING LAYOUT WITHIN PARKING STRUCTURE
7. SEE SHEET C-300 FOR PROPOSED GRADING AND SPOT ELEVATIONS FOR PROPOSED ELEVATIONS
8. SEE SHEETC-500 FOR EXISTING AND PROPOSED UTILITIES
9. SEE SHEET L-000FOR SITE FEATURES WITHIN THE PROPOSED COURTYARD AREA

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
Know what's Call below. before you dig.

APPROVED
SPECIAL USE PERMIT NO. _____
DEPARTMENT OF PLANNING & ZONING
DIRECTOR _____ DATE _____
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR _____ DATE _____
CHAIRMAN, PLANNING COMMISSION _____ DATE _____
DATE RECORDED _____
INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn

11400 COMMERCE PARK DRIVE, SUITE 400, RESTON, VA 20191
PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

50% SD SET

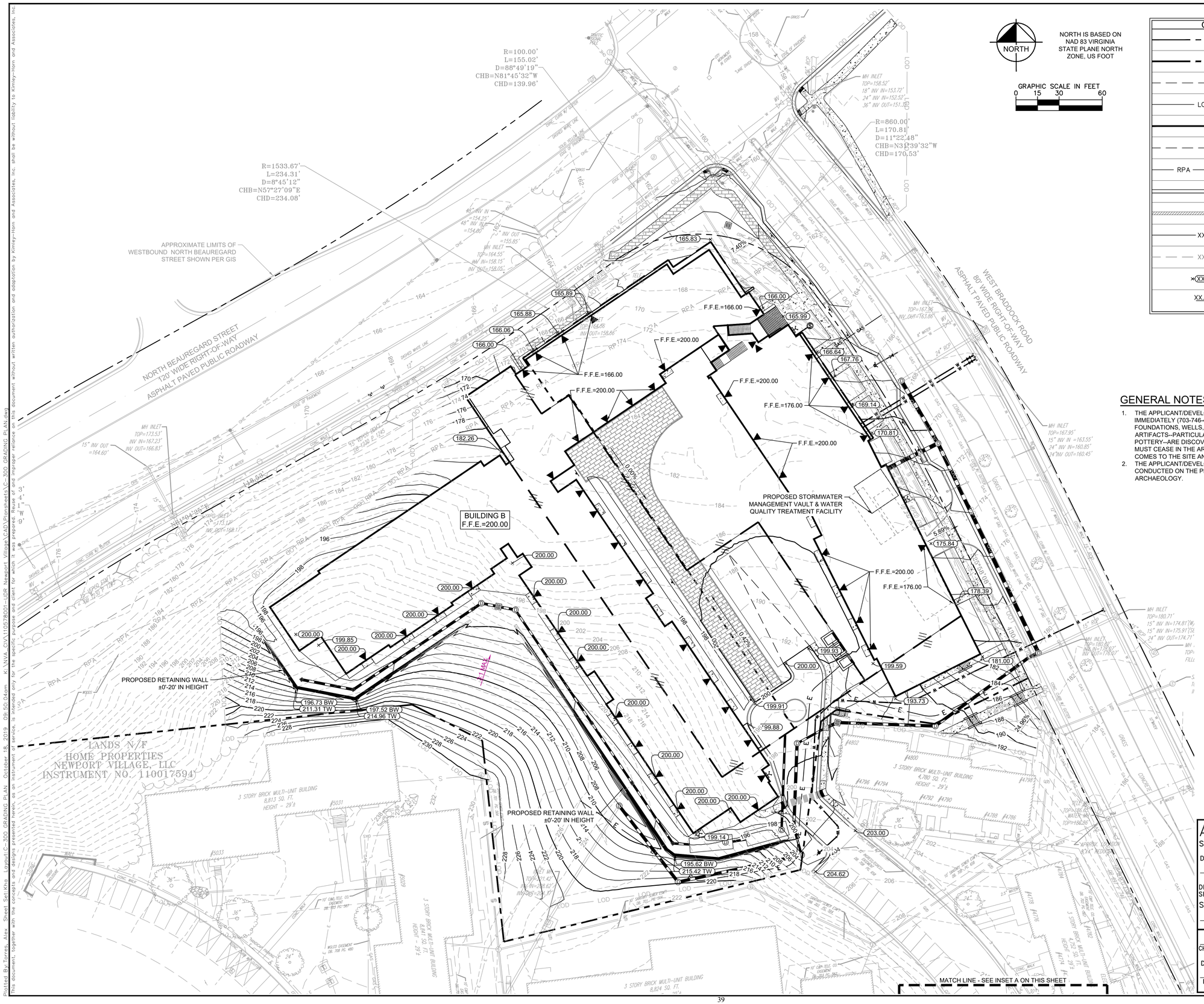
KHA PROJECT	110578001
DATE	10/16/2019
SCALE	AS SHOWN
DESIGNED BY	AT
DRAWN BY	CEC
CHECKED BY	RM

SITE PLAN

NEWPORT VILLAGE
PREPARED FOR
UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER
C-200



NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 15 30 60

GRADING PLAN LEGEND

	EXISTING PROPERTY LINE
	PROPOSED SUBDIVISION LINE
	PROPOSED ROW DEDICATION
LOD	LIMITS OF DISTURBANCE (4.04 AC)
	PROPOSED BUILDING FOOTPRINT
	GARAGE ACCESS RAMPS
RPA RPA	EXISTING RPA LIMITS
	CURB & GUTTER
	RETAINING WALL
XXX	PROPOSED CONTOUR
XXX	EXISTING CONTOUR
XXX	PROPOSED ELEVATION
XX.X%	PROPOSED SLOPE

GENERAL NOTES

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS--PARTICULARLY PIECES OF WORKED QUARTZ, QUARTZITE, OR INDIAN POTTERY--ARE DISCOVERED DURING GROUND DISTURBING ACTIVITIES. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS.
2. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
811 Know what's Call below. before you dig.

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SPECIAL USE PERMIT NO. _____
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED _____
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

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50% SD SET

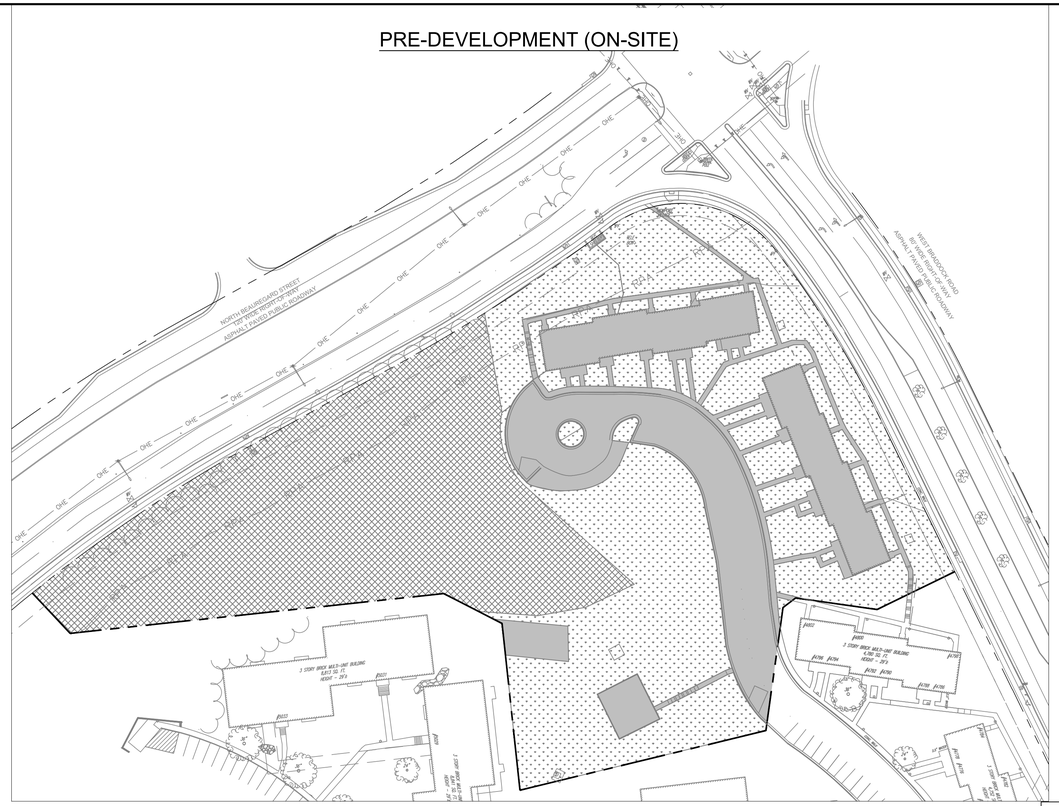
KHA PROJECT 110578001
DATE 10/18/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

GRADING PLAN

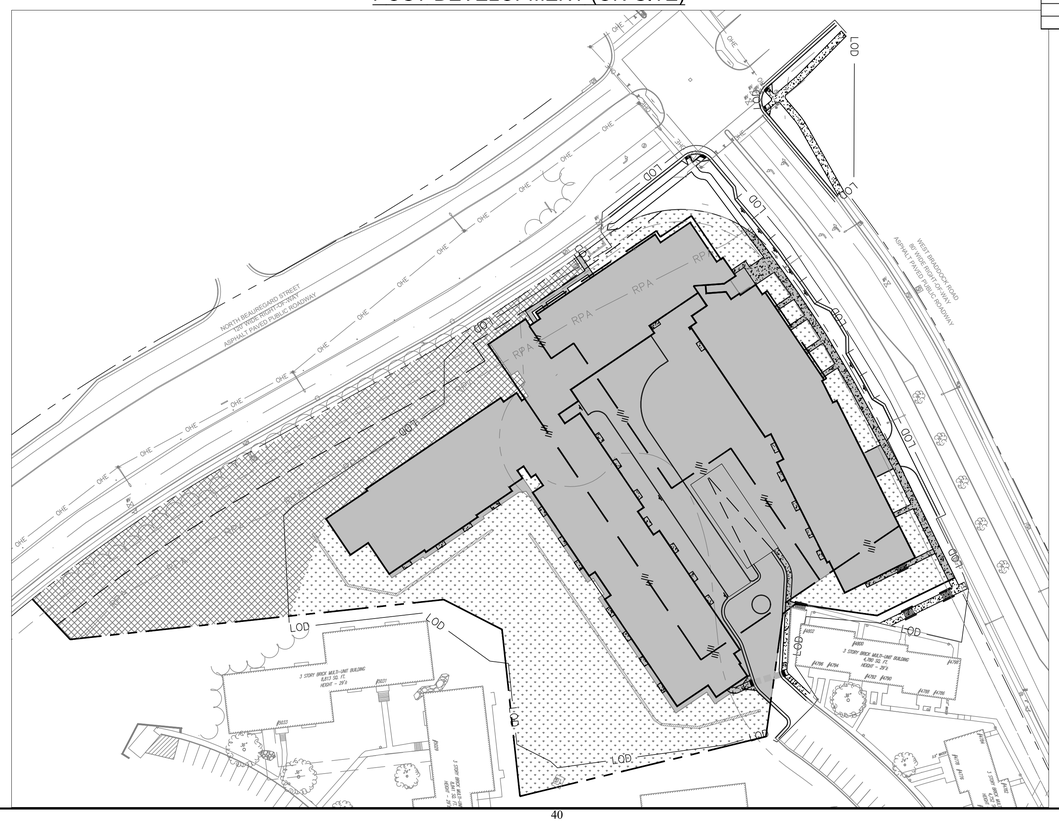
NEWPORT VILLAGE
PREPARED FOR UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER C-300

PRE-DEVELOPMENT (ON-SITE)



POST-DEVELOPMENT (ON-SITE)



NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 30 60 120

IMPERVIOUS AREA PLAN LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- PROPOSED ROW DEDICATION LINE
- LOD — LIMITS OF DISTURBANCE
- PROPOSED BUILDING FOOTPRINT
- RPA — EXISTING RPA LIMITS
- IMPERVIOUS AREA (ON-SITE)
- GRASS AREA (ON-SITE)
- FOREST AREA (ON-SITE)

LAND COVER SUMMARY (ON-SITE)

	FOREST AREA		PERVIOUS AREA		IMPERVIOUS AREA		TOTAL SITE AREA
	SF	AC	SF	AC	SF	AC	AC
PRE-DEVELOPMENT	63,962	1.47	75,180	1.73	43,284	0.99	4.19
POST-DEVELOPMENT	39,000	0.90	46,220	1.06	97,356	2.23	4.19

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SITE PLAN NO. _____

_____ _____
DIRECTOR DATE

_____ _____
CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

_____ _____ _____
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

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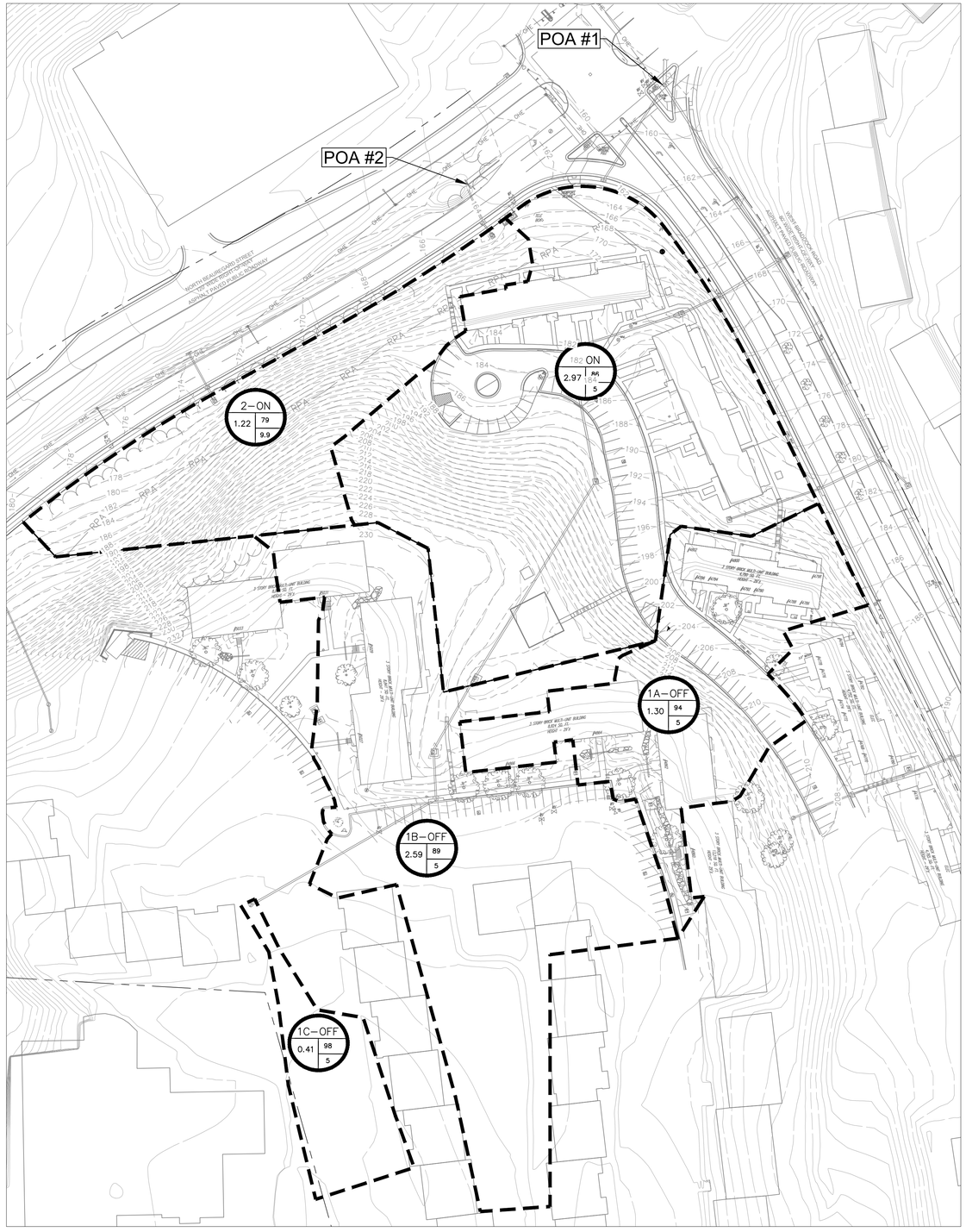
IMPERVIOUS AREA PLAN

NEWPORT VILLAGE

PREPARED FOR
UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER
C-400



PRE-DEVELOPMENT DRAINAGE AREA MAP

LEGEND

DRAINAGE AREA DIVIDE

DA
A | C
TC

DA = DRAINAGE AREA LABEL
A = AREA (ACRES)
CN = CURVE NUMBER
TC = TIME OF CONCENTRATION (MINUTES)

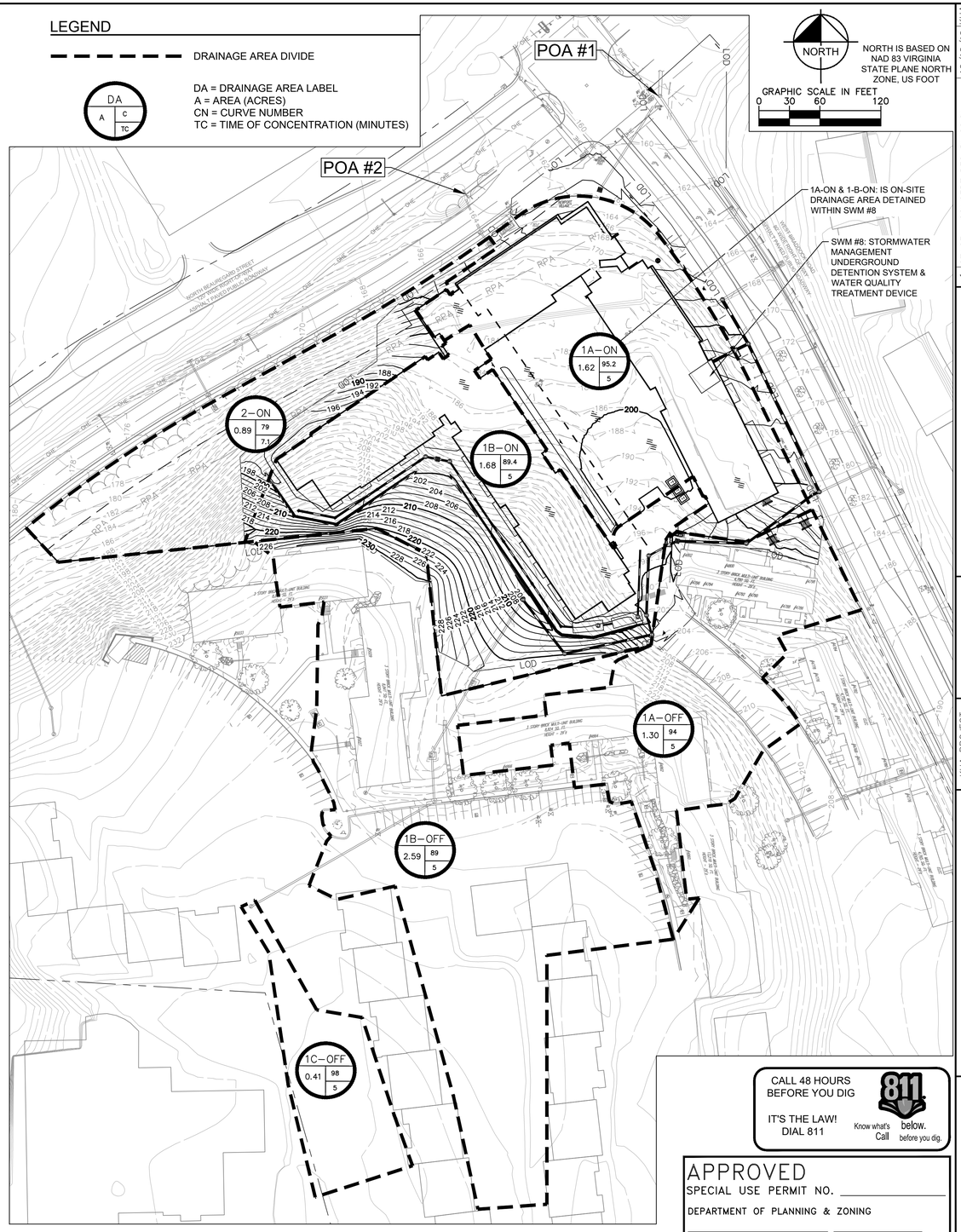
NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 30 60 120

1A-ON & 1-B-ON: IS ON-SITE DRAINAGE AREA DETAINED WITHIN SWM #8

SWM #8: STORMWATER MANAGEMENT UNDERGROUND DETENTION SYSTEM & WATER QUALITY TREATMENT DEVICE



POST-DEVELOPMENT DRAINAGE AREA MAP

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DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED _____
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

SEE SHEET C-403 FOR CHANNEL PROTECTION TABULATIONS AND CALCULATIONS.

NOTES:

1. THE TOPOGRAPHY INFORMATION PROVIDED ON THIS PLAN IS BASED ON A FIELD SURVEY PREPARED BY GRS GROUP, DATED AUGUST 27, 2018, REVISED OCTOBER 23, 2018 IN ACCORDANCE WITH THE REQUIREMENTS OF VIRGINIA ASSOCIATION OF LAND SURVEYORS.
2. DRAINAGE AREAS BEYOND THE SURVEY AREA WERE DELINEATED BY SOURCING CITY OF ALEXANDRIA GIS 2 FT TOPOGRAPHIC DATA ACCESSED ON NOVEMBER 11, 2018.

No.	REVISIONS	DATE	BY
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DRAINAGE AREA MAPS

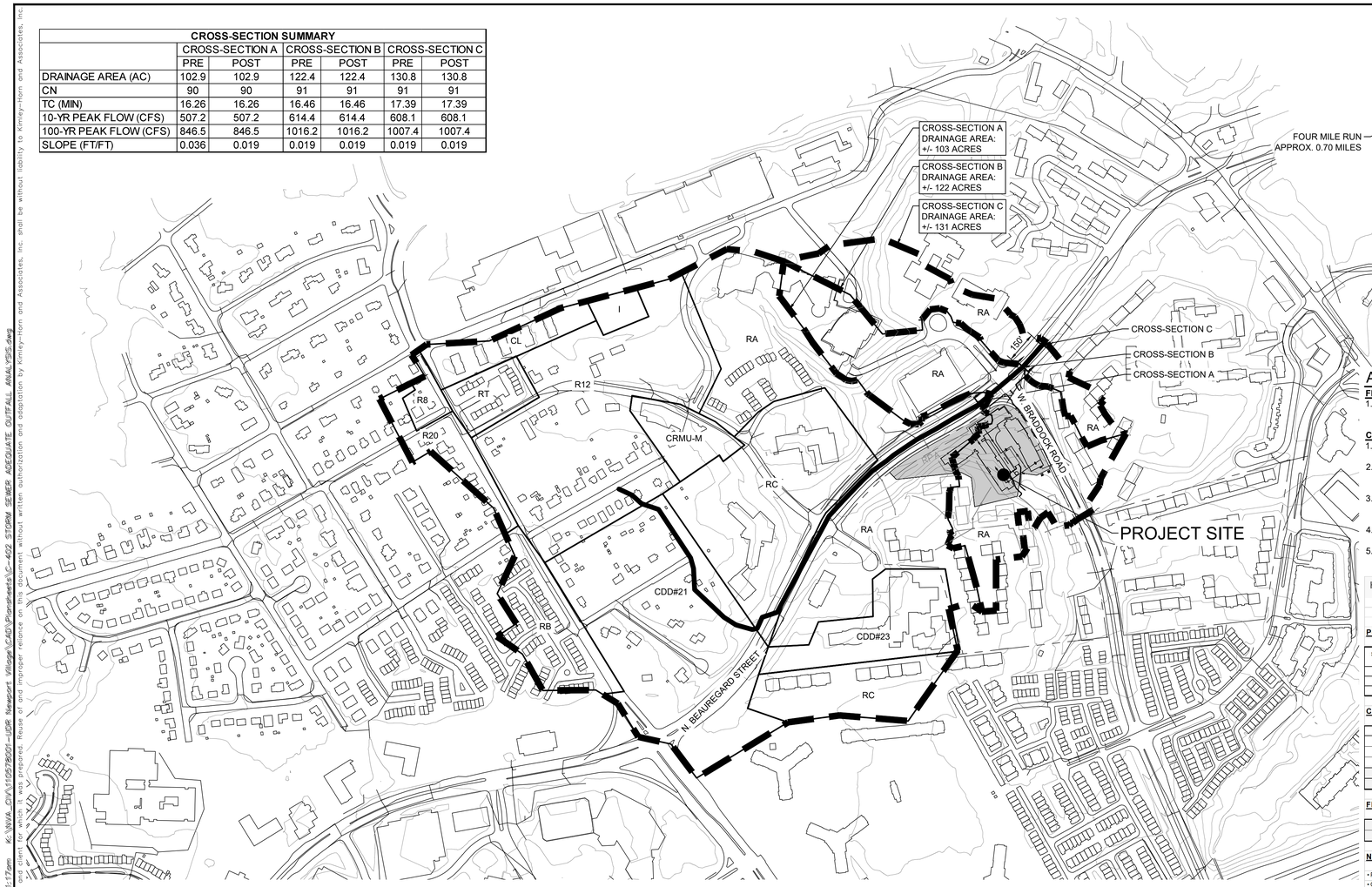
NEWPORT VILLAGE

PREPARED FOR UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER
C-401

CROSS-SECTION SUMMARY						
	CROSS-SECTION A		CROSS-SECTION B		CROSS-SECTION C	
	PRE	POST	PRE	POST	PRE	POST
DRAINAGE AREA (AC)	102.9	102.9	122.4	122.4	130.8	130.8
CN	90	90	91	91	91	91
TC (MIN)	16.26	16.26	16.46	16.46	17.39	17.39
10-YR PEAK FLOW (CFS)	507.2	507.2	614.4	614.4	608.1	608.1
100-YR PEAK FLOW (CFS)	846.5	846.5	1016.2	1016.2	1007.4	1007.4
SLOPE (FT/FT)	0.036	0.019	0.019	0.019	0.019	0.019



NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 150 300 600

ADEQUATE OUTFALL LEGEND	
	DRAINAGE AREA
	TIME OF CONCENTRATION PATH
	ZONING BOUNDARY

ADEQUATE OUTFALL ANALYSIS NARRATIVE

FLOOD PROTECTION

1. FLOOD PROTECTION REQUIREMENTS WILL BE ADDRESSED BY MEETING THE REQUIREMENTS OF THE VIRGINIA ENERGY BALANCE EQUATION USING THE TR-55 METHODOLOGY AND CITY OF ALEXANDRIA RAINFALL DATA. SEE RELEVANT CALCULATIONS ON SHEET C-404.

CHANNEL PROTECTION

1. CHANNEL PROTECTION REQUIREMENTS WILL BE ADDRESSED BY ANALYZING THREE CROSS-SECTIONS IN THE STREAM LOCATED WITHIN NORTH BEAUREGARD STREET.
2. CROSS-SECTION A IS LOCATED DIRECTLY BEFORE THE EXISTING CULVERT LOCATED WEST OF THE BEAUREGARD/BRADDOCK INTERSECTION. CROSS-SECTION B IS LOCATED DIRECTLY AFTER THE EXISTING CULVERT LOCATED EAST OF THE BEAUREGARD/BRADDOCK INTERSECTION. CROSS-SECTION C IS LOCATED 150 FEET DOWNSTREAM OF CROSS-SECTION B.
3. CURVE NUMBERS FOR FOR THE DRAINAGE AREAS CONTRIBUTING TO EACH CROSS-SECTION POINT WILL BE DETERMINED BY REFERENCING THE "CITY OF ALEXANDRIA 2016 ZONING MAP" FOR EXISTING LAND USES AND TABLE 2-2 OF THE "URBAN HYDROLOGY FOR SMALL WATER SHEDS" MANUAL DEVELOPED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE IN JUNE, 1986.
4. PEAK FLOW RATES TO EACH CROSS-SECTION WILL BE CALCULATED USING THE TR-55 METHODOLOGY AND CITY OF ALEXANDRIA RAINFALL DATA THROUGH THE "AUTODESK HYDRAFLOW HYDROGRAPHS" SOFTWARE.
5. THE WATER SURFACE ELEVATION FOR THE 1, 2, AND 10-YEAR, 24-HOUR STORM EVENT WILL BE EVALUATED FOR EACH OF THE THREE CROSS-SECTIONS TO DETERMINE WHETHER THESE STORM EVENTS ARE MAINTAINED WITHIN THE EXISTING BANKS OF THE STREAM.

Kimley»Horn

Calculations for Compliance with VA DEQ Requirements

Project: Newport Village Redevelopment **Date:** 10/11/19 **Initials:** PAT

Peak Flow Comparison

Storm Frequency (years)	Pre-Development (cfs)	Post-Development Undetained (cfs)	Post-Development Detained (cfs)	Post-Development (cfs)
1	8.469	1.450	3.166	4.335
2	11.090	1.997	8.194	9.747
10	22.010	4.396	17.370	21.160

Channel Protection (9VAC25-870-66 B.3.a)

I.F. (improvement factor)	0.8	
$RV_{1\text{-yr-Developed}}$	26720	cf
$Q_{1\text{-yr-Pre-Developed}}$	8.469	cfs
$RV_{1\text{-yr-Pre-Developed}}$	18646	cf
$Q_{1\text{-yr-Developed}}$ Allowed	4.73	cfs
$Q_{1\text{-yr-Developed}}$ Proposed	4.34	cfs

Flood Protection (9VAC25-870-66 C)

$Q_{10\text{-yr-Pre-Developed}}$	22.01	cfs
$Q_{10\text{-yr-Developed}}$	21.16	cfs

Notes

- Precipitation Depth Data: NOAA Atlas 14
- Calculation Methodology: Technical Release 55 (TR-55)
- Calculation Software: Autodesk Hydraflow Hydrographs

In accordance with the following methodology (**Energy Balance**):

$Q_{1\text{-yr-Developed}} \leq I.F.^{*}(Q_{1\text{-yr-Pre-developed}}{}^{*}\ RV_{1\text{-yr-Pre-Developed}})/RV_{1\text{-yr-Developed}}$

Under no condition shall:

$Q_{1\text{-yr-Developed}} > Q_{1\text{-yr-Pre-Developed}}$

$Q_{1\text{-yr-Developed}} < (Q_{2\text{-yr-Forest}}{}^{*}\ RV_{1\text{-yr-Forest}})/RV_{1\text{-yr-Developed}}$

where

I.F. (**improvement factor**) = 0.8 for sites > 1 acre or 0.9 for sites ≤ 1 acre

$Q_{1\text{-yr-Developed}}$ = the allowable peak flow rate of runoff from the developed site

$RV_{1\text{-yr-Developed}}$ = the volume of runoff from the site in the developed condition

$Q_{1\text{-yr-Pre-Developed}}$ = the peak flow rate of runoff from the site in the pre-developed condition

$RV_{1\text{-yr-Pre-Developed}}$ = the volume of runoff from the site in pre-developed condition

$Q_{2\text{-yr-Forest}}$ = the peak flow rate of runoff from the site in a forested condition

$RV_{1\text{-yr-Forest}}$ = the volume of runoff from the site in a forested condition

SEE SHEET C-401 FOR ON-SITE DRAINAGE AREA MAPS.
SEE SHEET C-403 FOR CHANNEL PROTECTION CALCULATIONS.
SEE SHEET C-404 FOR FLOOD PROTECTION CALCULATIONS.

REFERENCE CURVE NUMBERS BY LAND USE						
			CN*			
RESIDENTIAL		% IMPERVIOUS	A	B	C	D
1/8 ACRE OR LESS	RA, RB, RC, RT	65	77	85	90	92
1/4 ACRE	R12	38	61	75	83	87
1/3 ACRE	R20	30	57	72	81	86
1/2 ACRE		25	54	70	80	85
COMMERCIAL	CL, CDD#21, CDD#23, CRMU-M, CRMU-H	85	89	92	94	95
INDUSTRIAL	I	72	81	88	91	93

*REFERENCE CURVE NUMBERS ARE SOURCED FROM TABLE 2-2A OF THE TR-55 "URBAN HYDROLOGY FOR SMALL WATERSHEDS" MANUAL PROVIDED BY THE USDA

CURVE NUMBER CALCULATIONS							
PRE-DEVELOPMENT							
		CROSS-SECTION A		CROSS-SECTION B		CROSS-SECTION C	
		TOTAL AREA (AC)	CN	TOTAL AREA (AC)	CN	TOTAL AREA (AC)	CN
1/8 ACRE OR LESS	RA	22.97	92	42.46	92	50.84	92
1/8 ACRE OR LESS	RB	5.21	92	5.21	92	5.21	92
1/8 ACRE OR LESS	RC	18.78	92	18.78	92	18.78	92
1/8 ACRE OR LESS	RT	2.24	92	2.24	92	2.24	92
1/8 ACRE OR LESS	R8	0.96	92	0.96	92	0.96	92
COMMERCIAL	CRMU-M	2.63	95	2.63	95	2.63	95
1/4 ACRE	R12	19.33	87	19.33	87	19.33	87
1/3 ACRE	R20	2.76	86	2.76	86	2.76	86
COMMERCIAL	CL	2.72	95	2.72	95	2.72	95
COMMERCIAL	CDD#21	18.68	95	18.68	95	18.68	95
COMMERCIAL	CDD#23	5.71	95	5.71	95	5.71	95
INDUSTRIAL	I	0.92	93	0.92	93	0.92	93
	Total	**102.92**	**90**	**122.41**	**90**	**130.79**	**91**
POST-DEVELOPMENT							
		CROSS-SECTION A		CROSS-SECTION B		CROSS-SECTION C	
		TOTAL AREA (AC)	CN	TOTAL AREA (AC)	CN	TOTAL AREA (AC)	CN
1/8 ACRE OR LESS	RA	18.98	92	38.47	92	46.85	92
1/8 ACRE OR LESS	RB	5.21	92	5.21	92	5.21	92
1/8 ACRE OR LESS	RC	18.78	92	18.78	92	18.78	92
1/8 ACRE OR LESS	RT	2.24	92	2.24	92	2.24	92
1/8 ACRE OR LESS	R8	0.96	92	0.96	92	0.96	92
COMMERCIAL	CRMU-M	2.63	95	2.63	95	2.63	95
1/4 ACRE	R12	19.33	87	19.33	87	19.33	87
1/3 ACRE	R20	2.76	86	2.76	86	2.76	86
COMMERCIAL	CL	2.72	95	2.72	95	2.72	95
COMMERCIAL	CDD#21	18.68	95	18.68	95	18.68	95
COMMERCIAL	CDD#23	5.71	95	5.71	95	5.71	95
INDUSTRIAL	I	0.92	93	0.92	93	0.92	93
Proposed Site	CRMU-H	3.99	95	3.99	93	3.99	93
	Total	**102.92**	**90**	**122.41**	**91**	**130.79**	**91**

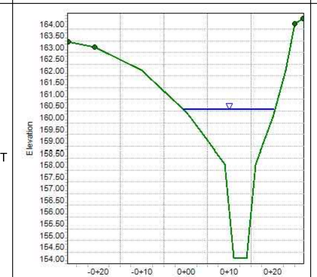
PRE-DEVELOPMENT

CROSS-SECTION A

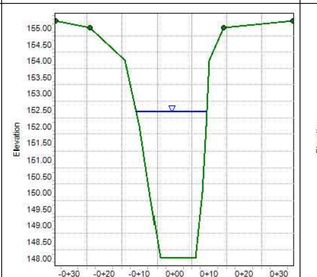
CROSS-SECTION B

CROSS-SECTION C

POST-DEVELOPMENT



CROSS-SECTION A



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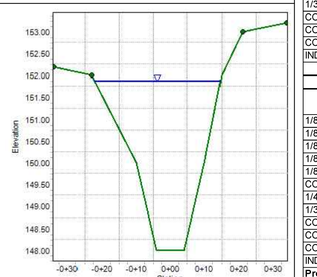

CROSS-SECTION C

CALL 48 HOURS BEFORE YOU DIG
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SITE PLAN NO. _____
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED _____
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

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KHA PROJECT 110578001
DATE 10/16/2019
SCALE AS SHOWN
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DRAWN BY CEC
CHECKED BY RM

STORM SEWER ADEQUATE OUTFALL ANALYSIS

NEWPORT VILLAGE
PREPARED FOR UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER C-402

1-YEAR PEAK FLOW SUMMARY

1

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.974	2	716	14,096	-------	-------	-------	PRE-1-ON
2	SCS Runoff	1.725	2	722	4,549	-------	-------	-------	PRE-2-ON
3	Combine	8.469	2	718	18,646	1, 2	-------	-------	PRE-SITE
4	SCS Runoff	6.007	1	717	13,201	-------	-------	-------	POST-1A-ON
5	SCS Runoff	5.065	1	717	10,455	-------	-------	-------	POST-1B-ON
6	SCS Runoff	1.450	1	719	3,068	-------	-------	-------	POST-2-ON (UNDETAINED)
7	SCS Runoff	220.95	2	722	623,126	-------	-------	-------	PRE-CROSS-SECTION A
8	SCS Runoff	274.22	2	722	776,955	-------	-------	-------	PRE-CROSS-SECTION B
9	SCS Runoff	270.39	2	724	851,430	-------	-------	-------	PRE-CROSS-SECTION C
10	SCS Runoff	220.95	2	722	623,126	-------	-------	-------	POST-CROSS-SECTION A
11	SCS Runoff	274.22	2	722	776,955	-------	-------	-------	POST-CROSS-SECTION B
12	SCS Runoff	270.39	2	724	851,430	-------	-------	-------	POST-CROSS-SECTION C
13	Combine	11.07	1	717	23,657	4, 5,	-------	-------	POST-1 (DETAINED)
14	Reservoir	3.166	1	725	23,652	13	174.70	7,520	SWM #8
15	Combine	4.335	1	720	26,720	6, 14	-------	-------	POST-SITE

UDR Newport Village.gpw | Return Period: 1 Year | Wednesday, 10 / 16 / 2019

2-YEAR PEAK FLOW SUMMARY

2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	9.053	2	716	18,390	-------	-------	-------	PRE-1-ON
2	SCS Runoff	2.378	2	722	6,223	-------	-------	-------	PRE-2-ON
3	Combine	11.09	2	718	24,612	1, 2	-------	-------	PRE-SITE
4	SCS Runoff	7.257	1	717	16,165	-------	-------	-------	POST-1A-ON
5	SCS Runoff	6.380	1	717	13,308	-------	-------	-------	POST-1B-ON
6	SCS Runoff	1.997	1	719	4,211	-------	-------	-------	POST-2-ON (UNDETAINED)
7	SCS Runoff	278.12	2	722	789,933	-------	-------	-------	PRE-CROSS-SECTION A
8	SCS Runoff	342.43	2	722	978,368	-------	-------	-------	PRE-CROSS-SECTION B
9	SCS Runoff	338.06	2	724	1,072,150	-------	-------	-------	PRE-CROSS-SECTION C
10	SCS Runoff	278.12	2	722	789,933	-------	-------	-------	POST-CROSS-SECTION A
11	SCS Runoff	342.43	2	722	978,368	-------	-------	-------	POST-CROSS-SECTION B
12	SCS Runoff	338.06	2	724	1,072,150	-------	-------	-------	POST-CROSS-SECTION C
13	Combine	13.64	1	717	29,472	4, 5,	-------	-------	POST-1 (DETAINED)
14	Reservoir	8.194	1	722	29,467	13	175.32	8,505	SWM #8
15	Combine	9.747	1	722	33,678	6, 14	-------	-------	POST-SITE

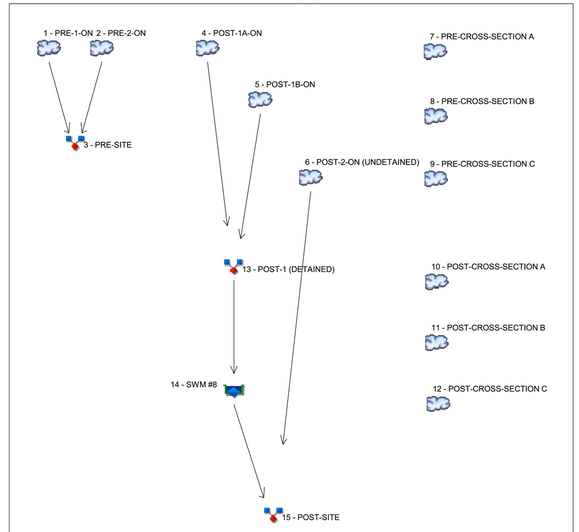
UDR Newport Village.gpw | Return Period: 2 Year | Wednesday, 10 / 16 / 2019

ROUTING MAP

1

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Project: UDR Newport Village.gpw | Wednesday, 10 / 16 / 2019

SEE SHEET C-401 FOR DRAINAGE DIVIDES AND C-402 FOR AREA CALCULATIONS.

10-YEAR PEAK FLOW SUMMARY

3

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	17.59	2	716	36,728	-------	-------	-------	PRE-1-ON
2	SCS Runoff	5.298	2	720	13,755	-------	-------	-------	PRE-2-ON
3	Combine	22.01	2	718	50,483	1, 2	-------	-------	PRE-SITE
4	SCS Runoff	12.20	1	717	28,141	-------	-------	-------	POST-1A-ON
5	SCS Runoff	11.65	1	717	25,193	-------	-------	-------	POST-1B-ON
6	SCS Runoff	4.396	1	718	9,370	-------	-------	-------	POST-2-ON (UNDETAINED)
7	SCS Runoff	507.24	2	722	1,482,325	-------	-------	-------	PRE-CROSS-SECTION A
8	SCS Runoff	614.37	2	722	1,809,404	-------	-------	-------	PRE-CROSS-SECTION B
9	SCS Runoff	608.13	2	724	1,982,844	-------	-------	-------	PRE-CROSS-SECTION C
10	SCS Runoff	507.24	2	722	1,482,325	-------	-------	-------	POST-CROSS-SECTION A
11	SCS Runoff	614.37	2	722	1,809,404	-------	-------	-------	POST-CROSS-SECTION B
12	SCS Runoff	608.13	2	724	1,982,844	-------	-------	-------	POST-CROSS-SECTION C
13	Combine	23.84	1	717	53,333	4, 5,	-------	-------	POST-1 (DETAINED)
14	Reservoir	17.37	1	721	53,328	13	177.51	12,007	SWM #8
15	Combine	21.16	1	720	62,698	6, 14	-------	-------	POST-SITE

UDR Newport Village.gpw | Return Period: 10 Year | Wednesday, 10 / 16 / 2019

100-YEAR PEAK FLOW SUMMARY

4

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	30.40	2	716	65,713	-------	-------	-------	PRE-1-ON
2	SCS Runoff	9.920	2	720	26,222	-------	-------	-------	PRE-2-ON
3	Combine	38.61	2	718	91,936	1, 2	-------	-------	PRE-SITE
4	SCS Runoff	19.52	1	717	46,238	-------	-------	-------	POST-1A-ON
5	SCS Runoff	19.44	1	717	43,588	-------	-------	-------	POST-1B-ON
6	SCS Runoff	8.192	1	718	17,937	-------	-------	-------	POST-2-ON (UNDETAINED)
7	SCS Runoff	846.48	2	722	2,550,726	-------	-------	-------	PRE-CROSS-SECTION A
8	SCS Runoff	1016.17	2	722	3,085,522	-------	-------	-------	PRE-CROSS-SECTION B
9	SCS Runoff	1007.40	2	724	3,381,286	-------	-------	-------	PRE-CROSS-SECTION C
10	SCS Runoff	846.48	2	722	2,550,726	-------	-------	-------	POST-CROSS-SECTION A
11	SCS Runoff	1016.17	2	722	3,085,522	-------	-------	-------	POST-CROSS-SECTION B
12	SCS Runoff	1007.40	2	724	3,381,286	-------	-------	-------	POST-CROSS-SECTION C
13	Combine	38.96	1	717	89,826	4, 5,	-------	-------	POST-1 (DETAINED)
14	Reservoir	38.54	1	718	89,821	13	177.93	12,684	SWM #8
15	Combine	46.73	1	718	107,758	6, 14	-------	-------	POST-SITE

UDR Newport Village.gpw | Return Period: 100 Year | Wednesday, 10 / 16 / 2019

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SPECIAL USE PERMIT NO. _____

DEPARTMENT OF PLANNING & ZONING

_____ DIRECTOR _____ DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

_____ DIRECTOR _____ DATE

_____ CHAIRMAN, PLANNING COMMISSION _____ DATE

DATE RECORDED _____

_____ INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

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PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

KHA PROJECT 110578001
DATE 10/16/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

CHANNEL PROTECTION CALCULATIONS

NEWPORT VILLAGE
PREPARED FOR UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER C-403

TIME OF CONCENTRATION TABULATION FOR STREAM ANALYSIS

Cross-Section A - Lag Time Calculations

Seg.	PRE-1	Length	Elev Up	Elev. Dn	Slope	P2	Cover	n value	Pipe Diameter	Channel Width	Channel S. Slopes	Channel Depth	Velocity	Tc	Area	Rh	Q
Type	Desc.	(ft.)	(ft.)	(ft.)	(ft./ft.)	(in.)	Type		(ft.)	(ft.)	H:V	(ft.)	(fps)	(min)	(sq. ft.)		(cfs)
1	Overland Flow (TR-55)	100	255.00	253.00	0.020	3.2	G	0.150						9.80			
2	Shallow Conc. 1	980	253.00	214.00	0.040		U						3.22	5.07			
	Shallow Conc. 2				0.000		P						0.00	0.00			
3	Pipe 1	473	214.00	186	0.059			0.013	3.5				25.50	0.31	9.6	0.9	245
3	Pipe 2	223	186	180	0.027			0.013	4				18.80	0.20	12.6	1.0	236
3	Channel 1	813	180.00	154.00	0.0320			0.045		5	2.5	8	15.32	0.88	200.0	4.2	3063
3	Pipe 3	0	154	148	0.000			0.013	4				0.00	0.00	12.6	1.0	0
	Channel 3	0	148.00	147.75	0.000			0.050		6	1.67	6	0.00	0.00	96.0	3.3	0
	Total Length	2589			0.0367								Total Tc (mins)	16.26			
													Total Travel Time, Tc (hrs)	0.271			
													Lag Time (hrs)	0.163			
													Lag Time (min)	9.758			
													Avg. Velocity (ft/s)	2.7			

Table 1. Overland Flow Manning's n values

Description	Code	n value
Smooth surfaces: concrete, asphalt, packed soil etc.	C	0.011
Bare Soil	B	0.060
Cultivated soils avg.	S	0.120
Short grass	G	0.150
Dense grasses.	D	0.240
Light w oods/Bermuda Grass	W	0.400
Woods Heavy Cover	H	0.800
Unpaved	U	16.1345*(slope)^0.5
Paved	P	20.3282*(slope)^0.5

Table 2. Typical Pipe and Channel Manning's n values

Description	n value
Concrete	0.013
Corrugated Metal Pipe (CMP)	0.024
Concrete channel	0.018
Grass channel mow ed	0.035
Grass channel not maintained	0.050
Rip-rap channel	0.040
Channels w ith significant w eeds and flow obs.	0.075

Cross-Section B - Lag Time Calculations

Seg.	PRE-1	Length	Elev Up	Elev. Dn	Slope	P2	Cover	n value	Pipe Diameter	Channel Width	Channel S. Slopes	Channel Depth	Velocity	Tc	Area	Rh	Q
Type	Desc.	(ft.)	(ft.)	(ft.)	(ft./ft.)	(in.)	Type		(ft.)	(ft.)	H:V	(ft.)	(fps)	(min)	(sq. ft.)		(cfs)
1	Overland Flow (TR-55)	100	255.00	253.00	0.020	3.2	G	0.150						9.80			
2	Shallow Conc. 1	980	253.00	214.00	0.040		U						3.22	5.07			
	Shallow Conc. 2				0.000		P						0.00	0.00			
3	Pipe 1	473	214.00	186	0.059			0.013	3.5				25.50	0.31	9.6	0.9	245
3	Pipe 2	223	186	180	0.027			0.013	4				18.80	0.20	12.6	1.0	236
3	Channel 1	813	180.00	154.00	0.0320			0.045		5	2.5	8	15.32	0.88	200.0	4.2	3063
3	Pipe 3	223	154	148	0.027			0.013	4				18.80	0.20	12.6	1.0	236
	Channel 3	0	148.00	147.75	0.000			0.050		6	1.67	6	0.00	0.00	96.0	3.3	0
	Total Length	2812			0.0359								Total Tc (mins)	16.46			
													Total Travel Time, Tc (hrs)	0.274			
													Lag Time (hrs)	0.165			
													Lag Time (min)	9.877			
													Avg. Velocity (ft/s)	2.8			

Table 1. Overland Flow Manning's n values

Description	Code	n value
Smooth surfaces: concrete, asphalt, packed soil etc.	C	0.011
Bare Soil	B	0.060
Cultivated soils avg.	S	0.120
Short grass	G	0.150
Dense grasses	D	0.240
Light w oods/Bermuda Grass	W	0.400
Woods Heavy Cover	H	0.800
Unpaved	U	16.1345*(slope)^0.5
Paved	P	20.3282*(slope)^0.5

Table 2. Typical Pipe and Channel Manning's n values

Description	n value
Concrete	0.013
Corrugated Metal Pipe (CMP)	0.024
Concrete channel	0.018
Grass channel mow ed	0.035
Grass channel not maintained	0.050
Rip-rap channel	0.040
Channels w ith significant w eeds and flow obs.	0.075

Cross-Section C - Lag Time Calculations

Seg.	PRE-1	Length	Elev Up	Elev. Dn	Slope	P2	Cover	n value	Pipe Diameter	Channel Width	Channel S. Slopes	Channel Depth	Velocity	Tc	Area	Rh	Q
Type	Desc.	(ft.)	(ft.)	(ft.)	(ft./ft.)	(in.)	Type		(ft.)	(ft.)	H:V	(ft.)	(fps)	(min)	(sq. ft.)		(cfs)
1	Overland Flow (TR-55)	100	255.00	253.00	0.020	3.2	G	0.150						9.80			
2	Shallow Conc. 1	980	253.00	214.00	0.040		U						3.22	5.07			
	Shallow Conc. 2				0.000		P						0.00	0.00			
3	Pipe 1	473	214.00	186	0.059			0.013	3.5				25.50	0.31	9.6	0.9	245
3	Pipe 2	223	186	180	0.027			0.013	4				18.80	0.20	12.6	1.0	236
3	Channel 1	813	180.00	154.00	0.0320			0.045		5	2.5	8	15.32	0.88	200.0	4.2	3063
3	Pipe 3	223	154	148	0.027			0.013	4				18.80	0.20	12.6	1.0	236
3	Channel 3	150	148.00	147.75	0.002			0.050		6	1.67	6	2.68	0.93	96.0	3.3	258
	Total Length	2962			0.0342								Total Tc (mins)	17.39			
													Total Travel Time, Tc (hrs)	0.290			
													Lag Time (hrs)	0.174			
													Lag Time (min)	10.436			
													Avg. Velocity (ft/s)	2.8			

Table 1. Overland Flow Manning's n values

Description	Code	n value
Smooth surfaces: concrete, asphalt, packed soil etc.	C	0.011
Bare Soil	B	0.060
Cultivated soils avg.	S	0.120
Short grass	G	0.150
Dense grasses	D	0.240
Light w oods/Bermuda Grass	W	0.400
Woods Heavy Cover	H	0.800
Unpaved	U	16.1345*(slope)^0.5
Paved	P	20.3282*(slope)^0.5

Table 2. Typical Pipe and Channel Manning's n values

Description	n value
Concrete	0.013
Corrugated Metal Pipe (CMP)	0.024
Concrete channel	0.018
Grass channel mow ed	0.035
Grass channel not maintained	0.050
Rip-rap channel	0.040
Channels w ith significant w eeds and flow obs.	0.075

STREAM ANALYSIS SUMMARY

10-Yr Stream Analysis Summary

	Drainage Area (Ac)	CN	Tc (min)	Solve For	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)	Water Surface Elevation (ft)	Elevation Range	Discharge (cfs)	Flow Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Normal Depth (ft)	Critical Depth (ft)	Critical Slope (ft/ft)	Velocity (ft/s)	Velocity Head (ft)	Specific Energy (ft)	Froude Number	Flow Type
Cross Section A - Pre	102.92	90	16.26	Normal Depth	Manning Formula	0.045	0.0357	160.31	154.00 to 164.20 ft	507.24	52.21	26.86	1.94	21.08	6.31	6.5	0.02957	9.72	1.47	7.78	1.09	Supercritical
Cross Section B - Pre	122.41	91	16.46	Normal Depth	Manning Formula	0.045	0.019	152.43	148.00 to 155.20 ft	614.37	67.31	23.7	2.84	20.06	4.43	4.1	0.02491	9.13	1.29	5.72	0.88	Subcritical
Cross Section C - Pre	130.79	91	17.39	Normal Depth	Manning Formula	0.045	0.019	151.86	148.00 to 153.20 ft	608.13	80.69	37.87	2.13	36.72	3.86	3.67	0.02398	7.54	0.88	4.74	0.9	Subcritical
Cross Section A - Post	102.92	90	16.26	Normal Depth	Manning Formula	0.045	0.0357	160.31	154.00 to 164.20 ft	507.24	52.21	26.86	1.94	21.08	6.31	6.5	0.02957	9.72	1.47	7.78	1.09	Supercritical
Cross Section B - Post	122.41	91	16.46	Normal Depth	Manning Formula	0.045	0.019	152.43	148.00 to 155.20 ft	614.37	67.31	23.7	2.84	20.06	4.43	4.1	0.02491	9.13	1.29	5.72	0.88	Subcritical
Cross Section C - Post	130.79	91	17.39	Normal Depth	Manning Formula	0.045	0.019	151.86	148.00 to 153.20 ft	608.13	80.69	37.87	2.13	36.72	3.86	3.67	0.02398	7.54	0.88	4.74	0.9	Subcritical

NOTE: FLOWMASTER PROGRAM USED FOR STREAM ANALYSIS

Hydrograph Report

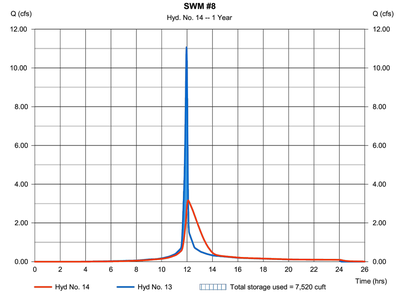
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Wednesday, 10 / 16 / 2019

Hyd. No. 14

SWM #8

Hydrograph type	= Reservoir	Peak discharge	= 3.166 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 23,652 cuft
Inflow hyd. No.	= 13 - POST-1 (DETAINED)	Max. Elevation	= 174.70 ft
Reservoir name	= SWM #8	Max. Storage	= 7,520 cuft

Storage Indication method used.



Hydrograph Report

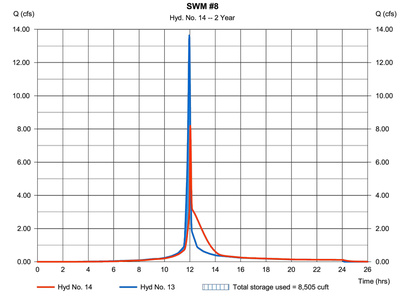
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Wednesday, 10 / 16 / 2019

Hyd. No. 14

SWM #8

Hydrograph type	= Reservoir	Peak discharge	= 8.194 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 29,467 cuft
Inflow hyd. No.	= 13 - POST-1 (DETAINED)	Max. Elevation	= 175.32 ft
Reservoir name	= SWM #8	Max. Storage	= 8,505 cuft

Storage Indication method used.



Hydrograph Report

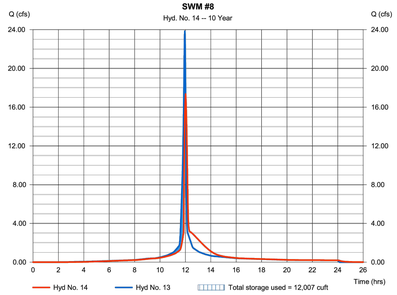
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Wednesday, 10 / 16 / 2019

Hyd. No. 14

SWM #8

Hydrograph type	= Reservoir	Peak discharge	= 17.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 53,328 cuft
Inflow hyd. No.	= 13 - POST-1 (DETAINED)	Max. Elevation	= 177.51 ft
Reservoir name	= SWM #8	Max. Storage	= 12,007 cuft

Storage Indication method used.



Hydrograph Report

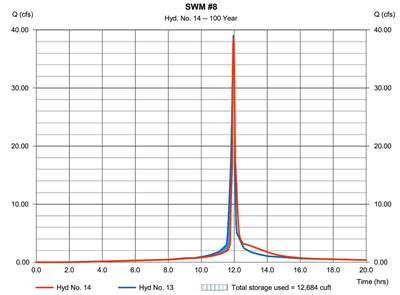
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Wednesday, 10 / 16 / 2019

Hyd. No. 14

SWM #8

Hydrograph type	= Reservoir	Peak discharge	= 38.54 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 89,821 cuft
Inflow hyd. No.	= 13 - POST-1 (DETAINED)	Max. Elevation	= 177.93 ft
Reservoir name	= SWM #8	Max. Storage	= 12,684 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Wednesday, 10 / 16 / 2019

Pond No. 1 - SWM #8

Pond Data

UG Chambers -Invert elev. = 170.00 ft, Rise x Span = 8.00 x 40.00 ft, Barrel Len = 40.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	170.00	n/a	0	0
0.80	170.80	n/a	1,280	1,280
1.60	171.60	n/a	1,280	2,561
2.40	172.40	n/a	1,280	3,841
3.20	173.20	n/a	1,280	5,121
4.00	174.00	n/a	1,280	6,401
4.80	174.80	n/a	1,280	7,682
5.60	175.60	n/a	1,280	8,962
6.40	176.40	n/a	1,280	10,242
7.20	177.20	n/a	1,280	11,522
8.00	178.00	n/a	1,280	12,803

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	5.50	6.00	Inactive
Span (in)	= 24.00	5.50	6.00	18.00
No. Barrels	= 1	2	9	20
Invert El. (ft)	= 170.00	170.00	174.70	172.95
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

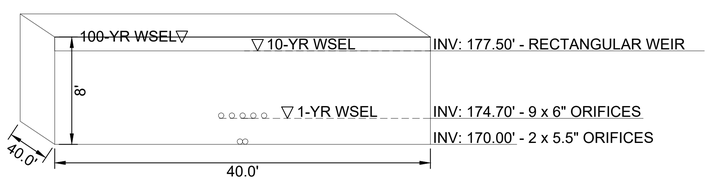
	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	35.00	Inactive	Inactive
Crest El. (ft)	= 177.00	177.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr)	= 0.000 (by Wet area)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	170.00	0.00	0.00	0.00	0.00	0.00	0.00	---	---	---	---	0.000
0.80	1,280	170.80	1.01 ic	1.01 ic	0.00	0.00	0.00	0.00	---	---	---	---	1.005
1.60	2,561	171.60	1.65 ic	1.65 ic	0.00	0.00	0.00	0.00	---	---	---	---	1.649
2.40	3,841	172.40	2.18 ic	2.13 ic	0.00	0.00	0.00	0.00	---	---	---	---	2.130
3.20	5,121	173.20	2.59 ic	2.53 ic	0.00	0.00	0.00	0.00	---	---	---	---	2.531
4.00	6,401	174.00	2.92 ic	2.88 ic	0.00	0.00	0.00	0.00	---	---	---	---	2.883
4.80	7,682	174.80	3.51 oc	3.18 ic	0.28 ic	0.00	0.00	0.00	---	---	---	---	3.461
5.60	8,962	175.60	9.86 oc	3.00 ic	6.86 ic	0.00	0.00	0.00	---	---	---	---	9.862
6.40	10,242	176.40	13.48 oc	3.23 ic	10.24 ic	0.00	0.00	0.00	---	---	---	---	13.47
7.20	11,522	177.20	16.21 oc	3.45 ic	12.76 ic	0.00	0.00	0.00	---	---	---	---	16.21
8.00	12,803	178.00	39.33 ic	0.78 ic	4.17 ic	0.00	0.00	34.38 s	---	---	---	---	39.32



1 PRELIMINARY STORMWATER DETENTION AND CONTROL STRUCTURE
NOT TO SCALE

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
811 Know what's Call below. before you dig.

APPROVED
SPECIAL USE PERMIT NO. _____
DEPARTMENT OF PLANNING & ZONING
DIRECTOR _____ DATE _____
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR _____ DATE _____
CHAIRMAN, PLANNING COMMISSION _____ DATE _____
DATE RECORDED _____
INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn
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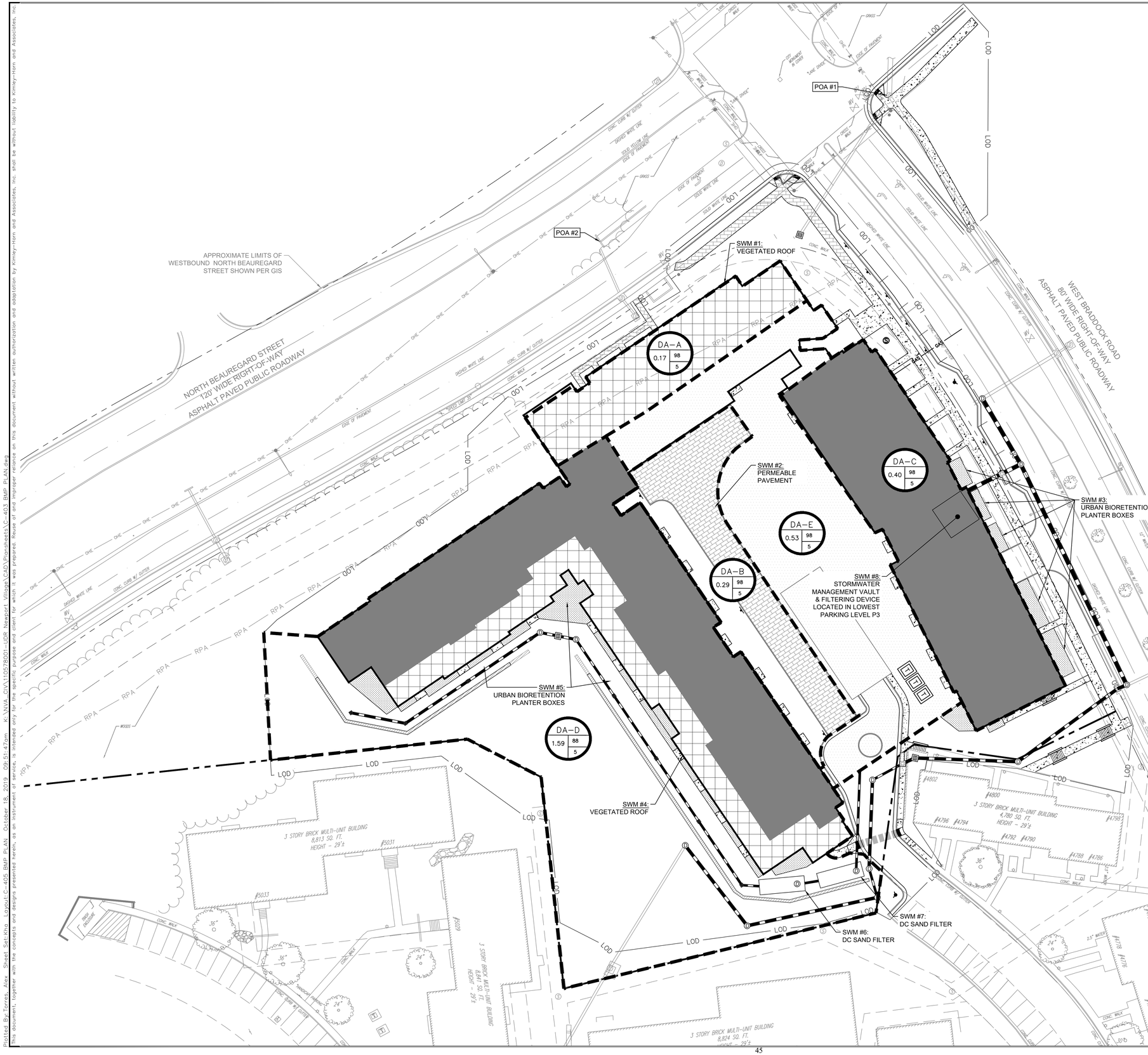
PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

KHA PROJECT 110578001
DATE 10/18/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

FLOOD PROTECTION CALCULATIONS

NEWPORT VILLAGE
PREPARED FOR UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER C-404



NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 15 30 60

LEGEND

- PERMEABLE PAVEMENT 0.15 ACRES TOTAL
- ROOF AREA DRAINING TO URBAN BIORETENTION PLANTER BOXES
- IMPERVIOUS AREA DRAINING TO SWM #8 (UNDERGROUND STORMWATER VAULT AND WATER QUALITY FILTERING DEVICE)
- VEGETATIVE GREEN ROOF 0.35 ACRES TOTAL
- URBAN BIORETENTION FILTER BED AREA 0.35 ACRES TOTAL
- BMP DRAINAGE DIVIDE

NOTES:

1. STORMWATER BMP DESIGN IS CONCEPTUAL AND SUBJECT TO CHANGE WITH DSUP AND FINAL SITE PLAN.
2. SEE SHEET C-406 FOR BMP CALCULATIONS.
3. THE STORMWATER BEST MANAGEMENT PRACTICES (BMP) REQUIRED FOR THIS PROJECT SHALL BE CONSTRUCTED AND INSTALLED UNDER THE DIRECT SUPERVISION OF THE DESIGN ENGINEER OR THEIR DESIGNATED REPRESENTATIVE. THE DESIGN ENGINEER SHALL MAKE A WRITTEN CERTIFICATION TO THE CITY THAT THE BMPs ARE CONSTRUCTED AND INSTALLED AS DESIGNED AND IN ACCORDANCE WITH THE APPROVED SITE PLAN. IN ADDITION, AGGREGATE LAYERS AND COLLECTOR PIPES MAY NOT BE INSTALLED UNLESS THE DESIGN ENGINEER OR THEIR REPRESENTATIVE IS PRESENT.
4. THE CONTRACTOR SHALL FURNISH THE CITY WITH AN OPERATION AND MAINTENANCE MANUAL FOR ALL BMPs ON THE PROJECT. THE MANUAL SHALL INCLUDE AN EXPLANATION OF THE FUNCTIONS AND OPERATIONS OF EACH BMP AND ANY SUPPORTING UTILITIES, CATALOG CUTS ON ANY MECHANICAL OR ELECTRICAL EQUIPMENT AND A SCHEDULE OF ROUTINE MAINTENANCE FOR THE BMPs AND SUPPORTING EQUIPMENT

WATER QUALITY NARRATIVE:

DRAINAGE AREA A:
- 0.17 ACRES OF IMPERVIOUS ROOF AREA SHALL BE TREATED THROUGH THE USE OF A VEGETATED ROOF (SWM #1).

DRAINAGE AREA B:
- 0.29 ACRES OF IMPERVIOUS COURTYARD AREA SHALL BE TREATED THROUGH THE USE OF PERMEABLE PAVEMENT (SWM #2). THE PERMEABLE PAVEMENT IS LOCATED WITHIN THE LIMITS OF THE FIRE LANE IN THE COURTYARD.

DRAINAGE AREA C:
- 0.40 ACRES OF IMPERVIOUS ROOF AREA SHALL BE TREATED THROUGH THE USE OF URBAN BIORETENTION PLANTER BOXES (SWM #3). THE ROOF WILL BE DESIGNED TO CAPTURE THE ROOF RUNOFF AND DIRECT THIS FLOW TO URBAN BIORETENTIONS ALONG FRONTAGE THROUGH A SYSTEM OF GUTTER DOWNSPOUTS.

DRAINAGE AREA D:
- THIS DRAINAGE AREA CORRESPONDS TO A TREATMENT TRAIN WHICH CONSISTS OF VEGETATED ROOF AREA, URBAN BIORETENTION PLANTER BOXES, AND DC SAND FILTERS.
- 0.18 ACRES OF IMPERVIOUS ROOF AREA SHALL BE TREATED THROUGH THE USE OF A VEGETATED ROOF (SWM #4). THEN THE RUNOFF WILL BE DIRECTED TO URBAN BIORETENTION PLANTER BOXES (SWM #5) AND FINALLY DISCHARGE TO PEAT SAND FILTERS (SWM #6 & SWM #7) FOR FINAL TREATMENT.
- 0.53 ACRES OF IMPERVIOUS ROOF AREA SHALL BE TREATED THROUGH THE USE OF URBAN BIORETENTION PLANTER BOXES (SWM #5) AND FINALLY DISCHARGE TO DC SAND FILTERS (SWM #6 & SWM #7) FOR FINAL TREATMENT.
- 0.84 ACRES OF PERVIOUS AREA AND 0.04 ACRES OF IMPERVIOUS AREA WILL BE COLLECTED VIA YARD INLETS AND DRAIN TO DC SAND FILTERS (SWM #6 & SWM #7).

DRAINAGE AREA E:
- THIS DRAINAGE CONSISTS OF ENTIRELY IMPERVIOUS AREA FROM A PORTION OF THE ROOF, COURTYARD, DRIVE AISLE, AND CONCRETE SIDEWALK. THIS AREA WILL BE COLLECTED INTO SWM #8 AND TREATED BY A FILTERING DEVICE LOCATED WITHIN THE STORMWATER VAULT.

RPA DISTURBANCE

- TOTAL AMOUNT OF DISTURBANCE IN THE RPA: 15,810 SF
- TOTAL AMOUNT OF IMPERVIOUS AREA REMOVED FROM THE RPA: 4,144 SF
- TOTAL AMOUNT OF IMPERVIOUS AREA PROPOSED IN THE RPA: 7,883 SF
- TOTAL AMOUNT OF REFORESTED AREA IN THE RPA: 1,465 SF

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
811 Know what's Call below. before you dig.

APPROVED

SPECIAL USE PERMIT NO. _____

DEPARTMENT OF PLANNING & ZONING

_____ DIRECTOR _____ DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

_____ DIRECTOR _____ DATE

_____ CHAIRMAN, PLANNING COMMISSION _____ DATE

DATE RECORDED _____

_____ INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO.

No.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn
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WWW.KIMLEY-HORN.COM

KHA PROJECT 110578001
DATE 10/18/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

BMP PLAN

NEWPORT VILLAGE

PREPARED FOR UDR

CITY OF ALEXANDRIA VA

SHEET NUMBER C-405

Project Name: Newport Village Redevelopment
Date: 10/17/2019
Linear Development Project? No

CLEAR ALL (Ctrl+Shift+R)

data input cells
constant values
calculation cells
final results

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area *(acres)* → 4.19

Maximum reduction required: 20%
The site's net increase in impervious cover (acres) is: 1.24
Post-Development TP Load Reduction for Site (lb/yr): 2.75

Check:
BMP Design Specifications List: 2013 Draft Stds & Specs
Linear project? No
Land cover areas entered correctly? ✔
Total disturbed area entered? ✔

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested	0.00	0.00	0.00	1.47	1.47
Managed Turf (acres) -- disturbed, graded for yards or other turf to be	0.00	0.00	0.00	1.73	1.73
Impervious Cover (acres)	0.00	0.00	0.00	0.99	0.99
					4.19

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested	0.00	0.00	0.00	0.90	0.90	*
Managed Turf (acres) -- disturbed, graded for yards or other turf to be	0.00	0.00	0.00	1.06	1.06	
Impervious Cover (acres)	0.00	0.00	0.00	2.23	2.23	
Area Check	**OK.**	**OK.**	**OK.**	**OK.**	4.19	

** Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method*

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT

Land Cover Summary-Pre		
Pre-ReDevelopment	**Listed**	**Adjusted[1]**
Forest/Open Space Cover (acres)	1.47	0.90
Weighted Rv(forest)	0.05	0.05
% Forest	35%	31%
Managed Turf Cover (acres)	1.73	1.06
Weighted Rv(turf)	0.25	0.25
% Managed Turf	41%	36%
Impervious Cover (acres)	0.99	0.99
Rv(impervious)	0.95	0.95
% Impervious	24%	34%
Total Site Area (acres)	**4.19**	**2.95**
Site Rv	**0.35**	**0.42**

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.1205	0.1042
Pre-ReDevelopment Treatment Volume (cubic feet)	5,251	4,539
Pre-ReDevelopment TP Load (lb/yr)	**3.30**	**2.85**
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	0.79	0.97
Baseline TP Load (lb/yr) **(0.41 lbs/acre/yr** applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		*1.21*

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary-Post (Final)	
Post ReDev. & New Impervious	
Forest/Open Space Cover (acres)	0.90
Weighted Rv(forest)	0.05
% Forest	21%
Managed Turf Cover (acres)	1.06
Weighted Rv (turf)	0.25
% Managed Turf	25%
Impervious Cover (acres)	2.23
Rv(impervious)	0.95
% Impervious	53%
Final Site Area (acres)	**4.19**
Final Post Dev Site Rv	**0.58**

Land Cover Summary-Post	
Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.90
Weighted Rv(forest)	0.05
% Forest	31%
Managed Turf Cover (acres)	1.06
Weighted Rv (turf)	0.25
% Managed Turf	36%
ReDev. Impervious Cover (acres)	0.99
Rv(impervious)	0.95
% Impervious	34%
Total ReDev. Site Area (acres)	**2.95**
ReDev Site Rv	**0.42**

Land Cover Summary-Post	
Post-Development New Impervious	
New Impervious Cover (acres)	1.24
Rv(impervious)	0.95

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.2024	**Post-ReDevelopment Treatment Volume (acre-ft)**	0.1042	**Post-Development Treatment Volume (acre-ft)**	0.0982
Final Post-Development Treatment Volume (cubic feet)	8,815	**Post-ReDevelopment Treatment Volume (cubic feet)**	4,539	**Post-Development Treatment Volume (cubic feet)**	4,276
Final Post-Development TP Load (lb/yr)	**5.54**	**Post-ReDevelopment TP Load (TP) (lb/yr)**	**2.85**	**Post-Development TP Load (lb/yr)**	**2.69**
Final Post-Development TP Load per acre (lb/acre/yr)	1.32	Post-ReDevelopment TP Load per acre (lb/acre/yr)	0.97		
		Max. Reduction Required (Below Pre-ReDevelopment Load)	20%		
		TP Load Reduction Required for Redeveloped Area (lb/yr)	**0.57**	**TP Load Reduction Required for New Impervious Area (lb/yr)**	**2.18**

[1] *Adjusted Land Cover Summary:*
Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requirement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	**2.75**

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	23.60	Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	39.62

Project Description

Development or **Redevelopment**

Drainage Area	Impervious	Pervious	Total
Site Area	2.23 AC	1.95 AC	4.18 AC
On-Site Treated	2.14 AC	0.84 AC	2.98 AC
Off-Site Treated	0.00 AC	0.00 AC	0.00 AC
Total Treated	2.14 AC	0.84 AC	2.98 AC
Any On-Site Disconnected by a Vegetated Buffer (25 ft)	0.00 AC		
Total On-Site Treated or Disconnected			2.98 AC

Water Treatment on site

BMP Type	*Area treated by BMP (acres)*	*Impervious area treated by BMP (acres)*	*BMP efficiency (%)*		VRRM Spreadsheet
(Type I) Green Roof	0.17 AC	0.17 AC	5.80%	(0.17 TP)	D.A.A.
(Type I) Permeable Pavement	0.29 AC	0.29 AC	12.62%	(0.37 TP)	D.A.B.
(Type I) Urban Bioretention	0.40 AC	0.40 AC	16.38%	(0.48 TP)	D.A.C.
Filtering Practice #1	1.59 AC	0.75 AC	58.01%	(1.63 TP)	D.A.D.
MTD - Hydrodynamic	0.53 AC	0.53 AC	5.80%	(0.17 TP)	D.A.E.

(Downstream Practice for Green Roof, Bioretention, and DC Sand Filter)

Miscellaneous

Total WQV treated: yes **no**
Detention on site: **yes** no

Project is within which watershed? Four Mile Run (West) Watershed

Project discharges to which body of water? Potomac River

Drainage Area A

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)					0.00	0.00
Impervious Cover (acres)				0.17	0.17	0.95
				Total	0.17	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. A (lb/yr) 0.37
Post Development Treatment Volume in D.A. A (ft³) 586

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
1. Vegetated Roof (RR)													
1.a. Vegetated Roof #1 (Spec #5)	45		0.17		264	322	586	0		0.37	0.17	0.20	
1.b. Vegetated Roof #2 (Spec #5)	60				0	0	0	0		0.00	0.00	0.00	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
1. Vegetated Roof (RR)				
0		2.63	1.18	1.45
0		0.00	0.00	0.00

Drainage Area B

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)					0.00	0.00
Impervious Cover (acres)				0.29	0.29	0.95
				Total	0.29	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. B (lb/yr) 0.63
Post Development Treatment Volume in D.A. B (ft³) 1,000

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
3. Permeable Pavement (RR)													
3.a. Permeable Pavement #1 (Spec #7)	45		0.29	0	450	550	1,000	25	0.00	0.63	0.17	0.28	
3.b. Permeable Pavement #2 (Spec #7)	75				0	0	0	25		0.00	0.00	0.00	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
3. Permeable Pavement (RR)				
25	0.00	4.49	2.64	1.85
25		0.00	0.00	0.00

Drainage Area C

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)					0.00	0.00
Impervious Cover (acres)				0.40	0.40	0.95
				Total	0.40	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. C (lb/yr) 0.87
Post Development Treatment Volume in D.A. C (ft³) 1,379

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
2. Rooftop Disconnection (RR)													
2.a. Simple Disconnection to A/B Soils (Spec #1)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.b. Simple Disconnection to C/D Soils (Spec #1)	25			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.d. To Dry Well or French Drain #1, Micro-infiltration #1 (Spec #8)	50			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.e. To Dry Well or French Drain #2, Micro-infiltration #2 (Spec #8)	90			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	
2.h. To Rainwater Harvesting (Spec #6)	0			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.i. To Stormwater Planter, Urban Bioretention (Spec #5, Appendix A)	40		0.53	341	868	1,301	2,169	25	0.21	1.15	0.75	0.61	11.a. Filtering Practice #1
11. Filtering Practices (no RR)													
11.a.Filtering Practice #1 (Spec #12)	0	0.84	0.04	1,301	0	2,202	2,202	60	0.61	0.56	0.71	0.47	
11.b. Filtering Practice #2 (Spec #12)	0			0	0	0	0	65	0.00	0.00	0.00	0.00	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
2. Rooftop Disconnection (RR)				
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
40	0.53	8.21	6.23	3.51
11. Filtering Practices (no RR)				
30	3.51	4.04	2.26	5.28
45	0.00	0.00	0.00	0.00

Drainage Area D

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)				0.84	0.84	0.25
Impervious Cover (acres)				0.75	0.75	0.95
				Total	1.59	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. D (lb/yr) 2.10
Post Development Treatment Volume in D.A. D (ft³) 3,349

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
1. Vegetated Roof (RR)													
1.a. Vegetated Roof #1 (Spec #5)	45		0.18		279	341	621	0		0.39	0.18	0.21	2.c. To Stormwater Planter (Urban Bioretention)
1.b. Vegetated Roof #2 (Spec #5)	60				0	0	0	0		0.00	0.00	0.00	
2. Rooftop Disconnection (RR)													
2.a. Simple Disconnection to A/B Soils (Spec #1)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.b. Simple Disconnection to C/D Soils (Spec #1)	25			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.c. To Soil Amended Filter Path as per specifications (existing C/D soils) (Spec #4)	50			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.d. To Dry Well or French Drain #1, Micro-infiltration #1 (Spec #8)	50			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.e. To Dry Well or French Drain #2, Micro-infiltration #2 (Spec #8)	90			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.f. To Rain Garden #1, Micro-Bioretention #1 (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
2.g. To Rain Garden #2, Micro-Bioretention #2 (Spec #9)	80			0	0	0	0	50	0.00	0.00	0.00	0.00	
2.h. To Rainwater Harvesting (Spec #6)	0			0	0	0	0	0	0.00	0.00	0.00	0.00	
2.i. To Stormwater Planter, Urban Bioretention (Spec #5, Appendix A)	40		0.40	0	552	828	1,379	25	0.00	0.87	0.48	0.39	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
1. Vegetated Roof (RR)				
0		2.79	1.25	1.53
0		0.00	0.00	0.00
2. Rooftop Disconnection (RR)				
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00
40	0.00	6.19	3.96	2.23

Drainage Area E

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)					0.00	0.00
Managed Turf (acres)					0.00	0.00
Impervious Cover (acres)				0.53	0.53	0.95
				Total	0.53	

CLEAR BMP AREAS

Total Phosphorus Available for Removal in D.A. E (lb/yr) 1.15
Post Development Treatment Volume in D.A. E (ft³) 1,828

Stormwater Best Management Practices (RR = Runoff Reduction)

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft³)	Runoff Reduction (ft³)	Remaining Runoff Volume (ft³)	Total BMP Treatment Volume (ft³)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
14. Manufactured Treatment Devices (no RR)													
14.a. Manufactured Treatment Device-Hydrodynamic	0		0.53	0	0	1,828	1,828	15	0.00	1.15	0.17	0.97	
14.b. Manufactured Treatment Device-Filtering	0			0	0	0	0	20	0.00	0.00	0.00	0.00	
14.c. Manufactured Treatment Device-Generic	0			0	0	0	0	20	0.00	0.00	0.00	0.00	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
14. Manufactured BMP (no RR)				
0	0.00	8.21	0.00	8.21
0	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00

Site Results (Water Quality Compliance)

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST/OPEN SPACE (ac)	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	0.17	0.29	0.40	0.75	0.53	OK.
IMPERVIOUS COVER TREATED (ac)	0.17	0.29	0.40	0.75	0.53	OK.
MANAGED TURF AREA TREATED (ac)	0.00	0.00	0.00	0.84	0.00	OK.
MANAGED TURF AREA TREATED (ac)	0.00	0.00	0.00	0.84	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft³) 8,815

Runoff Reduction Volume and TP By Drainage Area

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft³)	264	450	552	1,147	0	2,413
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	0.37	0.63	0.87	2.10	1.15	5.12
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.17	0.37	0.48	1.63	0.17	2.81
TP LOAD REMAINING (lb/yr)	0.20	0.26	0.39	0.47	0.98	2.30
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	1.18	2.64	3.96	9.75	0.00	17.54

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	5.54
TP LOAD REDUCTION REQUIRED (lb/yr)	2.75
TP LOAD REDUCTION ACHIEVED (lb/yr)	2.81
TP LOAD REMAINING (lb/yr)	2.73
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00 **

** TARGET TP REDUCTION EXCEEDED BY 0.06 LB/YEAR **

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	39.62
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	17.54
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	22.09

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NO.	REVISIONS	DATE	BY
1	STAGE II CONCEPT RESUBMISSION	10/16/19	KHA

Kimley»Horn

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PHONE: 703-674-1300
WWW.KIMLEY-HORN.COM

KHA PROJECT 110578001
DATE 11/07/2019
SCALE AS SHOWN
DESIGNED BY AT
DRAWN BY CEC
CHECKED BY RM

BMP CALCULATIONS

NEWPORT VILLAGE VA
PREPARED FOR UDR
CITY OF ALEXANDRIA

SHEET NUMBER C-406

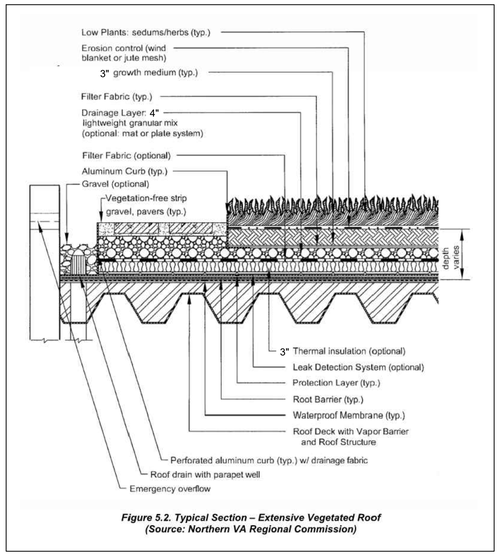

Figure 5.2. Typical Section – Extensive Vegetated Roof (Source: Northern VA Regional Commission)

1 TYPE I GREEN ROOF DETAIL (SWM #1 & SWM #4)
SCALE: NOT TO SCALE

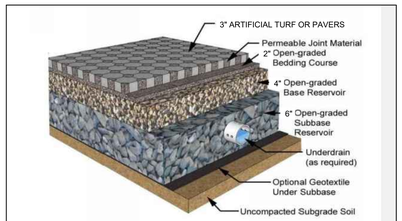

Figure 7.3. Typical Detail (Source: Smith, 2009)

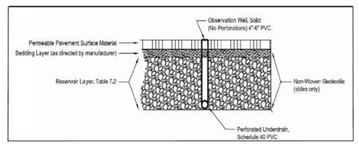

Figure 7.4. Typical Section Permeable Pavement Level 1

2 TYPE I PERMEABLE PAVEMENT DETAIL (SWM #2)
SCALE: NOT TO SCALE

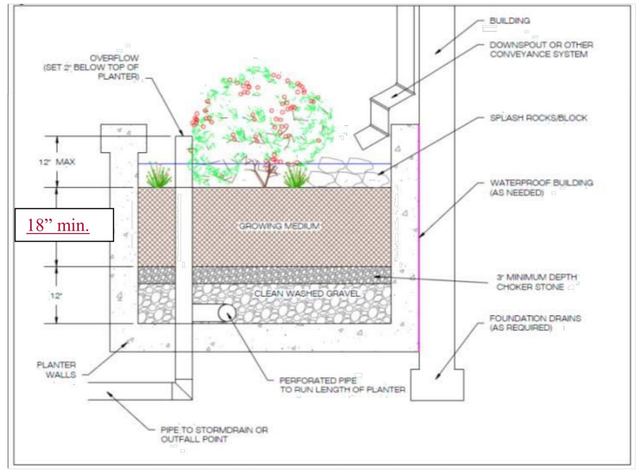

Figure 9-A.4. Stormwater Planter Cross-Section

3 URBAN BIORETENTION DETAIL (SWM #3 & SWM #5)
SCALE: NOT TO SCALE

12.1 - Overview of Practice

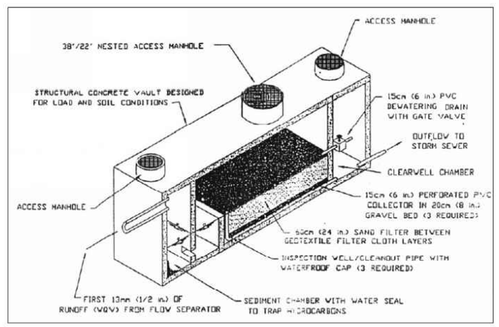

Figure 12.1. Washington D.C. Underground Vault Sand Filter
(Virginia Stormwater Management Handbook, 1999, Et seq.)

The Washington D.C. underground vault sand filter shown in Figure 12.1 can be either precast or cast in place and is composed of three chambers. The first chamber is a three foot deep "plunge pool" which absorbs energy and pre-treats runoff by trapping sediment and floating organic matter. The first chamber is hydraulically connected to the second chamber containing the sand filter media. Finally, the third chamber serves as a collection point for filtered runoff, where it is then directed to the downstream storm sewer. This type of filter is typically constructed *offline*, with only the site water quality volume directed to the structure.

4 DC SAND FILTER DETAIL (SWM #6 & SWM #7)
SCALE: NOT TO SCALE

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DIRECTOR DATE
_____ _____
CHAIRMAN, PLANNING COMMISSION DATE
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_____ _____ _____
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Kimley»Horn

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PHONE: 703-674-1300
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KHA PROJECT 110578001
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BMP DETAILS

NEWPORT VILLAGE
PREPARED FOR UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER
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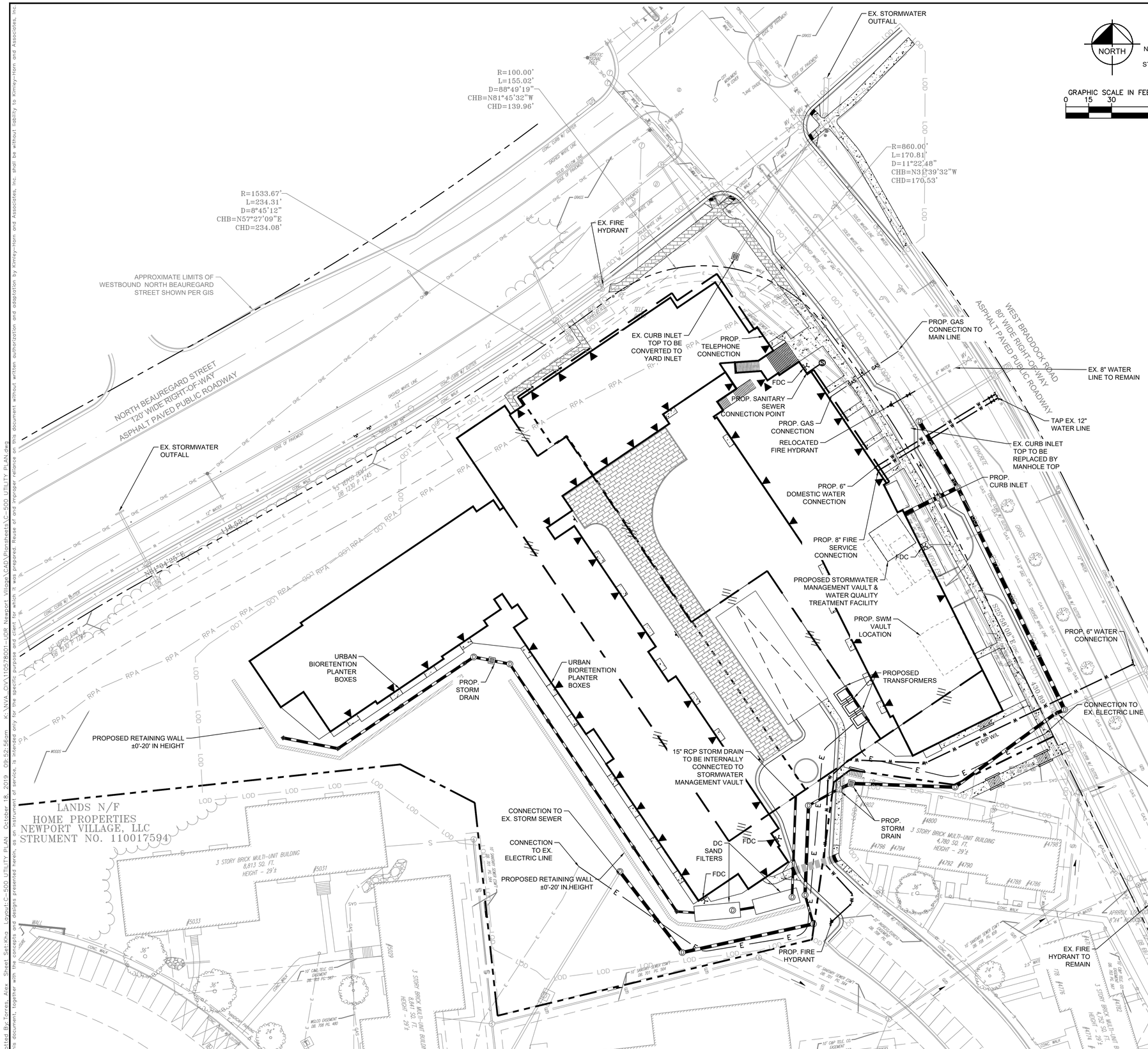

NORTH

NORTH IS BASED ON NAD 83 VIRGINIA STATE PLANE NORTH ZONE, US FOOT

GRAPHIC SCALE IN FEET
0 15 30 60

UTILITY LEGEND

	EXISTING PROPERTY LINE
	PROPOSED SUBDIVISION LINE
	PROPOSED ROW DEDICATION
LOD	LIMITS OF DISTURBANCE
W	PROPOSED WATER
W	EXISTING WATER
	PROPOSED WATER STRUCTURE (VALVE, FH, FDC)
	EXISTING WATER STRUCTURE (VALVE, FH)
S	PROPOSED SANITARY SEWER
S	EXISTING SANITARY SEWER
	EXISTING SANITARY SEWER STRUCTURE
	PROPOSED STORM SEWER
	EXISTING STORM SEWER
	PROPOSED STORM SEWER STRUCTURE (MH, INLET)
	EXISTING STORM SEWER STRUCTURE (MH, INLET)
T	PROPOSED TELEPHONE LINE
T	EXISTING TELEPHONE LINE
E	PROPOSED ELECTRIC
E	EXISTING ELECTRIC
GAS	PROPOSED GAS LINE
GAS	EXISTING GAS LINE

NOTES

1. THE PROJECT IS NOT LOCATED IN A COMBINED SEWER AREA.
2. THE ANTICIPATED SANITARY SEWER FLOW IS APPROXIMATELY 437,400 GPD. THIS IS GREATER THAN THE 10,000 GPD THAT REQUIRES A STATEMENT ON ADEQUATE OUTFALL PER MEMO TO INDUSTRY 06-14. FOLLOWING A PRELIMINARY SANITARY SEWER ADEQUATE OUTFALL ANALYSIS, THE RECEIVING SANITARY SEWER SYSTEM HAS CAPACITY FOR THE PROPOSED DEVELOPMENT.
3. WATER METER SIZING TO BE ADDRESSED WITH NEXT SUBMISSION.
4. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS--PARTICULARLY PIECES OF WORKED QUARTZ, QUARTZITE, OR INDIAN POTTERY--ARE DISCOVERED DURING GROUND DISTURBING ACTIVITIES. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS.
5. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.

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UTILITY PLAN

NEWPORT VILLAGE
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CITY OF ALEXANDRIA VA

SHEET NUMBER
C-500

ATTACHMENT #7

WIRE GILL LLP

Kenneth W. Wire
kwire@wiregill.com
703-677-3129

September 5, 2019

VIA EMAIL TO ***karl.moritz@alexandriava.gov***
Karl Moritz, Director Planning and Zoning
301 King Street, Suite 2100
Alexandria, Virginia 22314

VIA EMAIL TO ***yon.lambert@alexandriava.gov***
Yon Lambert, Director, Transportation and Environmental Services
301 King Street, Suite 4100
Alexandria, Virginia 22314

RE: Newport Village

Gentlemen:

On behalf of my client, UDR, I am submitting this request for City approval of an encroachment into the Resource Protection Area ("RPA") along the eastern side of Beauregard Street for the above referenced property. The applicant requests this exception to Zoning Ordinance Section 13-107 as permitted by Zoning Ordinance Section 13-119. As shown on the attached exhibits, the total improvements to the property will increase the impervious area within the RPA with offsets proposed by removing City impervious area associated with travel lanes at this intersection and replanting other areas within the RPA. This exception is appropriate because 1) the existing RPA is separated from the stream itself by several lanes of Beauregard Street, 2) the overall water quality will be improved by the proposed mitigation and 3) the proposed building line will create a better interaction between the building façade and the future BRT station.

I. Project Background

UDR is the owner of the Newport Village Apartments and has worked with your staff over the past several months to determine a viable redevelopment strategy for a small portion of the property located at the south western intersection of Beauregard Street and Braddock Road. UDR's initial concept was to demolish the three smaller scale buildings located at this intersection and redevelop their footprint with a larger multi-family building with below grade parking. *See* attached Exhibit A.

As you may know, the grade of the property is very steep as the property rises significantly to the south. During the initial design phase, the UDR team obtained updated construction pricing associated with pushing the new building into the grade which proved to be

extremely inefficient and costly. UDR and its team spent the past few months redesigning the new development proposal to move the new building out from the steep slope and save one of the existing buildings by revisiting the proposed project's footprint. *See* attached Exhibit B.

UDR and its team worked with the City to also design a better interaction of the new building with the proposed BRT stop at Beauregard Street and orient the active uses within the building towards the BRT stop. The team also proposes shifting a portion of the building slightly further into the RPA to enhance the pedestrian experience at the intersection and remove the City's existing impervious slip lanes. UDR is supportive of this approach and requests a positive EPC recommendation for the encroachment.

II. Existing RPA Conditions

The proposed redevelopment site is located at the south-west corner of N. Beauregard Street and W. Braddock Road. There is a 100-foot resource protection area (RPA) associated with the stream that runs in the N. Beauregard median. The RPA extends approximately 60 feet into the redevelopment site on the north side. There are existing improvements located within the RPA including the N. Beauregard travel lanes, sidewalks, buildings and other existing infrastructure. Within the redevelopment site, there is one building and its associated concrete walkways located within the RPA. The total on-site impervious area currently within the RPA is approximately 2,400 s.f. (0.06 Ac). *See* attached Exhibit C.

III. Proposed RPA Mitigation

The proposed redevelopment consists of the demolition of 2 existing buildings, associated walkways/sidewalks, parking, drive aisles and utilities, and the construction of a new multifamily building with associated walkways, drive aisles and utilities. Approximately 2,400 s.f. (0.06 Ac) of existing impervious area will be removed from the RPA to make way for the proposed improvements. Approximately 8,700 s.f. of the proposed building and 1,500 s.f. of associated walkways are proposed within the RPA. Therefore, the total on-site impervious area proposed within the RPA is approximately 10,200 s.f. (0.23 Ac).

In order to mitigate the impacts of the proposed improvements within the RPA, the owner is proposing the following (*see* attached Exhibit C):

1. **Removal of the existing slip lanes at the intersection of North Beauregard and West Braddock** - In order to reduce the impervious surface within the RPA, the two existing slip lanes at the intersection will be removed. The removal of the existing slip lanes will remove approximately 4,356 s.f. (0.1 Ac) of impervious area from the RPA. With the removal of the slip lanes, vehicular contact areas will be removed from the RPA and replaced with pervious cover. This will reduce the amount of high-concentration pollutants generated by surface runoff being conveyed into the RPA.

2. **Reforestation** – For any additional areas of impacts within the RPA (estimated as 0.07 Ac), reforestation using native species will be provided within the RPA (approximately 3,300 s.f. is proposed).

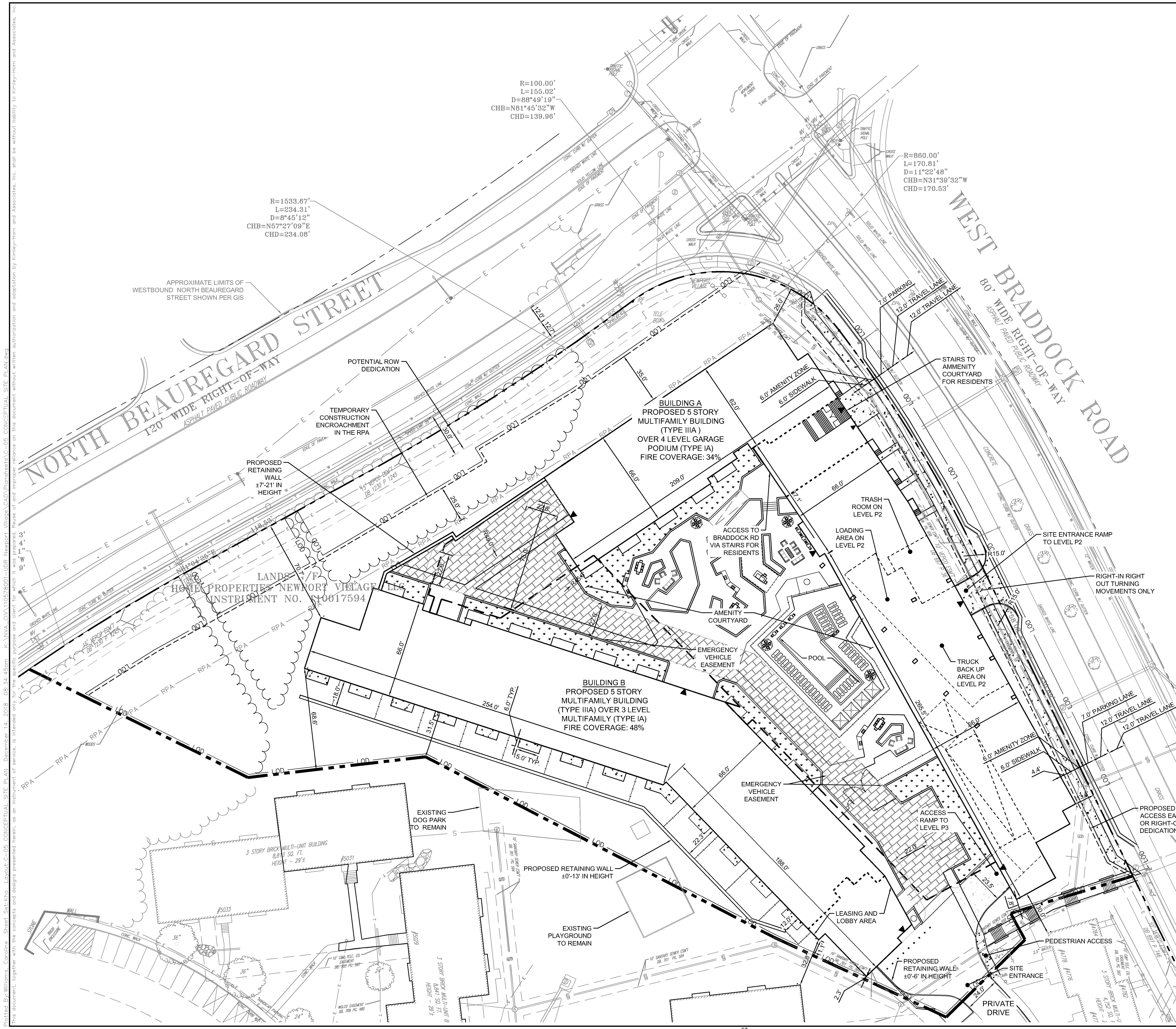
3. **Concentrate Green Roof Areas within the RPA** – In an effort to reduce stormwater runoff into the RPA and mimic natural ground cover, green roof areas on the roof of the proposed building will be concentrated in the portion of the building located within the RPA.

For each of these reasons, we respectfully request City approval of an exception to Zoning Ordinance Section 13-107 for the proposed encroachments and improvements within the RPA. If the EPC finds that is cannot recommend support of the proposed encroachment, UDR will proceed with a slightly revised project layout which removes all additional encroachments from the RPA and leaves the existing slip lanes and off-site RPA as is (Exhibit A).

Sincerely,

By:_____
Kenneth W. Wire, Wire Gill LLP

ATTACHMENT #8



LEGEND

- PROPOSED SUBDIVISION LINE
- PROPOSED EASEMENT/DEDICATION
- BUILDING FOOTPRINT
- BELOW-GROUND PARKING
- BUILDING OVERHANG
- GARAGE ACCESS RAMPS
- RPA LINE
- LIMITS OF DISTURBANCE
- PERMEABLE PAVEMENT
- BIORETENTION
- CONCRETE PAVEMENT

NOTES

1. SITE BOUNDARY, TOPOGRAPHY, UTILITY AND ROAD INFORMATION TAKEN FROM A SURVEY BY GRS GROUP, LLC PREPARED ON AUGUST 27, 2018, REVISED ON OCTOBER 23, 2018.
2. LOD OFFSET 2 FT FOR READABILITY.
3. LIMITS OF RIGHT OF WAY DEDICATION PENDING FINAL NORTH BEAUREGARD STREET SECTION DESIGN BY CITY OF ALEXANDRIA.
4. FUTURE PARKING RESTRICTION SIGNAGE TO BE DETERMINED.
5. DISTURBANCE ACTIVITIES WITHIN THE EXISTING RPA ARE TO INCLUDE A 20 FOOT AREA ALONG THE RPA BOUNDARY LINE TO ALLOW CONSTRUCTION STAGING AND EQUIPMENT ACCESS, SUPPORTS FOR EXCAVATION, INSTALLATION OF A STORM PIPE, AND INSTALLATION OF AN ELECTRICAL DUCT BANK.

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COMMONWEALTH OF VIRGINIA
RICHARD MOLLER
Lic. No. 0402049416
12/13/2018
PROFESSIONAL ENGINEER

KHA PROJECT	110578001
DATE	12/13/18
SCALE	AS SHOWN
DESIGNED BY	CJW
DRAWN BY	CJW
CHECKED BY	RM

CONCEPTUAL SITE PLAN

NEWPORT VILLAGE
PREPARED FOR
UDR
CITY OF ALEXANDRIA VA

SHEET NUMBER
C-05