Prince George's County
Department of Permitting, Inspections and Enforcement
SITE/ROAD PLAN REVIEW DIVISION
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100-YEAR FLOODPLAIN DESIGN REVIEW CHECKLIST

This checklist serves as a guide for the consultant in the preparation and for the County in the review of an existing or ultimate 100-year floodplain study if prepared by a consultant. Any questions regarding items contained herein should be referred to the Prince George's County DPIE for clarification. Applicable page number or section in the Stormwater Management Design Manual or County Code for specific criteria are included for reference.

NOTE: PLANS SUBMITTED WITHOUT A COMPLETED CHECKLIST MAY BE RETURNED WITHOUT REVIEW

Site/Project Name: _____ Date: _____

Applicant: _____ Consultant: _____

Email Address: _____ Email Address: _____

Site Development Concept Plan No.:_____ DPIE Permit Case No.: _____

Flood Plain Study No.: _____

Consultant: Please complete the checklist below by indicating the following:
C or ✓ = Complete or checked; X = Not Applicable; O = Outstanding, need to address
Please place the appropriate symbol in the CONSULT column.

ONLY COMPLETE PART B FOR FLOODPLAIN DELINEATION MAP

Item #	Design Checklist Item	Reference	CONSULT	DPIE
A	**FLOODPLAIN INVESTIGATION PROCESS**			
A1	The County Floodplain Information Request form was submitted to DPIE to obtain current floodplain information. DPIE provided the previously approved existing channel condition study or other studies for the property. A Drainage Area (DA) Map is included showing any streams with a DA greater than 50 acres on or adjacent to the property.	A.1 and A.2		
A2	If there is a FEMA Study, County Watershed Study, DoE GIS Study, or Private Consultant Study with no approved existing channel condition delineation, proceed to Part B.			
A3	If there is no approved existing channel condition study and/or delineation for any stream with the drainage areas greater than 50 acres, the engineer prepared a floodplain hydrology and hydraulic model using Parts C - F before completing Part B.	4.1, 4.6, & 4.9.1		

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A3	A request was submitted to DoE to prepare an existing channel condition study if a Private Consultant Study was not prepared. (Upon receipt of study, proceed to Part B for delineation requirements).	4.1, 4.6, & 4.9.1		
A4	The Existing Channel Condition floodplain was submitted prior to submission of the Site Development Concept Plan	A.4		
B	**FLOODPLAIN DELINEATION MAP**			
B1	Title Block: Name of Project (Legal Subdivision Name), Sheet Title, Election District, County, and State provided.			
B2	North arrow and Maryland Coordinate System (State plane grid) based on North American Datum of 1983 (NAD83/91) noted on plan for horizontal and for vertical, the plan must be in one vertical datum (North American Vertical Datum NAVD88 or National Geodetic Vertical Datum NGVD 1929) and the plan identifies the vertical datum on all sheets. A minimum of three (3) grid tics in a" L" shaped pattern provided for each plan sheet placed at the perimeter of the sheet.	2.2.1.E & I		
B3	Vicinity map with latest edition of Prince George's County Road Atlas page and grid at a maximum scale of 1" = 2,000' located in upper right hand corner of sheet outside of a 5" x 10" County approval area on the right side. (This is for DPIE approval stamps to be applied by DPIE.) Site area outlined and labeled.	2.2.1.B		
B4	The plan scale is a maximum of 1" = 50'. Graphic scale provided.	2.2 & 2.4		
B5	Sheet size is one of the following; 22"x34", 24"x36", or 30"x42".			
B6	Owner/Developer/Applicant with contact name, address, phone number, and email address noted.			
B7	Sheet Index provided if more than 3 plan sheets. Match lines coordinated with current number of sheets.	2.2.1.K & M		
B8	Key Plan provided on each sheet if more than 4 plan sheets.	2.2.1.O		
B9	Legend for all floodplain types included and matches plan sheet graphics. Line styles for each type of floodplain delineation shown on the sheet such as; County Watershed Study, DoE-GIS Study, FEMA Study, existing channel condition, and proposed channel condition, etc., are clearly identified.	2.6		
B10	Property lines, off-site property ownership, and parcel or lot and block numbers labeled in vicinity of study with plat or deed reference.			
B11	Text size meets recommended minimum size: 0.08 to 0.12 inch tall (0.10 preferred).	2.2		
B12	Chesapeake Bay Critical Area (CBCA) limits and stream centerline or stream channel shown with label and flow direction.			
B13	Adjacent roadways and streams labeled.			
B14	Existing and proposed topography labeled with a maximum 2-foot contour interval. At least the index contours are labeled in the vicinity of the floodplain limits.			
B15	Topography on design plan will match topography used for floodplain delineation. If not, a revised floodplain delineation approval based on the changed topography during the design process will be provided. It would not require a change in the WSEL.			
B16	See Technogram xxx-2019 for freeboard requirements for each type of study.			

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B17	For a Private Consultant Study, no freeboard required for field run topography. If aerial photography, or a combination of the two has been utilized, then one-foot freeboard is required. If M-NCPPC GIS topography or other GIS topography was used, then 2 feet of freeboard was added to the WSEL. Please follow floodplain technogram 004-2020			
B18	Field survey provided for existing bridges or culverts including: bridge geometry such as opening dimensions, material, length, invert elevations, etc., and road profile were provided for the hydraulic model.	4.9.1.4.D		
B19	All modeled cross sections in the hydraulic model are shown on the plan; flood elevations (existing channel condition and proposed channel condition) provided at each cross-section; floodplain boundary (existing channel condition and proposed channel condition) delineated; proposed changes to the stream, overbank, structures, etc. are shown. Other information such as wetland buffer, PMA, drainage divides, etc. are not required or shown for this plan.	4.9.1.3.G		
B20	The 100-year floodplain delineation shown on the plan is based on DPIE Technogram 004-2020 and freeboard sketch. Choose one or more of the following as it applies to the project.			
B20a	For a new Private Consultant Study with no prior study, the regulatory floodplain limit and the delineation is based on the HEC-RAS elevations at the cross sections and corresponds to the topographic contours. No freeboard was required if the channel topography is field survey and the overbanks utilize aerial topo.			
B20b	For a DoE GIS Study, the regulatory floodplain limit is labeled "Established 100-Year Delineation" and the delineation is based on the cross-section elevations provided on the DoE approval letter and corresponds to the topographic contours. The DoE approval letter and cross sections have been added to the plan.			
B20c	If a County Watershed Study governs, the regulatory floodplain limit is based on the Base Flood Elevation plus any required freeboard per Technogram 004-2020, freeboard sketch, and the delineation corresponds to the topo contours. Also, the FEMA horizontal boundary is shown per the topography. The FEMA boundary is shown per County regulatory elevation (FEMA BFE elevation plus 1' freeboard). It is labeled as "Established 100-Year Delineation" per Technogram 004-2020 and is delineated using the project topographic contours.			
B20d	If a FEMA Study governs, the FEMA horizontal boundary is shown per the topography. The FEMA boundary is shown per County regulatory elevation (FEMA BFE elevation plus 1' freeboard). It is labeled as "Established 100-Year Delineation" per Technogram 004-2020 and is delineated using the project topographic contours.			
B20e	When there is a Zone A and a County DoE GIS study, the DoE GIS study will govern. The FEMA zone A should be updated through the LOMR process if county regulatory floodplain is higher. Provide a worksheet with each study's delineation. The County regulatory floodplain limit should be shown based on Technogram 004-2020 and freeboard sketch.			
B20f	For a County Watershed Study with a corresponding FEMA Study, provide a worksheet with each study's delineation. Delineation should be based on topographic contours. The County regulatory floodplain limit shall be labeled "Established			

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	100-Year Delineation" and follows the guidance from DPIE Technogram 004-2020 and freeboard sketch.			
B21	Floodplain elevations match project topography datum. If they do not match, a datum conversion was used.			
B22	If a SWM facility emergency spillway is overtopped, the floodplain delineation includes this area. Outlet control calculations for the outfall conduit and any appropriate backup information is provided to show that no overland flooding will occur downstream of the detention basin. If overland flooding occurs downstream of the SWM facility, floodplain boundary delineation of the floodplain that results from overtopping of the spillway is provided.			
B23	Any portion of the site that lies within the danger reach of any existing or planned upstream dams is identified and dam breach limits outside the floodplain delineated. DPIE and PGSCD were contacted for any studies that show a bam breach limit.			
B24	Existing structures shown when immediately adjacent to or within floodplain.			
B25	A table of all cross sections and elevations for the existing channel condition floodplain model, including vertical datum are provided on plan.			
B26	The proposed floodplain delineation ties into the existing floodplain delineation both upstream and downstream of the proposed changes. If this is not possible, DPIE was contacted and they provided written guidance, which is included in the report.			
B27	Existing and proposed channel condition floodplain elevations and differential WSEL at each cross section are noted and new cross sections identified.			
B28	All proposed structures are located outside the limits of the dam danger reach study limits.			
B29	Proposed structures are at or above the Flood Protection Elevation (FPE) according to Technogram 004-2020. A floodplain waiver request was submitted for any grading or structure addition in the floodplain. The finish floor or lowest entry elevation is shown for buildings (identified with address, building number (only if available), in or adjacent to floodplain. For basements, please follow Technogram 004-2020. For a project with **fill in the floodplain,** compensatory storage computations (cut and fill) volume with cross sections or other computations are provided, as applicable.			
B30	Existing Floodplain Study (FPS) number is provided, if applicable.			
B31	The Grade Establishment Plan for the proposed road containing a stream crossing will be approved prior to proposed channel condition floodplain. The stream crossing provides at least one (1) foot of freeboard from the 100-year backwater elevation to the ground elevation at the public R/W limit for closed section road, to the edge of paving for an open section road, or the bottom of a new bridge superstructure.	32-207-01(e)		
B32	Stream crossings that provide maintenance access or for a trail, the crossing passes at least the 2-year storm event (Bank full). All impacts to floodplain have been be addressed.			
B33	Professional consultants seal, signature, date, and Professional Certification required by COMAR is provided on all sheets.	4.9.1.C		
C	**FLOODPLAIN DRAINAGE AREA MAP (FOR CONSULTANT PREPARED STUDY)**			

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C1	Name of Project, Vicinity Map, North arrow, and plan datum information is provided per items B-2 and B-3.	2.2.1.E & J		
C2	Maximum scale is 1" = 200 feet (preferred). Graphic Scale included.	2.2 & 2.4		
C3	A legend is provided and it matches plan sheet graphics.	2.6		
C4	The Drainage Area map is incorporated into the overall plan set and numbered accordingly. A summary table of Drainage Area, RCN, and Tc for each POI is provided.			
C5	Stream names and adjacent street names labeled.			
C6	Aerial photographs for base data or color shading for land use are **NOT** acceptable as they do not reproduce in black and white printing.			
C7	Existing and proposed topography labeled with a maximum 2-foot contour interval. Sufficient offsite topography to document drainage divides included. M-NCPPC 2' GIS topography is acceptable. Boundaries of ultimate land-use (Master Plan) and soil types provided. HSG labeled on map or provided in table.			
C8	On and Off-site Drainage divides shown for each sub-watershed. A flow path used for Tc calculation is shown and labeled for both existing and proposed channel conditions. Tc path labeled for each type of reach such as sheet flow, pipe, channel, etc., and information provided in table with slope and length. Not required if the Tc time used is 0.1 hour with acceptable justification.	4.9.1.2.A		
C9	Existing storm drain system or SWM facilities in the Tc flow path are shown.			
C10	Professional consultants seal, signature, date, and Professional Certification required by COMAR is provided on all sheets. An original signature will be required at time of approval.	4.9.1.C		
D	**FLOODPLAIN STUDY REPORT**			
D1	Provide a report that will address the following items, as applicable for the type of study. • A narrative description of existing site conditions and proposed improvements and impacts to any affected property. • Discussion how the existing channel condition model was calibrated if the difference between the HEC-2 (original model) and the HEC-RAS elevations at cross sections was more than 0.5 feet. • The discharges such as 2, 10, 50, 100, and/or 500-year are provided in a table. • Hydrology discussion (if required). • WSEL comparison table • Environmental impacts are discussed for proposed floodplain impacts. • Assumptions made in computations are explained. • References for the computational procedures and equations obtained from manuals, books, etc. are provided • Ranges of Manning's "n" values for channel and overbanks and any assumptions on how "n" values were determined. • Source of floodplain data, cross sections and how they were modified or supplemented (Field survey, aerial topography, etc.) •Methodology for determining the starting water surface elevation and boundary condition, is discussed	2.11 & 4.9.1.1.B, C & E		
D2	The appendices should include the following: • All pertinent information such as correspondence, intra/inter-agency agreements, • DPIE Floodplain Information Request Form response, • Hydrology input and output, if applicable.	4.9.1.1.M 4.9.1.1.N		

Item #	Design Checklist Item	Reference	CONSULT	DPIE
	• DoE GIS approval letter included. • The HEC-RAS information provided includes input data, cross-section plots, and the summary output for HEC-RAS for all channel condition studies. This includes the "Profile Table - Standard Table 1" and "Errors Warnings and Notes for Plan". The input data for HEC-RAS provided by email to the DPIE Floodplain Information Section. • A Watershed Schematic is provided if more than 1 subarea • Any existing floodplain study input and output provided (County Watershed Study, DoE-GIS Study, FEMA Study, or private consultant study) and used as the base for the existing channel conditions analysis, is included in a separate appendix.			
D3	The use of HEC-2 is not acceptable for establishing a new floodplain delineation. Previously prepared HEC-2 data may be used as backup for hydrology computations.			
D4	A Summary of Elevations table (cross sections stations match between report, plan, and HEC-RAS) for existing and proposed conditions at each cross section and differential column for each condition is included. See Technogram 004-2020 for further guidance.	4.9.1.1.I		
D5	Required models depend on each project conditions and scope. DPIE Floodplain Section contacted for guidance on naming convention. They could include Pre-project, corrected effective, duplicate, existing channel condition, proposed channel condition, etc.			
D6	For buildings, channel modifications, or other site fill within the "Freeboard (100-Year Delineation)", an equal or greater amount of compensatory floodplain storage is provided to counter-balance proposed floodplain fill. The volume is based on the County regulatory elevation (i.e. Freeboard added) not the BFE elevation from the hydraulic model. A site grading plan and computations are provided showing a balance of cut-and-fill. Computations provided by cross sections or alternative calculations. Cut is noted as a negative value and fill is noted as a positive value. The impact must minimize disturbance of the floodplain. (Road crossings do **NOT** require compensatory storage.)	4.4.E 4.9.1.1.D, K, & L		
D7	All data input and output files are formatted so each line is not wrapped to the next line.			
D8	If there is impact within the "Established 100-Year Delineation". a floodplain waiver request was submitted and addressed to the DPIE Director explaining why the floodplain impacts meets County code or the County code is not applicable. The waiver request must be approved before the proposed channel condition floodplain approval is issued.			
D9	The report does NOT include the Drainage Area Map or floodplain sheets. This information is provided on full size format sheets for separate approved by the County.			
D10	Professional consultants seal, signature, date, and Professional Certification required by COMAR is provided on all sheets. An original signature will be required at time of approval.	4.9.1.C		
E	**HYDROLOGY (FOR CONSULTANT PREPARED STUDY)**			
E1	Only NRCS Win TR20/55 was used for peak flow determination for a private consultant prepared study. The use of regression equations is not permitted. HEC-HMS may not be used until input	4.9.1.2.		

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	or output is available to include in the report, unless the County approves the use on a project specific basis.			
E2	The ratio of the largest drainage area to the smallest drainage area did not exceed 5:1 without permission from DPIE	4.9.1.2.F		
E3	If there is more than 1 subarea, a Watershed Schematic is provided in the report.	4.9.1.2.N		
E4	The 24-hour rainfall amount for the 100-year floodplain storm event in Prince George's County is 7.4 inches. Rainfall distribution Table II and Antecedent Moisture Condition II were used.	DoE Email dated 12031 4.9.1.2.C.3		
E5	Runoff Curve Numbers are determined based on ultimate land use obtained from the most recent zoning map/sectional map amendment or utilizing the ultimate development plan for the on-site project area	4.9.1.2.B		
E6	The soil types (HSG) are based on the latest version of the Prince George's County Soil Survey. If the HSG is "A", and the soil complex includes an" Urban" component, the HSG was adjusted per the Prince George's Soil Conservation District guidance in section VII of their design manual.	4.9.1.2.B		
E7	Sheet Flow Time of Concentration Manning's "n" factor reflects ultimate land use condition (for existing and proposed channel conditions). This may require an assumption of a reasonable site development layout. A maximum value of 0.24 for grass in yards with a minimum of 3% slope was used. The "n" value of 0.4 for woods was used. Per county requirements, a P_{100}=7.4 inches was used in the equation to determine sheet flow travel time. The total sheet flow length does not exceed 100 feet.	4.9.1.2.C		
E8	Shallow concentrated flow was used until the existence of a channel or storm drain. Generally, the maximum allowable length is 700 feet. Written discussion in report for lengths greater than 700 feet shall be provided. The length and slope is documented on Drainage Area Map.	4.9.1.2.C		
E9	Rating tables for channel routing were generated from reliable hydraulic analysis such as HEC-RAS, previous HEC-2 modeling (identify cross section used), or TR55 travel time estimator. Also acceptable, a cross section of the channel using Flow Master or similar channel hydraulics program at bank full to establish velocity. The use of an assumed velocity for channel flow is **NOT** acceptable. An assumed velocity of 6 fps for a storm drain system is acceptable.	4.9.1.2.C		
E10	Computations for stage-discharge-area relationships used for any channel routing rating tables are included. M-NCPPC's GIS 2-foot contour topographic map is the minimum required. Rating tables adjusted to reflect proposed channel conditions.	4.9.1.2.G & H		
Item #	**Design Checklist Item**	**Reference**	**CONSULT**	**DPIE**
E11	Stage-discharge computations for reservoir control structures have (where applicable) taken into account the submergence of weirs, slots, and orifices due to tailwater conditions. The most recent and updated topographic information is used to determine the stage-storage relationship.	4.9.1.2.H		
E12	Existing or proposed stormwater ponds or road embankments that act as SWM ponds which significantly impact the 100-year discharge may be included. The existing and proposed channel condition models use the same POI, so the 100-year discharge is compared at the same study points.	4.9.1.2.J		

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E13	The existing and proposed channel condition models use the same POI, so the 100-year discharge is compared at the same study points.	4.9.1.2.J		
E14	The assumption that 100-year SWM is provided upstream by future development is not acceptable unless the facility is in the County CIP or is approved by the County.			
E15	The flood elevation for reservoir routing calculated from the WIN TR-20 output and the predicted flood elevation energy grade line from the HEC-RAS model are within 0.10 feet.	4.9.1.2.H		
F	**HYDRAULICS**			
F1	FEMA HEC-2 data may be obtained from DPIE.			
F2	HEC-2 has not been used for establishing a new floodplain delineation. If previously prepared HEC-2 data was used in HEC-RAS, the following steps were taken. a. Imported the HEC-2 data into HEC-RAS program. Compared the results between the two models and if less than 0.5 feet different, this is the "Duplicate Effective" model. b. If the difference is more than 0.5', (usually at a bridge/culvert) contact DPIE for guidance. After making adjustments per DPIE direction, this is the "Corrective Effective" model. c. If man made changes occurred after the date of the original hydraulic model, modified cross sections were included in the "Duplicate or Corrective Effective" model and saved as the "Existing Channel Condition" model. d. For the proposed channel condition, any proposed changes were shown in either the "Corrective Effective" model or the "Existing Channel Condition" model and saved as the "Proposed Conditions" model to be used as comparison.			
F3	If cross sections were imported from a previous HEC-2 or HEC-RAS model, **the** vertical datum matches the plan vertical datum, or a conversion reference table is provided in report and on plan.	4.9.1.3.A		
F4	The cross sections are modeled left to right looking downstream. Plan view matches cross sections for fill conditions.			
F5	Discharge input data for HEC-RAS determined in Win TR-20/55 or flows from existing channel condition model (FEMA Study, County Watershed Study, or DoE GIS Study) is consistent with the source. The 100-year discharge was based on previously computed ultimate conditions analysis. Examples include original HEC-2, NRCS hydrology models TR-20 or TR-55. Other models or methodologies approved by DPIE in advance. The programs must be publically available.			
F6	Manning's "n" values reflect actual field conditions. The composite or equivalent coefficient of roughness of any cross section was not averaged for the wetted perimeter of the cross section.	4.9.1.3.C.1		
F7	Proper expansion and contraction coefficients were used. The value of loss coefficients was adjusted at abrupt transitions in the channel reach.	4.9.1.3.C.2		
F8	The HEC-RAS is modeled using subcritical flow. Therefore no supercritical flow is present for the 100-year floodplain output or WSEL.			
F9	Starting Water Surface Elevation (WSEL) used a downstream study. If not available, normal depth method was used. If tributary is at the confluence of another stream, the higher of normal depth	4.9.1.3.B		

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	or the receiving stream WSEL (backwater effects) to map the confluence was used.			
F10	Top widths at upstream and downstream face of bridge are reasonably encroached. For pressure or low flow conditions, top widths are the same as the bridge opening. For weir flow, top width is not limited to the bridge opening, and velocity head does not exceed 0.5 feet at upstream face of bridge without appropriate justification.	4.9.1.5.A		
F11	The first and last cross sections adjacent to the bridge are located sufficiently up and downstream of the bridge/culvert so the flow is not affected by the contraction and expansion due to the structure. The middle two cross sections was placed a few feet up and downstream of the structure, representing natural ground i.e. is not located on the road crossing side slopes.	4.9.1.5.A		
F12	The cross sections are extended horizontally and vertically so the flow is contained in the cross section.			
F13	If the proposed channel conditions discharge is greater than existing channel condition discharge, the floodplain study was extended downstream of the site to a point determined by County.			
F14	All storm events discharges, such as 2, 10, 50, 100, and/or 500-year as provided by FEMA Study, County Watershed Study, DoE-GIS Study, or determined by the private consultant study are modeled and WSEL profiles for each storm event do not cross each other.			
F15	For channel modifications, a hydraulics analysis was prepared for both existing and proposed channel conditions. The analysis was extended upstream until the WSEL's converge. Floodplain easement has been procured for any increases on offsite property.	*4.9.1.3.E*		
F16	Divided flow messages analyzed to ensure they match plan view. If divided flow condition occurred for three or more cross sections consecutively, then separate profiles were developed and modeled for each segment of divided flow.	4.9.1.5.B		
G	**MISCELLANEOUS**			
G1	If proposed floodplain is located within the FEMA Detailed Study Floodplain limits and there is an increase in BFE of more than 0.5 feet, or a change in the stream centerline, then a Conditional Letter of Map Revision (CLOMR) application is required and prior approval by FEMA must occur before a County permit is issued. In addition, within a floodway, any increase in BFE a CLOMR is required. If the change is less than 0.50' only County approval is required.	County Cod 32-204.h.3		
G2	A Letter of Map Revision (LOMR) was prepared and submitted to FEMA within 6 months of completion of the project. 1. Any change to a FEMA floodplain (positive or negative) in Base Flood Elevation that is equal to or greater than 0.5 feet, a LOMR is prepared. 2. If the floodplain delineation is within 5% of FEMA map scale, and the change in BFE is less than 0.5 feet, there is no CLOMR/LOFP MR requirement.			
G3	Areas outside the property limits with a rise in the water surface elevation due to changes to the existing channel condition floodplain are indicated. The additional area flooded must be acquired by the applicant or by acquisition of suitable floodplain easements.	32-205(g)		

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G4	The HEC-RAS input files have been emailed to DPIE. All plans and supporting documentation including the grading plans, culvert profile and plan, and H&H data sheet are uploaded to ePlan.			
G5	HY-8 is provided for culvert analysis.			
G6	For culverts and bridges, please make sure to follow culvert and bridge design checklist.			
G7	Submit Scour analysis prepared by registered Civil Engineer in state of Maryland.			