

Drainage Impact Study  
~~POLICY~~  
PROCEDURE

Ascension Parish Planning & Zoning Commission

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~~The preliminary plans for a~~ proposed development, as defined by Section 17-503A of Appendix V Drainage ordinance, shall not be considered for approval until the applicant has submitted a drainage impact study stamped by a Louisiana registered civil engineer as to the ability of existing watercourse channels, storm sewers, culverts and other improvements pertaining to drainage for flood control within the development, to handle additional runoff which would be generated by the development of the land.

The **Drainage Impact Study** shall comply with the following minimum requirements:

Site Location and Description:

- Describe location of subject property; locate by Section, Township, and Range; identify adjacent developments, major drainage outfalls, streets, highways, assessor's map page number; and provide a vicinity map.
- Describe the predominate existing and planned land use in the project watershed (Parish Land Use Data, aerial photo's, etc.). Describe the proposed development, soil types, vegetative cover, and watershed slopes and provide an estimate of percent of impervious area for pre and post development conditions. Provide photos of existing channels, ditches, natural drains, proposed outfall structures and drainage structures.
- Include *Project Drainage Information Form* with data if provided by the Department of Public Works.

Pre-Development Map

- Provide pre-development work map that includes existing surveyed onsite contours at 1 ft. intervals, development boundaries, roadways, pre-development watercourses with labeled entry and exit points, the off-site drainage area acreage, floodway and drainage servitudes, and on and off site the overbank slopes.
- Pre-development work maps shall include determined existing peak 10-year, 25-year, and 100-year runoff rates at entry and exit points.
- Pre-development work maps shall delineate the existing inundation area for the 10-year and 25-year events, and 100-year event based on existing FIS study or Parish information, if available.

Post-Development Map

- The post development work map shall contain the full drainage area including the proposed on-site drainage system with labeled entry and exit points, identifying drainage ditches, culverts, and storage ponds, proposed major drainage structures, channel realignments and cross section locations.
- Post development work maps of the development shall include determined peak 10-year, 25-year, and 100-year runoff rates at entry and exit points.
- Post-development work maps shall delineate the post development inundation area for the 10-year and 25-year events, and 100-year event based on existing FIS study or Parish information, if available.
- Delineate the 100-year overflow route for onsite drainage for areas within the floodplain.

#### Watershed Map and FIRMette Map:

- ~~Delineate drainage boundaries; indicate the acreage; and show slope of basins, and peak 10-year, 25-year, and 100-year runoff rates at entry and exit points (both pre-developed and post-developed) of the development.~~ The watershed map should indicate the location of existing channels, ditches, natural drains, proposed major drainage structures, channel realignments and cross section locations.
- The latest U.S.G.S. 7.5 minute quadrangle map or better, at a scale of 1 inch = 500 feet or less, may be used as the base for the delineating watersheds map for large off-site areas.
- The location of the site on a FEMA FIRMette with base flood elevations identified where available shall be provided.

#### Hydrologic Design:

- The drainage impact analysis shall include hydrological calculations determining existing condition peak 10-year, 25-year, and 100-year flow rates at the development entry and exit points. The drainage impact analysis shall include hydrological calculations determining future condition peak 10-year, 25-year, and 100-year flow rates at the development exit points.
- The 25-year storm shall be used to design drainage features and stormwater detention for proposed developments. The resulting post-development outflow from proposed development sites for the 25-year storm shall be limited to the outflow that would occur for the 10-year 24-hour duration storm and pre-development conditions.
- The impact of the 100-year design storm ~~shall~~ should also be checked for maximum water surface elevation, and total site runoff peak discharge rates to allow Engineer Review Agency to assess impact on properties and infrastructure.
- Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds" (frequently called the SCS method) shall be used to produce pre and post development runoff hydrographs. The computations shall be based on 10 year, 25-year, and 100 year Type III rainfall distributions producing totals of 7.8, 9.6, and 12.6 inches of rainfall respectively in 24 hours. The shape factor when using SCS method can be lowered to a minimum of 323 rather than using the default 484. The pre development times of concentration can be determined by either the lag or TR-55 worksheet methods but the post development times of concentration must be determined by the TR-55 worksheet method. Other methods may be used to calculate pre and post development runoff hydrographs, if approved by the Engineer Review Agency prior to performing the drainage impact analysis. Rainfall data on other frequency events is found in NOAA Atlas 14 volume 9 version 2.

#### Hydraulic Capacities:

- *On site capacity:* Indicate capacity of any existing drainage outfall facility (ditch, canal, culvert, bridge, etc.) within the proposed development site and required type size, and capacity of any proposed outfall facilities as defined above.
- *Off-site capacity:* Determine capacity of existing downstream outfall facilities (ditch, canal, culvert, bridge, etc.) that will be utilized to convey flow from the downstream limits of the proposed development to the main outfall as identified by the Engineer Review Agency. An inventory of downstream structures including size, type, invert elevation and over topping elevation should be made. Channel cross sections at upstream and downstream limits of the proposed development, at structure locations and at intermediate canal locations shall be required to adequately define existing channel capacities.
- Design water levels: Indicate design water levels for site storage facilities and at the upstream and downstream boundaries. 10-year, 25-year and 100-year 24-hour duration

design water surface elevations are to be provided.

- The 25-year storm shall be used to design drainage features and stormwater detention for proposed developments. The resulting post-development outflow from proposed development sites for the 25-year storm shall be limited to the outflow that would occur for the 10-year 24-hour duration storm and pre-development conditions.
- The impact of the 100-year design storm ~~should~~ **shall** be checked for maximum water surface elevation, and total site runoff peak discharge rates to allow Engineer Review Agency to assess impact on properties and infrastructure.

#### Special Site Conditions:

- Special conditions which may exist at the proposed development site ~~should~~ **shall** be clearly identified including but not limited to such items as:
  1. Special Flood Hazard Areas (FIRM Zones A and AE)
  2. Regulatory Floodway
  3. Fill placement location and mitigation requirements. Mitigation is to consider impact to local drainage and floodplain fill.
  4. Potential wetland sites
  5. Churches, schools, cemeteries or parks
  6. Landfills and Hazardous Waste Sites
  7. Existing houses with relatively low slab elevations or any known existing flooding conditions that are located near the new development boundary.

#### Study Conclusions and Recommendations:

- Study ~~should~~ **shall** clearly identify the results of the computations, state a conclusion to the analysis and provide recommendations of any required action(s) so that no adverse impact is experienced by surrounding properties.

No increase in the rate of run-off that existed prior to development will be permitted unless the developer/sub-divider, on a case by case basis to be determined at the discretion of the Engineer Review Agency, can establish to their respective satisfaction that the existing downstream drainage is adequate to handle and maintain the anticipated flow resulting from the proposed development of the property. The Drainage Impact Study shall clearly state how the reduction in the post development peak rate of runoff from 25-year post-development to 10-year pre-development conditions will be achieved. If the reduction is achieved by a detention system, the detention system shall be sized to safely accept and route the 25-year 24-hour design storm through the detention system without overtopping the levee or earthen embankment. The 25-year 24-hour flow is to be controlled by a pipe and/or control structure. ~~through an emergency spillway as not to cause a dam breach.~~ The 100-yr event is to be checked to ensure emergency weir is properly sized to prevent pond overtopping and to safely convey overflow to the receiving body of water. The 100-year 24-hour flow is also to be checked to estimate impact on development and upstream and downstream boundaries.

Absent such notice, run-off from the proposed development shall be detained onsite by using storage, swales, ponds and/or basins or other accepted methods, as approved by the Parish and released at a rate of flow that does not exceed the rate of flow as described above.

No increase in upstream water surface elevation from that existed prior to development will be permitted unless the developer/subdivider, on an area by area basis to be determined at the discretion of the Engineer Review Agency, that the increase will not adversely affect any property.

#### Considerations for Protecting Existing Watersheds and Conveyance Systems

- There are four conditions which must be mitigated to protect existing watersheds and

conveyance systems.

1. Existing Watershed Flow Pattern - For measurement of obstruction of flow patterns where all drainage flows including overland flow which normally would flow unimpeded through the site are blocked by site will need to be mitigated. This mitigation will be via designed channels through or around the site, without increasing flooding upstream of the site or along the flow path through or around the site.
2. Conveyance System - For measurement of the impact of conveyance change, a continuous backwater model such as HECRAS must be performed. The following river stations will be needed in the model.
  - a. A convenient location at least 200 feet or further downstream of the downstream development boundary section.
  - b. 50 to 100 feet downstream of the development boundary section. This will be the beginning of a transition to a section containing "fill".
  - c. Downstream boundary section which will contain "fill" in the post development model.
  - d. Intermediate sections along the proposed development at no more than 500 feet intervals (minimum of one) which will contain "fill" in the post development model.
  - e. Upstream boundary section which will contain "fill" in post development model.
  - f. 50 to 100 feet upstream of the upstream development boundary section to mark the end of transition to pre-development conditions.
  - g. The channels in these sections may be interpolated from surveyed sections upstream and downstream of the development. Overbank conditions may utilize LiDAR or site survey data extended to subbasin ridgelines.
  - h. The post development "fill" must be adjusted until the model documents that there is no adverse increase in water surface elevation at the upstream section or potential impacts upstream of that section.
  - i. Cross sections need to be provided at the upstream and downstream property lines
  - j. An exhibit must be provided with the submittal of the HEC-RAS model that shows the location of the cross sections on exhibits showing same info as the pre-developed and post-developed drainage area maps.

3. Stormwater Detention - For measurement of stormwater detention, the inflow hydrograph must be for a 24 hour or longer storm event. The detention pond must be designed to contain the post-development 25-year 24-hour storm volume without overtopping the pond's rim. The pond shall be designed such that the 25-year storm outflow leaving the developed portion of a site does not exceed the pre-development 10-year storm outflow.

The computation must be based on Dynamic Discharge (tailwater of the receiving stream and the effect of the outfall conduit).

The maximum stage within the pond must be compared with the roadway elevations, building foundations, and stormwater conduits within the development. A separate analysis will be prepared for the 100-year storm event. This analysis will be used to compare the maximum stage within the pond to roadways, building foundations, stormwater conduits, and pond levee confinement heights.

4. Placement of Fill - For measurement of compensatory fill, any volume placed below the Base Flood Elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the Base Flood Elevation and above the normal pool water level. The volume of water below such elevation is considered Dead Storage.

- a. The determining criteria for land subject to this requirement shall be all land below the Base Flood elevation as determined by actual on-the-ground contours referenced to the official Parish benchmark system, regardless of whether the FEMA Flood Insurance Rate Maps (FIRM) depict the property in question to be in a recognized flood zone.

- b. Where lakes are excavated, the volume of dirt removed below the normal pool level of the lake cannot be credited as compensatory storage.

- c. Compensatory storage must have an equivalent hydraulic conveyance to the floodplain as the area being filled. Compensatory storage that is hydraulically disconnected will not be credited towards fill mitigation.

- d. If the compensatory storage is derived from an off-site source that is not a part of the proposed development it must be located in the same watershed as the proposed development and the base flood elevation at the off-site source shall not be greater than one (1) foot higher than or one (1) foot lower than the base flood elevation of the developed site.

- e. If the storage pond is to be adjacent to a stream, the excavation must be storage oriented rather than become an increase in stream conveyance (physically separated from the stream).

- f. Storage pond volume for detention to attenuate local runoff shall not include the required storage needed for fill mitigation. The

two shall be accounted for separately but can be in the same pond.

g. Site specific floodplain stage-storage curves for the pre- and post-development conditions shall be prepared and compared for consistency, conformance, and balance so that no net loss in storage occurs at any stage as a result of the development.

~~Some of the requirements of the Drainage Impact Study may be omitted, on a case-by-case basis to be determined at the discretion of the Engineer Review Agency, if the developer/subdivider can show that the proposed development will not adversely affect the existing downstream drainage system.~~