

The Hills Section 1-FINAL DRAINAGE PLAN

13.04.085 Request by applicant for plan review and approval.

A. All requests for drainage plan approval shall be made by the applicant to the drainage board through the county surveyor's office by the presentation to the surveyor of the drainage plan and the supporting data, all in duplicate, by the close of the business day two full weeks prior to the meeting at which approval of the drainage plan shall be sought.

C. Included with the Drainage Plan shall be the following information regarding the applicant that shall be provided on FORM 801.

Method of calculation (form 830)

13.04.095 Conditions of drainage plan approval.

In order for an applicant to obtain approval of a final drainage plan, the following requirements must be met:

A. The applicant shall be eligible under the terms of this chapter to apply for and obtain drainage plan approval.

B. The drainage plan and supporting submittals required by this chapter shall have been prepared and submitted in a timely and proper manner in accordance with the provisions of this chapter. **Final Drainage Plan submitted on**

C. The drainage plan and supporting submittals shall reflect compliance with the requirements of this chapter, and compliance with any conditions of approval applied to the plan by the drainage board.

Required Revisions are shown in red.

D. The submitted data shall be gathered, analyzed, assembled into the drainage plan and supporting submittals; and shall be certified, and presented to the drainage board all by a civil engineer or land surveyor regularly engaged in stormwater drainage design, and registered to practice in the state of Indiana.

E. An easement has been dedicated to house any off-site drainage facilities if such facilities are required to serve the project's stormwater drainage system.

F. The person, persons, partnership, corporation, or other entity to whom approval of the drainage plan is granted must be the person, persons, partnership, corporation, or entity who will be responsible for accomplishing the project for which the drainage plan is developed. **Sterchi Homes Corporation, 8820 Big Hill Drive, Evansville, IN 47711**

13.04.125 Building permits conditioned.

The Vanderburgh County building commissioner shall not allow construction of buildings, or other impervious structures or facilities to commence at the site of a project requiring final drainage plan approval until:

- A. Such approval has been expressed by the drainage board;
- B. And all storm drainage facilities are constructed. **See comment under Section 13.04.130**

13.04.130 Phased development of large projects allowed.

Large projects may be divided into phases for the purpose of constructing drainage facilities and obtaining permits in accordance with the requirements of this chapter.

13.04.160 Contents of preliminary drainage plan. Comments in this Section were addressed and approved with Preliminary Drainage Plan that was approved 4/7/2015

A. The contents of the preliminary drainage plan shall include a map based on the most current county planimetric maps, or a topographic map prepared from a more recent aerial photo reconnaissance that provides more accurate data, complete with contour lines, and showing the following:

1. The extent and area of each watershed affecting the design of the drainage facilities for the project; Provided. For final drainage plan
2. The soil types based on the most current information available from the SWCD; **Soil map with description of soil was provided. Area is almost entirely in row crops. There are a few areas that are steeped sloped.**
3. Zone "A" floodplain based on the current FIRM panels; **March 17, 2011 FIRM panel 112 of 275 provided. The map was prior to the construction of Spring Valley.**
4. The existing man-made and natural waterways, ponds, basins, pipes, culverts, and other drainage facilities or features within or affecting the project; **Record Drawing provided that shows existing basin and culverts that control flow from basin.**
5. The preliminary layout and design of the streets, and all stormwater drainage facilities, including depressed pavements used to convey or temporarily store overflow from the heavier storms, and all outlets for the storm water drainage facilities; **Layout provided. Major drainage will utilize existing stream.**
6. The existing streams, floodways, and floodplains to be maintained, and new channels to be constructed, their locations, cross sections, profiles, and materials used; **No new channels to be constructed other than backyard swales. Drainage Easements are shown for these. The final drainage plan will need to address control of drainage from steep sloped areas. Provide a typical cross section of the existing stream and typical swale cross section for the overflow swale at P535. Provided on 4/2/2015**

7. The proposed culverts and bridges to be built, with the specific materials to be used, elevations, waterway openings, and the basis of their design; **Two box culverts are planned to be utilized. USCOE Nationwide or Individual permit will be required. The design for these culverts as well as information on USCOE permitting needs to be provided to the County for Final Drainage Plan.**

8. Existing detention basins or ponds within the project, or outside the project but affecting it, to be maintained, enlarged, or otherwise altered, together with any new basins or ponds to be built; and their basis of design; **One existing basin was constructed as part of the Spring Lake Valley Development which was the previous name of the subdivision and in which 49 lots were platted in the first phase of that development. The existing lake is oversized as it was utilized for fill.**

9. The estimated depth and amount of storage required of the basins and ponds, and their available freeboards; **A record drawing was provided of the original basin. Surveyed cross sections show that the slopes of the basin are shallower than required. The stated storage capacity is 661,462 cubic feet which according to the report is 7.2 times the required storage capacity.**

10. The estimated location and percentage of impervious surface existing and expected to be constructed at completion of the project. **Provided-utilized summation of standard footprint**

11. Any interim plan which is to be incorporated into the project pending its completion according to the final drainage plan. **Not addressed. Will all streets and drainage structures/swales be constructed prior to the construction of any homes? Will the subdivision be platted all at once or in phases? Response from dated 4/2/2015 All streets and drainage structures/swales that are required for construction of any home in that phase will be completed as part of that phase. The Hills subdivision will be platted in phases.**

B. Notations and Explanations on the Preliminary Plan. All notations necessary to indicate the existing conditions, and the proposed functions of the various features shown thereon; and shall include the following. **Provided**

C. Geographic Orientation Required. A north arrow, scale, location insert, and other information necessary for geographic clarification shall be included on a preliminary plan. **Provided**

D. Data Required to Accompany Preliminary Plan. Descriptive data sufficient to support the feasibility of the preliminary drainage plan with regard to the requirements of this chapter, including calculations of the predevelopment and post development runoff rates using rainfall data supplied herein shall accompany a preliminary drainage plan. **Predevelopment runoff rate calculated at 86.53 cfs which is the same as was shown in the original Springs Valley Final Drainage Report. The Report states that 2.62 acres discharge directly into Locust Creek undetained; where are these acres? Response from dated 4/2/2015 The 2.62 acres referred to in this question are shown in the proposed drainage exhibit in**

the original report denoted as "basin 2". This basin/area was part of the original Spring Lake Valley Subdivision and will not be part of this project. The Preliminary Drainage Plan references a report on Kimsey's Lake that is not included. It is not required for the preliminary plan, but if it is to be included please provide with proper references to the current property owner. Provided

Other Comments-these do not need to be addressed as part of the Preliminary Plan but are listed to assist in the Final Drainage Plan Submittal

Calculations for the final drainage plan must utilize methodology beyond the Rational Method as the water shed exceeds 200 acres. This would be similar to the original submittal for Spring Valley.

The preliminary plan provides a general layout of the subdivision and the retention requirements. Final Drainage plan in addition to additional detail that is required will need to address the following issues.

- Hillside drainage specifically along the backs of the lots on the south side of the development, especially shallow lots 61-67, and the lots along the north side of the subdivision. Additional swales and the associated drainage easements may be required on these lots.
- Greater detail will need to be provided regarding the lake to the east of lots 80 and 81 to ensure that the drainage outflow the lake to these lots is properly channeled.
- Swale detail will need to be provided to specifically show erosion control on steep swales as this will be an issue in this development.
- It is the County's understanding that the stream that runs through the development are jurisdictional waters. Copies of permits regarding this stream should be supplied to ensure that the county's approval does not conflict with USCOE/IDEM approvals.
- The APC Design Requirements and Improvements Section 16.12.070 C may have a direct bearing on the final drainage plan of this subdivision.

13.04.165 Contents of the final drainage plan.

The contents of the final drainage plan shall include all the items listed above for a preliminary drainage plan, plus:

- A. Soils Map. A soils map indicating soils names and their hydrologic classification must be provided for a proposed project. **Provided for Phase I area-soils are Stendal Silt loam**
- B. Location and Topographic Map. In addition, a location and topographic map must be provided showing the land to be developed, and such adjoining land whose location and topography may affect or be affected by the layout or drainage of the project. **Provided** The map must also identify all adjoining landowners. **Provided on plat map**
- C. Contour Intervals.

1. The contour intervals shown on the topographic map shall be two and one-half feet for slopes less than four percent; and five feet for slopes four percent or greater; or best available; 1'

Contours

2. The location of streams and other stormwater conveyance channels, both natural and man-made; and the vertical and horizontal limits of the one hundred (100) year floodplain, according to FIRM panels, and/or the building commissioner; all properly identified; . **FIRM Map provided-most homesites will require fill**

3. The normal shoreline of lakes, ponds, swamps, and basins, their floodplains, and lines of inflow and outflow; **The inlet of the stream into the existing retention basin and the outlet is not correctly shown on the map. The map shows the stream to be a straight through flow line instead of the diversion into the retention pond. The outlet needs to be correctly shown. A cross section needs to be provided of the inlet and outlet into the pond to show that they will be adequately carry the 25 year storm. Drawing updated to correctly show outlet. Per comments provided pipe was designed to discharge at less than 10 year storm but does not have capacity for 25 storm. Originally approved plan allowed for excess from 25 year storm to discharge from emergency spillway.**

4. The location of exiting regulated drains, farm drains, inlets and outfalls;

5. Storm, sanitary, and combined sewers, and outfalls; 6. Wells, septic tank systems, and outfalls, if any;

7. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record;.

8. The limits of the entire proposed project and the limits of the expected extent of land disturbance required to accomplish the project

9. The location of the streets, lot lines, and easements;

10. A scale, preferably one inch equals fifty (50) feet;

11. An arrow indicating North. **Provided**

D. On-Site Bench Mark Required. A benchmark determined by "Mean Sea Level Datum 1929," is required to be located within the project limits.

13.04.170 Final drainage plan layout.

A. In addition to the requirements listed for a preliminary drainage plan, the final drainage plan shall depict the following:

1. The extent and area of each watershed tributary to the drainage facilities within the project; Information regarding developed basins is not shown.
2. The final layout and design of proposed storm sewers, their inlet and outfall locations and elevations, the receiving streams or channels; all with the basis of their design; **No information provided regarding design sizes of pipes . As Pipes 563, P535, P544 and P560 were installed as part of the Spring Lake Valley Subdivision these pipes may require sediment removal if the sediment is the result of inadequate erosion control during house construction.**
3. The location and design of the proposed street system, including depressed pavements used to convey or detain overflow from storm sewers and over-the-curb runoff resulting from heavier rainstorms, and the outlets for such overflows; all with their designed elevations;
4. The locations, cross sections, and profiles of existing streams, floodways, and floodplains to be maintained, and the same for all new channels to be constructed. **Provided in preliminary plan**
5. The materials, elevations, waterway openings, size, and basis for design of the proposed culverts and bridges;_
6. Existing ponds and basins to be altered, enlarged, filled, or maintained; and new ponds, basins, swales, to be built, and the basis of their design
7. The location and percentage of impervious surfaces existing and expected to be constructed;
8. The material types sizes slopes grades and other details of all the stormwater drainage facilities;
9. The estimated depth and amount of storage required in the new ponds or basins, the freeboard above the normal pool and highwater pool of wet basins, and details of the emergency overflows from the basins **Provided in Preliminary Plan**
10. For all controlled release basins, a plot or tabulation of the storage volumes with corresponding water surface elevations, and a plot or tabulation of the basin outflow rates for those water surface elevations; **Provided in Preliminary Plan**
11. The location of any applicable “impacted drainage areas” or other areas designated to remain totally undisturbed, natural, or for common and/or recreational use. **Existing stream is most probably jurisdictional-comment on the status of any permitting and/or whether any disturbance will be allowed along the stream**

B. Protection of Structures From One Hundred Year Flooding. All structures to be occupied as residences or businesses shall have finished floor elevations two feet above the high water calculated to occur during a one hundred (100) year return period storm for the subject building site; and the required

floor elevations shall be depicted on the plan drawings for such affected sites. **Elevations noted on plans**

13.04.175 Submittal of a written drainage design report.

The final drainage plan shall be accompanied by a written report containing the following:

- A. Any significant stormwater drainage problems existing or anticipated to be associated with the project; **See comment under 13.04.170 A11**
- B. The analysis procedure used to identify and evaluate the drainage problems associated with the project; **Rational-note this plan is for a small subdivision within a larger watershed. For the future calculations of the remaining subdivision, the point of outflow from the total subdivision has a watershed in excess of 200 acres. As addressed in the Preliminary Drainage Plan, future Final Drainage plan for this area must utilize methodology other than the Rational Method-Noted in response**
- C. Any assumptions or special conditions associated with the use of the procedures, especially hydrologic or hydraulic methods, used to identify and evaluate drainage problems associated with the project;
- D. The proposed design of the drainage control system;
- E. The results of the analysis of the proposed drainage control system showing that it does solve the project's identified and anticipated drainage problems; **Existing basin has sufficient storage and controls outflow**
- F. A detailed description, depiction, and log of all hydrologic and hydraulic calculations or modeling, and the results obtained thereby; together with the input and output files for all computer runs
- G. Maps showing individual drainage areas within the project subdivided for use in the analysis thereof

13.04.180 Typical cross sections of the drainage facilities.

One or more typical cross sections must be provided for each existing and proposed channel, basin, pond, or other open drainage facility, which cross sections **Existing Basin**

- A. Must show the elevation of the existing land immediately adjacent to all drainage facilities;
- B. Must show the high water elevations adjacent to all waterways and impoundments as expected from the one hundred (100) year storm in relationship to permanent structures

13.04.440 General detention/retention basin design requirements.

The following design principles shall be observed for detention and retention basins:

- A. Duration of Storage. The maximum volume of water stored and subsequently released at the design release rate shall not result in a storage duration in excess of forty-eight (48) hours, unless additional storms occur within the period **Not provided Form 800 provided.**
- B. Depth of Stored Water. The maximum depth of stormwater to be stored, without a permanent pool shall not exceed four feet; and the maximum depth of stormwater to be stored above a permanent pool shall not exceed four feet. **Provided in Preliminary Plan**
- C. Finished Floor Elevations Adjacent to Basins. The lowest floor of any building or structure occupied by humans must be at least two (2) feet above the one-hundred (100) year storm water elevation of detention/retention basins.
- D. Earthen Side Slopes 4:1 Maximum Steepness for Basins. All detention and retention basins with grassed, earthen side slopes shall have side slopes no steeper than four horizontal units of measurement to one vertical unit of measurement (4:1) to the base of dry basins, and to the typical low waterline of wet basins. **Existing Basin**
- E. Riprap Side Slopes 2:1 Maximum Steepness for Basins. Wet retention basins with riprap armored side slopes shall have slopes no steeper than two horizontal units of measurements to one vertical unit of measurement (2:1) at any point in the side slope. **Existing Basin**
- F. Riprap to Extend Two Vertical Feet Below Waterline. The armored portion of the side slope must extend to a minimum depth below the permanent pool elevation of two vertical feet **Existing Basin**
- G. Underwater Earthen Side Slopes 2:1 Maximum Steepness. Nonarmored earthen side slopes shall have slopes no steeper than two horizontal units of measurement to one vertical unit of measurements from a point two vertical feet below permanent pool, thence downward. **Existing Basin**
- H. Minimum Depth of Riprap Application. Riprap side slope armor shall be a minimum twelve (12) inches in depth at all points of application. **Existing Basin**
- I. Drain Recommended for Maintenance of Wet Basins. If possible, a drain should be installed to lower the pool of wet basins to a level sufficient to repair any wave action erosion along the waterline, and to perform other periodic maintenance. **Not provided nor is it required**
- J. Safety Ledges and/or Fencing of Wet Basins. Safety fencing surrounding the basin, and/or shallow safety ledges shall be provided if deemed necessary by the design engineer or the board. **Existing Basin**
- K. Outlet Controls to Operate Automatically. Outlet control structures shall be designed to operate as simply as possible, and shall require little or no maintenance for proper operation. **No controls**

L. Designed Water Level Control Required. A controlled positive outlet shall be required to maintain the designed water level in wet basins, and provide the required detention storage above the designed low water level. **Existing Basin-provided**

M. Emergency Spillway Requirements.

1. An emergency overflow spillway shall be provided for the release of storm runoffs exceeding the designed maximum detention volume, or all overflow volumes in emergency conditions, should the normal discharge devices become totally or partially inoperative. **Existing Basin**

2. A minimum freeboard of one-half foot above the calculated elevation of the design storm detention high water level to the elevation of the spillway flowline peak is required as a safety factor for all basins. **Existing Basin**

N. Automatically Operating Emergency Spillway Required. The emergency overflow spillway shall be designed so that it operates openly, automatically, does not require manual attention, and will pass all the one hundred (100) year return period storm flow with a one-half foot vertical minimum above the one hundred (100) year return storm flow to the lowest dirt elevation in the surrounding earthwork. **Existing Basin**

O. All Permanent Pools Require Water Quality Provisions. Designers of basins with permanent pools shall consult available manuals from the soil and water conservation district, and incorporate provisions therefrom for maintaining water quality, safety, and soil stability. **Existing Basin**

P. Dry Basin Cover and Maintenance. Dry basins shall be planted and maintained in vegetative cover equal to that of residential lawns **Wet Basin, not applicable**

Q. Side Slopes to Remain Stable. All side slopes of a basin shall be constructed stable and shall be maintained in a stable condition by the same criteria as specified herein for open channels. **Existing Basin**

R. Wet Basin Cover and Maintenance. The earthen side slopes of wet basins shall be provided with grass cover above the low water elevation, which shall be maintained equal to turfed residential lawns, and in no case shall the cover growth exceed twelve (12) inches in height, or the most current county standard **Existing Basin**

S. Maintenance Pathway for Basins. A flat pathway with a minimum width of ten (10) feet shall be constructed completely around the top of the embankment of all detention/retention basins. **There appears to be sufficient space to maintain.**

T. Maintenance Easement for Basins. An easement dedicated for the purpose of accessing and maintaining the basin and its appurtenances shall be provided, and the easement shall be configured so that it includes the entire basin, the entire earthwork encompassing the basin, the maintenance pathways into and around the basin, and all inletting and outletting appurtenances of the basin. **Provided**

U. Maintenance Report Required for Basin.

1. A brief and concise report shall be prepared, by the design engineer, consisting of a description of the location, intended function of all parts appurtenant to the basin, together with a description of the ways in which the basin and its appurtenances should be maintained, all worded in language easily understood by residential or commercial property owners; and; **Not Provided Per Submittal dated 7/22/2015 banks to be mowed by property owners and storm pipes to be maintained by county (Plan B)**

2. The report shall be attached to the restrictions for the property on which the basin and its parts are located.

3. Such restrictions shall be shown to exist prior to the board's final approval of the drainage plan for a project whose plans include a basin. **The drainage plan is being submitted prior to final plat. See note under 13.04.460.**

V. Copy of Report Must be Submitted With the As-Builts. A copy of the maintenance report described above shall be included with the as-built plans required to be submitted hereinabove.

W. Elevation of Dry Basin Bottom Marked. A continuous concrete liner at least equal in characteristics to that described in Section 13.04.315F shall be installed in all dry basins from the point of inflow of each channel entering a basin to the point of outflow from the basin. The concrete liner shall be installed at an elevation slightly lower than the earthen floor of the basin, so that it may serve as a trickle trough or low flow liner. **Wet Basin, not applicable**

X. No tree limbs, trunks, refuse from legally burnt vegetation, nor construction waste, demolition materials, or other man made material may be buried within the area in which an impounding structure will be located. Notice shall be placed on construction drawings noting the prohibition to the burying of any such materials. Certain natural materials such as large rocks may be located in the bottom of wet basins in order to provide fish habitat or habitat breeding areas provided that such materials are not included within the calculations for required storage volumes and will not block outlet structures.

Y. For small sites of less than 5 acres, infiltration trenches may be utilized instead of a wet or dry basin. In utilizing an infiltration trench, the storage volume is equal to the void ratio multiplied by the total volume of the trench. Information must be provided in advance validating the void ratio as well as testing proposal to validate the void ratio. The infiltration trench must have an outlet that restricts the flow per code provisions. **Not applicable**

Z. No retention basin shall be allowed within the flowline of a Regulated Drain of Vanderburgh County. The Drainage Board cannot use its rights to discretionary decisions granted under Section [13.04.025](#) to exempt this restriction. **Not within Regulated Drain**

13.04.460 Responsibility for drainage facility maintenance.

The installation, maintenance, repair, and replacement of all stormwater drainage facilities, and erosion and siltation control measures for a project during the period of construction, and until final approval by the county engineer, shall be the responsibility of the land developer(s), and/or the property owner(s) of record.

The assignment of responsibility for the maintenance and repair of all stormwater drainage systems and facilities outside of county accepted road rights-of-way after the completion of the project, and final approval thereof by the county engineer, shall be determined before the final drainage plan is approved; and shall be documented by appropriate covenants and restrictions applied to the subdivision and to the property deeds thereof, and shall be printed clearly upon all recorded plats of the project.

The Drainage Plan needs to address whether a Plan A (Lot Owners) or Plan B (Repair Fund held by County) will be utilized. If Plan A is to be utilized how will the responsibilities for this subdivision be handled in relation to the existing Spring Hills Subdivision. If Plan B is used, an access easement will need to be provided on lot 1 in order to allow P563 to be accessed for repair/replacement. The north line of lot 1 is the preferred location of this access easement in order to avoid areas along the ditch that could be in the Corps of Engineers' jurisdiction. If the access easement is provided along the south line of lot 1, the easement should be outside the 15' drainage easement in order to minimize Corps of Engineers' involvement in accessing P563. The Developer is requesting Plan B (payment of \$2/ft fee with County maintaining pipes). An access easement along lot lines 1 & 2 has been provided and shown on the plat.

13.04.425 Upstream flow through drainage system.

The upstream storm drainage flow through the storm water drainage system constructed for a project subject to this chapter shall be designed in accordance with the following:

- A. For Watersheds One Square Mile or Less. Drainage systems serving a project shall have adequate capacity to convey the stormwater runoff from tributary areas totalling one square mile or less through the project under consideration, and within drainage easements, for a twenty-five (25) year return period storm calculated on the basis of upstream land in its existing condition.
- B. Watersheds Larger Than One Square Mile. Drainage systems shall have adequate capacity to convey the stormwater runoff from all tributary areas totalling greater than one square mile through the project under consideration, and within drainage easements, for a fifty (50) year return period storm calculated on the basis of upstream land in its present state of development.
- C. Allowance for Existing Upstream Detention. An allowance, equivalent to the reduction in flow rate provided, shall be made for upstream detention when such upstream detention and release rate previously have been approved by the board; and evidence of the detention facility's as-built construction, or existing condition, can be shown certified to the drainage board.
- H. For all new major subdivisions as defined in Title [16](#) of this code, which major subdivisions are shown to discharge an amount of stormwater in addition to that which is discharged prior to new

development and all minor subdivisions, C-0 Through M-3, as defined in Title [16](#) of this code, which minor subdivisions are zoned for commercial use, the applicant shall notify all adjoining landowners and Registered Neighborhood Associations within 1/2 mile of any development of the proposed Drainage Plan.