City of Columbus – Bartholomew County
Planning Department

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MEMORANDUM

TO: Columbus Redevelopment Commission Members

FROM: Jeff Bergman

DATE: March 12, 2015

RE: Walesboro Industrial Site / Former Airfield Floodplain Mapping

As some of you may recall, for the last several years there has been discussion of the mapping of the former Walesboro airport property as a floodplain by FEMA. Prior to December 9, 2014 the floodplain in this area consisted of a relative small portion of the property along the Walesboro Drain, a ditch that runs along the west and south sides of the former airport. On December 9 FEMA's updated floodplain maps for Bartholomew County became effective. Among other changes, these new maps designated the vast majority of this property as a floodplain. The City had been aware of this proposed change for several years; as we were provided the opportunity by FEMA to review drafts of the proposed map updates. As part of that update process FEMA provided an "appeal period" by which any affected property owners could provide data demonstrating that the proposed maps were in error. The City hired Christopher Burke Engineering to assist us with the needed documentation and submitted an appeal for this property. Working within the limits of FEMA's appeal process, Burke was able to provide for the City a successful appeal. However, the results of that appeal were limited. The floodplain designation for the property remained, however the "flood protection grade" (the extent to which any new structures would need to be elevated to avoid flooding) was reduced. While this change did make building on the site more economical, the continued presence of the floodplain designation impairs the redevelopment potential of the property.

Please note that all who have examined this property agree that the floodplain designation exists on paper only and is the result of the limitations of FEMA's standard floodplain modeling software and protocols. This includes local officials familiar with the property, the staff at Christopher Burke Engineering, and the staff at the Indiana Department of Natural Resources (IDNR - who act on FEMA's behalf on this matter). The goal of any effort to challenge the floodplain designation has been to accurately represent the true flooding hazards, and not to manipulate the floodplain regulations to benefit the redevelopment of the property.

The adoption of the updated floodplain maps last year provides some new opportunities to re-examine this issue outside of the context of the FEMA map update process. To that end, the City has obtained a proposal for professional services from Landwater Group, Inc. This is a local company with an emphasis on floodplain regulations and drainage. Landwater Group proposes to build on the previous efforts and to supplement them with alternative floodplain modeling techniques. These alternative methods were not options during the FEMA map update appeal period, when the City last explored this issue. Staff from the Landwater Group and I have discussed their proposed approach to modeling the floodplain on the property with IDNR and have gained their general agreement and support for that method.

Attached for your consideration is a proposed contract with Landwater Group. The contract provides for the re-mapping of the floodplain on the property and the completion of the process for gaining FEMA approval of the resulting floodplain map changes. The contract proposes a lump sum fee of $30,000 for these services. I have also attached the pre- and post-2014 floodplain maps of the property for your information. Please feel free to contact me with any questions you may have.

March 10, 2015

Jeffrey R. Bergman, Planning Director
City of Columbus - Bartholomew County Planning Department
123 Washington Street
Columbus, Indiana 47201

Re: Walesboro Airport Tributary
Revised Floodplain Study & FEMA Map Revision
Engineering Proposal

Dear Mr. Bergman,

This engineering proposal is respectfully submitted in response to your request for proposal for the completion of a comprehensive drainage/floodplain/mapping study for the Walesboro Airport Economic Redevelopment project site located along CR 450 South on the southwest side of Columbus, Indiana. Thank you for your input and provision of key documents as we developed the scope and justification for this endeavor.

Background

- The federal FEMA Flood Insurance Study maps for Bartholomew County were recently revised and the Walesboro Airport Economic Redevelopment Project Site (here-in after referred to as Project Site) was placed in the Zone AE Special Flood Hazard Area of Airport Tributary. On the pervious FEMA FIRM map, the Project Site was located outside the floodplain.
- The Columbus Redevelopment Commission (here-in after referred to as Client) retained an engineering consulting firm that prepared a revised floodplain study for the Project Site and surrounding area that included updated hydrologic, hydraulic and mapping information that resulted in a successful appeal to the proposed/revised FEMA FIRM mapping.
- Although the floodplain study revision and FEMA map appeal was successful, it did not result in a substantial change to the Zone AE floodplain status at the Project Site. The entire site remained in the floodplain, only the flood levels changed slightly.
- Further investigation of the FEMA information products initiated by informal discussions and later confirmed by a meeting with DNR engineers clearly indicated that the FEMA study likely over-stated the flood risk at the Project Site.
- The basis of the apparent errors in the final FEMA mapping at the Project Site is the overly simplistic modeling approach utilized by the hydrologic and hydraulic computer simulation models that failed to reasonably simulate actual physical conditions associated with the regulatory flood event at the Project Site, resulting in a floodplain extent and volume that is likely not physically possible based on simple mass conservation (not enough water produced by watershed to fill floodplain).
- Initial investigation by Landwater Group, Inc. (here-in after referred to as LWG) indicates that a more comprehensive floodplain study methodology will likely reduce but may or may not eliminate the floodplain status on all or a portion of the Project Site. If floodplain areas remain at the Project Site, they are expected to degrade to very shallow aprons or narrow ribbons of floodplain. Even if floodplain

areas remain, if the associated base flood elevations are reduced by a foot or more, millions of dollars of unnecessary site filling could be realized with a more realistic FEMA floodplain map.

Key Objectives

- The primary objective of this project is to increase the value and marketability of the Project Site by pushing back against a damaging inclusion in a floodplain by FEMA on its recently updated federal Flood Insurance Study mapping.

- Since flood risks are real, the objective includes a process designed to better leverage flood risks with developments costs and constraints through the application of state-of-art computer modeling and data synthesis. Whatever the outcome, the value of improved floodplain risk data has high leverage value in this case due to the relatively large size of the Project Site; multiple impacts to marketability and future development costs; and quantitative significance of the errors in the FEMA product.

- The ultimate objective is a formal revision of the FEMA Flood Insurance Study FIRM map (LOMR) and associated documents based on "better information or methodology". FEMA has a formal procedure and policies for this type of LOMR. A key factor in most FEMA reviews is concurrence by the intermediary state agency which in this case is the DNR Division of Water which has agreed to work closely with the Client and LWG as the study is developed and prepared by submission to FEMA for consideration. There is not guarantee, however, that the effort will in fact result in a LOMR.

Following is the proposed scope of services that defines many of the tasks associated with this agreement. As with any nth degree study, it is likely that tasks will evolve as new data becomes available or is developed.

Scope of Services

Item A-Revised Floodplain Study (Hydrology/Hydraulics/Mapping)

1. Obtain LIDAR topo for entire watershed down to railroad tracks and develop a scaled cad drawing that can be augmented with additional overlay layers described below.

2. Create overlay layer that shows the total watershed boundary of the subject Airport Tributary Ditch based on StreamStats and/or Burke study.

3. Create another overlay layer that shows the new floodplain boundaries based on Burke study and/or new FEMA FIRM. Include BFE influence lines from Burke study as they extend across the airport site.

4. Using varying BFE values as the lid, determine the total volume of the floodplain based on finite element differential between BFE and ground elevation. Ideally a tin model would be created. If not possible, a set of cross sections that extend the Burke HECRAS sections through the airport site could be generated (one already developed) and the volume computed using the average end area method.

5. Develop the extended cross sections from the Burke study using LIDAR through the airport site (same as one already developed). The Burke study sections should be transferred to the LIDAR map and then sections extended roughly parallel to the alignment of the BFE influence lines unless altered to reflect actual fluvial geomorphology within the airport site.

6. Create GIS topo/sub-basin map that can be scanned into cad as a picture and use landmarks or other tools to create a conventional map scale that aligns with other cad layers.

7. Use the scaled GIS topo overlay layer to delineate all the watershed sub-basins (around 40) down to the railroad tracks or SR 11. Use the air photo layer from the GIS (or other source if more up-to-date) to determine the areas for TR55 land uses in each sub-basin.

8. Use the NRCS Soil Survey map from the website to scan in a scaled overlay layer for the soil types.

9. Use the soil overlay for each sub-basin to determine the percentage of each NRCS soil type and associated NRCS soil group (A-D).

10. Use the GIS topo overlay layer to develop storage ratings for each watershed natural or manmade detention basin. Augment w/actual site plans where available from City files.

11. Obtain field survey data and utilize GIS/LIDAR topo for the outlet control pipes, ditches or weirs (including roadways in some cases) for each watershed natural or manmade detention basin. (Augment w/actual site plans where available from City files, but confirm actually built per plan w/field check.)

12. Utilize extended Burke study cross sections (or new sections created by LIDAR and/or ILS survey data) to determine the horizontal location and vertical crest of the control berm between the main ditch channel floodplain (streamward of divide) and extended floodplain as depicted on the Burke study and new FEMA FIRM.

13. Develop a continuous ground profile line using LIDAR along the control berm, extending along the ditch from the CR175 culvert to the downstream end of the airport site by connecting the "dots" of the crest location at each extended cross section. (The control berm may not be a recognizable hump to the naked eye. It may look like flat ground or a point occupied by a building. Based on the LIDAR topo, it is the location at which floodwaters emanating from the overflow of the main ditch channel begin to flow along a ground surface that slopes away from the overflow crest or control berm. This overflow discharge is critical and its volume and flow rate should be carefully computed for design conditions and properly diverted away from the floodwaters that continue to follow the main ditch channel, the portion of the cross section that is streamward of the control berm.)

14. Utilize high points along the control berm profile to create a set of "lateral overflow weir" segments identified as A through ? depending upon how many individual overflow lateral weir segments are developed.

15. Utilize LIDAR and field survey data within the airport site (culverts, stormsewers, ditches, etc.) to determine the likely flow pathway from the control berm/lateral overflow weir" segments through the airport site and back to the main ditch channel just upstream of the railroad tracks.

16. Adjust the boundaries between the control berm/lateral overflow weir" segments (A-?) using the location of the main ditch HECRAS/ICPR cross sections; high points along the control berm; and diversion flow pathway fluvial geomorphology along the downstream side (landward) of the control berm.

17. Use LIDAR data and sub-basin GIS topo, to determine the time-of-concentration flow path for each sub-basin. (For sub-basins containing a detention basin (natural or manmade), make sure the sub-basin is divided into area contributing to or downstream of the detention basin, if applicable. This won't be

necessary of the outlet control is at the downstream boundary of the sub-basin (entire sub-basin flows to detention basin).

18. Develop TR-55 models that utilize input data including sub-basin drainage area; weighted soil groups; weighted land uses; time of concentration flow path data to compute the weighted NRCS curve number and time-of-concentration for each drainage sub-basin.

19. Build, debug and execute an ICPR rainfall/runoff/flood routing model using input data including:

A. Burke study rainfall data (maintain for continuity from FEMA approved study). (Unlike previous FEMA study and Burke study, create a model for the entire range of standard storm durations from 15 minutes to 24 hours. Utilize Huff distributions for all events but also include NRCS-Type 2 distributions for 24 hour storms for comparison purposes.)

B. Sub-Basin drainage area, weighted curve number and time-of-concentration.

C. Stage vs. storage ratings for each detention storage node to be considered by ICPR model. (These storage areas can be turned off to model condition in which they are to be neglected in terms of flood control.)

D. Outlet control geometry for each detention storage node to be considered by ICPR model. (Multiple outlet pathways can be inserted as independent elements/model then combines when routed. Typical elements include weirs, pipes, channels and rating curves developed from other sources like HECRAS).

E. Geometry of other "links" that connect ICPR "nodes". (Similar structures as outlet control, however add the open channel flow HECRAS-type cross sections along the main ditch channel).

F. Control berm/lateral overflow weir geometry (profile) associated with the appropriate nodes along the main channel. (Model should allow both forward and backward flow so that floodwaters can return to main channel if flood physics dictate this condition).

G. Diversion conveyance pathway geometry through airport site, including storage areas caused by control elements or lack of positive drainage outlet creating trapped storage pockets. Typical elements include cross section and pipe links and stage/storage nodes. (In this case, infiltration may need to be considered particularly if ground is determined to be highly pervious Also may need to further breakdown airport site sub-basins to isolate sub-areas that drain to mini-storage basins that are outside the effective flow pathway as site conditions dictate.)

H. Return or convergence conveyance pathway geometry downstream of airport site. This is the pathway where floodwaters that overflow from main ditch across the control berm; do not return to the main ditch channel; but instead flow through the airport site flow back to the main ditch channel near the upstream side of the railroad culvert. Note that ICPR model allows flow in both directions and keeps track of volumes so "magic water" is not created as in previous models. (This pathway is currently a mystery inasmuch as topo shows a swale but air photos show heavy development along the pathway. A field check will determine if additional survey data is needed, which is likely the case.

20. Create floodplain maps for the 1% chance flood event using LIDAR or best available mapping.

21. Repeat model/mapping with selected detention basins turned off, ignoring storage benefits.

22. Alternative method is steady, split/divert-flow HECRAS model w/flows from hydrology model.

Scope Note: Accurate floodplain modeling in complex cases require highly integrated data woven together from the best available sources to build proportionally complex rainfall/runoff/flood routing/floodplain mapping models for a set of standard synthetic design rainfall events (described earlier). The primary study elements can be broken down into three key phases including hydrology; hydraulics; and floodplain mapping.

For complex urban floodplain studies, data quality among these phases should be as good as possible and if possible of roughly equivalent in level of refinement since the model output quality is arguably only as good as the weakest phase element. If the hydrology is all wrong, it is likely that the hydraulics and floodplain map will also be wrong. It is all connected and that is why that upgrading to a superior model like ICPR over standard HECHMS/HECRAS makes sense when accuracy is a high priority.

In this case, it is expected that improved modeling approach will improve output data quality and this change will likely reduce the expected floodplain impact at the airport site by better accounting for flood volume conservation of mass within a complex, multi-pathway conveyance system existing at the Walesboro Airport and associated Airport Tributary floodplain.

Item B-Project Coordination, Collaboration & Communication

1. LWG shall consult with the Client and City staff as needed and/or requested during the development of the study and subsequent submittals to DNR and FEMA.

2. LWG shall coordinate with DNR engineering staff at key milestone points in the development of the study and subsequent submittals to DNR and FEMA in an effort to gain as much technical consensus as possible on several subjective modeling approaches and data synthesis issues.

3. LWG shall meet with DNR management and provide support to the Client as needed to obtain necessary and reasonable policy interpretations by DNR and subsequently FEMA on any issues that require special consideration due to the unique site conditions at the Project Site related to floodplain and watershed drainage.

4. LWG shall provide progress updated as requested by the Client during all project phases and attend public meetings/make presentations as requested.

5. LWG shall provide post DNR and post FEMA submittal coordination and follow-up as needed to complete the respective technical review processes at DNR and FEMA (if LOMR is submitted).

Item C-Project Deliverables

1. LWG shall prepare a certified technical information report presenting the revised floodplain study in a format and including data required for DNR and FEMA reviews. The report and appendices will include relevant hydrologic, hydraulic and mapping data as well as standard DNR and FEMA administrative forms. The initial report will be submitted to DNR for formal review.

2. LWG shall provide follow-up data adjustments, as needed, to complete the DNR agency review of the submitted revised floodplain study.

3. Pending approval by DNR and findings of adequate technical justification by the study, LWG shall prepare a FEMA Letter of Map Revision (LOMR) application packet and submit it to FEMA through standard procedures.

4. LWG shall provide follow-up data adjustments, as needed, to complete the FEMA agency review of the submitted revised floodplain study and mapping information.

Item D-Supplemental Survey

1. LWG shall secure the services of a Surveyor to obtain additional field survey data and other currently unforeseen items as reasonably required by LWG for completion of the study and deliverables.

Client Responsibilities

Following are the project support to be provided by the Client.

2. Client shall provide LWG with available information from City records as needed and available that will improve the quality of the study information.

3. Client shall provide input and guidance as reasonably needed by LWG as it executes the scope of work.

4. Client shall provide reasonable support to LWG in dealings with DNR and FEMA in furtherance of the project objectives.

Compensation

The scope of services is limited to consultation services as described above. Landwater Group, Inc. proposes to provide the above described scope of services on Lump Sum Basis. The fee for the four project tasks are listed below.

ITEMS A, B,C & D…….……..…….....$30,000.00
TOTAL LWG Fee…...…….……...$30,000.00

DNR and FEMA do not usually charge a fee for this type of LOMR, however any such fee would need to be added to the budget.

Payment Terms

LANDWATER GROUP, INC. is not bound to the individual phase budgets (one phase may cost less and others more than estimated), however LANDWATER GROUP, INC. will notify the client if the total project budget appears to be inadequate due to overruns in a particular phase.

LANDWATER GROUP, INC. will not exceed the total project fee without additional authorization from the CLIENT. LANDWATER GROUP, INC. may suspend work on the project that will cause the estimated budget to be overrun until authorization for additional expenditures is received from the CLIENT. Significant supplemental authorizations will be obtained in writing via a supplemental letter agreement.

LANDWATER GROUP, INC will invoice monthly at the first of each month for the previous month's work. The billing will reflect an estimated percent of project completion less any previously invoiced amounts.

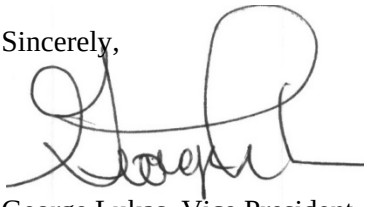
The Client may suspend or terminate the project with written notice and will be responsible for billable work incurred up to the termination date. Payment is based on hours incurred for the study by LWG and is not contingent upon acceptance of the study by DNR or FEMA and the final outcome is not guaranteed by LANDWATER GROUP, INC.

Project Schedule

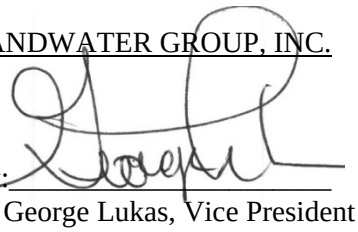
Upon notice to proceed, LWG will initiate the study, starting with data collection, field inspections and ordering of survey data. It is expected that the study will require 90 to 120 days to complete for DNR submittal. The DNR review process will likely take 90 to 120 days to complete. If this results in a LOMR submittal to FEMA, the FEMA review process will likely take 90 to 120 days to complete. Based on past experience, the whole process will take about one year to complete through FEMA review and issuance of LOMR, if successful.

Thank you for your request for proposal. The project is complex, so feel free to recommend adjustments to this document or provide a standard form agreement on your terms. If this proposal is acceptable and you wish to proceed, please execute this agreement and return one signed original to our office.

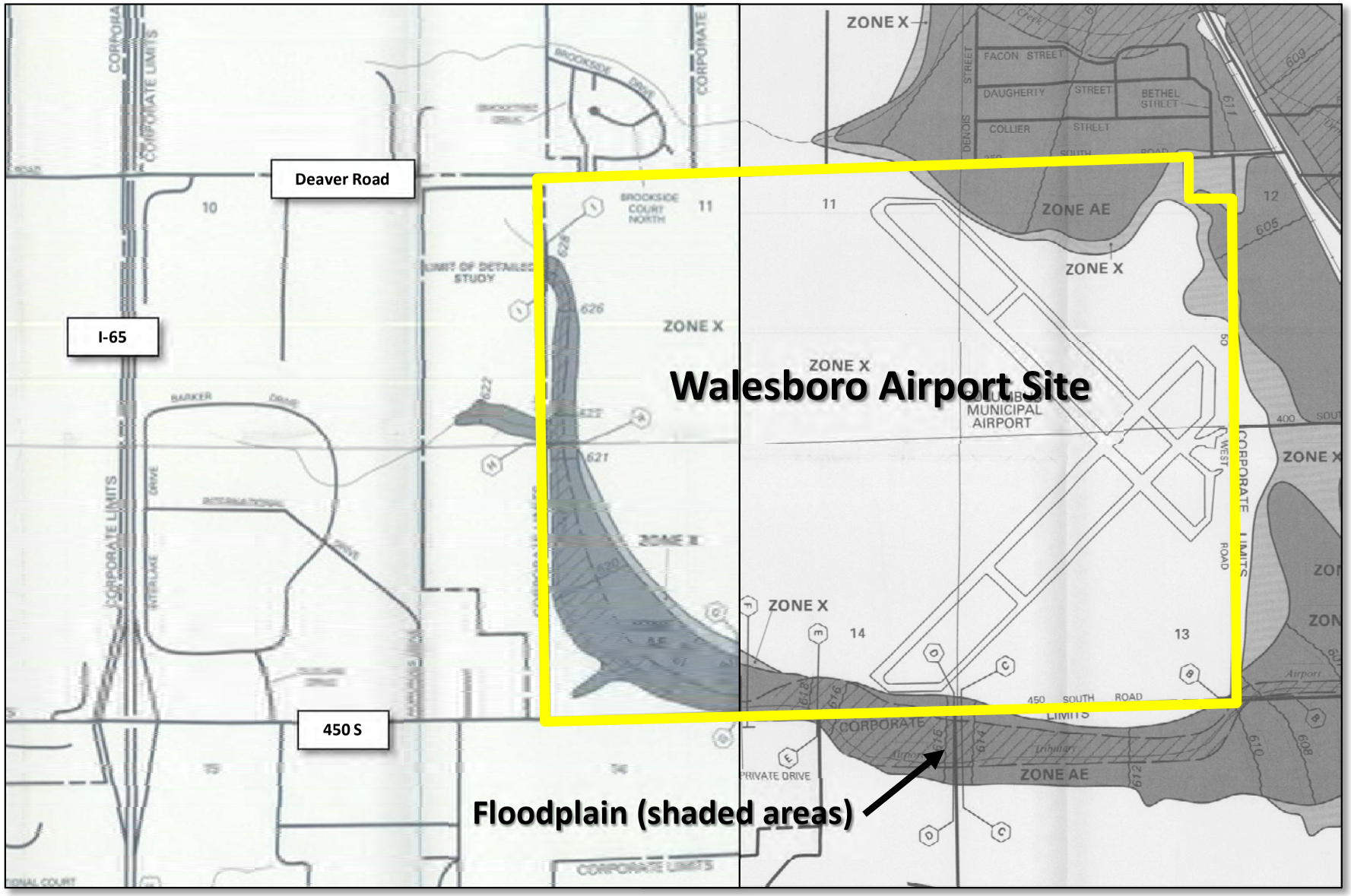
Sincerely,



George Lukas. Vice President

LANDWATER GROUP, INC.	CLIENT
By: 	
George Lukas, Vice President	
Date: March 10, 2015	Date: _____

“Walesboro Drain” Floodplain (Pre-2014)



“Walesboro Drain” Floodplain (effective Dec. 9, 2014)