



December 22, 2017

Ref: 52151.04

National Flood Insurance Program

LOMC Clearinghouse
3601 Eisenhower Ave, Suite 500
Alexandria, VA 22304-6426

Attn: LOMR Manager

Re: Additional Data Required for Letter of Map Revision (LOMR)
Case No. 18-01-0144P
Town of Exeter, New Hampshire (Community No. 330130)
Great Dam Removal, Exeter River, FIRM Panels 33015C0382E, 0402E, 0403E, 0404E, 0406E, and 0408E

Dear Ms. Amar,

This letter addresses the issues listed in the letter from Benjamin Kaiser dated December 5, 2017 requesting additional data to complete your review for the LOMR request for the Great Dam Removal on the Exeter River in Exeter, NH (Case No. 18-01-0144P). Please find attached an electronic copy of the requested LOMR supporting data. David Cloutier of VHB spoke with Ellie Pitney by phone on Friday, December 15, 2017 to review the comments and confirm that the following revisions to the submittal are consistent with FEMA requirements. We have provided a point-by-point response to your comments below (responses in **bold type**):

1. Our review of the submitted hydraulic model for the post-project floodway analysis for the Exeter River revealed the following issues. Please update the floodway analysis and submit the revised hydraulic model for review.
 - a) Please revise the encroachment stations at Cross Sections 19704, 19646, 19595, 19494, 14936, and 5422 as either right or left encroachment stations at these cross sections are set outside the 1-percent-annual-chance (base) floodplain limits in the hydraulic model. Encroachment stations should be set within the floodway fringe i.e., the area between the channel bank station and the limits of the base floodplain.

VHB has revised the encroachment stations at these Cross Sections to be set within the floodway fringe. Refer to Table 1 (below) for a summary of all encroachment station revisions to the Exeter River.

Engineers | Scientists | Planners | Designers

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- b) Please revise the encroachment stations at Cross Sections 19324, 19156, 18914, 7463, and 7301 as they are set within an area of ineffective flow. The encroachment stations should be set so that the floodway is completely within effective flow area.

VHB has revised the encroachment stations at these Cross Sections to be set within the area of effective flow. Refer to Table 1 (below) for a summary of all encroachment station revisions to the Exeter River.

- c) The post-project floodway delineation shown in the submitted workmap entitled "Topographic Work Map" prepared by VHB and dated September 2017 revealed that the post-project floodway delineation is not hydraulically smooth between Cross Sections 10367 to 11320, Cross Sections 13166 to 13928, Cross Sections 15812 to 16735, and Cross Sections 17483 to 18914. Please revise the delineations (especially on the left overbank) so that floodway is hydraulically smooth.

VHB has revised the encroachment stations through these Cross Sections ranges to maintain a hydraulically smooth floodway for the post-project model. Refer to Table 1 (below) for a summary of all encroachment station revisions to the Exeter River.

- d) The surcharges at Cross Sections 1839, 1054 and 848 are -0.07 foot, -0.06 foot and -0.11 foot, respectively. Please revise the floodway model so that surcharges remain between 0.0 feet and 1.0 foot at all cross sections.

VHB has revised the encroachment stations at these Cross Sections and other Cross Sections as needed to ensure that surcharges remain between 0.0 and 1.0 feet throughout the model. Refer to Table 1 (below) for a summary of all encroachment station revisions to the Exeter River.

- e) The topwidths of the regulatory floodway computed in the post-project conditions hydraulic model at the cross sections listed in the table below do not match the approximate floodway topwidths shown on the above-referenced topographic work map. Please submit a revised hydraulic analysis or revised work maps as appropriate to resolve these discrepancies.

VHB re-delineated the Exeter River floodway in the Topographic Work Map to incorporate the encroachment changes made in response to comments a) through d) above. After re-delineating the floodway, VHB reviewed the mapped floodway widths to verify that they were consistent with the HEC-RAS floodway encroachment stations, including Cross Sections 28834, 17942, 16924, 16557, 11603, 11517, 9600, 9189, 8200, 5210, and 4075.

Table 1 provides a summary of all revisions made to the Exeter River floodway encroachment stations in the HEC-RAS model. Revisions are color coded to indicate the corresponding comment that each revision addresses. During our review and revision of the model, VHB made some revisions to additional Cross Sections to ensure that the entire model meets the requirements outlined in the above comments; these revisions are color-coded as "General Fixes."



Table 1: Floodway Encroachment Station Changes, Exeter River

Key to changes:					
Comment 1a			Comment 1d		
Comment 1b			Comment 3e		
Comment 1c			General Fixes		
Cross Section	Encroachment Left Station	Encroachment Right Station	Cross Section	Encroachment Left Station	Encroachment Right Station
35573	2299.51	2377.35	14176	3233.64	4025
32728	1739.09	2400	13928	3285	4070
32012	1478.3	2100	13788	3310	4155
31241	2065	2396	13612	3330	3960
29877	2140	3149.22	13357	3400	4217.65
23300	2375	3050	13166	3445	4190.36
19756	2700	4570	13012	3511.27	4175
19704	2700	4600	11517	3910	4542.56
19646	2860	4630	11320	3910	4814.43
19595	2820	4650	10970	3650	4501.78
19494	2900	4830	10769	3640	4516.22
19324	3130	4900	10561	3720	4879.98
19156	3070	4860	10367	3730	4896.23
18914	3070	4930	10188	3750	4903.83
18719	3050	4750	9600	3655.92	4680
18512	2980	4590	9388	3836.54	4680
18313	2900	4500	7463	4489.43	5190
18121	2850	4443.89	7301	4500.22	4980
17942	2800	4534.93	5422	4213.05	4800
17726	2680	4654.13	5210	3990	4700
17105	2680	4053.17	5028	4040	4650
16735	2725	4238.17	4075	2870	3590
16557	2730	4510.66	3857	2720	3350
16365	2730	4239.79	3651	2600	3200
16166	2580	3739.14	3448	2450	2950
15989	2570	3590	3234	2200	2600
15812	2590	3560	2836	2260	2500
15574	2574.99	3730	2426	1950	2185
15402	2573.18	3830	2249	1575	1880
15153	2348.12	3900	2086	1360	1640
14936	2320	3520	1839	1080	1390
14770	2486.71	3500	1624	1100	1380
14565	2649.8	3550	1054	1240	1388
14366	3130.4	4140	848	1068	1208



2. Our review of the submitted hydraulic models for Little River No. 1 revealed the following issues. Please update the models and submit the revised hydraulic models for review.

- a) Please revise the encroachment stations in the post-project floodway analysis at Cross Sections 10288 and 5375 as they are set within an area of ineffective flow. The encroachment stations should be set so that the floodway is completely within effective flow area.

VHB has revised the encroachment stations at these Cross Sections to be set within the area of effective flow. Refer to Table 2 (below) for a summary of all encroachment station revisions to the Little River.

- b) From the post-project floodway analysis, the surcharge at Cross Section 10367 (Cross Section M) is -0.72 foot. Please revise the floodway model so that surcharges remain between 0.0 feet and 1.0 foot at all cross sections.

VHB has revised the encroachment stations at these Cross Sections and other Cross Sections as needed to ensure that surcharges remain between 0.0 and 1.0 feet throughout the model. Refer to Table 2 (below) for a summary of all encroachment station revisions to the Little River.

- c) Our review of the workmap and hydraulic model revealed that the upstream most Cross Section 12906 is set approximately 240 feet downstream of the effective limit of study. Please add another cross section right at the limit of study location so that entire revision area can be updated based on the updated Water Surface Elevation (WSEL).

VHB has added an additional Cross Section, 13129, at the upstream limit of study immediately downstream of the Brentwood Road (NH Route 111A) crossing. HEC-RAS model has been revised to add this new cross-section and the 1%- and 0.2%- floodplains have been re-delineated upstream of Cross Section 12907. The floodway encroachment table and Topographic Work Map have been revised to incorporate these changes.

- d) The topwidths of the base floodplain computed in the post-project conditions HEC-RAS hydraulic model at Cross Section 12907 do not match the approximate floodplain topwidths shown on the above-referenced topographic work map. As per the model, the topwidth is 324 feet, but it is approximately 297 feet in the work map. Please provide an explanation for the discrepancy, or submit a revised hydraulic analysis and/or work maps as appropriate.

VHB re-delineated the base floodplain from Cross Section 12907 to the upstream limit of study to address comment c) above. After re-delineating the floodplain, VHB reviewed the mapped floodplain width at Cross Section 12907 to verify that it was consistent with the HEC-RAS model. The HEC-RAS model top width is 324.4 feet, but this includes a small isolated area between station 40 and 50, to the left of the limit of effective flow – this area is a local low point with no hydraulic connection to the floodplain. The effective flow topwidth (removing this isolated area) is 317.65, consistent with the mapped floodplain width in the Topographic Work Map.



- e) The topwidths of the regulatory floodway computed in the post-project conditions hydraulic model at the cross sections listed in the table below do not match the approximate floodway topwidths shown on the above-referenced topographic work map. Please submit a revised hydraulic analysis or revised work maps as appropriate.

VHB re-delineated the Little River floodway in the Topographic Work Map to incorporate the encroachment changes made in response to comments a) and b) above. After re-delineating the floodway, VHB spot-checked the mapped floodway widths to verify that they were consistent with the HEC-RAS floodway encroachment stations at Cross Sections 10288, 9951, and 9566.

Table 2 provides a summary of all revisions made to the Little River floodway encroachment stations in the HEC-RAS model. Revisions are color coded to indicate the corresponding comment that each revision addresses. During our review and revision of the model, VHB made some revisions to additional Cross Sections to ensure that the entire model meets the requirements outlined in the above comments; these revisions are color-coded as "General Fixes."

Table 2: Floodway Encroachment Station Changes, Little River

Key to changes:		
Comment 2a		
Comment 2b		
Comment 2c		
General Fixes		
Cross Section	Encroachment Left Station	Encroachment Right Station
13129	272.81	338.58
11945	335	385
10367	195	230
10288	140	185
9951	460	500
9566	310	400
5375	640	705

- 3. The above-referenced topographic work map does not provide some of the essential information required to complete our review of this request. Please submit a revised topographic work map, certified by a registered Professional Engineer (P.E.) that shows all applicable items listed in Section C of Application/Certification Form 2, entitled "Riverine Hydrology & Hydraulics Form," including the following information.
 - a. The Exeter River post-project base floodplain and 0.2-percent-annual-chance floodplain delineations extend until preliminary hydraulic model Cross Section 40787. It is recommended



however, to terminate the revised post-project delineation at Kingston Road/Route 111. By showing graphical tie-in at Kingston Road/Route 111, the revision area will remain entirely within the Town of Exeter. Since Kingston Road controls the flood elevations upstream, a vertical tie-in requirement can be waived between the effective and post-project model at this location. Also, there is perfect 0.00 feet vertical tie-in with the preliminary model at Kingston Road. Therefore, please show the graphical tie-in in the work map and annotated FIRM at Kingston Road. There should be no change in the pre and post-project hydraulic model for the multiple run and floodway analysis upstream of the Kingston Road from the base preliminary hydraulic model. Please update the graphical tie-in location in the work map. Please note that if you intend to show the graphical tie-in at preliminary hydraulic model Cross Section 40787, then the Town of Brentwood will also be affected by this revision. If the Town of Brentwood is affected, then please submit MT-2 Form 1, entitled "Overview and Concurrence Form," that includes the signature of a Town of Brentwood community official on the 2nd block of Section D. All forms and instructions are available for your information on the FEMA website at <http://www.fema.gov/library/viewRecord.do?id=1493>

The Town of Exeter is amenable to changing the tie-in location to Kingston Road (NH Route 111). VHB has revised the Topographic Work Map to tie-in at this graphical location instead of at Pickpocket Dam as in the original submittal. The post-project HEC-RAS hydraulic model geometry upstream of Kingston Road is unchanged from the pre-project model from the Preliminary FIS. VHB has reviewed the revised model (incorporating changes addressing the other comments in this letter) and verified that the post-project base flood profile and floodway profile upstream of this new tie-in location are similarly unchanged from the Preliminary FIS. Please note that there now is no proposed change to Effective flood mapping in FIRM Panel 33015C0382E due to this revision; this panel should be removed from the list of revised flood map panels.

- b. Please update the boundary delineations of the post-project conditions base floodplain, 0.2 percent-annual-chance floodplain, and regulatory floodway of all flooding sources based on comments in the hydraulic model requested above. Please ensure that the revised floodway is shown within the revised base floodplain delineation. At several locations along Exeter River, the revised floodway line is shown outside the base floodplain delineation line. It should always be within, or coincident with, the base floodplain. Please update the post-project floodway delineation appropriately.

The base floodplain, 0.2-percent-annual-chance floodplain, and regulatory floodway for both the Exeter River and Little River have been re-delineated in the Topographic Work Map. VHB has reviewed these revisions to verify that the HEC-RAS model results and graphical delineations are consistent.

- c. Please show the boundary delineations of the currently effective regulatory floodway also along with base and 0.2-percent-annual-chance delineation for all flooding sources.



The current Effective regulatory floodway and 0.2-percent-annual-chance floodplain have been added to the Topographic Work Map.

- d. Please show proper graphical logical tie-ins between the revised and effective flood hazard boundary delineations at the upstream and downstream ends of the Exeter River. The revised delineations should be extended to merge smoothly with the effective delineations. Please ensure that there is smooth tie-in between the Zone AE and Zone A floodplains at the border between the Towns of Exeter and Kensington. The tie-in location must be within the Town of Exeter, otherwise, concurrence will need to be provided by the Town of Kensington.

VHB has reviewed the graphical tie-ins between the revised and effective flood hazard boundary in the Topographic Work Map. David Cloutier of VHB spoke with Ellie Pitney by phone on Friday, December 15, 2017 to review these changes and confirm that the revised tie-ins are consistent with FEMA requirements. Please note that the FEMA GIS delineation of Zone A in Kensington does not fully extend to the Exeter/Kensington town line, resulting in a slight gap between Effective Zone AE and Effective Zone A. VHB has therefore terminated the proposed Zone AE tie-in at the town line at the same locations as the Effective Zone AE tie-ins.

- e. Please show the delineation of the floodway within the Town of Kensington on the work map and annotated FIRM. The submitted work map currently shows the right overbank of the floodway truncated at the community boundary between Cross Sections 19756 and 18313. Please note that even if the eventual LOMR Flood Insurance Rate Map (FIRM) shows the floodway truncated, the work map and annotated FIRM should show the complete floodway delineated according to the encroachment stations in the model.

The floodway encroachment stations submitted the initial LOMR filing were unchanged from the pre-project model taken from the Preliminary FIS. VHB reviewed the HEC-RAS post-project floodway model and determined that the floodway encroachment stations can be adjusted through this section of the model to keep the floodway within the Exeter town limits.

- f. Please provide reference to a datum, such as the North American Vertical Datum of 1988 (NAVD 88) on the work map.

The Topographic Work Map has been revised to include a note clarifying that all elevations are referenced to the NAVD88 datum.



Please find attached the following submittal materials that have been revised to address the issues discussed in this letter:

- Revised HEC-RAS model with updated Post-Project floodway encroachment stations for the Exeter River and Little River, and with new Little River Cross Section 13129
- Revised Post-Project floodway data tables for the Exeter River and Little River
- Revised Post-Project flood profile for the Little River including Cross Section 13129
- Revised Annotated FIRM Panels incorporating all changes discussed above
- Revised Topographic Work Map including all changes discussed above
- Revised GIS shapefiles incorporating the changes made to the Topographic Work Map

Please feel free to contact me directly if you have any further questions, (207)-536-2582.

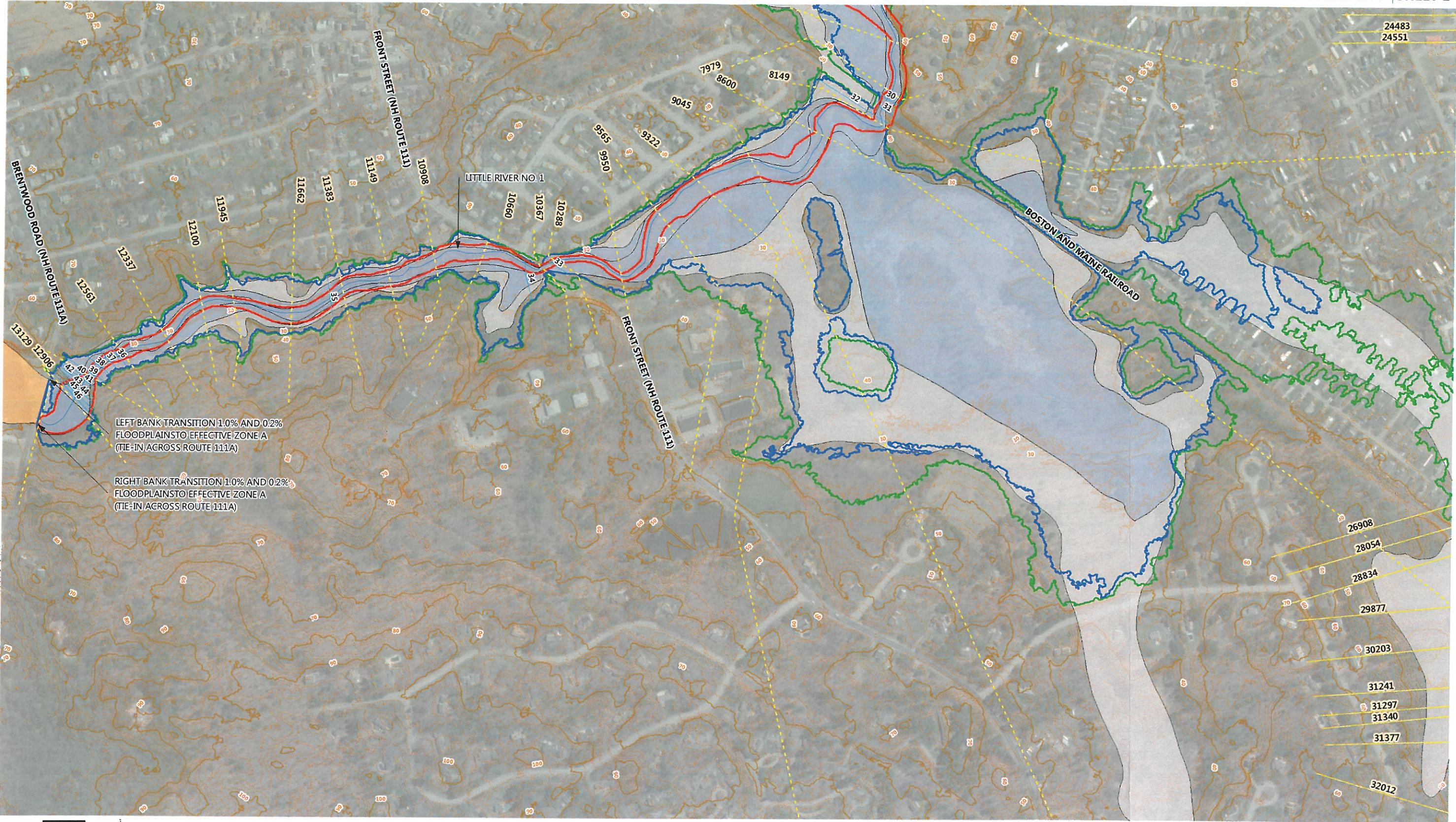
Sincerely,

Vanasse Hangen Brustlin, Inc.

A handwritten signature in blue ink that reads "David Cloutier". The signature is fluid and cursive.

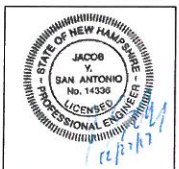
David Cloutier, P.E.

Water Resources Engineer
dcloutier@vhb.com



LEFT BANK TRANSITION 1.0% AND 0.2% FLOODPLAIN TO EFFECTIVE ZONE A (TIE-IN ACROSS ROUTE 111A)

RIGHT BANK TRANSITION 1.0% AND 0.2% FLOODPLAIN TO EFFECTIVE ZONE A (TIE-IN ACROSS ROUTE 111A)



Exeter Dam Removal LOMR

Town of Exeter, NH

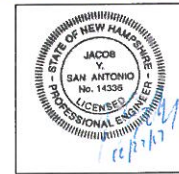
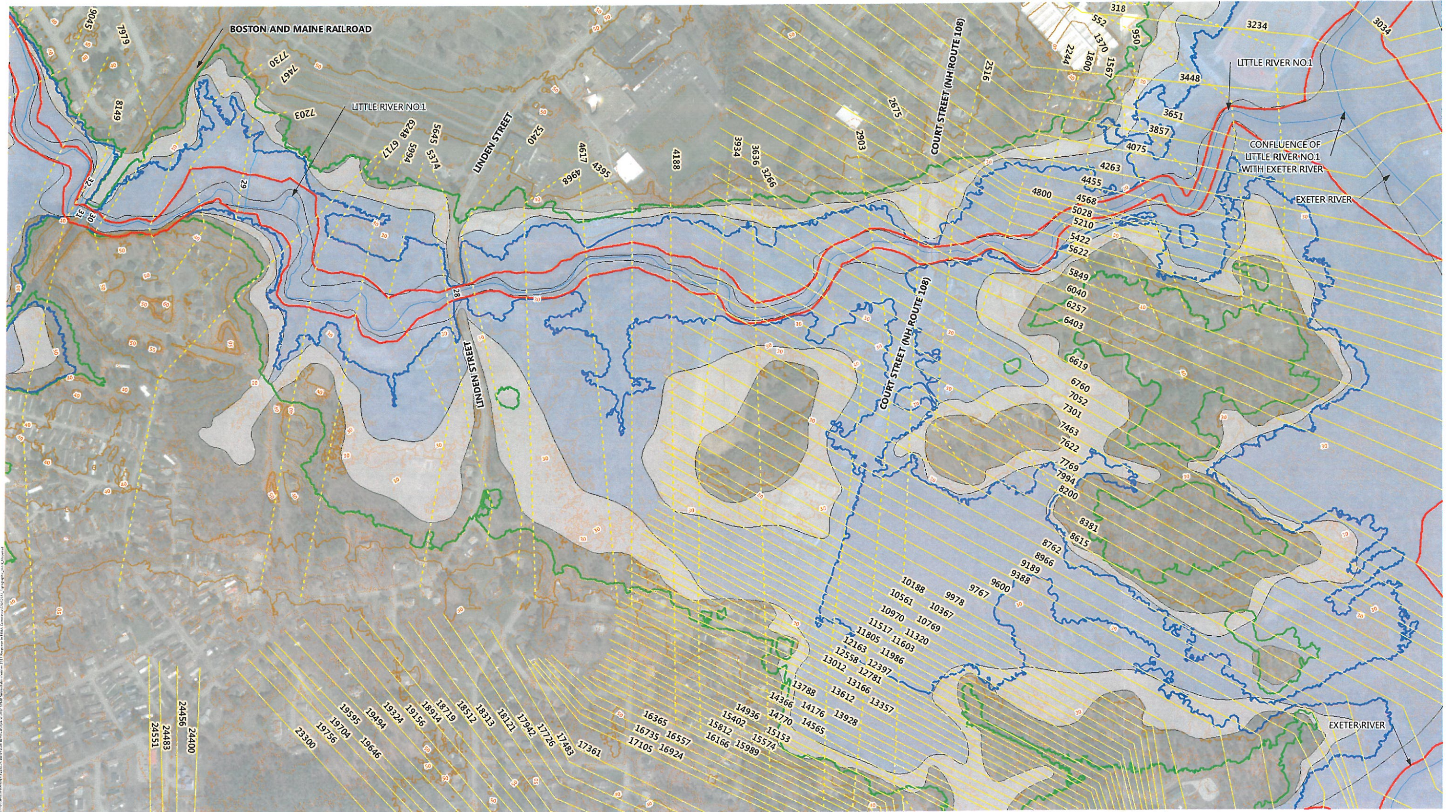
All elevations shown on this map are referenced to the North American Vertical Datum of 1988 (NAVD88)

Appendix D - Topographic Work Map

Source Info:
 1) Aerial Orthoimagery: ESRI World Imagery
 2) Topographic Contours: USGS 2011 LiDAR for the North East
 3) Effective Flood Hazard Areas: FEMA Map Service Center

24483
24551

26908
28054
28834
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31241
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32012



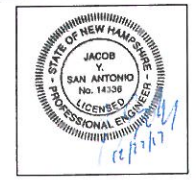
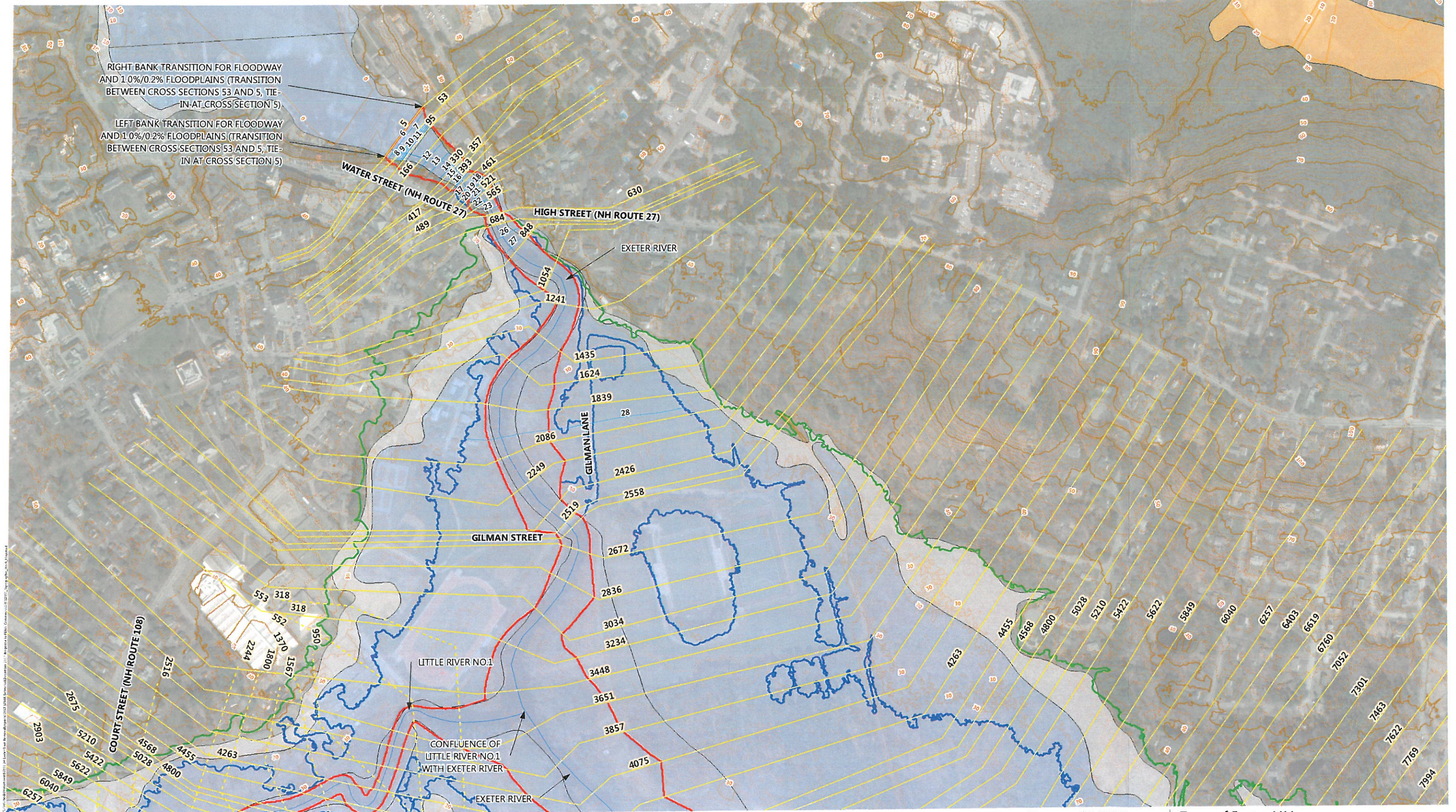
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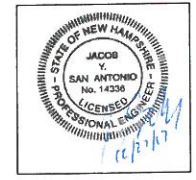
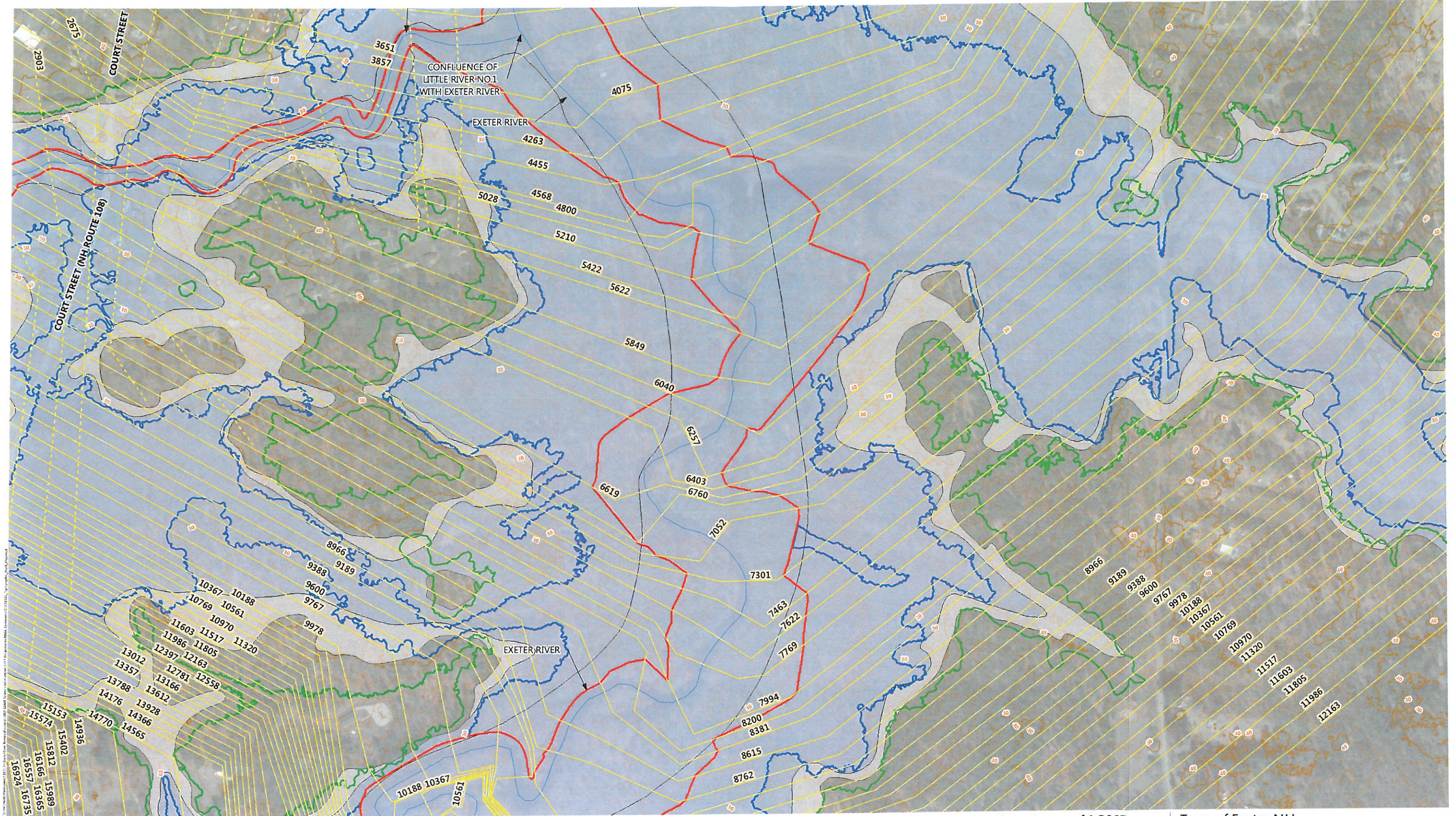
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Town of Exeter, NH

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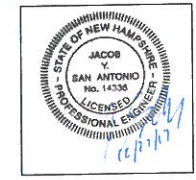
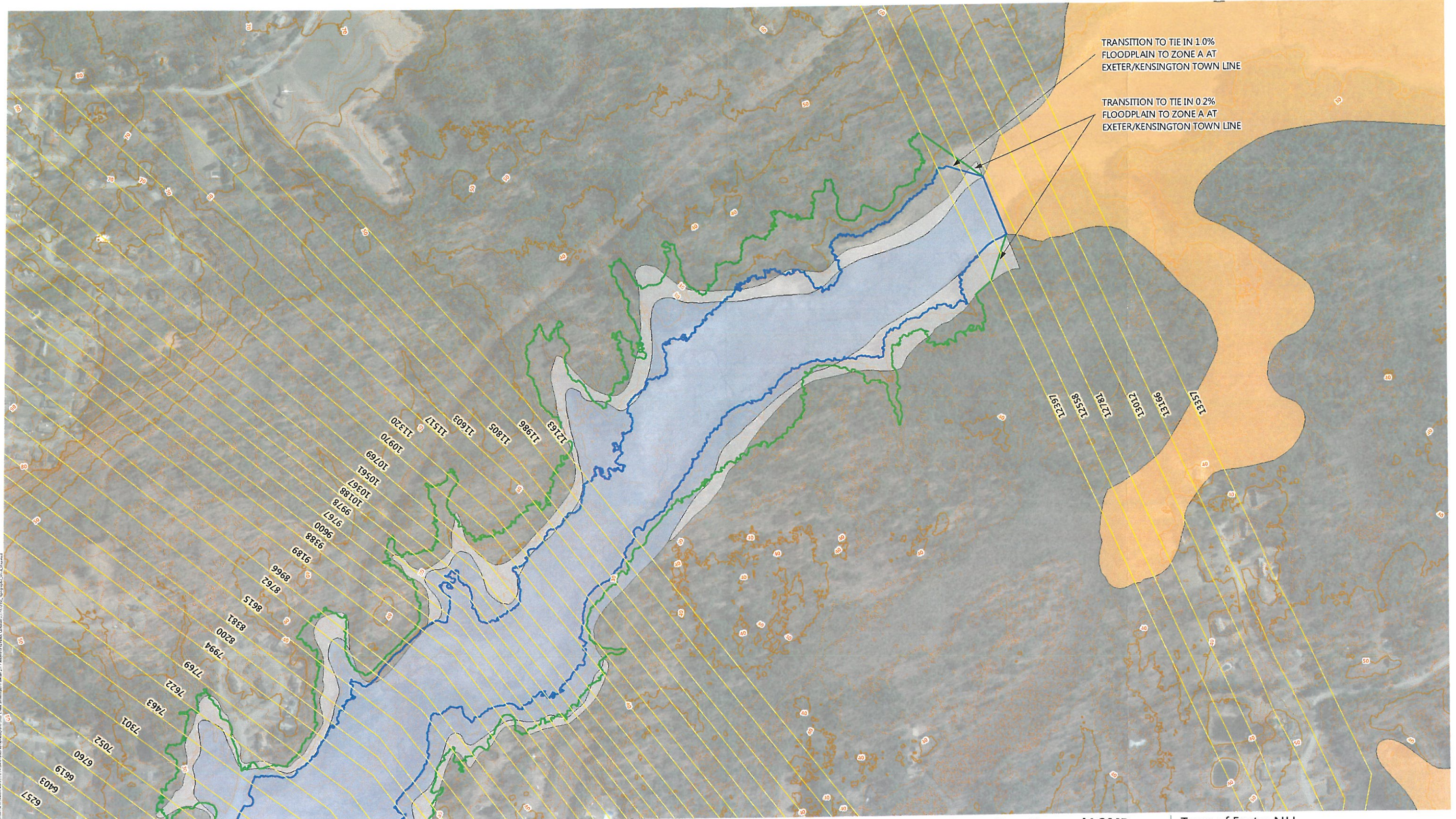
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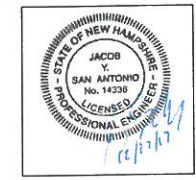
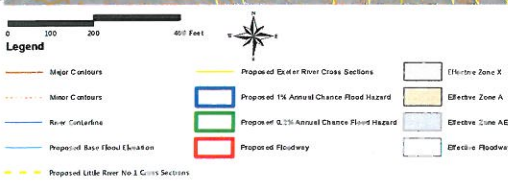
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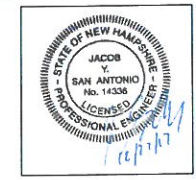
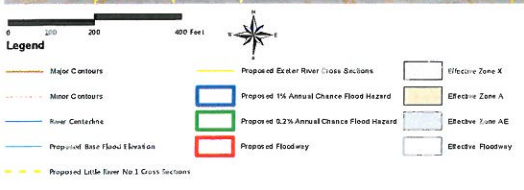
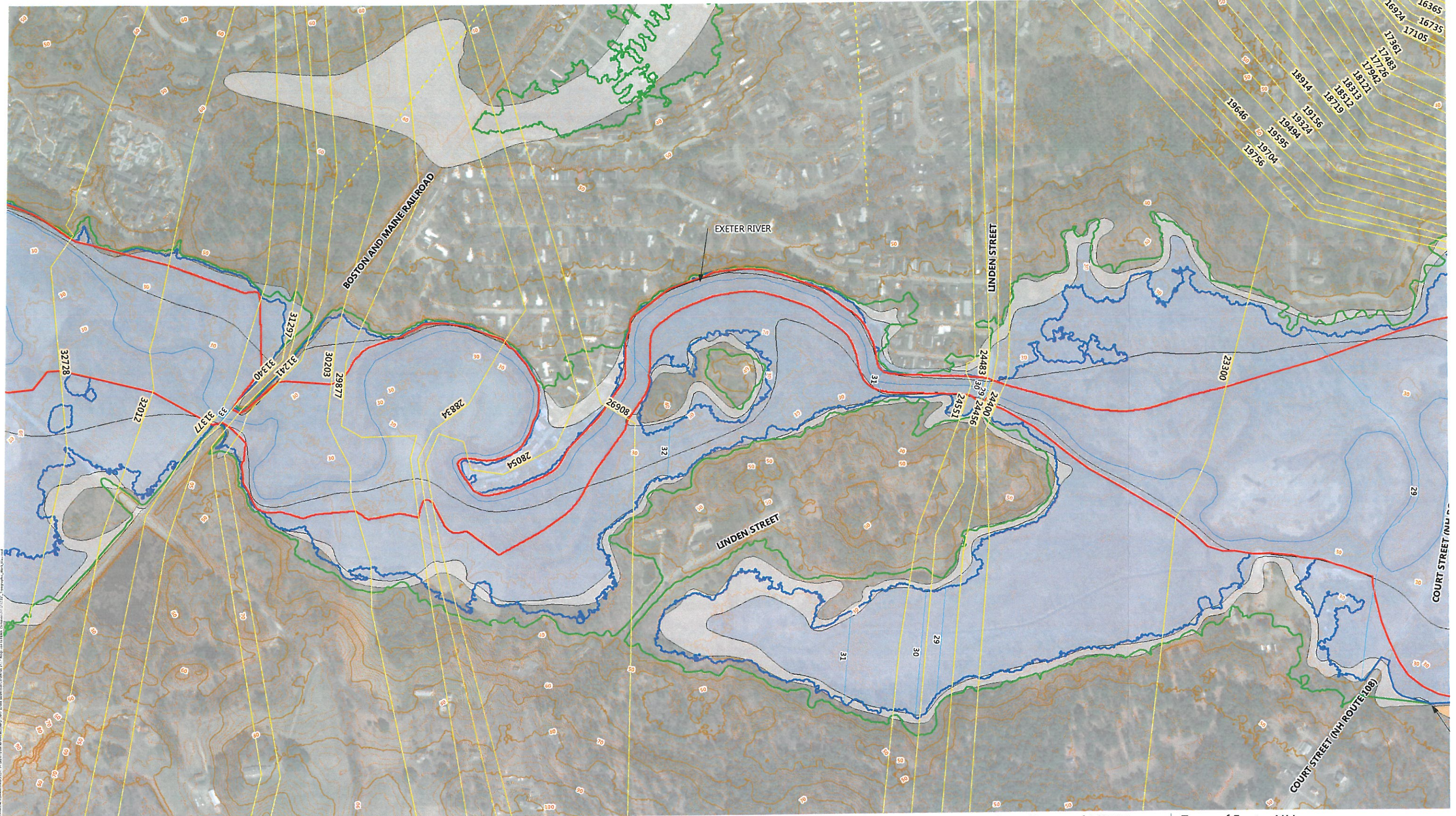
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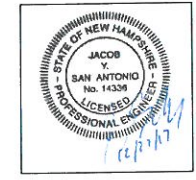
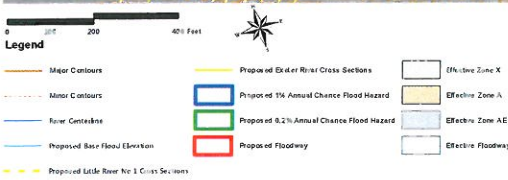
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