RAMBOLL

WATER

TECHNICAL NOTE

Project name	**Carver Reality, LLC Floodplain Evaluation**
Project no.	**1940102846**
Client	**Ingalls & Associates, LLP**
Technical Note no.	**1**
Version	**2.0**
To	**David Ingalls, PE**
From	**Shaun Gannon, P.E., D.WRE, P.H., CFM, PMP**
Copy to	**File**
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1 Background

Carver Reality, LLC (Carver, the applicant) is considering developing a parcel situated along the Mohawk River in the Town of Glen, Montgomery County, New York. The parcel (INST #2016-66824, S.B.L. 36.-3-9) is situated within the 1% Annual Chance Exceedance (ACE) floodplain of the Mohawk River as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) No. 36057C0178E effective January 19, 2018 (FIRMette attached). The Base Flood Elevation (BFE) at the parcel is 292 ft. NAVD88 and portions of the parcel are within the floodway.

The National Flood Insurance Program (NFIP) 44CFR60.3(d)(3) states the following:

> *"Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge."*

Per the attached site plan, Carver intends to regrade the site to an elevation of 286 ft. NAVD88, triggering the need for a flood encroachment analysis.

2 Methodology

As of the date of this memorandum, Ramboll has not received the effective model from the FEMA library. Therefore, the findings herein are preliminary and are subject to change. Ramboll does have an unofficial copy of the MIKE 11 model used by FEMA to develop the effective Flood Insurance Study (FIS). This model was used to evaluate potential impacts of the proposed development on the 1% ACE.

Ramboll followed the FEMA MT-2 process to assess potential impacts of the proposed placement of fill in the floodplain. This methodology is the process by which FEMA evaluates requests to revise the FIRM. While Carver is not requesting a revision to the FIRM, following this methodology provides the local floodplain administrator clear documentation allowing them to execute their obligation under the NFIP accurately.

The MT-2 process is a muti-step approach which provides well-defined documentation of results ensuring clear understanding of the reason for changes in water surface elevation (WS). The process involves 4 steps:

1. Obtain the effective model used to develop the FIS.
2. Execute the effective model in the current version of the modeling software, creating a duplicate effective model, and document any changes in WS.
3. Using the duplicate effective model, create a corrected effective model to include any known changes within the reach and document any changes in WS.
4. Using the corrected effective model, develop a proposed conditions model which includes the proposed grading within the floodplain and document any changes in WS.

At the conclusion of this process the documentation clearly separates what, if any, changes in WS are attributed to the proposed project and which can be attributed to changes in software coding or other development within the reach. The following subsection details steps 2, 3, and 4 of the MT-2 process performed for this site. Each model was executed for the 1% ACE discharges shown in the effective FIS.

Duplicate Effective Model

The unofficial version of the effective model used for this analysis was developed using the Danish Hydraulics Institute (DHI) 2007 version of MIKE 11 software. A duplicate effective model was developed by executing the MIKE 11 model in the 2022 update 1 release of DHI MIKE +. MIKE + includes updates to the one-dimensional unsteady computation method used in MIKE 11. The project is located at XS 52 with chainage 97200.72.

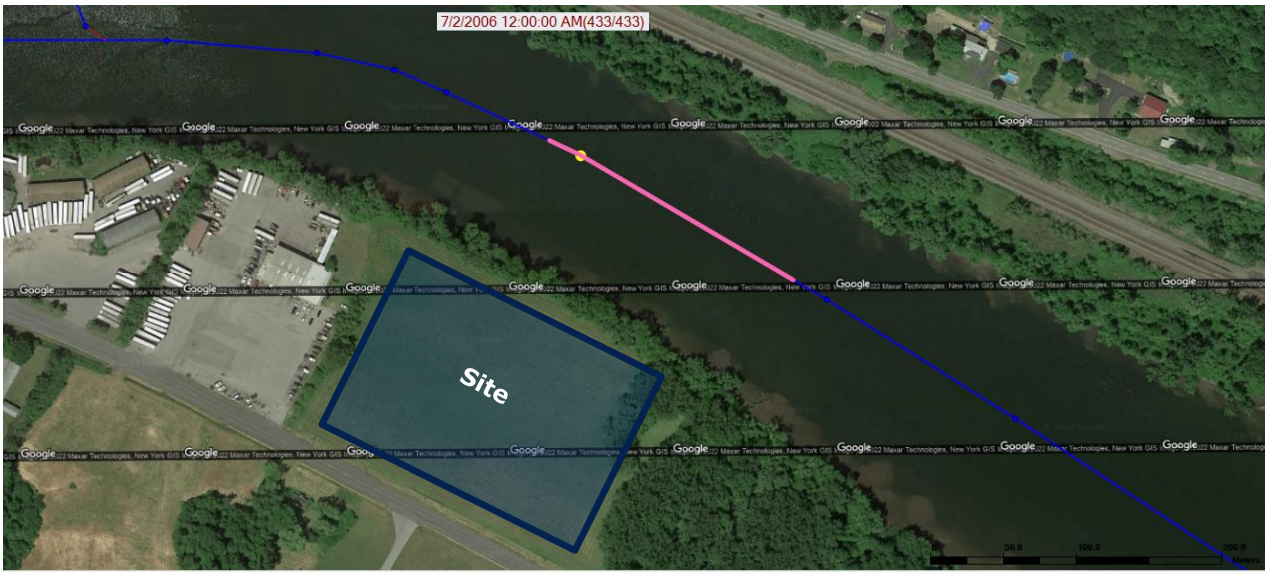

Figure 1. Project site relative to MIKE + model cross section.

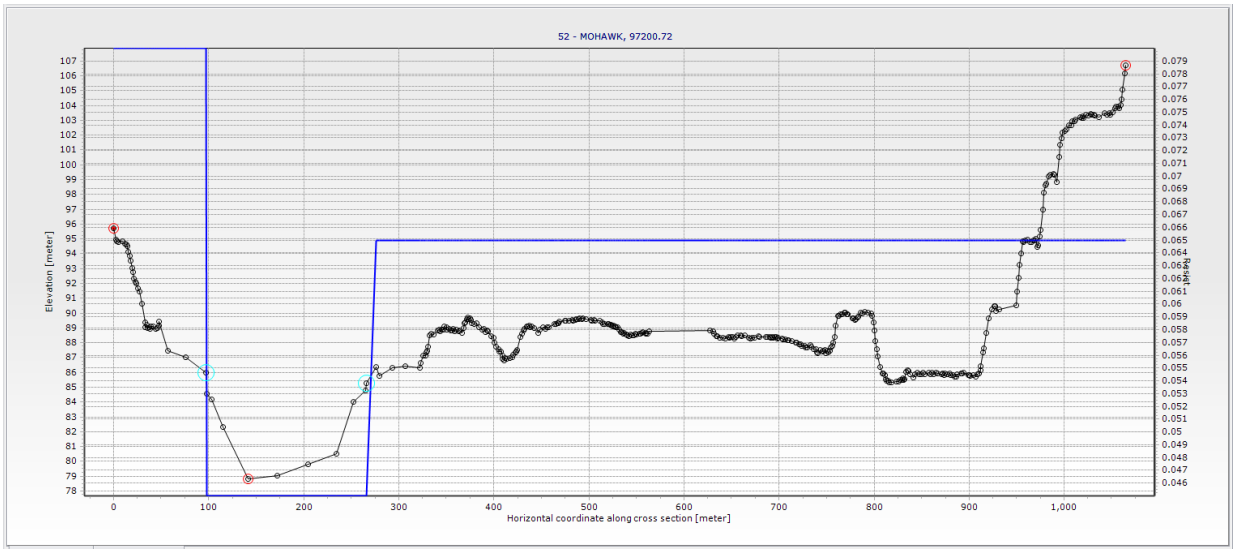

Figure 2. XS 52 duplicate effective model results.

Corrected Effective Model

The duplicate effective model was reviewed and compared against known changes within the floodplain in the vicinity of the proposed project by observation of time-lapsed orthoimagery. Ramboll did not identify development within a hydraulicly significant distance to the proposed project that would alter the results in the duplicate effective model. Therefore, the corrected and duplicate effective models are the same for this analysis.

Proposed Conditions Model

To create the proposed conditions model, the duplicate effective model was modified by altering cross section 52 with chainage 97200.72 in the MIKE + model. Modifications included smoothing and raising the grade within the project limits including bulk aggregate storage (25 ft. (7.6 m) x 10 ft. (3.2 m).

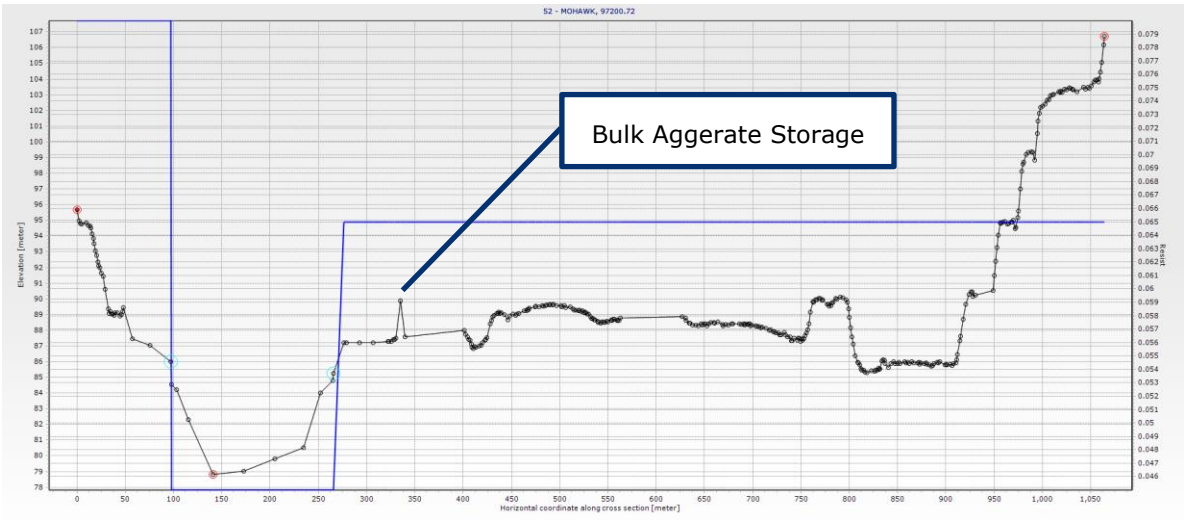

Figure 3. Proposed conditions Chainage 97200.72

Chainage 97200.72 was duplicated and placed 520 feet (159 meters) upstream creating chainage 97042.22 resulting in two cross sections representing the proposed conditions at the project site. Figure 4 represents the proposed conditions at chainage 97042.22. Figure 5 represents the location of chainage 97042.22 in relationship to the proposed grading plan.

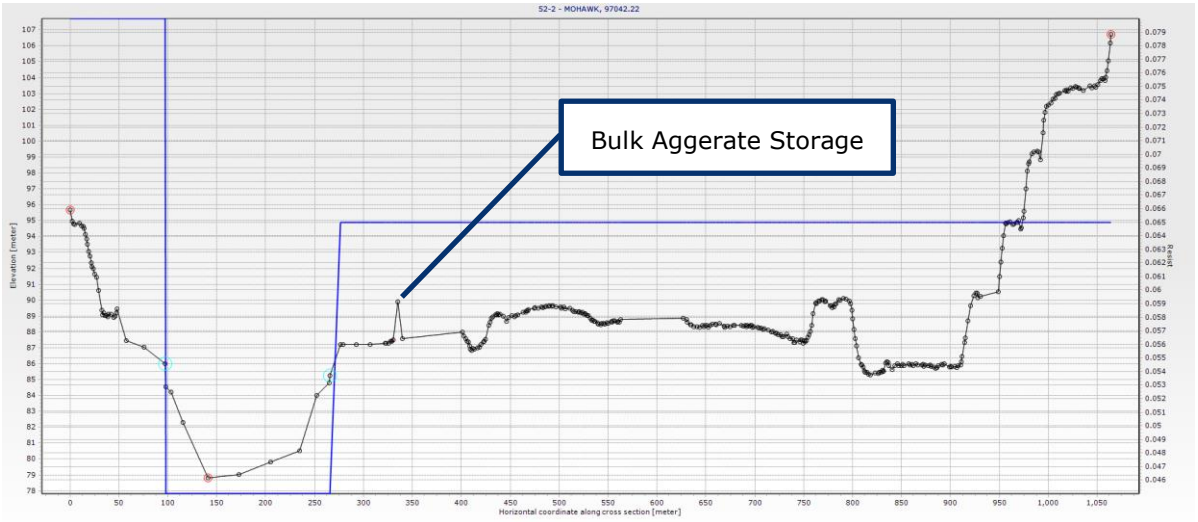

Figure 4: Additional Chainage 97042.22

Figure 5: Proposed Chainage Map

Table 1 below summaries the duplicate effective and proposed conditions WS at XS 52 and surrounding XS.

Table 1. Duplicate Effective and Proposed Conditions WS at XS 52

MIKE + XS (Chainage)	Duplicate Effective (WS, m / ft.)	Proposed Condition (WS, m / ft.)	Difference (m / ft.)
53 (97692.67)	88.952 / 291.801	88.942 / 291.801	0.00
New (97042.22)	88.952 / 291.801	88.942 / 291.801	0.00
52 (97200.72)	89.013 / 292.034	89.013 / 292.034	0.00
51 (96814.84)	89.071 / 292.224	89.071 / 292.224	0.00

A review of the table indicates that the proposed project will have no adverse impact as it will not increase the BFE or the 1% ACE WS.

Encroachment Analysis

The Town of Glen, New York Code §74-15 requires that, "all encroachment, including fill, new construction, substernal improvements and other development, are prohibited within the floodway unless a technical evaluation demonstrates that such encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge."

The regulatory flood elevation at the site is between 292 and 292.4, Labeled Sections S and T in Figure 4. The Floodway elevation increase is between 0.3 and 0.4 ft. to between 292.3 and 292.8 ft. NAVD88, per Figure 4.

The proposed grading will raise the site to a maximum of 288 ft., NAVD88, or approximately 4 feet below the regulatory flood stage. An encroachment analysis was performed using the MIKE 11 model against the exiting condition encroachment station and the proposed grading plan. This analysis indicates that the proposed grading will result in a 0.00 ft. change in the effective base flood elevation.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mohawk River (Continued)								
I	46044	1038	23908	4.9	272.7	272.7	273.1	0.4
J	49028	945	18948	6.2	275.7	275.7	276.1	0.4
K	51146	1254	26035	4.5	276.6	276.6	277.0	0.4
L	56247	1375	24648	4.7	278.0	278.0	278.3	0.3
M	61907	1429	26034	4.5	279.5	279.5	279.7	0.2
N	67106	1219	17719	6.5	280.8	280.8	281.1	0.4
O	70529	1369	27083	4.3	289.1	289.1	289.1	0.0
P	75542	1466	20045	3.4	290.1	290.1	290.1	0.0
Q	79775	1427	23216	2.9	290.5	290.5	290.8	0.3
R	84173	1102	20485	3.3	291.2	291.2	291.4	0.2
S	90875	772	17019	3.9	292.0	292.0	292.3	0.3
T	93322	845	16887	4.0	292.4	292.4	292.8	0.4
U	97795	732	14295	4.6	293.3	293.3	293.7	0.4
V	102514	965	21581	3.0	294.1	294.1	294.5	0.4
W	105173	890	18552	3.5	294.4	294.4	294.8	0.4
X	109885	1211	22755	2.8	295.0	295.0	295.3	0.3
Y	115526	983	18400	3.5	295.6	295.6	296.0	0.4
Z	119006	893	16947	3.7	296.1	296.1	296.6	0.5
AA	123670	1218	20040	3.1	297.3	297.3	297.9	0.6
AB	129501	1121	22120	2.8	298.5	298.5	299.0	0.5
AC	131869	845	19873	3.1	298.8	298.8	299.3	0.5
AD	137769	1116	22498	2.7	299.6	299.6	300.2	0.6
AE	141916	734	15024	4.0	300.3	300.3	300.9	0.6
AF	144546	905	20752	2.9	301.0	301.0	301.6	0.6
AG	150604	1322	24190	2.5	301.9	301.9	302.2	0.3
AH	156423	640	16257	3.6	302.6	302.6	302.9	0.3

[1]Feet above limit of study

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, NY
(ALL JURISDICTIONS)

FLOODWAY DATA

MOHAWK RIVER

Figure 6. Effective FIS Floodway Data Table