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Appendix I – GHG Analysis

Draft Supplemental Environmental Assessment Morgan Shoal Revetment Reconstruction (45th - 51st)

USACE analyzed GHG emissions for the preferred alternative. Table 1 provides the total amount of GHG emissions that are expected to result from construction for the preferred alternative. Emissions were calculated using the Fuel Volume Analysis Method Calculator (Air Quality and GHG Sub-CoP SOP) (USACE, 2024).

Construction of the proposed action would take approximately 3 years, and the average working day is anticipated to be 8 hours. The equipment list is below (. The proposed action would be broken up into three phases, with Phase two containing most of the project work. Therefore, the majority of GHG emissions would occur during Phase two

The Fuel Volume Emissions Method is used for projects with low to intermediate emissions anticipated and makes assumptions to simplify the quantification of emissions. This model assumed 10 gallons of fuel/hour (based on an overestimate of equipment fuel consumption) and all equipment fuel to be Distillate Fuel Oil No.2 (diesel). Emissions Factors were acquired from the USEPA Emission Factors for Greenhouse Gas Inventories. To determine the sum total GHG emissions, the emissions for each type of GHG were standardized to a common unit. This standard unit is the carbon dioxide equivalent (CO_2e), which is calculated by multiplying the GHG emissions for each gas by their respective Global Warming Potential (GWP). It is anticipated that GHG emissions from operation and maintenance of either Alternative 1 (preferred alternative) or the no action alternative would be minimal and do significant enough to be quantified.

The preferred alternative would not sequester carbon nor impact the ability of the State of Illinois to meet its emissions goals. Implementation of the preferred alternative would not result in significant short-term or long-term impacts related to GHG emissions or air quality more generally within Cook County.

Table 1. GHG Calculations for Preferred Alternative. Fuel Volume Analysis Method Calculator used to calculate emissions (USACE, 2024).

Alternative 2 (Preferred Alternative) Emissions Calculation						
GHG	Fuel Volume (Gallons)	Emissions Factor (Grams of Emissions/Gallons of Fuel)	Emissions (Grams)	Emissions (Tons)	Carbon Dioxide Equivalents	Emissions (Metric Tons) (CO_2e)
CO_2	1313178.2	10210	13407549422	13,407.55	1	12163.13
CH_4	1313178.2	0.06	78790.69	0.0788	28	2
N_20	1313178.2	0.45	590930.19	0.5909	265	142.06
			Total Emissions (Metic Tons)(CO_2e)			12307.19
		Net Emissions (Metric Tons)(Preferred Alternative - No Action)				11233.15

Table 2. Alternative 2 (Preferred Alternative) Equipment List with operation hours

Equipment Type	Fuel Type	Total Hours
110HspBulldozer(CatD5)	D	867.01
170HspBulldozer(CatD6)	D	1570.21
3.5CYLoader(Cat950)	D	1635.34
4.5CYLoader(Cat966)	D	787.01
6.5CYLoader(Cat980)	D	1246.07
7.5CYLoader(Cat988)	D	1684.4
1800LBSkidSteerLoader(Cat236)	D	80
2000LBSkidSteerLoader(Cat248)	D	607.67
2000LBSkidSteerLoader(Cat248)	D	507.54
140HspGrader(Cat140)	D	973.43
200HspGrader(Cat14G)	D	40
Farm Tractor-4WheelDrive	D	340
GravelShoulderSpreader	D	20.59
2CYBackhoe(Cat330)	D	1267.52
2.6CYBackhoe(Cat350)	D	366.5
5.2CYBackhoe(Cat365)	D	5661.92
7CYBackhoe(Cat385)	D	8150.15
1.4CYBackhoeLoader(JD410)	D	742.5
1.7CYBackhoeLoader(Case680)	D	482.58
5TonFlatbedTruck	D	300
20 Ton(10CY)TandemTruck	D	480.3
24 Ton(12CY)TandemTruck	D	50
32Ton(16CY)TriaxleTruck	D	663.88
20 Ton(10CY)TandemTruck-Operated	D	3362.76
32Ton(16CY)TriaxleTruck-Operated	D	80.53
35TonArticulatedTruck(CatD350)	D	648.06
35TonOffHwyTruck410Hsp(Cat769)	D	140.05
JumpingJackHandheldPacker	D	547.58
22" SmoothDrumManual(Bomag55)	D	930.32
13 TonCompactor72"(Cat553)	D	507.54
120HspGrapple(Cat517)	D	8781.53
150HspGrapple(Cat527)	D	6147.41
AsphaltSpreaderTrack(CedarRapid416)	D	50.91
AsphaltSteelRoller(Ferguson)	D	20.59
AsphaltRoller(Dynapac2100RT0)	D	101.81
AsphaltBroomRideOn(Ten215)	D	20.59
Tack-DistributorMachine	D	50.91
16FtWideConcretePaver	D	53.12
ConcretePowerTrowel-Walker	D	242.32
46x16VibratingGrizzly	D	28
Grizzly	D	507.54
PortableConcreteCrusher	D	507.54
5FtWheelMountedChainTrencher	D	361.84
150 AmpGasWelder	D	774.36
400 AmpDieselWelder	D	7149.07
CuttingTorch	D	467.14
ConcreteAgitatorCar4CY	D	159.37
1-CYConcreteBucket(Gravity)	D	140.23
Concrete Vibrator-Normal	D	435.57
30 KWDieselGeneratorSet	D	686.55
125 CMFMDieselCompressor	D	462.87
150 CMFMDieselCompressor	D	195.32
185 CMFMDieselCompressor	D	6181.94
250 CMFMDieselCompressor	D	78.44
375 CMFMDieselCompressor	D	9.23
CAT350	D	380.53
250 TonTruckCrane(American9530)	D	553.99
250 TonCrawlerCrane(American9320)	D	1941.2
200 Feet(60m)TowerCrane	D	140.23
4TonneForklift(JCB-8000lb)	D	664.19
CatTH63Forklift	D	500
Ice1412BVibro(APEMod400)	D	1048.25
Truck MountedPostHoleAuger	D	343.18
MarineEquipment	D	4190.73
100 HspHarbourMaster	D	88.7
125 HspMarineWorkboat	D	6731.8
700HspMarineInlandTugboat802.35	D	802.35
145ftx45ftx9ftMaterialDeckBarge	D	4993.09
80ftx130ftx12ftRingerBargewithspuds	D	4190.73
80 LBJackhammer	D	118.46
HydraulicHoeRam	D	1099.6
2.5"AirDrill	D	710.4
2.5"AirTrackRockdrill(IR100)	D	215.33
DiamondCoreDrill(Hilti)	D	23.44
1/2TonPickupTruck4x4	D	9207.94
3/4TonPickupTruck2x2	D	7182.67
3/4TonPickupTruck4x4	D	254.47
3/4TonCrewCabTruck2x4	D	12.17
3/4TonCrewCabTruck4x4	D	71.57
1TonPickupTruck4x4	D	700
SurveyVan	D	100
5TonFlatBedTruck	D	969.17
1000GallonWatertruck	D	73.71
3000GallonWatertruck	D	140.05
5TonBoomtruck	D	60
10TonBoomtruck	D	268
15TonPitmanBoomTruck	D	393.93
FlatbedTrailer48ft	D	50
TractorTruck(KenworthT800)	D	50
Tractor&Trailer	D	2645.14
SurveyLevel&Rod	D	2220
SurveyGroundPositioningSystem	D	2220
SurveyTotalStation	D	2220
RoboticTotalStation	D	2220
HeavyDutyCoreDrill	D	467.14
ConcreteSaws&Blades	D	5
140HspGrader(Cat140)	D	10
185HspGrader(Champion780A)	D	10
10 TonCompactor120hsp(DynCA25)	D	10
15 TonCompactor84"(Cat563)	D	10
Truck MountedPostHoleAuger	D	120
CompactPickupTruck2x2	D	10
0.5TonPickupTruck2x2	D	125
GarbageTruck	D	1200
SewageTruck	D	1200
Alternative 1 Total Hours Diesel		68267.99

No Action Alternative

USACE analyzed GHG emissions under the no action alternative. Repairs for the no action alternative would take approximately 90 days every 10 years or as repairs are needed. The tables below Table 3 provides the total amount of GHG emissions that are expected to result from construction for the preferred alternative. Emissions were calculated using the Fuel Volume Analysis Method Calculator (Air Quality and GHG Sub-CoP SOP) (USACE, 2024).

The no action alternative would have the lowest GHG emissions compared to the preferred alternative) (Table 1 and Table 3). However, the no action alternative would be smaller in scope and shoreline linear feet (approximately a third of the preferred alternative) as it would include repairs segments of the reach every 10 years or as needed. Equipment list with operation hours listed in Table 4.

The no action alternative would not sequester carbon nor impact the ability of the State of Illinois from meeting their emissions goals. The no action alternative would not result in significant short-term or long-term impacts on air quality or GHG emissions.

Table 3. GHG Calculations for No Action Alternative. Fuel Volume Analysis Method Calculator used to calculate emissions (USACE, 2024).

No Action (Alternative 1) Emissions Calculation						
GHG	Fuel Volume (Gallons)	Emissions Factor (Grams of Emissions/Gallons of Fuel)	Emissions (Grams)	Emissions (Tons)	Carbon Dioxide Equivalents	Emissions (Metric Tons) (CO_2e)
CO_2	114600	10210	1170066000	1,170.07	1	1061.47
CH_4	114600	0.06	6876	0.0069	28	0.17
N_20	114600	0.45	51570	0.0516	265	12.40
			Total Emissions (Metic Tons)(CO_2e)			1074.039

Table 4. No Action Alternative Equipment List with operation hours

No Action						
Equipment Type	Fuel Type	# of Equipment	Hours (Per day)	# of Days	Total Hours	
3 axle dump trucks		6	2	11	132	
Forklift		1	8	60	480	
Crane		1	8	60	480	
Concrete Mixer		1	8	30	240	
Loader		1	8	30	240	
Roller/Compacter		1	8	30	240	
End Loader		1	8	60	480	Repair every 10 years for 50 years
No Action Total Hours Diesel					2292	11460