Appendix D

Clean Air Act: Record of Non-Applicability and Emissions Estimate

RECORD OF NON-APPLICABILITY

Environmental Analysis Branch (CENAN-PL-E)

May 20, 2015

RECORD OF NON-APPLICABILITY (RONA)

Project Name: Montauk Point, NY

Reference:

Equipment list and schedule provided by Peter Weppler (4 May 15) to Jenine Gallo via

email

Project/Action Point of Contact: Peter Weppler

Begin Date: Summer 2017

End Date: Spring 2019

- 1. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).
- 2. The requirements of this rule do not apply because the total direct and indirect emissions from this project are significantly less than the 100 tons trigger levels for NO_x, VOC, PM_{2.5}, or CO for each project year (40CFR§93.153(b)(1) & (2)). The estimated total NO_x emissions for the project are 21.2 tons. VOC, PM_{2.5}, and CO are all less than 1 ton each for the project (see attached estimates).

3. The project is presumed to conform with the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

Encl

Chief, Environmental Analysis Branch



US Army Corps of Engineers – New York District Montauk Point, NY General Conformity Related Emission Estimates

Emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

E = hrs x LF x EF

Where:

E = Emissions per period of time such as a year or the entire project.

hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).

LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.

EF = Emission factor, an estimate of the amount of a pollutant (such as NO_x) that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of pollutant per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

250 horsepower x $0.43 \times 1,000 \text{ hours} = 107,500 \text{ hphr}$

The emissions from diesel engines vary with the age of an engine and, most importantly, with when it was built. Newer engines of a given size and function typically emit lower levels of pollutants than older engines. The NO_x emission factors used in these calculations assume that the equipment pre-dates most emission control requirements (known as Tier 0 engines in most cases), to provide a reasonable "upper bound" to the emission estimates. If newer engines are actually used in the work, then emissions will be lower than estimated for the same amount of work. In the example of the crane engine, a NO_x emission factor of 9.5 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$\frac{107,500 \text{ hphr } \times 9.5 \text{ g NO}_x/\text{hphr}}{453.59 \text{ g/lb } \times 2,000 \text{ lbs/ton}} = 1.1 \text{ tons of NO}_x$

SCG 1 May 2015



US Army Corps of Engineers – New York District Montauk Point, NY General Conformity Related Emission Estimates

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Marine engine load factors are primarily from a document associated with the New York and New Jersey Harbor Deepening Project (HDP): "Marine and Land-Based Mobile Source Emission Estimates for the Consolidated Schedule of 50-Foot Deepening Project, January 2004," and from EPA's 1998 Regulatory Impact Analysis (RIA): "EPA Regulatory Impact Analysis: Control of Commercial Marine Vessels." Land-side nonroad equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

Emission factors have also been sourced from a variety of documents and other sources depending on engine type and pollutant. The NO_x emission factors for marine engines have been developed primarily from EPA documentation for the Category 1 and 2 standards (RIA, "Control of Emission from Marine Engines, November 1999) and are consistent with emission factors used in documenting emissions from the HDP, while the VOC emission factors for marine engines are from the Port Authority of New York and New Jersey's "2010 Multi-Facility Emissions Inventory" which represent the range of marine engines operating in the New Jersey harbor and coastal region in terms of age and regulatory tier level. Nonroad equipment NO_x emission factors have been derived from EPA emission standards and documentation, while the nonroad VOC emission factors have been based on EPA's Diesel Emissions Quantifier (DEQ, accessed at: www.epa.gov/cleandiesel/quantifier/), run for moderately old equipment (model year 1995). On-road vehicle emission factors have also been developed from the DEQ, assuming a mixture of Class 8, Class 6, and Class 5 (the smallest covered by the DEQ) on-road trucks.

As noted above, the emission factors have been chosen to be moderately conservative so as not to underestimate project emissions. Actual project emissions will be estimated and tracked during the course of the project and will be based on the characteristics and operating hours of the specific equipment chosen by the contractor to do the work.

The following pages summarize the estimated emissions of pollutants relevant to General Conformity, NOx, VOC, PM2.5, SO2, and CO in sum for the project and by calendar year based on the schedule information also presented (in terms of operating months per year). Following this summary information are project details including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

SCG 2 May 2015

U.S. Army Corps of Engineers Montauk Point, NY General Conformity Related Emission Estimates DRAFT 5/15/2015

Summary of I	tons		
\mathbf{NO}_{x}	VOC	SO_{x}	$PM_{2.5}$
21.18	0.43	0.01	0.36

WATERS AND SEAWALLS Category Horsepower (approx.) Construction Comprox. Preparation Struction Caracter Introduction Bern Driving Surface Caracter Caracter COTION ARTICULATED 138 HP (103 KW) 12" (3.6 M) BLADE WIDTH Grader 48.24 BARDION SELP-PROPELLED DOUBLE DRUM SMOOTH 6T ON (5.4 MT) 66" (1.7 M) WIDE ASPHALT COMPACTOR Other diesel engines 48.24 CARWLER (DOZGR) 101 HP HYDROSTATIC W/2.60 CY POWER ANGLE TILE (PAT) BLADE (ADD ATTACHMENTS) Dozer 176.47 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 444 DOZER 176.47 ON ACCESS RAMP ON THE SELECT ARTICULATED 444 BURDEN TROWHEEL 9.00 CY BUCKET ARTICULATED 444 Excavator 58.82 RODIX END WINTER ON THE SELECT ARTICULATED 444 DOZER AUGUST ARTICULATED 1444 PROVIDED ON CHESCAS AND POWER SHIFT WUNIVERSAL BLADE DOZER TARK BORD TEND WHEEL 9.00 CY BUCKET ARTICULATED 444 BURD TRANS CHARGE ARE REPAIR RUNIVERSAL BLADE DOZER AUGUST ARTICULATED 138 HP (103 KW) 12" (3.6 M) BLADE WIDTH Grader 8.11 BORD TEND WHEEL 9.00 CY BUCKET ARTICULATED 444 BURD TRANS CHARGE ARE REPAIR RUNIVERSAL BLADE DOZER 7.84 <	Load			-	grams p	er hphr*			tons		
Preparation	r Factor	Hours	hphrs	NO _x	VOC	so _x	$PM_{2.5}$	NO_x	VOC	SO _x	PM_2
Instruction Berm Driving Surface											
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CRAWLER (DOZER) 101 HP HYDROSTATIC W/Z.60 CY POWER ANGLE TILT (PAT) BLADE (ADD ATTACHMENTS) AND ART ON WHEEL 9.00 CY BUCKET ARTICULATEO 4X4 (AND ATTACHMENTS) DOZER 176.47 RONT END WHEEL 9.00 CY BUCKET ARTICULATEO 4X4 (AND ATTACHMENTS) DOZER 176.47 RONT END WHEEL 9.00 CY BUCKET ARTICULATEO 4X4 (AND ATTACHMENTS) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) E SCAVATOR CRARCE (BOXER) 341-400 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 2.515 BRATTORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2-TYON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR DOZER 2.516 BRATTORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2-TYON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR DOZER 2.517 CRAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT (GF W/UNIVERSAL BLADE DOZER 2.518 CRAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT (GF W/UNIVERSAL BLADE DOZER 2.519 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 150 000 LB (72 575 KG) 4.5 OCY (3.4 M3) BUCKET 34.8" (10.5 M) MAX DIGGING DEPTH 1	0.59	138	3,928	9.5	0.19	0.0050	0.16	0.041	0.001	0.0000	0.001
Add Improvement	0.59	137	3,899	9.5	0.19	0.0050	0.16	0.041	0.001	0.0000	0.001
CRAWLER (DOZER) DI 1 H HYDROSTATIC W/Z-60 CY POWER ANGLE TILT (PAT) BLADE (ADD ATTACHMENTS) Rubber tired loader 176.47 Robber tired loader 176.	0.59	101	16,124	9.5	0.19	0.0050	0.16	0.169	0.003	0.0001	0.003
RIONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 ION ACCESS RAMP ONTO REVEREMENT CEXCAVATOR ATTACHMENT MATERIAL, HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL, HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) Rubber tired loader 47.06 Rubber tired loader 47.07 Rubber tired l											
ION ACCESS RAMPO ONTO REVERTINET C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE/ 5-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) ROBERT 100 WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 37.84 ROBERT 100 WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 38.81 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 381-96 (1) (8.94 M3) FRONT END BUCKET 14.6° (3.7 M) DEPTH OF HOE 24° (0.61 M) DIPPER 4X4 Rubber tired loader 39.81 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT LGP W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT LGP W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT LGP W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT LGP W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT LGP W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE 39.82 RORAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/U	0.59	101	10,516	9.5	0.19	0.0050	0.16	0.110	0.002	0.0001	0.002
C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 6.50CY 4-TINE / S-TINE (ADD 75 000 LB HYDRAULIC EXCAVATOR) Excavator	0.59	300	31,235	9.5	0.19	0.0050	0.16	0.327	0.007	0.0002	0.00
RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 ging Areas (North & South) CRAWLER (DOZER) 31-1-40 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE Grader 8.11 RONT END WHEEL ARTICULATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH RONT END WHEEL ARTICULATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH RONT END WHEEL ARTICULATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH RONT END WHEEL ARTICULATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH RONT END WHEEL ARTICULATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH RONT END WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6F (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Backhoe 22.15 BARTON'S SELF-PROPELLED DOUBLE DRUM SMOODT 1-2.7 TON 12.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR DOZER 8.11 CRAWLER (DOZER) 181-250 HP (135-186 KW) POWERSHIFT M/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 181-250 HP (135-186 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 8.11 CRAWLER (DOZER) 341-240 HP (255-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZE											
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CRAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE CRAWLER (GOZER) 341-440 HP (1254-328 KW) POWERSHIFT W/UNIVERSAL BLADE Grader 8.11 RONT & RANT CLUATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH Grader 8.11 RONT & RANT CLUATED 138 HP (103 KW) 12' (3.6 M) BLADE WIDTH GO.30 8.24 M. BUBDET (IVER) 139 RONT &	0.59	300	8,330	9.5	0.19	0.0050	0.16	0.087	0.002	0.0000	0.00
IN APPROACH ARTICULATED 138 HP (103 KW) 12" (3.6 M) BLADE WIDTTH AOTOR ARTICULATED 138 HP (103 KW) 12" (3.6 M) BLADE WIDTTH ARTICULATED 138 HP (103 KW) 12" (3.6 M) BLADE WIDTTH AND TAN DIMEBEL ARTICULATED 2.75 CY (2.1 M3) BUCKET 4X4 ACKNOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6" (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Backhoe 22.15 BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Other diesel engines BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Oboser BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Oboser BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Oboser BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 4.8 M (3.1 MT) CRAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT EGP W/UNIVERSAL BLADE Oboser BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 4.8 M (3.6 MT) BRATORY SELF-PROPELLED DOUBLE OR WIN SMOOTH 2.7 TON (2.5 MT) 4.8 M (3.6 MT) BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 5.8 KM) POWERSHIFT W/UNIVERSAL BLADE Oboser BRATORY SELF-PROPELLED DOUBLE OR WIN SMOOTH 2.5 TON (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR RATLCHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) BRAULIC TRUCK MOUNTED 2.5 TON (2.2.7 MT) 80" (24.4 M) BOOM 6.44 CEXCAVATOR CRAWLER 1.10 CY (0.84 M3) FRONT END BUCKET 14.6" (3.7 M) DEPTH 0.F HOE 24" (0.61 M) DIPPER 4.44 Rubber tired loader EXCAVATOR CRAWLER 1.50 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 1.60 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 1.60 000 LB (72 575 KG) 4.50 CY (3.4											
### ### ### ### ### ### ### ### ### ##	0.59	440	2,035	9.5	0.19	0.0050	0.16	0.021	0.000	0.0000	0.000
RONT END WHEEL ARTICULATED 2.75 CY [2.1 M3] BUCKET 4X4 ACKHOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 BASKHOE BARTORY SELF-PROPELLEE DOUBLE DRUMS MONOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Other diesel engines 8.11 CRAWLER (DOZER) 181-250 HP (135-186 KW) POWERSHIFT LGP W/UNIVERSAL BLADE DOZER 7.84 VARVIER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 7.84 VARVIER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER T.84 VARVIER C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR CRAWLER 1.10 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 RUBBER 1111 GLADE THE GOOD LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 2111 GLADE THE GOOD CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 2111 GLADE THE GOOD CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 2111 GLADE THE GOOD CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 2111 GLADE THE GOOD CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 2111 GLADE THE GOOD CRAWLER 160 000 L											
ACKHOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4	0.59	138	660	9.5	0.19	0.0050	0.16	0.007	0.000	0.0000	0.000
BRATORY SELF-PROPELLED DOUBLE DRUM SMOOTH 2.7 TON (2.5 MT) 47" (3.8 M) WIDE ASPHALT COMPACTOR Other diesel engines (8.11 CRAWLER (DOZER) 181-259 HP (135-186 KW) POWERSHIFT LGP W/UNIVERSAL BLADE Dozer 7.84 VARIOR (135-186 KW) POWERSHIFT W/UNIVERSAL BLADE Dozer 7.84 VARIOR (135-186 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE VARIOR CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH 1 Excavator 1.176.47 Lag Toe - Cast Along Toe Outside Sacrificial Unusable Stone (CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH EXCAVATOR (160 CAST ALONG CEXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) (160 CAST ALONG CEXCAVATOR CRAWLER 10.10 CY (0.84 M3) FRONT END BUCKET 14.6" (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160 CAST ALONG CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH (160	0.59	250	44	9.5	0.19	0.0050	0.16	0.000	0.000	0.0000	0.000
CRAWLER (DOZER) 181-250 HP (135-186 KW) POWERSHIFT LGP W/UNIVERSAL BLADE Dozer 7.84 AVAILAGE (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE Dozer 7.84 AVAILAGE REVERSHIP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER) 341-450 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 1 Excavator 1,176-47 (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 1 Excavator 274-51 (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 1 Excavator 274-51 (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 1 Excavator 274-51 (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 1 Excavator 274-51 (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT W/UNIVERSAL BLADE DOZER 341-85 (10.6 M) MAX DIGGING DEPTH 254-85 (10.6 M) POWERSHIFT PADE (ABOVE 10.6 M) P	0.21	110	512	9.5	0.19	0.0050	0.16	0.005	0.000	0.0000	0.000
CRAWLER (DOZER) 341-440 HP (254-328 KW) POWERSHIFT W/UNIVERSAL BLADE Varior Varior Varior CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 Excavator 1,176.47 Note That I and the Standard of Counties Sacrificial Unusable Stone CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 Excavator 274.51 VERNOR OF Counties Sacrificial Unusable Stone CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 274.51 VERNOR OF COUNTIES STORE THE INFORMATION OF THE INFORM	0.59		172	9.5	0.19	0.0050	0.16	0.002	0.000	0.0000	0.000
Varion Reverment - Cast Unusable Stone Along Toe (C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1 Excavator 1,176.47 rag Toe - Cast Along Toe Outside Sacrificial Unusable Stone (C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 27.45.1 terment Fill itsting Stone Tie-in 6 Ton Stone (C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 27.45.1 terment Fill itsting Stone Tie-in 6 Ton Stone (C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 L8 HYDRAULIC EXCAVATOR) Excavator 23.53 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 24.51.00 BACKLOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Rubber tired loader 23.53 e Stone Removal (Existing) - Placed at Toe C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 25.294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 36.00 C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 47.06 or Stone C EXCAVATOR CRAWLER 160 000 L8 (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 47.06 or Stone C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 47.06 C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Rubber tired loader 47.06 EC EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Rubber tired loader 47.176 EC EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.0		250	1,196	9.5	0.19	0.0050	0.16	0.013	0.000	0.0000	0.000
TO REVENTE TO LOSS TO	0.59	440	2,035	9.5	0.19	0.0050	0.16	0.021	0.000	0.0000	0.000
C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH 1											
The Cock Along Toe Outside Sacrificial Unusable Stone C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator Extrement Fill C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 RUBber tired loader 23.53 EXONE REMOVALE 1.01 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 RUBber tired loader 23.53 EXONE REMOVAL [Existing] - Placed at Toe C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M											
EXCAVATOR CRÄWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 274.51 **Internet Fill **Interne	0.59	500	347,059	9.5	0.19	0.0050	0.16	3.634	0.073	0.0019	0.06
tetment Fill Listing Stone Tie-In 6 Ton Stone LEXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLI											
isting Stone Tie-In 6 Ton Stone C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) ROTT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 23.53 ROTT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 RUbber tired loader 24.12 BACULIC TRUCK MOUNTED 25 TON [22.7 MT] 80' (24.4 M) BOOM 6X4 ROTT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 RUbber tired loader 23.53 8 Stone Removal [Existing] - Placed at Toe C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00 CY 4.50 CM 3.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00 CY 4.50 CM 3.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00 CY 4.50 CM 3.8' (10.6 M) MAX DIGGING D	0.59	500	80,980	9.5	0.19	0.0050	0.16	0.848	0.017	0.0004	0.014
IC EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 fic Layer DRAULIC TRUCK MOUNTED 25 TON (22.7 MT) 80' (24.4 M) BOOM 6X4 DRAULIC TRUCK MOUNTED 25 TON (22.7 MT) 80' (24.4 M) BOOM 6X4 AUBBERT 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Rubber tired loader 45.10 Rubber tired loader 23.53 a Stone Removal (Existing) - Placed at Toe C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCA											
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DRAÜLIC TRUCK MOUNTED 25 TON (22.7 MT) 80" (24.4 M) BOOM 6X4 Off-road truck 294.12 JACKHOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6" (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Rubber tired loader 45.10 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 23.53 a Stone Removal (Existing) - Placed at Toe Facavator 117.65 C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8" (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 47.06 47.06 OF Stone 50.00 50.0	0.59	300	4,165	9.5	0.19	0.0050	0.16	0.044	0.001	0.0000	0.001
ACKHOE WHEEL 1.10 CY (0.84 M3) FRONT END BUCKET 14.6' (3.7 M) DEPTH OF HOE 24" (0.61 M) DIPPER 4X4 Rubber tired loader 23.53 8 Stone Removal (Existing) - Placed at Toe C EXCAVATOR C RAMUER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 117.65 dding on Filter Fabric (Above) C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 47.06 or Stone OR C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 47.06 C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 47.06 C EXCAVATOR WHEEL 9.00 CY BUCKET ARTICULATED 4X4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR EXCAVATOR DIGGING DEPTH EXCAVATOR MAX DIGGING DEPTH EXCAVATOR EXCAVATOR DIGGING DEPTH EXCAVATOR DIGGING DIGGING DEPTH EXCAVATOR DIGGING DIGGING DEPTH EXCAVATOR DIGGING DIGGING DIGGING DEPTH EXCAVATOR DIGGING											
RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 23.53 8 Stone Removal (Existing) - Placed at Toe CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator St. 294 RUBDET tired loader St. 294 RUB		225	28,456	9.5	0.19	0.0050	0.16	0.298	0.006	0.0002	0.005
e Stone Removal (Existing) - Placed at Toe C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH dding on Filter Pabric (Above) C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCXET 34.8' (10.6 M) MAX DIGGING DEPTH EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR			2,927	9.5	0.19	0.0050	0.16	0.031	0.001	0.0000	0.00
C EXCAVATOR CRÂWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 117.65 dding on Filter Fabric (Above) C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 CANDER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator Rubber tired loader 47.06 or Stone C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Excavator 2.411.76 CRONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 RUBBER 150 TON 240' BOOM LIFTING CANDER 150 TON 240' BO	0.59	300	4,165	9.5	0.19	0.0050	0.16	0.044	0.001	0.0000	0.00
dding on Filter Fabric (Above) 5.2,94 C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52,94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 47.06 Totale TOTALE CHARDOLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Excavator 2,411.76 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 2,411.76 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Crane 1,205.88	0.50	500	24.707		0.40	0.0050	0.46	0.000	0.007	0.0000	0.00
CEXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 52.94 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 47.06 47.06 TOP STORE 52.94 CONTROLL 52.94	0.59	500	34,707	9.5	0.19	0.0050	0.16	0.363	0.007	0.0002	0.006
RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 47.06 or Stone CEXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Excavator 2,411.76 RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 2,411.76 IECHANICAL LATTICE BOOM CRAWLER 150 TON 240' BOOM LIFTING Crane 1,205.88	0.50	500	45.645								
or Stone Inc. IC EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE/ 5-			15,617	9.5	0.19	0.0050	0.16	0.164	0.003	0.0001	0.003
ORD CEXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) Rubber tired loader 2,411.76 ECHANICAL LATTICE BOOM CRAWLER 150 TON 240' BOOM LIFTING Crane 1,205.88	0.59	300	8,330	9.5	0.19	0.0050	0.16	0.087	0.002	0.0000	0.001
C EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) EXCAVATOR ATTACHMENT MATERIAL HANDLING GRAPPLE 9.00CY 4-TINE/ 5-TINE (ADD 100 000 LB HYDRAULIC EXCAVATOR) ROBERT STATE OF THE STA											
RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 2,411.76 IECHANICAL LATTICE BOOM CRAWLER 150 TON 240' BOOM LIFTING Crane 1,205.88		400	500 475								
IECHANICAL LATTICE BOOM CRAWLER 150 TON 240' BOOM LIFTING Crane 1,205.88			569,175	9.5	0.19	0.0050	0.16	5.960	0.119	0.0031	0.100
			426,882	9.5	0.19	0.0050	0.16	4.470	0.089	0.0024	0.075
ne - Denina new Reverment Armor Stone & Kun-up Protection	0.43	282	146,225	9.5	0.19	0.0050	0.16	1.531	0.031	0.0008	0.02
C EVCAVATOR CRANILER 1CO 000 LR /73 ETE VC) 4 EO CV /3 4 M3) RUCVET 34 RI (10 C M) MAY RICCINIC REPTU	0.50	500	222.100	0.5	0.10	0.0050	0.16	2.225	0.047	0.0012	0.00
C EXCAVATOR CRAWLER 160 000 LB (72 575 KG) 4.50 CY (3.4 M3) BUCKET 34.8' (10.6 M) MAX DIGGING DEPTH Excavator 756.30			223,109	9.5 9.5	0.19	0.0050	0.16	2.336	0.047	0.0012	0.039
RONT END WHEEL 9.00 CY BUCKET ARTICULATED 4X4 Rubber tired loader 176.47	0.59	300	31,235	9.5	0.19	0.0050	0.16	0.327	0.007	0.0002	0.006
l Totals		8.458	2.019.683					24.4-	********	0.011	0.356

U.S. Army Corps of Engineers Montauk Point, NY General Conformity Related Emission Estimates DRAFT 5/15/2015

		grams per mile**				tons			
	Miles	NO_x	VOC	SO_x	$PM_{2.5}$	NO_x	VOC	SO_x	$PM_{2.5}$
Land Equipment Mob 3		23.50			2232	300		-33.0	
TRUCK HIGHWAY 50 000 LB (22 680 KG) GVW 6X4 3 AXLE (ADD ACCESSORIES)	1,242.35	9.74	2.063	0.011	0.686	0.013	0.003	0.00002	0.001
TRUCK HIGHWAY CONVENTIONAL 8 800 LB (3 992 KG) GVW 4X4 2 AXLE 3/4 TON (0.68 MT) - PICKUP 1	1,283.09	9.74	2.063	0.011	0.686	0.014	0.003	0.00002	0.001
Final Staging Area Grading & Repair									
TRUCK OPTION DUMP BODY REAR 12 CY (9.2 M3) (ADD 45 000 LB (20 412 KG) GVW TRUCK)	22.15	9.74	2.063	0.011	0.686	0.0002	0.0001	0.0000	0.0000
TRUCK HIGHWAY 45 000 LB (20 412 KG) GVW 6X4 3 AXLE (ADD ACCESSORIES)	22.15	9.74	2.063	0.011	0.686	0.0002	0.0001	0.0000	0.0000
On-Road Totals						0.03	0.01	0.00	0.00
	**Emission fact	ors from MOVES2	014 for 201	5, Union Co	o. NJ. MY 2000 s	ingle-unit sho	rt-haul tru	ıck	

Total Emissions 21.18 0.43 0.01 0.36



US Army Corps of Engineers – New York District Montauk Point Greenhouse Gas Emission Estimates

Greenhouse gas (GHG) emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

E = hrs x LF x EF

Where:

E = Emissions per period of time such as a year or the entire project.

hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).

LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.

EF = Emission factor, an estimate of the amount of greenhouse gas that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of GHG per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

250 horsepower x 0.43 x 1,000 hours = 107,500 hphr

The CO₂ emission factors used in these calculations are based on locally-specific emissions data related to off-road and on-road diesel engines.¹ In the example of the crane engine, a CO₂ emission factor of 571 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$\frac{107,500 \text{ hphr x } 571 \text{ g CO}_2/\text{hphr}}{1,000,000 \text{ g/metric ton}} = 61.4 \text{ metric tons (tonnes) of CO}_2$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load

SCG 1 February 2017

¹ http://www.panynj.gov/about/pdf/PANYNJ-2014%20Multi-Facility-EI-Report-1-Mar-16-scg.pdf



US Army Corps of Engineers – New York District Montauk Point Greenhouse Gas Emission Estimates

factors have been obtained from various sources depending on the type of equipment. Land-side non-road equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

The following pages summarize the estimated emissions of CO₂ in sum for the project including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

GHG emissions, metric tons CO_2 :

1,158

Equipment Report		Load			CO_2	
10 BREAKWATERS AND SEAWALLS	Horsepower	Factor	Hours	hphrs	g/hphr	tonne
Revetment Construction	(approx.)					
0002 Site Preparation						
Install Construction Berm Driving Surfac	e					
Grader	48.24	0.59	138	3,928	571	2
Other diesel engines	48.24	0.59	137	3,899	571	2
Dozer	270.59	0.59	101	16,124	571	9
Access Road Improvement						
Dozer	176.47	0.59	101	10,516	571	6
Rubber tired loader	176.47	0.59	300	31,235	571	18
Construction Access Ramp onto Revetme	ent					
Excavator	58.82	0.59	300	10,411	571	6
Rubber tired loader	47.06	0.59	300	8,330	571	5
Grade Staging Areas (North & South)						
Dozer	7.84	0.59	440	2,035	571	1
Final Staging Area Grading & Repair						
Grader	8.11	0.59	138	660	571	0
Rubber tired loader	0.30	0.59	250	44	571	0
Backhoe	22.15	0.21	110	512	571	0
Other diesel engines	8.11	0.59	36	172	571	0
Dozer	8.11	0.59	250	1,196	571	1
Dozer	7.84	0.59	440	2,035	571	1
0003 Excavation				,		
Existing Stone Revetment - Cast Unusab	le Stone Along Toe					
Excavator	1,176.47	0.59	500	347,059	571	198
Sand Along Toe - Cast Along Toe Outside	,			,		
Excavator	274.51	0.59	500	80,980	571	46
0004 Revetment Fill				,		
New to Existing Stone Tie-in 6 Ton Stone	1					
Excavator	23.53	0.59	400	5,553	571	3
Rubber tired loader	23.53	0.59	300	4,165	571	2
Filter Fabric Layer				.,		_
Off-road truck	294.12	0.43	225	28,456	571	16
Rubber tired loader	45.10	0.59	110	2,927	571	2
Rubber tired loader	23.53	0.59	300	4,165	571	2
Unsuitable Stone Removal (Existing) - Pl				.,		_
Excavator	117.65	0.59	500	34,707	571	20
Gravel Bedding on Filter Fabric (Above)				- 1,1 - 2 - 1		
Excavator	52.94	0.59	500	15,617	571	9
Rubber tired loader	47.06	0.59	300	8,330	571	5
0005 Armor Stone		0.55	300	0,550	3,1	J
15 Ton Stone						
Excavator	2,411.76	0.59	400	569,175	571	325
Rubber tired loader	2,411.76	0.59	300	426,882	571	244
Crane	1,205.88	0.43	282	146,225	571	83
1 Ton Stone - Behind new Revetment Ar	•		202	170,223	3/1	65
Excavator	756.30	0.59	500	223,109	571	127
Rubber tired loader	176.47	0.59	300	31,235	571	18
	2, 0, 1,	0.55	555	31,233	3,1	10

		CO_2	
Land Equipment Mob 3	Miles	g/hphr	tonnes
TRUCK HIGHWAY 50 000 LB (22 680 KG) GVW 6X4 3 AXLE (ADD ACCESSORIES)	1,242.35	1,812	2
TRUCK HIGHWAY CONVENTIONAL 8 800 LB (3 992 KG) GVW 4X4 2 AXLE 3/4 TON (0.68 M	1,283.09	1,812	2
Final Staging Area Grading & Repair			
TRUCK OPTION DUMP BODY REAR 12 CY (9.2 M3) (ADD 45 000 LB (20 412 KG) GVW TRUC	22.15	1,812	0
TRUCK HIGHWAY 45 000 LB (20 412 KG) GVW 6X4 3 AXLE (ADD ACCESSORIES)	22.15	1,812	0
On-Road Totals			5

\mathbf{CO}_2 emission factors

Nonroad	571 g/hphr
Onroad	1812 g/mi at 35 mph

The nonroad engine CO2 emission factor is the average of nonroad equipment in the PANYNJ 2014 emissions inventory, representative of nonroad engines in general.

Onroad emission factor is the heavy-duty truck emission factor in the PANYNJ 2014 emissions inventory.