

Estimate of Economic Resources

SUPPORTING DOCUMENTATION



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MEMORANDUM

TO: Rich Smith, Precision Paving

FROM: William Halbert, LEG

William E. Halbert

DATE: July 17, 2019

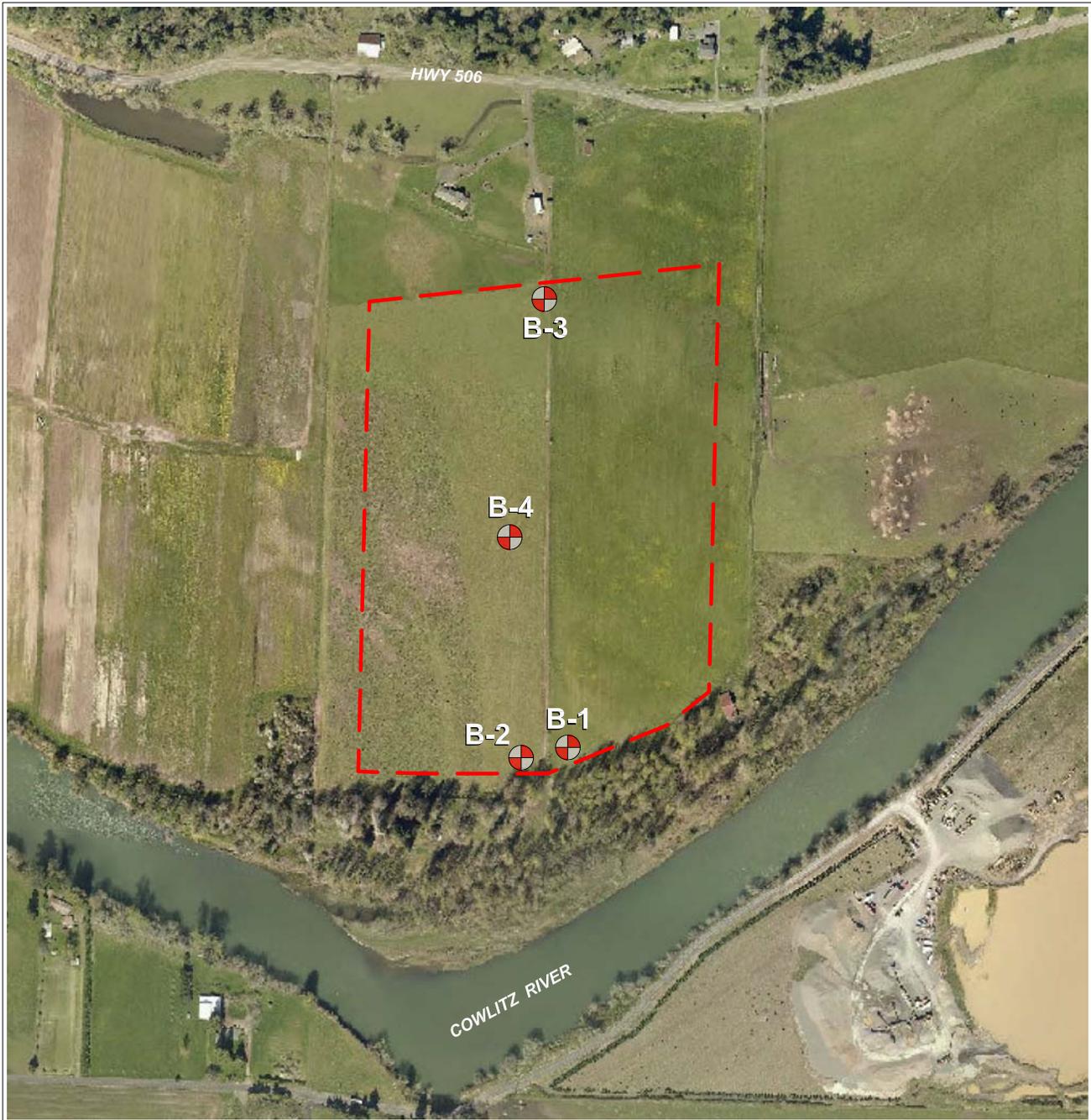
SUBJECT: 1117-001-01 Proposed Vader Pit, Estimate of Economic Resources

At your request, we drilled four borings at the site of your proposed gravel mining operation located south of Highway 506 and north of the Cowlitz River in Lewis County, Washington (Lewis County Parcel Numbers: 01252300200 [32.65 acres] and 012509002002 [34.05 acres]). The proposed site comprises of two parcels of land totaling about 70 acres. The proposed mining area is roughly rectangular in shape with an aerial extent of about 32 acres. A general layout of the site, along with the boring locations, is shown in Figure 1, attached.

Our borings indicated that gravel resources extend from a depth of about 13 feet below the existing ground surface to at least 60 feet in the southern portion of the site. About 15 feet of sandy overburden material overlies the gravel resource across the site. An erosional surface in the bedrock (former river terrace) consisting of silt and clay, is present in the northern portion of the proposed mine area at a depth of about 30 feet below ground surface, reducing the depth of minable resource in the northern part of the site.

To calculate the value of the minable gravel, we assumed that the upper 15 feet of sandy material will be removed and set aside for future reclamation of the pit. We assumed that the sides of the pit will slope inward to the center at a slope of about 2:1 (H:V), although this angle may be a bit steeper as mining allows, resulting in additional resources. We also assumed that the non-mined bedrock surface rises from the center of the pit at a depth of 60 feet, to the northern mining limit at a depth of 30 feet. Our calculations, based on these assumptions, indicate a minable volume of 1.37 million cubic yards of material. We then reduced this volume by 30 percent to allow for the sand fraction, which is not marketable and will be wasted, resulting in a volume of 822,000 cubic yards of gravel. This quantity was then multiplied by a market rate of \$6.00 per cubic yard for pit-run material, resulting in a value of \$4.93 million for the gravel resource at the proposed pit.

Based on our conservative calculations of the value of the minable resource, it appears that the project meets the criteria for mineral resource land (LCC 17.30.850) by having a probable value of the gravel resource in excess of \$1 million.



Source: Lewis County GIS (c) Image 2016

LEGEND:

-  **B-1** APPROXIMATE BORING LOCATION
-  APPROXIMATE MINING LIMITS



SCALE: 1" = 500'

PROPOSED VADER EXTRACTION RESOURCE PIT

VADER, WASHINGTON



Figure 1
Site Plan

B-1

DEPTH (FEET)	SAMPLE NUMBER AND DEPTH	INCHES ABOVE RECORDED	SPT "N" VALUE	U.S.G.S.	LITHOLOGY	SOIL DESCRIPTION	REMARKS AND LABORATORY TEST RESULTS	
0								
10	1	18/12	10	SP		Dark brown fine to medium sand, loose, moist		
13								
20	2	18/10	45			Dark brown fine to coarse gravel with fine to coarse sand, very dense, wet		
30	3	12/12	50/6"					
40	4	18/10	11	GP		Grades to gray sandy fine to coarse gravel, medium dense		
50	5	12/12	50/6"			Grades to fine to coarse gravel, very dense		
60	6	6/2	50/6"			Grades to cobbles		
61.5	Groundwater encountered at 13 feet							
70								
80								

LEGEND:

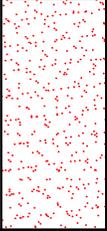
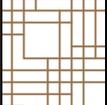
PROJECT NO.: 1117-001-01
 DATE: JULY 15, 2019
 TOTAL DEPTH: 61.5 FEET
 DRILLING CONTRACTOR: HOLOCENE
 DRILLING EQUIPMENT: B-58
 DRILLING METHOD: HSA
 LOGGED BY: KV

PROPOSED VADER RESOURCE EXTRACTION PIT

JURISDICTION, WASHINGTON



B-2

DEPTH (FEET)	SAMPLE NUMBER AND DEPTH	INCHES ABOVE RECORDED	SPT "N" VALUE	U.S.G.S.	LITHOLOGY	SOIL DESCRIPTION	REMARKS AND LABORATORY TEST RESULTS	
0								
10	1	18/12	44	SP		Dark brown fine to coarse sand with fine to coarse gravel, dense, moist		
20	2	17/4	50/5"	GP		Brown fine to coarse gravel with fine to coarse sand, dense, moist Grades to wet		
30	3	12/10	50/6"			Grades to very dense		
40	4	5/2	50/5"			Grades to gray		
50	5	12/8	50/6"			Grades to fine to coarse gravel		
60	Groundwater encountered at 20 feet							
70								
80								

LEGEND:

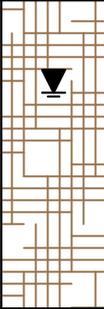
PROJECT NO.: 1117-001-01
 DATE: JULY 15, 2019
 TOTAL DEPTH: 60 FEET
 DRILLING CONTRACTOR: HOLOCENE
 DRILLING EQUIPMENT: B-58
 DRILLING METHOD: HSA
 LOGGED BY: KV

PROPOSED VADER RESOURCE EXTRACTION PIT

JURISDICTION, WASHINGTON



B-3

DEPTH (FEET)	SAMPLE NUMBER AND DEPTH	INCHES ADVANCED RECORDED	SPT "N" VALUE	U.S.G.S.	LITHOLOGY	SOIL DESCRIPTION	REMARKS AND LABORATORY TEST RESULTS	
0						No sampling		
10				SP				
20				GP		Gravel Grades to wet		
30								
40				ML				
50	1	11/11	50/5"			Gray silt, very dense, dry		
51	Groundwater encountered at 20 feet							
60								
70								
80								

LEGEND:

PROJECT NO.: 1117-001-01
 DATE: JULY 15, 2019
 TOTAL DEPTH: 51 FEET
 DRILLING CONTRACTOR: HOLOCENE
 DRILLING EQUIPMENT: B-58
 DRILLING METHOD: HSA
 LOGGED BY: KV

PROPOSED VADER RESOURCE EXTRACTION PIT

JURISDICTION, WASHINGTON



B-4

DEPTH (FEET)	SAMPLE NUMBER AND DEPTH	INCHES ADVANCE RECORDED	SPT "N" VALUE	U.S.G.S.	LITHOLOGY	SOIL DESCRIPTION	REMARKS AND LABORATORY TEST RESULTS
0						No sampling	
10				SP			
20						Gravel	
30				GP			
40							
50							
60							
70							
80							

LEGEND:

PROJECT NO.: 1117-001-01
 DATE: JULY 15, 2019
 TOTAL DEPTH: 60 FEET
 DRILLING CONTRACTOR: HOLOCENE
 DRILLING EQUIPMENT: B-58
 DRILLING METHOD: HSA
 LOGGED BY: KV

PROPOSED VADER RESOURCE EXTRACTION PIT

JURISDICTION, WASHINGTON

