Red Deer County

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Development and Reclamation Plan

Thompson Pit

SE32-34-4-W5M

June 20, 2006

Introduction

Gravel is important resource for re-gravelling program and capital project According to exploration results, the Thompson property in SE32-34-4-W5 is one of the resources with large quantity of potential gravel deposit of 2 3 million cubic meters Therefore, the Operation Services is proposing a gravel pit operation on the above land to serve the regravelling program and capital project of the Red Deer County

General Information

The proposed gravel pit is located next to Rge Rd 4-4 west, directly one mile north of Secondary Highway 587

The proposed gravel pit will eventually disturb approximate 26 hectares or 64 22 acres of the quarter section Pursuant to the *Code of Practice For Pits*, registration under *Environment Protection and Enhancement Act* is required for a pit area greater than 5ha or 12 5ac

The proposed gravel extraction will keep above water table and a license under *Water Act* is not required

General Development Plan

- Existing Conditions

Presently, the land is designated as agricultural use and can be described as a high plateau, which is pasture and approximate 12 meter higher than the Schrader Creek valley The SW area is open hayfield and relatively flat to undulating The SE is undulating pasture with few trees except an existing gravel open face at very southeast corner Two existing pipelines cross and an oil well is operating in this area The NE portion is also pasture with dense trees and a dwelling Schrader Creek, a fish-bearing (brook trout and brown trout) stream, continuously flow southeast from northwest through the southwest portion of the quarter

- Soils and LSRS class

The dominant landform is hummocky with low relief that features a limiting slope of 6% (H1l) There are three groups of soil composing the land

North. 40% of Orthic Gray Luvisol, medium textured (L, CL) till (HUBst),
40% of Brunisolic Gray Luvisol, medium textured (L, CL) till (LOB),
and 20% of Brunisolic Gray Luvisol, gravely coarse textured (HORBurg).

East. Brunisolic Gray Luvisol, medium textured (L, CL) till (LOB)

Southwest Organic Typic Mesisol

LRSR Class 4 – severe limitations with temperature, soil structure, and slope restrictions (Alberta Soil Information Viewer)

- Drainage and Groundwater

Currently the surface water naturally drains from the higher ground to the Schrader Creek However, the creek is a fish-bearing stream and sedimentation will be major concerns from fisheries perspective

To minimize environmental impact caused by gravel operations, at least 30 meters undisturbed buffer zone will be maintained along north side of the creek and a well-vegetated berm will be in place to retain the runoff from high ground so that solid sedimentation will be settled on the mining floor The water runoff will seep through the obstructions because of the well-drained soil properties

Site grading will be performed incorporate with the drainage system and slope will remain stable along property lines and pipeline right of ways

Static water was not encountered during gravel testing. Gravel mining will stay above water table as well as north side of the creek The ground water will remain untouched

❖ Access Road

Rge Rd 44 will be utilized for gravel haul route and an access will be constructed to the pit open The contractors of the gravel hauling, crushing and stockpiling will maintain the road and the Red Deer County will be responsible to monitor the road conditions and regulate the contractors during active operating and hauling period

❖ Development Plan

The proposed site will be operated in the period of 2007 to 2055 The expected lifetime of the gravel deposit will be 48 years

- Strategies of Gravel Operations

  Gravel will be excavated, screened and crushed on site and hauled to the designated location Maximum disturbance area over lifetime of the proposed site will be 26 hectares or 64 22 acres more or less

  The average depth of excavation including the removal of topsoil, subsoil, overburden and gravel ranges from 3m to 8m depending on various locations No gravel extraction will take place under water table

  The extractions will be divided into 6 phases (see Phasing Plan) Mining schedules are planed Phase 1 – year 2007 to 2015, Phase 2 – year 2015 to 2023, Phase 3 – year 2023 to 2031 and Phase 4, 5 and 6 – future schedule

  Gravel crushing and stockpiling will be tendered and awarded to Contractor based on best price principle Loaders, Screens, Crushers and Trucks will be used for the operations The quantity and combination of the equipment will be the Contractor's choice based on consideration of job size, productivity, safety, cost effectiveness, and the least environmental impact to the surroundings

- Topsoil Salvage

  Topsoil of the disturbance area including overburden stockpile site will be salvaged. Striping will be carried out when the ground is not frozen. Stripping distance will be at least 5m ahead of open face Overburden will be stockpiled and retained for site contour construction during reclamation

To minimize erosion potential and cut down on weed growth, topsoil stockpiles will be seeded with domestic grass

o Undisturbed Buffer Zone and Extraction Setbacks

Minimum 3m undisturbed buffer zones will be maintained from property lines to the edge of disturbance, minimum 30m buffer zone will be maintained from the Schrader Creek

Extraction setbacks from all boundaries and undisturbed buffer zones will be included to ensure that adequate material is available to meet the sloping requirement for reclamation The extraction setbacks are 1.5 times mining depth plus undisturbed buffer distance above-mentioned where side slope of 3 1 will be established

Setbacks from pipelines are set as required by the owners

A dwelling is located at NE portion of the quarter It will remain on site before commencing Phase 6 Relocate or set up setbacks will be discussed by then

o Operation Hours

Gravel crushing and hauling will be 6 days a week, 14 hours a day, from 6 00 am to 8 00 pm and will be closed on statutory holidays including New Year's Day, Alberta Family Day, Good Friday, Easter Monday, Victoria Day, Canada Day, Labour Day, Remembrance Day and Christmas Day

It is estimated that there will be 12 ~ 16 crushing operations within lifetime of the pit, averaging one crushing every 3 ~ 4 years, while operation period of one crushing will be approximate 90 operating days

o Gravel Haul Route

Trucks will haul gravel one mile directly south of Rge Rd 4-4, then turn onto SH587 Thereafter, SH587 will be utilized to transport gravel to re-gravelling site, which will vary in different projects Only one mile gravel road in the Clearwater County will be on the route Haul route will be built to requirements of Clearwater County if it differed from standard roads.

A fleet of average 10 units or trucks will be contracted to haul gravel from the proposed site It is assumed that there may be 5 trips per truck per day hauling gravel so that there may be 100 units daily traffic increase for about 90 days period per occasion Red Deer County will be responsible to regulate contractor and the contractor will be required to submit procedure related to safety, noise and dust control protocol and conduct driver training as part of the tender agreement

o Equipment

Generally, One of each Scraper, excavator, and dozer will be used for topsoil stripping or ripping One of each Grader and loader will be used for site reclamation. One of each Loader, dozer, screen and crusher, and/or 2 trucks will be used for gravel mining. Equipments are subject to change according to the capacity and gravel demand

o Dust and Noise Control

Residences within ½ mile may be affected by the gravel operations The Operations is committed to mitigation or avoidance of noise and dust impacts

Methods for reducing and controlling noise are,

- Crusher will be located as low on pit floor as possible so that noise emission will be absorbed and blocked by the land
- Daylight hours working only will keep the least noise affecting on neighborhood.
- Straw bale berm may be constructed at specific locations to block noise travel towards residents if necessary
- Grading roads to ensure that potholes, washboards and frost heaving are repaired immediately and create a smoother, quieter running surface during gravel haul season to minimize noise and dust
- A 15 minutes interval will be maintained between any of the two trucks to minimize dust and noise hazards
- Also tightening loose and rattling hitches will reduce noise sufficiently

Method for reducing and controlling dust are,

- Seeding domestic grasses on topsoil and overburden stockpiles to avoid water and wind erosion
- Minimize drop height from conveyor to stockpile
- Regularly spray water calcium chloride, or other approved dust suppressant on Rge Rd 4-4 and access road of the pit to reduce dust by as much as 50% during operation season Spay frequency will depend on the road conditions
- Reduce truck speed from unregulated to speed limit of 60km/h on Rge Rd 4-4 during gravel haul season, this can reduce dust by 25%
- Avoid traveling during rush hours to reduce traffic impact

Communications with adjacent landowners will be conducted before each crushing and hauling season to address neighborhoods concerns Open house will be held if necessary

o Weeds Control

Noxious weeds control will be applied by the Agriculture Services of the County Combined efforts should be made with adjacent landowners

- Site Security and Protection

  Caution signs such as "Danger, Open Pit Excavation" and "Truck Turns" will be erected near site and on Rge Rd. 44 as well as on connecting SH587

  Site will be fenced and be locked after hours "No Trespass" sign will be installed at proper location

  Signs should be securely mounted and erected in such a way that they will not be easily damaged or stolen

  Periodically check all signs on the site to ensure they are clean, properly positioned and have not been damaged

❖ Reclamation Plan

The final land use will be remained as agricultural land The site will be reclaimed back to pastureland upon closure of the site. Progressive reclamation strategy will be utilized to maintain the least environmental impact (i e reclaim Phase 1 before commencing Phase 2, and so on so forth) Reclamation certificate will be obtained from Alberta Environment once vegetation being established and reclamation criteria being met.

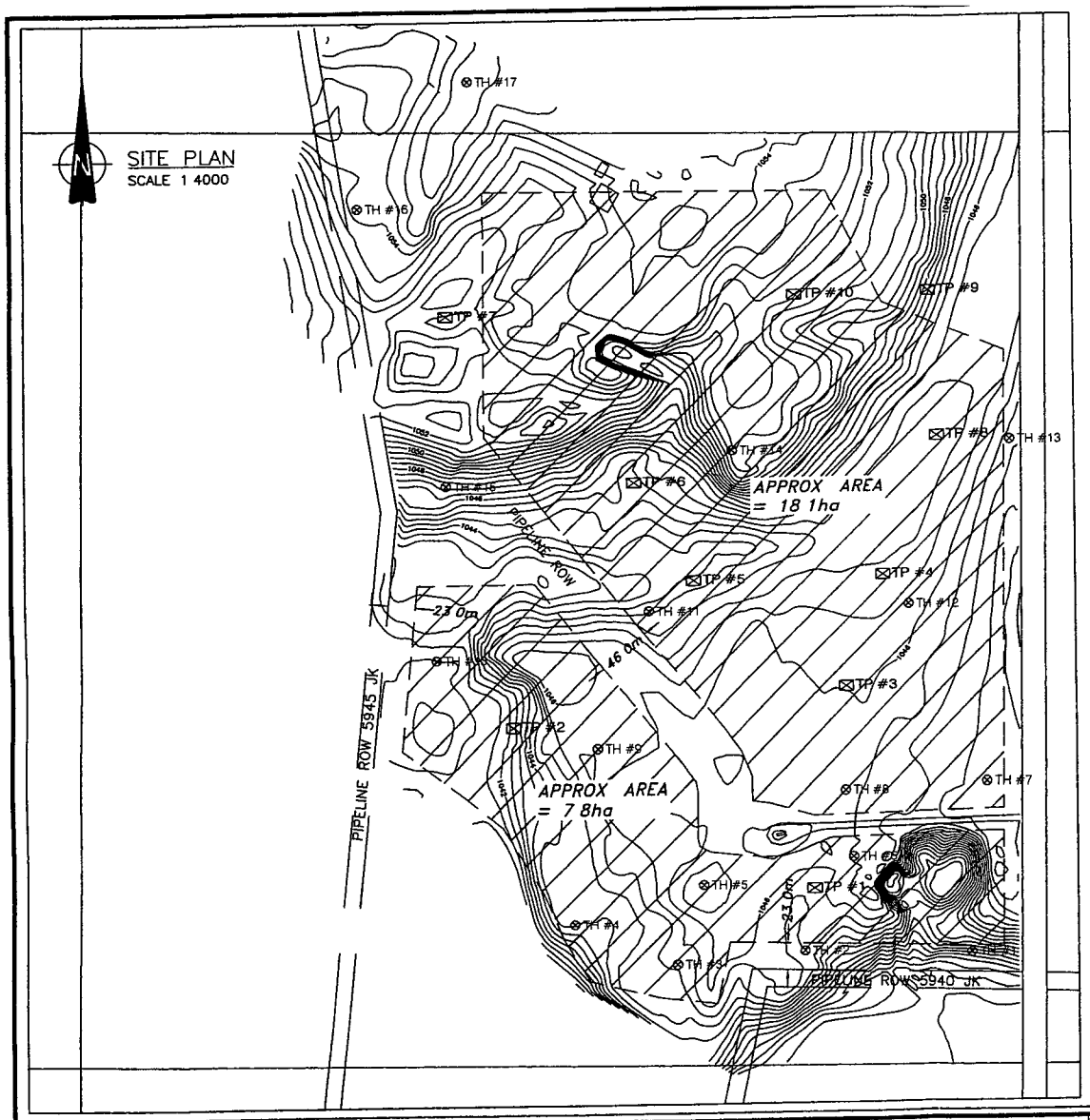
The depleted gravel pit will be re-contoured at side slope no steeper than 3 1 with preference 4 1 Coarse material will be buried at the bottom of the site or used for slope reconstruction Overburden will be spread evenly across the site and used for site grading and re-contouring Topsoil replacement will occur after contouring is completed and topsoil will be replaced evenly across the site

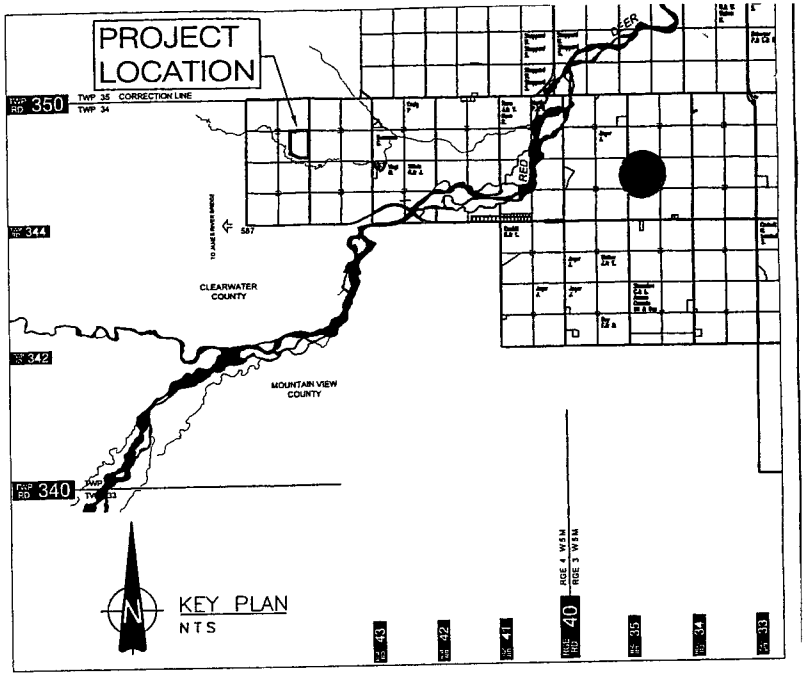
The site will be reclaimed to landowner's satisfaction regarding to pastureland Domestic grass will be seeded on prepared seedbed Grazing or browsing is prohibited during the vegetation establishment period Weeds control will be performed by Agricultural Services of the County in the proposed stockpile site area This will be a joint effort with adjacent landowner

Reclamation certificates will be obtained from Alberta Environment under the *Environment Protection and Enhancement Act* to fulfill the reclamation obligation of the Red Deer County

Summary

The proposed gravel pit will supply adequate gravel to ensure re-graveling program being undertaken in the Red Deer County The development of the gravel pit will benefit publics and allow Operations provide sufficient services to the Red Deer County residents The land will be returned back to pasture to minimize environmental impact





LEGEND

- ⊠ TESTPIT DUG ON MARCH 29 2006
- ⊗ TESTHOLE DRILLED ON JANUARY 10 2006

BASED ON TESTHOLE AND TESTPIT INFORMATION SUPPLIED BY AMEC THE FOLLOWING VOLUMES ARE ESTIMATED
TOPSOIL = 77 700 cu m
OVERBURDEN = 51 800 cu m
PIT--RUN GRAVEL = 2,265 219 cu m
VOLUMES ARE CALCULATED TO A BOTTOM ELEVATION OF 1038

TEST HOLE SUMMARY

TH#1 – 0 9m TOPSOIL/OVERBURDEN 3 1m GRAVEL AND SAND 2 1m CLAY
TH#2 – 0 3m TOPSOIL/OVERBURDEN 4 9m GRAVEL AND SAND 1.5m CLAY
TH#3 – 0 3m TOPSOIL/OVERBURDEN 7 9m GRAVEL AND SAND 0 9m CLAY
TH#4 – 0 3m TOPSOIL/OVERBURDEN 3 4m GRAVEL AND SAND 2.4m CLAY
TH#5 – 0 2m TOPSOIL/OVERBURDEN 5 0m GRAVEL AND SAND AUGER REFUSAL
TH#6 – 0 3m TOPSOIL/OVERBURDEN 0 3m GRAVEL AND SAND, AUGER REFUSAL
TH#7 – 0 6m TOPSOIL/OVERBURDEN 11 6m GRAVEL AND SAND
TH#8 – 0 6m TOPSOIL/OVERBURDEN 1 7m GRAVEL AND SAND AUGER REFUSAL
TH#9 – 0 3m TOPSOIL/OVERBURDEN 7 9m GRAVEL AND SAND 0 9m CLAY
TH#10 – 0 4m TOPSOIL/OVERBURDEN 3 8m GRAVEL AND SAND 1 9m CLAY
TH#11 – 0 6m TOPSOIL/OVERBURDEN 0 9m GRAVEL AND SAND AUGER REFUSAL
TH#12 – 0 2m TOPSOIL/OVERBURDEN 0 1m GRAVEL AND SAND AUGER REFUSAL
TH#13 – 0 3m TOPSOIL/OVERBURDEN 1 8m GRAVEL AND SAND AUGER REFUSAL
TH#14 – 0 2m TOPSOIL/OVERBURDEN 10 5m GRAVEL AND SAND 1.2m CLAY
TH#15 – 0 2m TOPSOIL/OVERBURDEN 1 3m CLAY 0 6m GRAVEL AND SAND 4 0m CLAY
TH#16 – 0 2m TOPSOIL/OVERBURDEN 5 9m CLAY
TH#17 – 0 2m TOPSOIL/OVERBURDEN 4 4m CLAY

TEST PIT SUMMARY

TP#1 – 0 1m TOPSOIL, 4 8m GRAVEL (0 25m MINUS) NO BOTTOM
TP#2 – 0 2m TOPSOIL, 1 6m CLAY 4 1m GRAVEL (0 2m MINUS) NO BOTTOM
TP#3 – 0 2m TOPSOIL, 0 1m CLAY 5 2m GRAVEL (0 2m MINUS) NO BOTTOM
TP#4 – 0 2m TOPSOIL, 0 25m CLAY 3 25m GRAVEL (0 2m MINUS) NO BOTTOM
TP#5 – 0 2m TOPSOIL, 1 0m CLAY 3 4m GRAVEL (0 2m MINUS) NO BOTTOM
TP#6 – 0 1m TOPSOIL, 0 4m CLAY 3 2m GRAVEL (0 2m MINUS) NO BOTTOM
TP#7 – 0 15m TOPSOIL, 1 35m GRAVEL (0 2m MINUS) 0 8m SAND 0 1m CLAY
TP#8 – 0 4m TOPSOIL, 0 8m CLAY 2 5m GRAVEL (0 25m MINUS) NO BOTTOM
TP#9 – 0 2m TOPSOIL, 3 4m CLAY 0 7m GRAVEL (0 2m MINUS) NO BOTTOM
TP#10 – 0 1m TOPSOIL, 0.2m CLAY 3 4 GRAVEL (0 25m MINUS) NO BOTTOM

NO	DATE	ENG	BY	SUBJECT
				REVISIONS

VERIFY SCALES
BAR IS 20mm ON ORIGINAL DRAWING
0 20mm
IF NOT 20mm ON THIS SHEET ADJUST SCALES ACCORDINGLY

Associated Engineering

PROJECT No	063963-020		
SCALE	AS SHOWN		
DRAWN	S. Kennedy		05/01/18
DESIGNED	S K.		05/01/19
CHECKED			
APPROVED			
DATE		INITIAL	

RED DEER COUNTY

GRAVEL EXPLORATION
SE 32-34-4-5
(THOMPSON)

SITE PLAN

DRAWING NUMBER	REV NO	SHEET
063963-02	1	1 / 1