INLAND AGGREGATES

(a DIVISION OF LEHIGH HANSON MATERIALS LIMITED)

PROPOSED SAND AND GRAVEL MINING OPERATIONS

QUICK EXTRACTION AREA
CALAHOO-VILLENEUVE SAND AND GRAVEL EXTRACTION AREA
CHAPTER IV – EXTRACTION ZONE 4
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1.0 INTRODUCTION

1.1 BACKGROUND

Inland Aggregates (Inland) a division of Lehigh Hanson Materials Limited and Lafarge Canada Inc. (Lafarge) have begun excavating sand and gravel from the area of land designated as the westerly Quick Extraction Area (QEA) in the Calahoo-Villeneuve Sand and Gravel Extraction Area Structure Plan (ASP). A number of specific steps and requirements are outlined in the ASP in terms of how the planning within the QEA must be undertaken from the conceptual plan stage to the detailed mine sequencing plans for each individual mining zone. As outlined in the previous chapters that have been submitted (i.e., Chapter I – Overall Conceptual Reclamation Plan, Chapter II – Initial Infrastructure and Chapter III – Extraction Zone 2) Inland owns and will be mining the majority of the land that makes up Extraction Zone 2 and all of the area that makes up Extraction Zone 4 (Drawing No. 1-3, Chapter I), whereas, Lafarge owns the majority of the area that makes up Extraction Zone 1 and 3 and all of the area that makes up Zone 5 and 6. This particular chapter, Chapter IV – Extraction Zone 4, provides updated information as to how Extraction Zone 4 will be mined and how it will be integrated with the mining that has been proposed and that has already taken place within Extraction Zone 2, and Inland's Youngson Pit located immediately to the south of Extraction Zone 4 within the south half of the S 27-54-27-W4M. This chapter also includes the necessary applications for all additional municipal and provincial authorizations. Extraction Zone 4 is located within the northern half of the S 27-54-27-W4M and the southwest corner of the NW 27-54-27-W4M as shown on Drawing No. 1-13.

1.2 CURRENT AUTHORIZATIONS

A registration application under the *Code of Practice for Pits* (the Code) was submitted to Alberta Environment and Parks (AEP) on November 19, 2010 and on March 9, 2012 a registration was issued (Registration No. 15621-01-00) for the initial infrastructure component associated with the Inland QEA mining area. In addition, a development permit application was also submitted to Sturgeon County on December 2, 2010 and on May 24, 2011 Development Permit No. 305305-10-D0565 was issued for the initial infrastructure. To begin the extraction of gravel within Extraction Zone 2 an updated activities plan was submitted to AEP in July 2012 and on August 23, 2013 the registration was amended (Registration No. 15621-01-02) to allow this activity. As required under the ASP in July 2012 a development permit application was also submitted to Sturgeon County and on September 11, 2012 a development permit was reissued (Permit No. 305305-12-D0279) that allowed mining to be initiated in Extraction Zone 2.

In addition to the updated activities plan that was submitted to AEP in July 2012, on October 5, 2012 a letter was sent to AEP requesting that an interim updated activities plan be authorized to allow Inland to strip the topsoil from Mining Block (MB) 1 and MB 2 along with the topsoil and subsoil material from the 1.6 ha, 3.2 ha and 3.5 ha stockpile areas for reclamation material as shown on Drawing No. 4-17 in the July 2012 submission. This interim updated activities plan was submitted in order to allow Inland to begin stripping reclamation material in the fall of 2012 while allowing AEP sufficient time to properly review and coordinate the July 2012 submission to coincide with the issuance of the *Water Act* authorizations. The above stripping operations were approved under Registration No. 15621-01-01 on November 8, 2012.

Given that the gravel reserves that Inland plan to mine within Extraction Zone 2 are being mined relatively quickly, Chapter IV represents the information that will be required to update the activities plan under the Code with AEP and obtain a new development permit from Sturgeon County.

For pit dewatering activities an application under the *Water Act* was previously submitted with Chapter III and an approval (Approval No. 00315162-00-00) was issued on August 13, 2013 for authorization to drain groundwater from aggregate extraction pits. Although approvals under the *Water Act* were not previously required for end pit waterbodies within this part of the province, given the recent restructuring of AEP it is understood that they may now be needed. Should this be the case, approval applications under the *Water Act* for the end pit waterbody proposed within Extraction Zone 2, the end pit waterbody that will extend from Extraction Zone 4 into the Youngson Pit and the end pit waterbody proposed within the eastern portion of Extraction Zone 4 have been included as part of this report.

1.3 INTENT

Similar to the operations currently being undertaken in Extraction Zone 2, apart from occasionally using a portable screener and crusher to process material within the pit, most of the sand and gravel, and a percentage of the sandy overburden from Extraction Zone 4 will be excavated and trapped as pit run material to Inland's processing plant located along the eastside of Highway 44 in Section 20-54-26-W4M. Mining within Extraction Zone 4 will be initiated within the western part of the zone (MB 10) and the central part of the zone to the west of the CN Railway right-of-way (MB 16) using a two cut system as shown on Drawing 5-13. Mining activities will also include mining out the common property lines between:

a) the road right of way registered to Alberta Transportation under Plan 0021197;

b) the undeveloped road allowance associated with Range Road 273 and the adjacent quarters within Extraction Zone 2, Extraction Zone 4 and Lafarge's Extraction Zone 3;

c) the southern half of the S 27-54-27-W4M and the northern half of the S 27-54-27-W4M (i.e., the common property boundary between Inland's Youngson Pit and Extraction Zone 4); and, the SE 27-54-27-W4M and the NE27-54-27-W4M (i.e., the common property boundary between Extraction Zone 4 and Lafarge's Extraction Zone 6).

Should screening and crushing activities take place they will be integrated with Inland`s ongoing mining operations with the majority of the processed aggregate material being hauled out as it is produced. Other than screening and crushing, and stockpiling activities, no other secondary processing will occur within Extraction Zone 2 or Extraction Zone 4.

Inland intends to operate within Extraction Zone 4 for a maximum of 5 years as stipulated in the ASP and will attempt to reclaim and seed 75% of Extraction Zone 2 as outlined in the textural amendment to the ASP dated May 3, 2007 before they open up and begin mining Extraction Zone 4. To help with meeting this requirement, Inland would request that a 1.64 ha area within the eastern part of Extraction Zone 2 that is physically fragmented from the remainder of this extraction area due to the presence of a large natural

wetland be excluded from Extraction Zone 2 and that it be included as part of Extraction Zone 4 within MB 10 as shown on Drawing No. 5-13.

1.4 REVISIONS TO CHAPTER III – EXTRACTION ZONE 2

Revisions to the plans that were presented in the July 2012 updated activities plan submission that accompanied Chapter III – Extraction Zone 2 include: the removal of a 1.64 ha area along the eastern side of Extraction Zone 2 so that it can be mined in conjunction with Extraction Zone 4; use of a mined out area within Inland's Youngson Pit as a groundwater recharge pond for dewatering activities; enlargement of the proposed end pit waterbody from 4.10 ha to 5.19 ha; mining a percentage of the sandy overburden in addition to aggregate material; and, use of overburden material to the east of MB 9 as a borrow source for reclamation purposes. In addition, as an agreement could not be reached between Alberta Transportation and Inland to mine out part of the road right of way registered to Alberta Transportation under Plan 0021197, this area has been removed from the mine sequencing plan. All other information submitted with Chapter III not discussed in this update will remain as originally described.

2.0 MUNICIPAL REQUIREMENTS

2.1 DEVELOPMENT PERMIT

As mentioned in Section 1.2 a development permit was issued for the initial infrastructure as well as extraction within Extraction Zone 2, however, as outlined in the ASP a new development permit must be issued for each individual extraction zone. An application for a development permit that is specific for Extraction Zone 4 and that addresses the revisions to Extraction Zone 2 as described in Section 1.4 is included in Appendix A. A copy of Development Permit No. 305305-10-D0565 that was issued for the initial infrastructure and a copy of Development Permit No. 305305-12-D0279 that was issued for Extraction Zone 2 is included in Appendix B. Copies of recent Certificates of Title for the areas that fall within Extraction Zones 2 and 4 are included in Appendix C.

2.2 AREA STRUCTURE PLAN AND LAND USE BYLAW AMENDMENT

At the time the ASP was prepared a relatively small 6.17 ha area located along the extreme eastern side of Extraction Zone 4 to the northeast of the CN Railway right-of-way as shown on Drawing No. 4-13 was not included as part of the QEA due to its proximity to the Soetaert residence within the SW 26-54-27-W4M. As this area contains a significant amount of aggregate material, Inland representatives have had discussions with Mr. Soetaert about amending the ASP to include this additional area as part of the QEA and Extraction Zone 4. Mr. Soetaert has indicated he would have no objections to the ASP being amended to allow Inland to mine this area provided the existing treed area remain in place, that sight and sound berm (Berm 4-1) adjacent to the Range Road 272 is constructed as per the requirements outlined in the ASP and access to this portion of Extraction Zone 4 is off of Roadway 6164 EU as shown on Drawing No. 2-13 to 5-13. Although previously submitted to Sturgeon County on January 19, 2016, a copy of the application to redistrict this 6.17 ha area from Agriculture to Specific-Development Control under the Land Use Bylaw and to change the policy area from Agriculture - No Resource Extraction (AG-NRE) to the Quick Extraction Area (QEA) policy area under the ASP has been included in Appendix D for information purposes.

2.3 ROAD USE AGREEMENT

Under Condition No. 16 of Development Permit No. 305305-12-D0279 it is stated that … 'the applicant shall follow the haul route outlined in the report submitted by Aspen Land Group dated July 12th, 2012 as approved by Sturgeon County, Infrastructure Services. The applicant is to enter into a road use agreement, to the satisfaction of Sturgeon County, Infrastructure Services.'

For mining activities to the southwest of the CN Railway right-of-way the haul route will for the most part remain unaltered from what was presented in the July 12th report. Access will continue to be off of Township Road 544 within the southwest corner of the SW 26-54-27-W4M with the haul road then extending west immediately to the south and to the west of Inland's Youngson Pit to Extraction Zone 2 and 4 as shown on Drawing No. 2-13. Although the portion of the haul road to the south and west of the Youngson Pit will remain pretty much unaltered, within the actual extraction zones ongoing internal adjustments to the haul

road will be required as mining proceeds within both zones. Road Use Agreement No. 2015/10 is currently in place for mining activities related to the Youngson Pit and Extraction Zone 2. Inland will enter into a new road use agreement for hauling material out of Extraction Zone 4 if required.

For that portion of Extraction Zone 4 located to the northeast of the CN Railway right-of-way, Roadway 6164 EU will be used to access the pit off of Township Road 544 as shown on Drawing No. 2-13 to 5-13 and as outlined in Chapters I and II. At the time mining commences in this area Inland will either enter into a new road use agreement or apply to have the existing agreement amended to include this new haul road system.

2.4 HOURS OF OPERATION

As outlined in Section 2.4 in Chapter III – Extraction Zone 2 the annual operational period is expected to be from six to seven months (i.e., from spring to fall) or as weather permits. The hours and days of operation that have been approved under Development Permit No. 305305-12-D0279 for stripping, mining, processing and hauling operations within Extraction Zone 2 are outlined in Table 1.

Table 1. Permitted Hours of Operation for Extraction Zone 2	
Activity	**Hours**
Stripping Operations	24 hours/day - 7 days/week (estimated to be a two to three week period three times per summer)
Gravel Trapping	24 hours/day – 7 days/week (during summer months as required)

Although Inland does not have any objections to the above hours and days of operation they would request that for Extraction Zone 2 and Extraction Zone 4 that they be modified and expanded upon as outlined in Table 2.

Table 2. Proposed Hours of Operation for Extraction Zone 2 and 4	
Activity	**Hours**
Stripping Operations	24 hours/day - 7 days/week
Sand and Gravel Extraction	24 hours/day – 7 days/week
Gravel Crushing and Screening	24 hours/day – 7 days/week
Gravel Trapping	24 hours/day – 7 days/week
Gravel Sales	16 hours/day – 7 days/week
Reclamation Activities	24 hours/day – 7 days/week

The proposed hours of operation as outlined in Table 2 will allow for the extraction and reclamation within Extraction Zones 2 and 4 to take place in the respective 4 and 5 year periods as stipulated in the ASP. As outlined in Section 1.3, the majority of the sandy overburden and aggregate material that is mined will be

trapped as pit run material to Inland's processing plant located along the eastside of Highway 44 in Section 20-54-26-W4M. Should there be a need crushing and screening activities within the pit will only be conducted on an occasional basis using a portable crusher.

2.5 DUST MITIGATION PLAN

As outlined under Section 9.2 in Chapter I – Overall Conceptual Reclamation Plan, Inland plan to keep the dust generated from their gravel mining activity to a minimum by implementing such measures as:

- ensuring that all gravel trucks adhere to speed limits of 30 km/hr while in their pits;
- ensuring that all loads of aggregate product sales are tarped;
- implementing dust control abatement measures on surfaces where dust is being emitted as a result of pit development or operations;
- reclaiming all disturbed areas as quickly as possible;
- seeding all long term stockpiles of reclamation material to a grass mix; and,
- ensuring that exposed dust producing areas are kept to a minimum.

2.6 NOISE

2.6.1 NOISE MITIGATION PLAN

In addition to the sight and sound perimeter berms that Inland were required to construct within Extraction Zone 2, Inland will continue to minimize any impacts associated with noise by implementing such measures as:

- ensuring that wherever possible existing stands of trees and shrubbery outside the development area are retained for sound attenuation;
- constructing additional perimeter berms around extraction areas beyond those required in select locations as outlined in the ASP;
- ensuring that trucks hauling aggregate adhere to posted speed limits on all haul roads;
- ensuring that trucks hauling aggregate do not use retarder brakes when near local residents;
- ensuring that back-up alarm systems used by equipment on site are at the minimum decibel levels allowable under Alberta Occupational Health and Safety Guidelines;
- monitoring equipment to ensure that it is working properly and that no noise other than what is considered normal is emanating from the equipment; and
- any other measures recommended by Acoustical Consultants Inc. (ACI) who have been hired by both Inland and Lafarge to develop a noise monitoring program.

2.6.2 NOISE MODELLING REQUIREMENTS

In the ASP it is indicated that the impact of sand and gravel operations on the noise climate in the region of the QEA needs to be established especially with regard to local residents. To establish the existing ambient noise climate it was outlined in the ASP under Table 11-2 Proposed Onsite Monitoring Stations that three strategic locations within the study area should be considered. In the spring of 2010 Inland and Lafarge hired ACI to initiate a noise monitoring program to establish the existing ambient noise climate using the three sites identified in the ASP.

In addition to collecting the above information, ACI have characterized the noise generated from similar mining equipment that is currently used in the Villeneuve area. As required under the ASP this information along with associated trucking activity has been entered into a model in order to predict the noise levels at key residential areas in proximity to the QEA. The model that was generated included the effects of wind and temperature gradients, vegetation and the noise control facilities (i.e., the site and sound berms) that are planned to be constructed by both Inland and Lafarge.

2.7 RECLAMATION OF THE PRECEDING EXTRACTION ZONE

Inland intend to operate within Extraction Zone 4 for a maximum of 5 years as stipulated in the ASP but they will not open up and begin mining this zone until 75% of Extraction Zone 2 has been reclaimed and seeded as outlined in the textural amendment to the ASP dated May 3, 2007. Although Inland is applying for all required municipal and provincial authorizations for Extraction Zone 4 at this time, as outlined in the textural amendment notification an updated reclamation plan will be provided to Sturgeon County and AEP advising them when 75% of Extraction Zone 2 has been reclaimed. To help meet this requirement Inland are requesting that a 1.64 ha area within the northeast corner of Extraction Zone 2 that is physically fragmented from the remainder of this extraction area due to the presence of a natural wetland be considered as part of Extraction Zone 4 as outlined in Section 1.3.

3.0 PROVINCIAL REQUIREMENTS

3.1 ALBERTA ENVIRONMENT AND PARKS *(ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT)*

3.1.1 UPDATED ACTIVITIES PLAN (*CODE OF PRACTICE FOR PITS*)

A registration under the Code (Registration No. 15621-01-00) was issued by AEP for the development of the initial infrastructure under Chapter II on March 9, 2012. On November 8, 2012 the registration was updated to allow soil stripping (Registration No. 15621-01-01) and on August 23, 2013 the registration was updated to allow mining activities within Extraction Zone 2 (Registration No. 15621-01-02). Copies of these three registration documents have been included in Appendix E.

As agreed to with AEP and as required under the Code an updated activities plan is required prior to Inland initiating mining activities in Extraction Zone 4. This report provides supporting information with regard to the updated activities plan and how Extraction Zone 4 can be developed and reclaimed to an equivalent land capability. Updated schedules that form part of the updated activities plan are included in Appendix F.

3.2 ALBERTA ENVIRONMENT AND PARKS *(WATER ACT)*

3.2.1 PIT DEWATERING

To facilitate mining there will continue to be a need to divert pit water from the individual mining blocks during mining operations. As there is a possibility that adjacent groundwater users could be impacted if pit water was diverted offsite to an existing drainage course, pit water will initially be diverted to a mined out area (MB YG1, MB YG2 and MB YG8) within the Youngson Pit as shown on Drawing No. 5-13. Then as mining proceeds from pit to pit, pit water will be diverted into end pit waterbodies or other areas within the pit where end pit waterbodies have been created or overburden material has been removed. Although an approval under the *Water Act* is not normally required for pit dewatering activities, given the regional importance of the aquifer as a domestic water supply within the Villeneuve/Calahoo area, prior to mining activities being initiated within Extraction Zone 2, AEP required Inland to submit an approval application under the *Water Act* for this activity. On August 13, 2013 Approval No. 00315162-00-00 was issued for authorization to drain groundwater from aggregate extraction pits within both Extraction Zones 2 and 4.

3.2.2 END PIT WATERBODIES

Although approvals under the *Water Act* were not previously required for end pit waterbodies within this part of the province, given the recent restructuring of AEP it is understood that they may now be required. Should this be necessary an approval application under the *Water Act* for the end pit waterbody proposed within Extraction Zone 2, the end pit waterbody that will extend from Extraction Zone 4 into the Youngson Pit and the end pit waterbody proposed towards the eastern side of Extraction Zone 4 has been included in Appendix G.

3.3 ALBERTA CULTURE AND TOURISM *(HISTORICAL RESOURCES ACT)*

3.3.1 HISTORIC RESOURCES

As outlined under Section 2.11 in Chapter I – Overall Conceptual Reclamation Plan, Alberta Culture and Tourism (formerly Alberta Tourism, Parks, Recreation and Culture) have conducted a review of the area proposed to be mined and have indicated that a Historical Resources Impact Assessment is not required. A letter of clearance from Alberta Culture and Toursim dated July 10, 2007 is included in Appendix C of Chapter I.

4.0 EXISTING CONDITIONS

4.1 TOPOGRAPHY AND SURFACE DRAINAGE

The majority of the pit area within Extraction Zone 2 including the 3.2 ha area that is currently being used as a stockpile site for reclamation material would have sloped towards the intermittent drainage course within the western part of the mining zone or towards the wetland located along the eastside of the mining zone. The intermittent drainage course slopes mildly to the north as does the drainage system associated with the wetland. Although water would only appear to flow out of the wetland during abnormally wet periods, an outlet is present at the north end. Drainage from the wetland flows north and then northwest to the intermittent drainage course. The total drop in relief from south to north is approximately 11 m (i.e., from approximately 691.0 m at the south end of the property to 680.0 m at the north end of the property).

As shown on Drawing No. 3-13, the majority of the area within the western part of Extraction Zone 4 located to the southwest of the CN Railway right-of-way is well drained. Currently a small area slopes to the west or south towards the wetland located along the eastside of Extraction Zone 2 and within the southwest corner of the SW 27-54-27-W4M. The remainder of Extraction Zone 4 located to the southwest of the CN Railway right-of-way slopes mildly to the north or northeast towards the railway and an intermittent drainage course that crosses the eastern side of the SE 27-54-27-W4M. Within this part of Extraction Zone 4, the total drop in relief from the high point towards the southwest side of the zone to the southeast corner of the zone is approximately 6.0 m (i.e., from approximately 688.0 m to approximately 682.0 m).

The area within Extraction Zone 4 that is located to the northeast of the CN Railway right-of-way is also well drained and slopes to the east towards an intermittent drainage course that crosses the northeast corner of the SE 27-54-27-W4M. The total drop in relief from the higher area within the western part of this portion of Extraction Zone 4 to the lower area along the eastern side of the zone is approximately 7.0 m (i.e., from approximately 682.0 m to approximately 675.0 m).

4.2 SOILS

The soils within Extraction Zone 4 are mainly comprise of Eluviated Black Chernozems of the Malmo series and Orthic Dark Gray Chernozems of the Mico series. Topsoil depths of these soils range from 10 – 30 cm with textures ranging from loam to silty clay loam as described in the “Soils Series Information for Reclamation Planning in Alberta Vols. 1 and 2”.

A pre-disturbance assessment was conducted by Aspen on June 1, 2012 for the area located within Extraction Zone 4. This soil assessment was conducted using a grid which meets the requirements of a survey intensity level (SIL) of one soil inspection site per five hectares (SIL 1) (Mapping System Working Group, 1981) for a total of 12 assessment points. Based on this assessment it was concluded that the depth of topsoil ranged from 12 cm to 35 cm with an average depth of 22 cm and textures ranging from loam to silty loam. The depth of the subsoil ranged from 29 cm to 53 cm with an average depth of 40 cm and a clay loam texture. For more detailed information with regard to the pre-disturbance assessment that was conducted on

June 1, 2012 please refer to Appendix H ((Soil Assessment for Extraction Zone 4 (letter report dated June 15, 2012)).

4.3 AGRICULTURAL CAPABILITY

The CLI capability for agriculture within the majority of the area within the western part of Extraction Zone 4 is predominantly Class 2 and 3 with subclass S and O limitations while the CLI capability for agriculture within the majority of the area within the eastern part of Extraction Zone 4 is mainly Class 2 and O with subclass W limitations. Soils that are rated as Class 2 have moderate limitations that restrict the range of crops or require special conservation practices while soils that are rated as Class 3 have moderately severe limitations that restrict the range of crops or require special conservation practices. Soils that are rated as Class O have not been placed in a capability class. Subclass S is comprised of soils with a combination of subclasses while subclass W denotes excess water.

4.4 GEOLOGY

As described in Section 5.1 in the ASP and Section 2.5 in Chapter I – Overall Conceptual Reclamation Plan the bedrock geology consists of a series of sandstones, shales and coal beds of the Late Cretaceous age known as the Wapti Formation. A major preglacial valley, the Onoway Channel, extends east from the Calahoo area through the QEA and eventually southward to join the Beverly Valley west of the City of St. Albert. The sands and gravels associated with this preglacial valley were subsequently buried by glacial and post glacial sediments. The lower sand and gravel deposits of this valley range from 0 to 15 m in thickness and it is this lower deposit that overlies the shale bedrock that is being removed for aggregate production.

4.5 STRATIGRAPHY

Drawing No. 6-13 to 12-13 depict the surface conditions and the stratigraphy within Extraction Zone 4. Based on available soil and test hole information the average depths within this particular part of the QEA are outlined in Table 3. Aggregate test hole information can be provided upon request.

Table 3. Stratigraphy

Material	**Average Depth**
Topsoil	0.22 m
Subsoil	0.40 m
Clayey Overburden	7.0 m
Sandy Overburden	6.0 m
Sand and Gravel	8.0 m

4.6 GROUNDWATER

Based on the Groundwater Assessment completed by Westwater and other hydrogeologists that have completed work in the Calahoo/Villeneuve area, it has been determined that the groundwater gradient is in

an east to northeast direction with the main aquifer found in the lower sand and gravel deposits of the Buried Onoway Valley overlying shale bedrock. For more information pertaining to groundwater and the possible effects the proposed sand and gravel pit could have on the local groundwater regime, refer to the December 2011 report prepared by Westwater entitled 'Groundwater Assessment for the Quick Extraction Area' that was included in Appendix D of Chapter III – Extraction Zone 2.

4.7 PHASE 1 ENVIRONMENTAL SITE ASSESSMENTS

There are two abandoned wellsites located within Extraction Zone 4. The first wellsite that is located within 05-27-54-27-W4M is licenced to Union Oil Company of California while the second wellsite that is located within 07-27-54-27-W4M is licenced to TAQA North Ltd. To determine if there was any potential for soil contamination within the areas surrounding these wellsites, Phase I Environmental Site Assessments (ESA) were conducted. Based on the results of these Phase I ESA's it was concluded that there would be a very small likelihood that the area around either wellsite would have been contaminated as a result of drilling activity with the environmental liability associated with these activities considered low. Copies of the Phase I ESA's for these two wellsites are included in Appendix I.

4.8 VEGETATION

Extraction Zone 4 is located within the Dry Mixedwoods Subregion of Alberta. The dominant native vegetation of the Dry Mixedwoods Subregion is aspen forests with fens commonly occurring in low-lying areas (Natural Regions Committee, 2006). Sites of average moisture and nutrients in the southern portion of the Dry Mixedwoods Subregion typically support understories of beaked hazelnut, prickly rose, wild sarsaparilla, cream-coloured vetchling, purple peavine and bluejoint. Poorly drained sites support a variety of bog and fen communities with treed and shrubby fens being the most common. Moist, rich sites typically host balsam poplar, aspen poplar and white spruce stands, either as pure or mixed stands. Cultivated landscapes are typical throughout this region.

The majority of the area within Extraction Zone 4 is currently used for cultivation. The only areas that are not used for this purpose is a 7.69 ha treed area within the southwest corner of the NW 27-54-27-W4M, a 1.28 ha treed area along the undeveloped road allowance associated with Range Road 273 and a 0.24 ha treed area within the northwest corner of the SE 27-54-27-W4M along the northeast side of the CN Railway right-of-way. To prevent disruption to nesting birds, tree clearing activities will try to be avoided between April 15th and August 31st to avoid contravention with the *Migratory Birds Convention Act*. Should clearing activities need to be conducted within this time period, a survey will be conducted by a professional biologist to determine if any nesting birds are present.

5.0 PROJECT DESCRIPTION

5.1 PRESENT CONDITIONS

As described in the preceding section and as shown on Drawing No. 4-13, the majority of the area within Extraction Zone 4 is currently used for cultivation apart from three treed areas amounting to approximately 9.21 ha. Based on the mapping provided by Abacus Datagraphics Ltd. and the Alberta Energy Regulator, two abandoned wellsites are located within Extraction Zone 4 as shown on Drawing No. 4-13 and as described in Section 4.7. The undeveloped road allowance associated with Range Road 273 currently forms the boundary between Extraction Zones 2 and 4 while the CN Railway right-of-way splits Extraction Zone 4 into two parts as shown on many of the plans provided in Appendix J. An existing residence that Inland own and are currently renting is located within the southwest corner of the NW 27-54-27-W4M. This residence will be removed at the time mining begins to approach this part of Extraction Zone 4.

5.2 PIT ACCESS

As outlined in Section 2.3, for mining activities to the southwest of the CN Railway right-of-way, the haul route will for the most part remain unaltered from what was presented in the July 2012 Chapter III – Extraction Zone 2 application. Access will continue to be off of Township Road 544 within the southwest corner of the SW 26-54-27-W4M with the haul road then extending west immediately to the south and to the west of Inland's Youngson Pit to Extraction Zone 2 and 4 as shown on Drawing No. 2-13, 4-13 and 5-13. Although the portion of the haul road to the south and to the west of the Youngson Pit will remain pretty much unaltered, within the actual extraction areas ongoing internal adjustments to the haul road will be required as mining proceeds within both zones. For the portion of Extraction Zone 4 located to the northeast of the CN Railway right-of-way, Roadway 6164 EU will be used to access the pit off of Township Road 544 as shown on Drawing No. 2-13, 4-13 and 5-13 and as outlined in Chapters I and II.

5.3 PERIMETER AND SURFACE DIVERSION BERMS

Details with respect to how the perimeter berms for Extraction Zone 2 (Berms 2-1 to 2-7) were constructed are described in Section 4.1, Chapter II – Initial Infrastructure as well as Section 5.4, Chapter III – Extraction Zone 2. The only perimeter berm identified in the ASP as being required for Extraction Zone 4 is Perimeter Berm 4-1 that will need to be constructed along the west side of Range Road 272 as shown on Drawing No. 4-13 and 5-13. As outlined in Chapter II this berm will be left in place following mining and will be integrated with the adjacent forested area to the north to form upland habitat. To achieve the above the berm will have side slopes of 3:1, a height of approximately 5 m above original ground, a 4 m top, a 34 m base and a length of 270 m. Overburden material from MB 23 will be used to construct the berm with both topsoil and subsoil from beneath the berm being placed on top of the berm in order to reconstruct the soil profile. The berm and the area immediately adjacent to the berm and the end pit waterbody will be seeded with a native seed mix specifically tailored for the soil and moisture conditions. In addition, trees will be planted on the berm to aid in creating upland habitat and to provide a visual barrier to mining operations once they are initiated within this part of the pit.

As outlined in Section 5, Chapter II – Initial Infrastructure, to prevent the run in of contaminants into the pit where gravel will be extracted it is a requirement in the ASP that surface diversion berms be constructed along the CN Railway right-of-way and major roadways. During operations a surface water diversion berm approximately one metre in height, with a top width of one metre and 1:1 side slopes will be constructed along the southwest side of the CN Railway right-of-way as shown on Drawing No. 5-13.

5.4 UNDISTURBED BUFFERS, PIT FACES AND EXTRACTION SETBACKS

To minimize the risk of pit operations affecting the right-of-way associated with Roadway 6164EO and the CN Railway, a 3 m undisturbed property line buffer will be maintained along these property boundaries as shown on Drawing No. 6-13 to 12-13. The remainder of the common property boundaries will be mined out. These include the common property lines between:

a) the road right of way registered to Alberta Transportation under Plan 0021197;

b) the undeveloped road allowance associated with Range Road 273 and the adjacent quarters within Extraction Zone 2, Extraction Zone 4 and Lafarge's Extraction Zone 3;

c) the south half of the S 27-54-27-W4M and the north half of the S 27-54-27-W4M (i.e., the common property boundary between Inland's Youngson Pit and Extraction Zone 4); and, the SE 27-54-27-W4M and the NE 27-54-27-W4M (i.e., the common property boundary between Extraction Zone 4 and Lafarge's Extraction Zone 6).

Agreements to mine through the common property boundaries that Inland have entered into with Lafarge and Alberta Transportation will be provided upon request.

If a portion of the pit should become inactive for more than two years, the pit faces will be re-sloped to 3:1 to ensure public safety and to avoid the potential loss of reclamation material due to erosion or slumping. As an average depth of approximately 7.0 m of clayey overburden material is available for back-sloping purposes, extraction setbacks will not be required to achieve the reclamation initiatives as described in Section 6.0.

5.5 TOPSOIL, SUBSOIL AND OVERBURDEN SALVAGE

Unless constrained by undisturbed buffer zones or in situations where common property boundaries are intended to be mined out, during future topsoil and subsoil stripping operations a minimum pre-stripped buffer of 5 m and 3 m respectively will be maintained in front of all pit faces. The integrity of the topsoil, subsoil and overburden stockpiles will be maintained by leaving a 3 m separation distance between these stockpiles as well as all product stockpiles. Topsoil stockpiles will be placed on un-stripped or replaced topsoil, subsoil on un-stripped or replaced subsoil and overburden on un-stripped overburden, replaced overburden or aggregate material. All stockpiles of reclamation material will be placed in stable locations that are at least 5 m from the edge of any pit faces.

Topsoil and subsoil stripping operations will be suspended during wet or partially frozen conditions. In order to limit terrain disturbance and soil structure damage, soil salvage operations will only resume when conditions improve.

5.6 DEWATERING METHODOLOGY AND AQUIFER RE-ESTABLISHMENT

Sand and gravel deposits associated with the pre-glacial Buried Onoway Valley underlie the property. To facilitate future mining there will continue to be a need to divert pit water from the individual mining blocks during mining operations. As there is a possibility that adjacent groundwater users could be impacted if pit water was diverted offsite, all pit water will be retained onsite as required in the ASP under Section 11.1.3 Groundwater Management. For the immediate future pit water will continue to be diverted to the groundwater recharge pond located within MB 5 and a mined out area within the Youngson Pit as described in Section 3.2.1. Once mining has been completed to a stage where mining operations impact the groundwater recharge pond in MB 5, pit dewatering will then be diverted to the mined out area within the Youngson Pit or other areas within the pit where end pit waterbodies have been created or overburden material has been removed. When operations are initiated within MB 23, CN Railway will be contacted to determine if pit water can be pumped using a flexible hose through an existing 900 mm culvert under the railway as shown on a number of the drawings provided in Appendix J to the mined out area in the Youngson Pit. Should this be unacceptable Inland will approach CN Railway to conduct a horizontal directional drill under the railway to install a standalone pipe for pit dewatering purposes.

Given this method of handling pit water, it is expected that the impact on the groundwater regime will be localized to just the immediate area adjacent to the area being dewatered. To maintain the hydraulic continuity of the lower sand and gravel aquifer as required under Section 11.1.3 of the ASP, a minimum of one metre of sandy overburden or reject sand will be placed in the bottom of the pit.

5.7 SITE PREPARATION

Given that most of the pit infrastructure was developed for the current mining operations in Extraction Zone 2 and as all reclamation material can now start being direct placed to either mined out areas in Extraction Zone 2 or the Youngson Pit, minimal preparation will be required to initiate mining operations in Extraction Zone 4. The only significant work that will be required will be the construction of Perimeter Berm 4-1 and adjustments to the internal haul roads that currently cross MB 10. Perimeter Berm 4-1 and the surface diversion berm will be constructed as outlined in Section 5.4 and all topsoil and subsoil from the haul road alternations will either be salvaged and stockpiled separately or direct placed to mined out areas in Extraction Zone 2.

5.8 MEASURES TO CONTROL DUST, WIND AND WATER EROSION

Mitigation measures to control dust, wind and water erosion are listed in Sections 9.2 and 9.3 in Chapter I – Overall Conceptual Reclamation Plan.

5.9 ENVIRONMENTAL MANAGEMENT PLAN

To minimize the impact on the environment, Inland plan to strictly implement a number of environmental management practices during the operation and the reclamation of the pit. These environmental management practices will include such things as:

- spill kits will be available on site;
- construction of a designated fueling/maintenance/equipment storage area(s) on undisturbed or compacted clayey overburden that include bermed edges for containment;
- use of double wall fuel storage tanks;
- properly storing and regularly hauling any industrial waste generated at the pit to an approved municipal or class II landfill;
- properly collecting and regularly hauling all sanitary waste to an approved wastewater treatment facility;
- development of an active weed control program that will include mowing, hand pulling, spot spraying, seeding stockpiles of reclamation material, etc. to prevent the initial establishment of weeds;
- proper application of herbicides; and
- ensuring that no herbicides, pesticides or any other hazardous substance will be stored onsite.

An assortment of Inland guidelines and policies will be used to address these issues and others.

5.10 DEVELOPMENT AND MINE SEQUENCING PLAN

In total 17 mining blocks averaging approximately 4.2 ha have been proposed for Extraction Zone 4 as shown on Drawing No. 5-13. The 13 mining blocks that have been proposed to the southwest of the CN Railway right-of-way will be mined in a counter clockwise direction using a two cut system with MB 10 to MB 15 representing the mining blocks in the first cut and MB 16 to MB 22 representing the mining blocks in the second cut. The last two mining blocks within each cut (i.e., MB 14 and MB 15 within the first cut and MB 21 and MB 22 within the second cut), as well as MB 13 1nd MB 17 and the northern portions of MB YG2, MB YG7 and MB YG8 within the Youngson Pit will form the majority of the area for the proposed 23.95 ha waterbody. The four mining blocks that have been proposed to the northeast of the CN Railway right-of-way will generally be mined from west to east with one 5.44 ha end pit waterbody being created within the central part of this extraction zone.

When mining is initiated in MB 10 and MB 16 of Extraction Zone 4, all overburden will be direct placed to mined out areas immediately to the south within the Youngson Pit upon placement of a minimum of one metre of sandy overburden or reject sand in the bottom of the pit. All topsoil and subsoil from MB 10 and

MB 16 will more than likely be direct placed to finalize reclamation within Extraction Zone 2, however, some of this material may also be direct placed to finalize reclamation within the Youngson Pit. In general portions of the Youngson Pit and Extraction Zone 4 will be mined and reclaimed concurrently. This will include an exchange of reclamation material between the two pits in order to provide positive drainage to the proposed 23.95 ha waterbody as shown on Drawing No. 8-13 to 13-13.

With the exception of the overburden that was previously used to construct Perimeter Berm 4-1, when mining operations are initiated along the northeast side of the CN Railway right-of-way within Extraction Zone 4 there will be a need to stockpile all the reclamation material from the initial mining block (MB 23). Once mining proceeds to MB 24 all the overburden from this mining block will be direct placed into MB 23 along with all the overburden that was previously stockpiled from MB 23. As with all mining in the Villeneuve area once the gravel has been removed from a mining block a minimum of one metre of sandy overburden or reject sand will be placed in the bottom of the pit as a means of reestablishing the aquifer. Within this part of Extraction Zone 4 subsoil will start being direct placed within MB 23 when mining progresses to MB 25 while topsoil will start being direct placed when mining progresses to MB 26. Once mining is complete a 5.44 ha end pit waterbody will form part of the reclaimed landscape as shown on Drawing No. 13-13.

6.0 CONSERVATION AND RECLAMATION PLAN

The objective in terms of reclamation will be to ensure that all the disturbed areas associated with sand and gravel mining activities are reclaimed back to an equivalent land capability. Both Extraction Zones 2 and 4 will be reclaimed back to an agricultural end land use that will be suitable for growing cereal crops. The reclaimed landscape will also include three end pit waterbodies with one that will extend into Inland's Youngson Pit, two pre-treatment waterbodies, one wetland area and a landscaped berm as shown on Drawing No. 13-13.

6.1 DIRECT PLACEMENT OF RECLAMATION MATERIAL

As discussed in Section 5.11 Inland is currently at a point with their mining operations in Extraction Zone 2 where all reclamation material can start being direct placed. Although they will not need to stockpile any reclamation material for the proposed mining operations within the part of Extraction Zone 4 that is located to the southwest of the CN Railway right-of-way, stockpiling of reclamation material will eventually be required when operations are initiated within that part of Extraction Zone 4 that is located to the northeast of the railway.

6.2 DESIGN OF WATERBODIES

As shown on Drawing No. 13-13, one end pit waterbody will form part of the reclaimed landscape within Extraction Zone 2 while two end pit waterbodies with one that will extend into Inland's Youngson Pit will form part of the reclaimed landscape in Extraction Zone 4. Based on the water levels recorded in the monitoring wells installed within and adjacent to the QEA the approximate full supply levels (FSL) for the proposed end pit waterbodies are estimated to be approximately 677.6 m for the 5.19 ha end pit waterbody within Extraction Zone 2, approximately 677.0 m for the 23.95 ha end pit waterbody located within the western side of Zone 4 and the Youngson Pit, and approximately 676.5 m for the 5.44 ha end pit waterbody proposed towards the eastern side of Extraction Zone 4. For the most part standard slopes of 5:1 one metre above and one metre below the FSL will be constructed around the edges of the waterbodies.

Two small shallow pre-treatment waterbodies as described in Section 4.1 in Chapter 1 – Overall Conceptual Plan will also be constructed within the replaced clayey overburden between the northern side of the proposed end pit waterbody and southwestern side of the CN Railway right-of-way in the western part of Zone 4. These pre-treatment waterbodies will not be hydraulically connected to the aquifer. They will be approximately 0.5 ha in size, reclaimed with 5:1 side slopes and are only expected to contain water during spring runoff or prolonged periods of rainfall. These waterbodies will be strategically located to collect and pre-treat any surface water that may originate from the railway prior to it flowing south into the end pit waterbody. A pre-treatment waterbody was also considered for the end pit waterbody proposed within the eastern part of Extraction Zone 4 but was considered unwarranted due to the prominent ditches associated with the railway and Roadway 6164 EU.

A *Water Act* application has been prepared and is included in Appendix G for the construction of the 5.19 ha

end pit waterbody (Waterbody A) in Extraction Zone 2, the 23.95 ha end pit waterbody (Waterbody B) that will be partially constructed within both Extraction Zone 4 and the Youngson Pit, and the 5.44 ha waterbody (Waterbody C) located towards the eastern side of Extraction Zone 4. The net evaporative loss calculations for the three waterbodies are shown in Table 4. Based on these calculations it has been determined that all three waterbodies will be net discharge points.

Table 4. Net Evaporative Loss Calculations for End Pit Waterbodies within Extraction Zones 2 and 4

Full Supply Level	Average Depth	Catchment Area	Net Evaporative Loss[1]	Runoff into Waterbody[2]	Result
5.19 ha Waterbody (Waterbody A) – Extraction Zone 2					
677.6 masl	8 m	4.2 ha	= 51,900 m^2 x (637.5 mm - 525 mm) / 1,000 = 5,838.8 m^3	= 4.2 ha x 0.01 x 35 dam^3/km^2 x 1000 = 1,470 $dams^3$	Net discharge point
23.95 ha Waterbody (Waterbody B) – Extraction Zone 4					
677.0 masl	11 m	49.2 ha	= 239,500 m^2 x (637.5 mm - 525 mm) / 1,000 = 26,943.8 m^3	= 49.2 ha x 0.01 x 35 dam^3/km^2 x 1000 = 17,220 $dams^3$	Net discharge point
5.44 ha Waterbody (Waterbody C) – Extraction Zone 4					
676.5 masl	12 m	8.7 ha	= 54,400 m^2 x (637.5 mm - 525 mm) / 1,000 = 6,120 m^3	= 8.7 ha x 0.01 x 35 dam^3/km^2 x 1000 = 3,045 $dams^3$	Net discharge point

[1] Calculations for evaporation are based on Alberta Environment and Parks 2005 Evaporation and Precipitation Maps.

[2] Calculations for runoff are based on the PFRA "Annual Unit Runoff Map" for 50% Probability of Exceedance.

6.3 CONTOURING AND SOIL REPLACEMENT

The objective in terms of reclamation is to ensure that the disturbed lands resulting the operation of the pit are reclaimed to an equivalent land capability. As the CLI capability for agriculture is predominantly Class 2 and 3, all internal slopes apart from those associated with the waterbodies will be re-contoured to 20:1 or gentler apart from the slope along the south side of the 5.19 ha waterbody within Extraction Zone 2. The reconstructed slopes within this part of the pit will be reclaimed to 7:1 to match the pre-disturbance embankment slopes along the intermittent drainage course as shown on Drawing No. 3-13 and 6-13. Reconstructed slopes adjacent to property lines and environmental buffers will be 3:1 or gentler.

Apart from the reclamation material that was required to construct Perimeter Berm 4-1, as is the current case with Extraction Zone 2, all salvaged topsoil, subsoil and overburden material within Extraction Zone 4

will be used for reclamation purposes. Prior to the placement of topsoil and subsoil, any areas exhibiting compaction will be alleviated. It is expected that the minimum replacement depth for topsoil and subsoil within Extraction Zone 4 will be in the range of 0.18 m and 0.32 m respectively.

6.4 REVEGETATION

Upon completion of mining within Extraction Zone 2 the landscape will be reclaimed to cultivation and integrated with the crop rotation apart from the one 5.19 ha end pit waterbody that will be designed for agricultural use and the one 0.35 ha wetland that will be designed for waterfowl/wildlife habitat. Upon completion of mining in Extraction Zone 4 the landscape will also be reclaimed to cultivation and integrated with the crop rotation apart from the one 23.95 ha end pit waterbody that extends into the Youngson Pit, the 5.44 ha end pit waterbody located towards the eastern side of Extraction Zone 4, the two small pre-treatment waterbodies and Perimeter Berm 4-1. The two end pit waterbodies within Extraction Zone 4 will be designed for agricultural use.

7.0 SECURITY

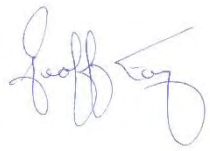
To cover the reclamation liability associated with the infrastructure and mining within Extraction Zone 2, financial security was posted in the amount of $1,692,197.40 with AEP. As Inland is following the mine sequencing and reclamation plan as presented in Chapter III – Extraction Zone 2 and are now beginning to direct place all reclamation material, the security that was provided at the time Registration No. 15621-01-02 was issued is still applicable. At the time Inland notifies Sturgeon County and AEP that 75% of Extraction Zone 2 has been reclaimed as required under the May 3, 2007 textural amendments to the ASP, an updated security estimate will also be provided. It is anticipated, however, that the financial security that was initially posted will be significantly higher than the amount required to cover the remaining reclamation liability for Extraction Zone 2 and the maximum reclamation liability envision for Extraction Zone 4. Refer to Section 7.0 Chapter III - Extraction Zone 2 for the detailed security estimate and Schedule 3 under the Code.

8.0 LIMITATIONS

This report has been prepared for the sole benefit of Inland Aggregates (Inland) a division of Lehigh Hanson Materials Limited. This document may not be used by any other person or entity without the expressed written consent of Aspen Land Group Inc. and Inland Aggregates (Inland) a division of Lehigh Hanson Materials Limited with the exception of Sturgeon County, and Alberta Environment and Parks. Any use of this report by a third party, or any reliance on decisions made based on it, or damages suffered as a result of the use of this report are the sole responsibility of the user.

The information and conclusions contained in this report are based upon work undertaken by trained professionals and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgment of Aspen Land Group Inc. based on the data obtained during the assessment and provided by Inland Aggregates (Inland) a division of Lehigh Hanson Materials Limited. Due to the nature of the assessment and the data available, Aspen Land Group Inc. cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be considered legal advice.

Prepared by:



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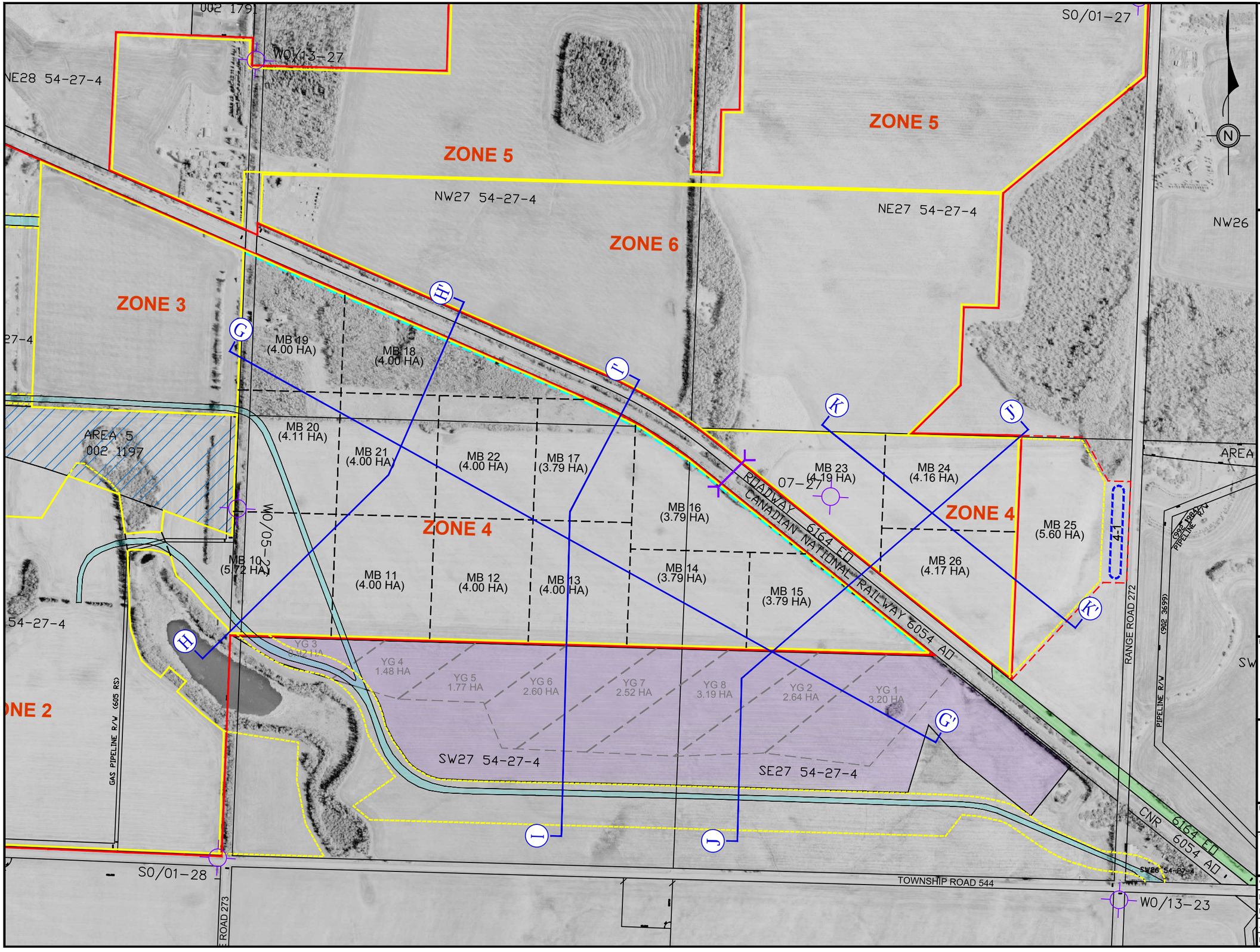
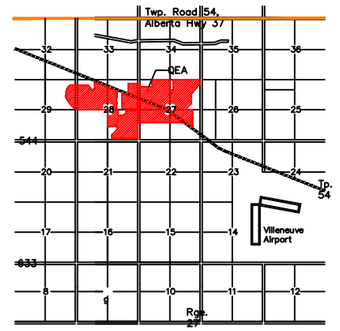




LOCATION PLAN

LEGEND

- PROPERTY LINE
- QEA BOUNDARY
- ADDITIONAL QEA BOUNDARY
- PIT BOUNDARY
- ADDITIONAL PIT AREAS
- PROPOSED PERIMETER BERM 4 - 1
- SURFACE WATER DIVERSION BERM
- INTERNAL HAUL ROAD
- ADDITIONAL HAUL ROAD FOR ZONE 4
- FUTURE TRANSPORTATION PIT
- ASP AMENDMENT (6.17 HA)
- INLAND ADDITIONAL MINING AREA (5.39 HA)
- YOUNGSON PIT
- CULVERT
- ABANDONED WELLSITE

Prepared By

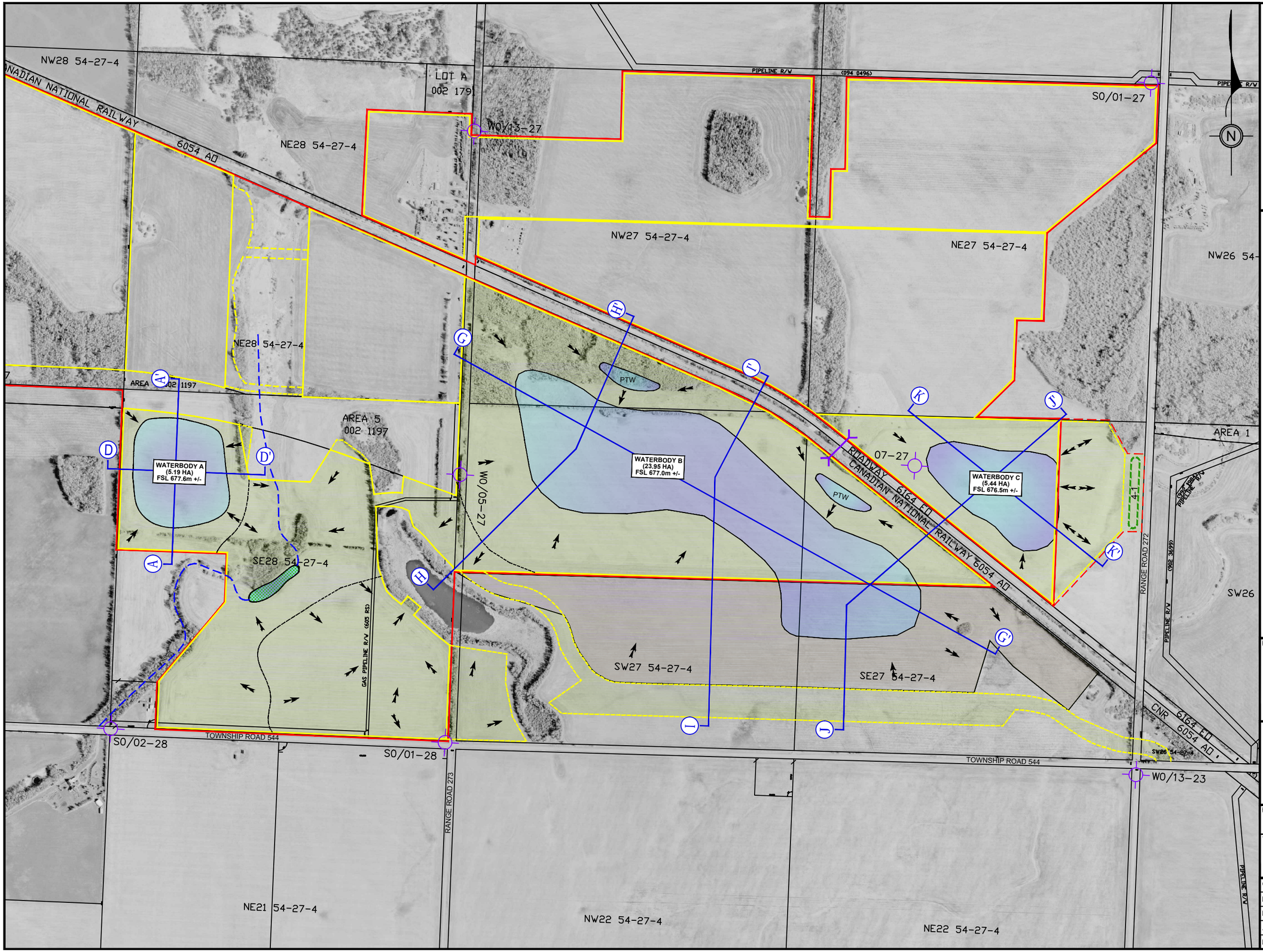
ASPEN LAND GROUP INC.

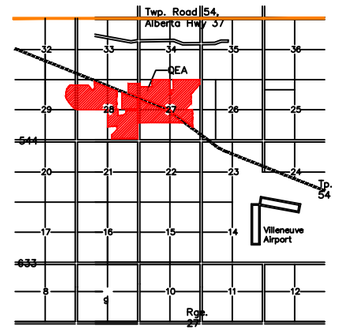
INLAND
HEIDELBERGCEMENT Group
A DIVISION OF LEHIGH HANSON MATERIALS LIMITED

Project
QEA EXTRACTION ZONE 4

Title
MINE SEQUENCING PLAN

Checked By:	M. CORRY & G. FOY	Scale:	1: 6500
Designed By:	T. FOY & G. FOY	Drawing No.	5 - 13
Drawn By:	T. FOY		
Air Photo:	2012		
DATE:	FEB. 29, 2016		





LOCATION PLAN

LEGEND

- PROPERTY LINE
- QEA BOUNDARY
- ADDITIONAL QEA BOUNDARY
- PIT BOUNDARY
- ADDITIONAL PIT AREAS
- INTERMITTENT DRAINAGE COURSE
- PROPOSED PERIMETER BERM 4 - 1
- YOUNGSON PIT
- CULTIVATION
- SHALLOW WETLAND (0.35 HA
- CULVERT
- ABANDONED WELLSITE
- PTW — PRE-TREATMENT WATERBODY
- DRAINAGE ARROWS

Prepared By

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Project

QEA EXTRACTION

Title

RECLAMATION PLAN

Checked By:	M. CORRY & G. FOY	Scale:	1: 8500
Designed By:	T. FOY & L. FOY	Drawing No.	13 - 13
Drawn By:	T. FOY		
Air Photo:	2012		
DATE:	FEB. 24, 2016		