BY-LAW NUMBER 2011/08

BY-LAW NO. 2011/08 is a by-law of the County of Wetaskiwin No. 10 in the Province of Alberta, to authorize the adoption of an Area Structure Plan for the purpose of providing a framework for subsequent subdivision and development of the area known as Cowles' Landing in Lot B, Plan 002 0956, (NE 2-47-28-W4M) and N ½ of NW 1-47-28-W4M in accordance with Section 633 of the Municipal Government Act, Chapter M-26.1, Revised Statutes of Alberta 2000, and amendments thereto.

WHEREAS: at the requirements of County Council, an Area Structure Plan has been prepared for Lot B, Plan 002 0956, (NE 2-47-28-W4M) and N ½ of NW 1-47-28-W4M

AND WHEREAS: the proposed Area Structure Plan has been widely circulated and discussed within the County pursuant to Section 230, 606(1), and 633(1) of the Municipal Government Act, 1994, Chapter M-26.1, and amendments thereto.

NOW THEREFORE: the County of Wetaskiwin No. 10, duly assembled, hereby enacts as follows:

1. The document attached to this By-law as "Appendix A", together with accompanying maps, is hereby adopted as the *"Cowles' Landing" in Lot B, Plan 002 0956, (NE 2-47-28-W4M) and N ½ of NW 1-47-28-W4M"*.
2. Cowles' Landing Area Structure Plan By-law 2005/43 is hereby rescinded and replaced by the Area Structure Plan, dated March 23, 2011.
3. This by-law comes into effect on the date of third reading.

READ: A First time this 14 day of April, A.D., 2011.

READ: A Second time this 14 day of April, A.D., 2011.

READ: A Third time and finally passed this 5 day of May, A.D., 2011.

REEVE

SECRETARY-TREASURER

By-law 2011/08
"Appendix A"
Cowles' Landing Area Structure Plan

Cowles' Landing

AREA STRUCTURE PLAN

COUNTY OF WETASKIWIN NO. 10

Prepared by:
Focus Corporation

020100591-110
May 2011

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LIST OF FIGURES

1.0 INTRODUCTION

1.1 Background

The proposed development of Cowles' Landing is situated along the eastern shore of Pigeon Lake approximately 0.5 km south from the Summer Village of Silver Beach **(Figure 1)**. The land was originally purchased by the Cowles family in 1921 and was subdivided into its current configuration in 1999. Pigeon lake is a popular fresh water lake vacation destination with many sandy beaches, cabins, resorts and retreats just 50 minutes south-west of Edmonton, Alberta.

The Cowles Landing Area Structure Plan (ASP) was originally approved under Bylaw 2005/43 on July 7, 2005. At that time Council included a number of conditions which needed to be met with the implementation of the plan. Originally, the ASP Plan area included two landowners who intended to develop the Plan area together. Since the owner of the northern Lot A passed away prior to any development proceeding, the estate has expressed a strong desire to remain undeveloped and has requested that Lot A, Plan 002 0956 be removed from the ASP. The owner of the southerly Lot B Plan 0020956 still wishes to proceed with development. This ASP reflects the change in Plan area.

1.2 Purpose

The objective of the Cowles' Landing Area Structure Plan (ASP) is to provide a framework for development of a lakeside residential Bareland Condominium community, including two park areas on the eastern and western edges of the development that are compatible with the natural setting of the area. The Plan is based on policy direction from the County of Wetaskiwin No. 10 Municipal Development Plan, Land Use Bylaw, and Pigeon Lake Watershed Management Plan. It will specify future land uses, residential density patterns, population density, environmental and municipal reserve requirements, transportation and utility requirements in accordance with the policies set out by the above documents and to County of Wetaskiwin standards. See Section **9.0 Development Statistics** for the breakdown of the preliminary development statistics.

The purpose of this document is to:

- Provide a comprehensive document outlining the planning and design goals for the Cowles' Landing Area Structure Plan;
- Establish the objectives and principles to guide the land use and character of the development;
- Provide a transportation plan; and
- Identify a servicing and stormwater system for the Plan area.

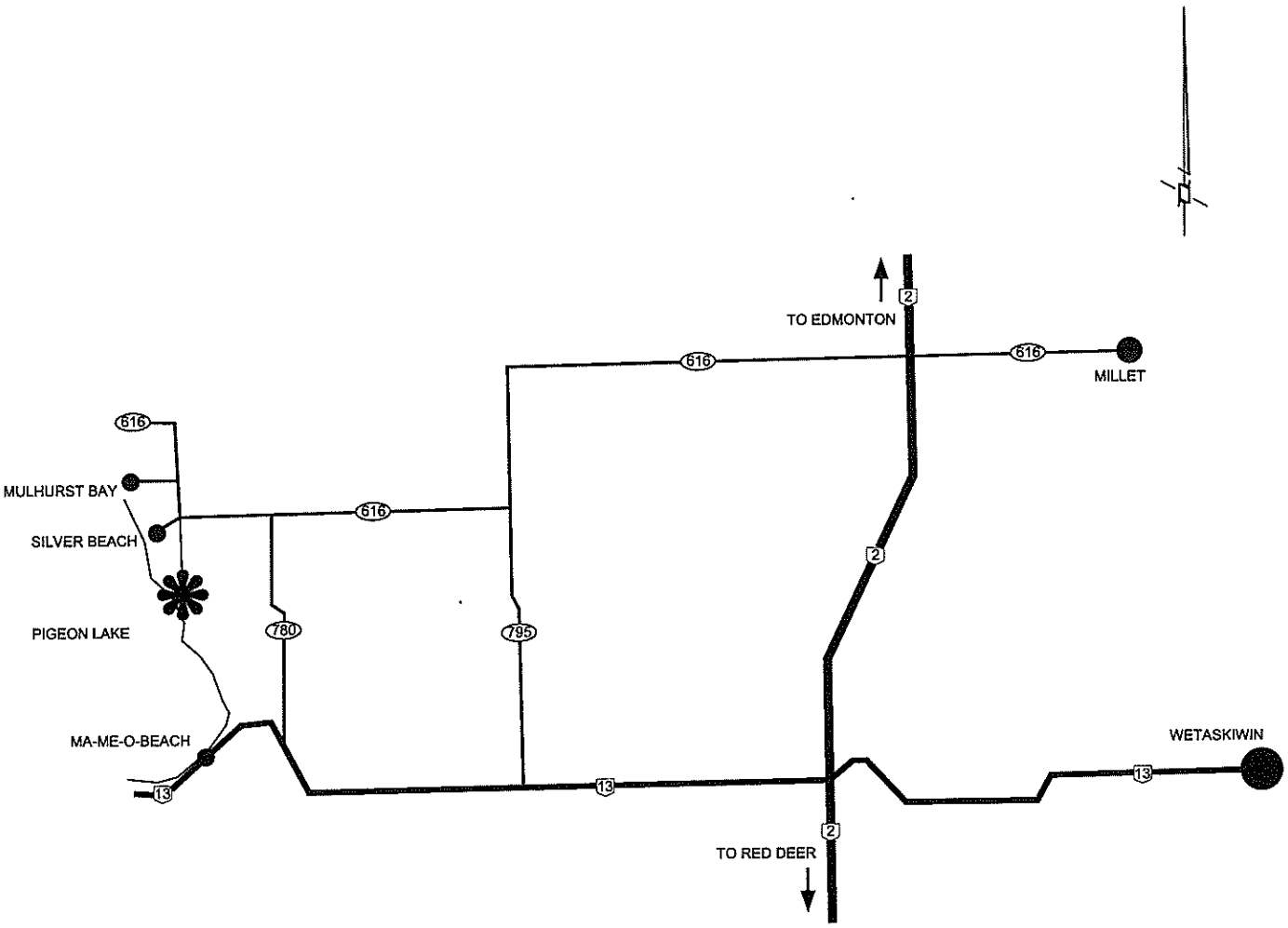
1.3 Plan Area

The lands affected by this Area Structure Plan (ASP) are located within the County of Wetaskiwin No. 10 along the eastern shore of Pigeon Lake **(Figure 2).** The Plan area includes Lot B, Plan 0020956, situated within northeast quarter Section 2, Twp 47, Range 28, W4M and a small portion of the northwest quarter Section 1, Twp 47, Range 28, W4M. The combined area is 3.45 hectares.

1.4 Land Ownership

Current ownership of the Plan area is shown in the chart below and illustrated in **Figure 3**:

Legal Description	Owner	Certificate of Title	Area (ha)
Lot B, Plan 002 0956	Ken Cowles		2.20
N1/2 N.W.1/4 1-47-28-4	Ken Cowles & Teresa Morton		1.25
		Total	**3.45**



Location of Area Structure Plan

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 1

Location Plan

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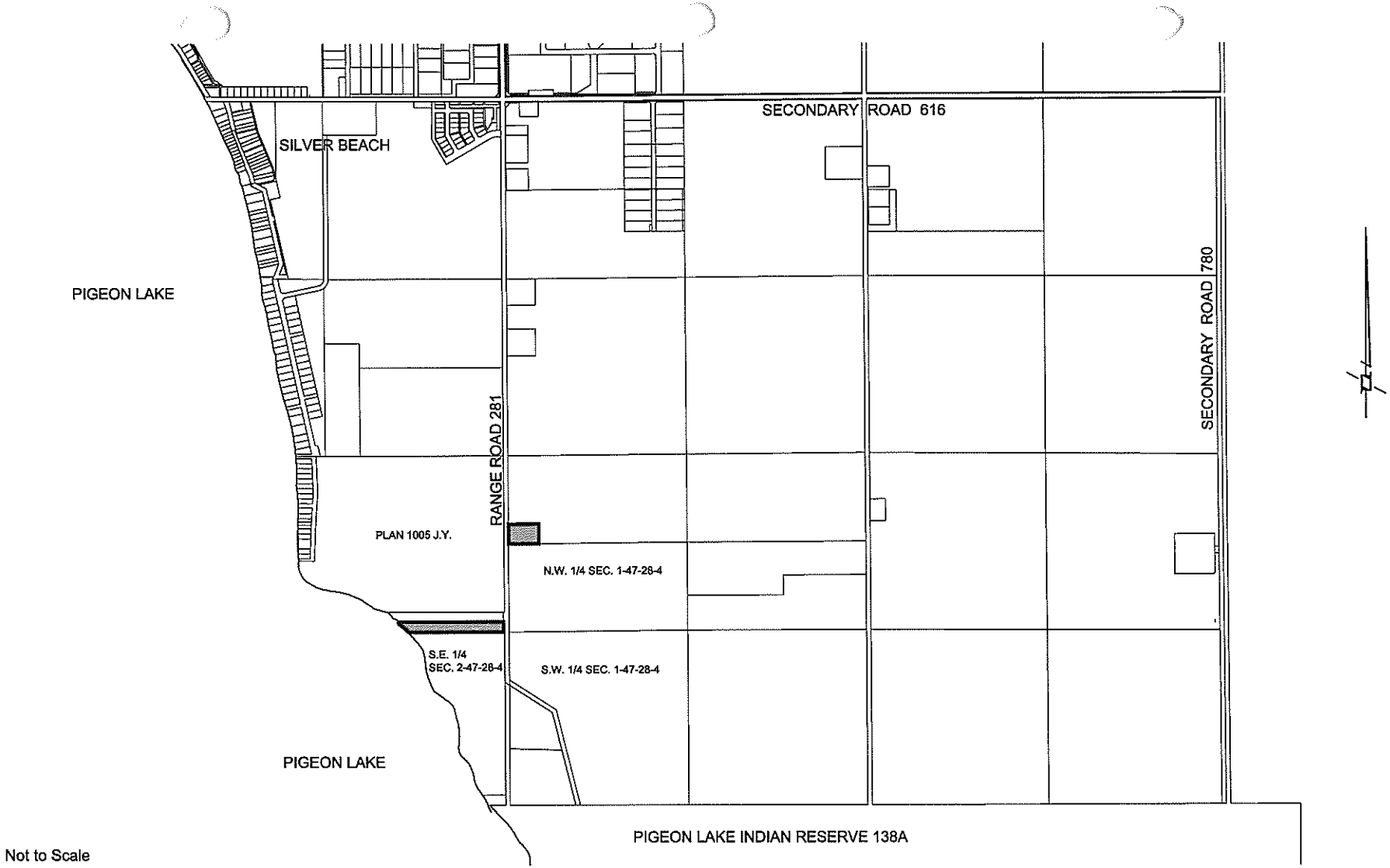

Location of Area Structure Plan

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 2

Context Plan

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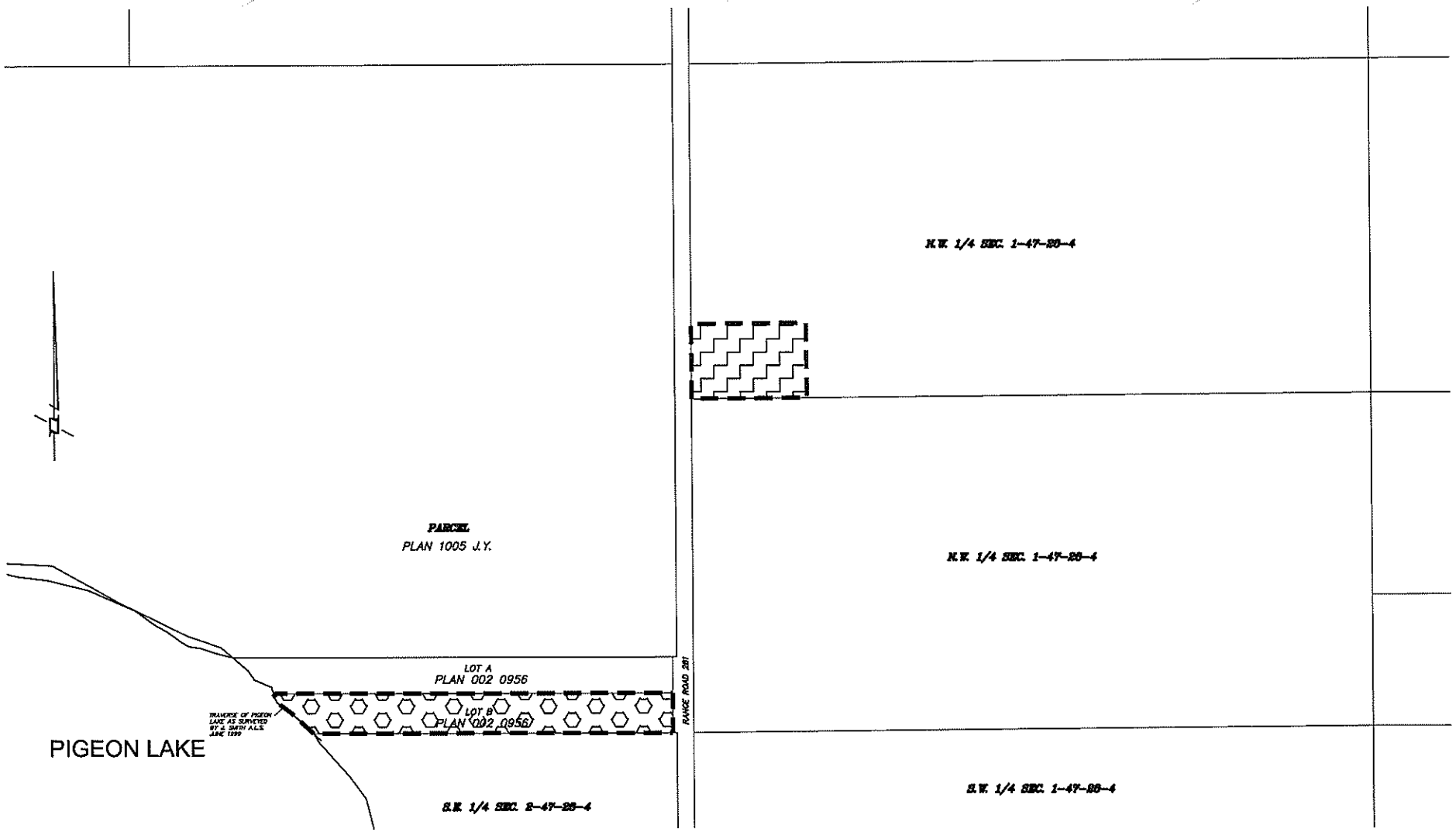

Area Structure Plan Boundary

Ken Cowles

Ken Cowles & Teresa Morton

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 3

Ownership Plan

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2.0 PHYSICAL FEATURES

2.1 General

In the preparation of the Cowles' Landing Area Structure Plan, it was necessary to examine existing site conditions, inventory active influences, and identify opportunities and constraints, both natural and man-made. The identification and evaluation of those factors, including a review of the development strategy led to the selection and refinement of the concept for the Plan area.

2.2 Existing Land Use

The Plan area west of Range Road 281 is primarily treed. The proposed development is bordered by Range Road 281 to the east and Pigeon Lake to the west. A private driveway runs parallel and in close proximity to the south property boundary. The Plan area east of Range Road 281 is agricultural.

2.3 Surrounding Area

Cowles' Landing is located approximately 0.5 km south from the Summer Village of Silver Beach and approximately 5 km south of Mulhurst Bay. It is not near any airports or intensive livestock operations. Land uses in the surrounding area vary from agricultural and recreational uses to cottage properties **(Figure 4).**

North of the proposed residential development, NE ¼ Sec 2-47-28-4, contains a co-generation plant in its northeastern portion currently owned and operated by Crescent Point Energy Corp.

2.4 Historical Resources

The Developers have been advised by West Central Planning that a Historical Resources Overview of the site is not required.

2.5 Soils

Soils in the Plan area have been evaluated using the Alberta Resource Inventory Soil Distribution Map and the Canada Land Inventory soils capability for agriculture.

Alberta Resource Inventory Soil Distribution Map
The soils are classified as dark gray chernozemic and dark gray luvisols. Chernozemic soils develop under grasslands in well drained to imperfectly drained sites. Luvisols develop under mixed deciduous-coniferous forests. They cover fifty-two percent of the Province and are found in imperfectly drained to moderately well drained sites.

Canada Land Inventory (CLI) Rating
The CLI shows the varying potential of a specific area for agricultural production by assigning classes and subclasses according to the Soil Capability Classification of Agriculture. The characteristics of the soil are determined by soil surveys. Soils in the Plan area have been assigned a Class 3 as follows:

"Class 3 Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices. The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage, planting and harvesting, choice of crops, and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops."

2.6 Vegetation

The Plan area west of Range Road 281 is treed with clearings. The subject lands east of Range Road 281 are agricultural with clusters of forested areas.

2.7 Topography

The topography of the Plan area west of Range Road 281 is primarily flat throughout most of the site. There are elevation differences of approximately five meters between the high points along the east boundary and center of the site to the shoreline of Pigeon Lake. The majority of the elevation change occurs through the proposed MR and ER areas as shown in **Figure 6**. The topography of the Plan area east of Range Road 281 is relatively level.

2.8 Noise Study

A noise study was conducted by ACI Acoustical Consultants Inc in October, 2005 which measured the noise levels created from the site. The report states that no more than a sound level 32.6 dBA was recorded within the subject lands during the worst case scenarios for sound travel. The allowable limit for noise within the subject area is 40 dBA, according to the same report. The noise level is well within the allowable limit. Since this time, there have been no changes to the type or levels of noise that is being created from this site. This has been stated in a letter to the developer from Crescent Point Energy dated May 25, 2010. An additional Noise Study was completed by Donald Olynyk, Acoustical Engineer which indicated that the noise measurements taken on the subject property on February 2, 2011 were below allowable limits. See **Appendix C** for Noise Study and supplementary information.

Area Structure Plan Boundary

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 4

Existing Conditions Plan

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3.0 POLICY FACTORS INFLUENCING THE PLAN

This Area Structure Plan provides the overall policy framework for the development of the Plan area. The document has been prepared in accordance with Section 633 of the Municipal Government Act, the County of Wetaskiwin No. 10 Municipal Development Plan (MDP), the County of Wetaskiwin No. 10 Land Use Bylaw No. 95/54, and the Pigeon Lake Watershed Management Plan. The role and potential impacts of existing policies and statutory plans have been analyzed and summarized below.

3.1 County of Wetaskiwin Municipal Development Plan

The County of Wetaskiwin Municipal Development Plan was adopted in 1998 as Bylaw 98/55. Its purpose is to spell out the broad land use planning framework for the County. The development proposed within this Area Structure Plan reflects the overall spirit and intent of the MDP. In summary the goals of the MDP are as follows:

- To maintain a clean environment;
- To support and encourage economic growth and development in the County; and
- To support a high quality of life in the County.

Due to the many recreational areas within the County and the potential effects of differing land uses on lakes and water resources, the MDP has two sections that deal with watershed protection and lakeshore development. The MDP further addresses the suitability of County lakes for subdivision and development by assigning all lakes a classification type as follows:

Type 1 - Lakes suitable for lakeshore residential uses and intensive recreational use;

Type 2 - Lakes which are or may be suitable for low-density rural conservation uses and small-scale, low impact recreational use; and

Type 3 - Lakes which should be left in their natural state.

Pigeon Lake is designated as a Type 1 lake and is thereby suitable for lakeshore residential uses and intensive recreational use. The County of Wetaskiwin Municipal Development Plan identifies the subject lands as Recreational and Agricultural. There are no pre-existing Area Structure Plans for the Plan area.

3.2 County of Wetaskiwin Land Use Bylaw No. 95/54

The proposed Cowles' Landing residential development is currently designated as Recreational (R), Country Residential (CR) and Agricultural (AG) in the County of Wetaskiwin Land Use Bylaw. The Plan area will require rezoning prior to development commencing.

3.3 Pigeon Lake Watershed Management Plan

The Pigeon Lake Watershed Management Plan was adopted by resolution by the Councils of twelve lake shore municipalities within the County of Wetaskiwin No. 10 in 2000. Previously in 1997 the Association of Pigeon Lake Municipalities (APLM) agreed to fund a study of lake water quality. The purpose of the study "was to find out if increasing onshore development had resulted in changes to water quality since the previous 1983 study by Hardy Associates, and how development in the drainage basin should be handled to preserve the recreational value of the lake" (APLM, 2000). The APLM appointed a committee with the mandate to review the findings of the study and come up with recommendations for dealing with planning and public access issues. The process resulted in the creation of the Pigeon Lake Watershed Management Plan that was adopted by the twelve municipalities as an intermunicipal agreement.

The management committee proposed the following seven principles to guide development in the Pigeon Lake drainage basin:

- Recognize the rights of the farming community
- Maintain water quality
- Protect groundwater flows
- Maintain public access to the lake
- Protect the fishery
- Allow suitable new development
- Keep open communication on development proposals

The development proposed within this Area Structure Plan complies with the above planning principles.

4.0 GOALS AND OBJECTIVES

The Cowles' Landing Area Structure Plan will provide the overall policy framework and objectives for development to reflect the recreational and natural setting of the area. The following objectives will guide the development of the area.

4.1 Overall Objectives

- To conserve and optimize the use of the natural environment through the sensitive integration of development with natural features.
- To preserve significant viewpoints and vistas provided by the area.
- To provide effective services to the standards of the County of Wetaskiwin No. 10.
- To provide a safe community in which people can live.

4.2 Residential Objectives

- To foster quiet country living in a community that will accommodate approximately 54 new residents.
- To create a self-sufficient community consisting of cottage-style, single-family detached residences under a Bareland Condominium form of ownership.
- To create a rural recreational development with a minimum lot size of 490 m^2.

4.3 Open Space, Park and Municipal Reserve Objectives

- To recognize the statutory requirements of the Municipal Government Act and the County of Wetaskiwin Municipal Development Plan by providing 10% of the Plan area as Municipal Reserve in the form of land or money in lieu of land or a combination thereof.
- To protect the environmentally sensitive area along the shoreline of Pigeon Lake through the dedication of land as environmental reserve.
- To provide all residents access to Pigeon Lake.

4.4 Transportation Objectives

- To provide for safe and convenient access for vehicles and pedestrians.
- To provide a private road in recognition of the rural character of the Plan area.
- To provide offsite R/V and guest parking.

4.5 Utility Objectives

- To provide services that meets the needs of the community in accordance with County engineering practices.
- To provide a means to tie into County services to be developed along Range Road 281 in the future.

5.0 DEVELOPMENT CONCEPT

The proposed land use concept for Cowles' Landing is illustrated in **Figure 5**. The intent of this plan is to provide a generalized land use concept that will be subject to further refinement at the time of subdivision and survey. The development concept for the Plan area is to create a rural Bareland Condominium development that reflects the recreational nature of the area **(Figure 6)**. This will be attained by preserving many of the trees and natural vegetation, providing residential access via a private road, and providing a common area near the lake. Access to Pigeon Lake will be via the private road. The Condominium Corporation will manage and maintain the common components of the development which includes roads, utilities, common recreation areas, snow removal, and compliance with architectural guidelines. A private utility lot, to be located in the eastern portion of the Plan area adjacent to Range Road 281, will provide a location for storage and additional parking for the residential community development.

5.1 Residential

The majority of the Plan area, west of Range Road 281, is proposed to become a Bareland Condominium residential development with a minimum lot size of 490 m^2 (0.12 acre) **(Figure 6)**.

Current County guidelines specify that ten feet of lake frontage per lot should be provided with all developments adjacent to Pigeon Lake. As such, where the entire lake frontage for the Plan area is approximately 227 feet, a maximum of 22 lots may be proposed in order to comply with this guideline. This Plan proposes 20 residential lots within the development. Assuming a density of 2.7 persons per single family unit, approximately 54 residents will be accommodated **(Section 9.0 Development Statistics)**.

The recreational concept will be enhanced by a park which will be situated near Pigeon Lake and accessed via the private road. To provide for the protection and safety of residents, a fence will be constructed around the perimeter of the residential area.

5.2 Architectural Guidelines

The architectural guidelines for the proposed residences indicate cottage-style single-family dwellings with double fronted attached garages **(Appendix A)**. These guidelines will ensure balanced and orderly development. The architectural guidelines will form part of the Agreement for Sale for each lot, which in turn will be registered on title and enforced by the Developer in this manner. The architectural guidelines included in **Appendix A** may change prior to final registration on title.

5.3 Open Space and Municipal Reserve

In accordance with the Municipal Government Act and the County of Wetaskiwin No. 10 Municipal Development Plan, a total of 10% of the developable area, less that portion dedicated Environmental Reserve, is required to be dedicated Municipal Reserve (MR).

A Deferred Reserve Caveat (DRC) is registered against Plan 002 0956 from the previous phase of subdivision, requiring MR dedication of 0.22 ha (0.54 acres). A total of 0.21 hectares of Municipal Reserve is currently included in the plan. Approximately 0.01 hectares of Municipal Reserve will be required as cash-in-lieu.

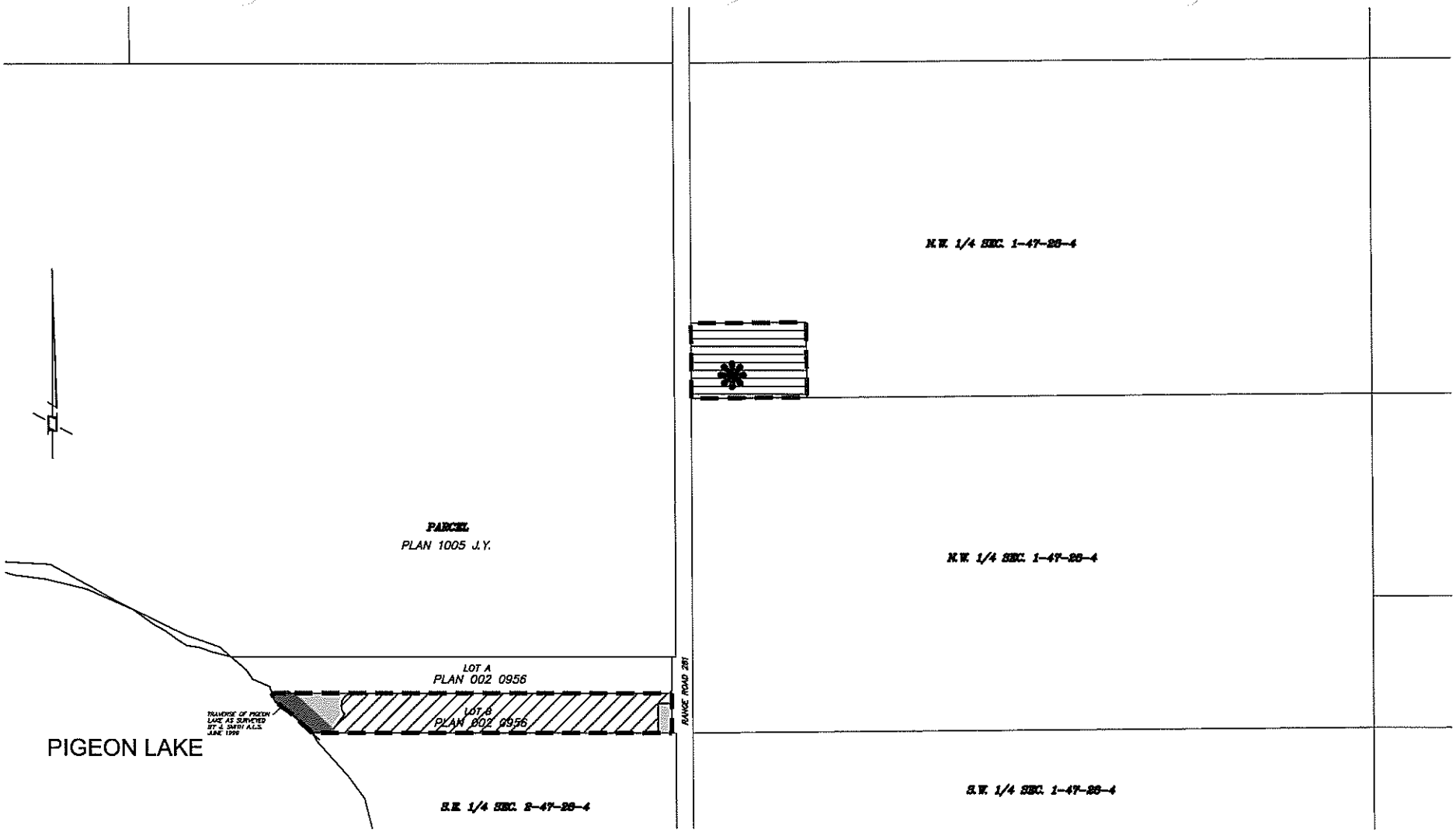
The intended use for the MR area along the lake shore is to provide residents with a clean beach and grassed area. The Condominium Association, as agents of the County, will maintain the Municipal Reserve area by

ensuring that it is kept clean. Any other uses for the Municipal Reserve area will lie within the jurisdiction of the County. No private structures or installations will be constructed on the lands that will be designated Municipal Reserve or Environmental Reserve. An additional parcel of Municipal Reserve will be allocated at the entrance of the development along Range Road 281. This site has an existing tree stand that will be preserved and will buffer the residential development from Range Road 281 and provide dust attenuation.

The Plan area provides for a 20 metre wide Environmental Reserve (ER) buffer along the shoreline of Pigeon Lake. In addition, a parcel comprising the majority of Municipal Reserve dedication will abut the ER. All residents will have access to this natural feature via the common property road. A walkway along the length of the Municipal Reserve between the shore of Pigeon Lake and the Bareland Condominium will be constructed by the Developer. A boat launch will not be developed within the plan area. There will be no access to the water by boats through the Environmental Reserve adjacent to the water. There is currently a public boat launch near the plan area which will be accessible to residents.

5.4 Private Utility Lot

A portion of the land in the eastern section of the Plan area will be developed to accommodate utility uses for the Bareland Condominium development. **(Figure 7)**. An area of approximately 1.25 hectares in the southwestern portion of this parcel will accommodate supporting uses for the Bareland Condominium development, such as visitor and RV parking, a site maintenance yard and shed, and a fire pond. The parking and storage areas will be contained within a secured chain-link fence. The fire pond will be built to the specifications and standards of the Fire Chief and setback a minimum of 30 metres from Range Road 281 to ensure accessibility and safety. This lot can be utilized for snow dumping in the winter. An easement or caveat will be registered against the parcel in favour of the Bareland Condominium for all supporting uses provided to the development.



Area Structure Plan Boundary

Low Density Residential

Private Utility Use

Municipal Reserve

Environmental Reserve

Proposed Location of Fire Pond

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COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 5

Proposed Land Use Concept

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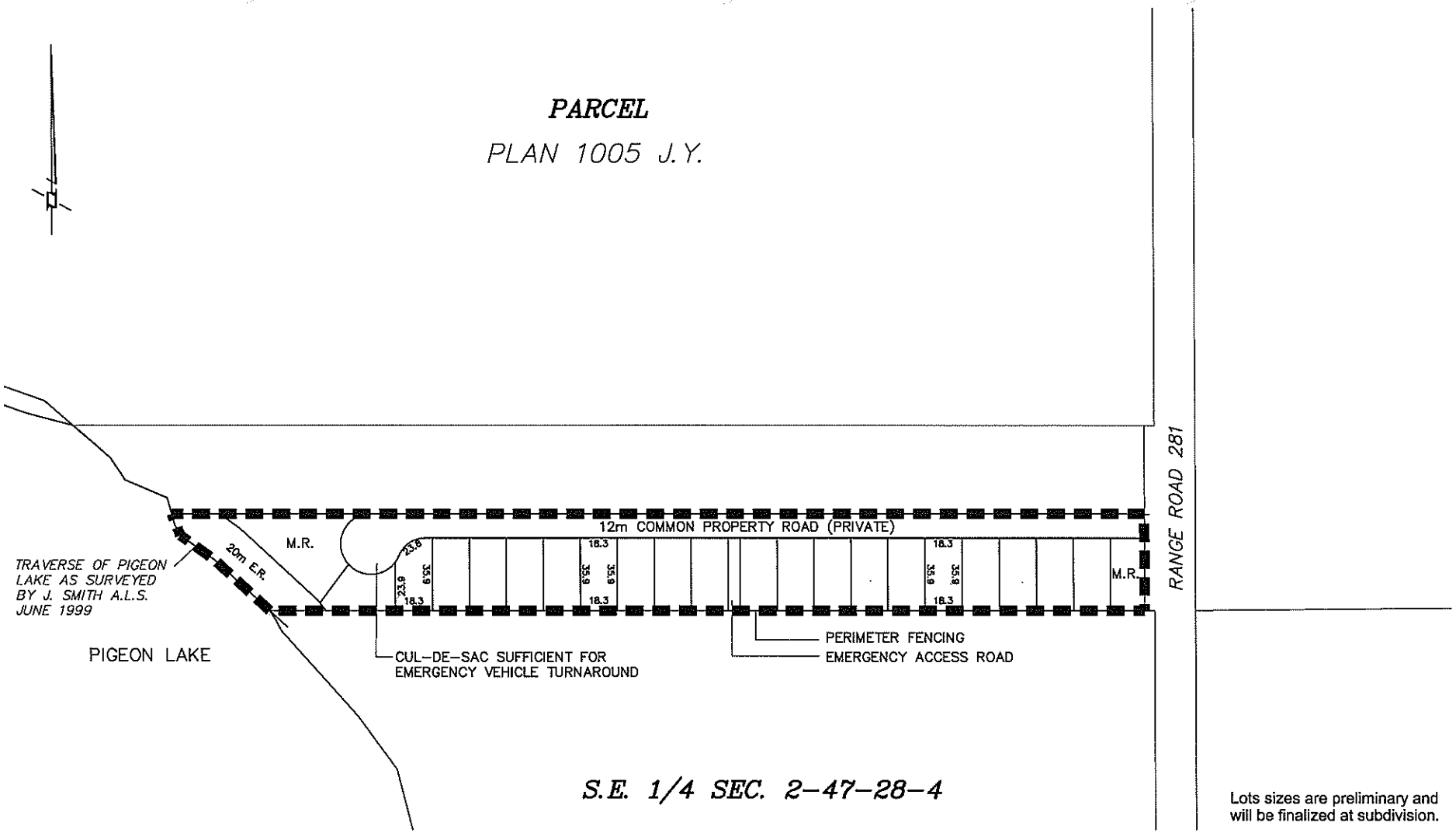

Area Structure Plan Boundary

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 6

Preliminary Design Concept - Residential

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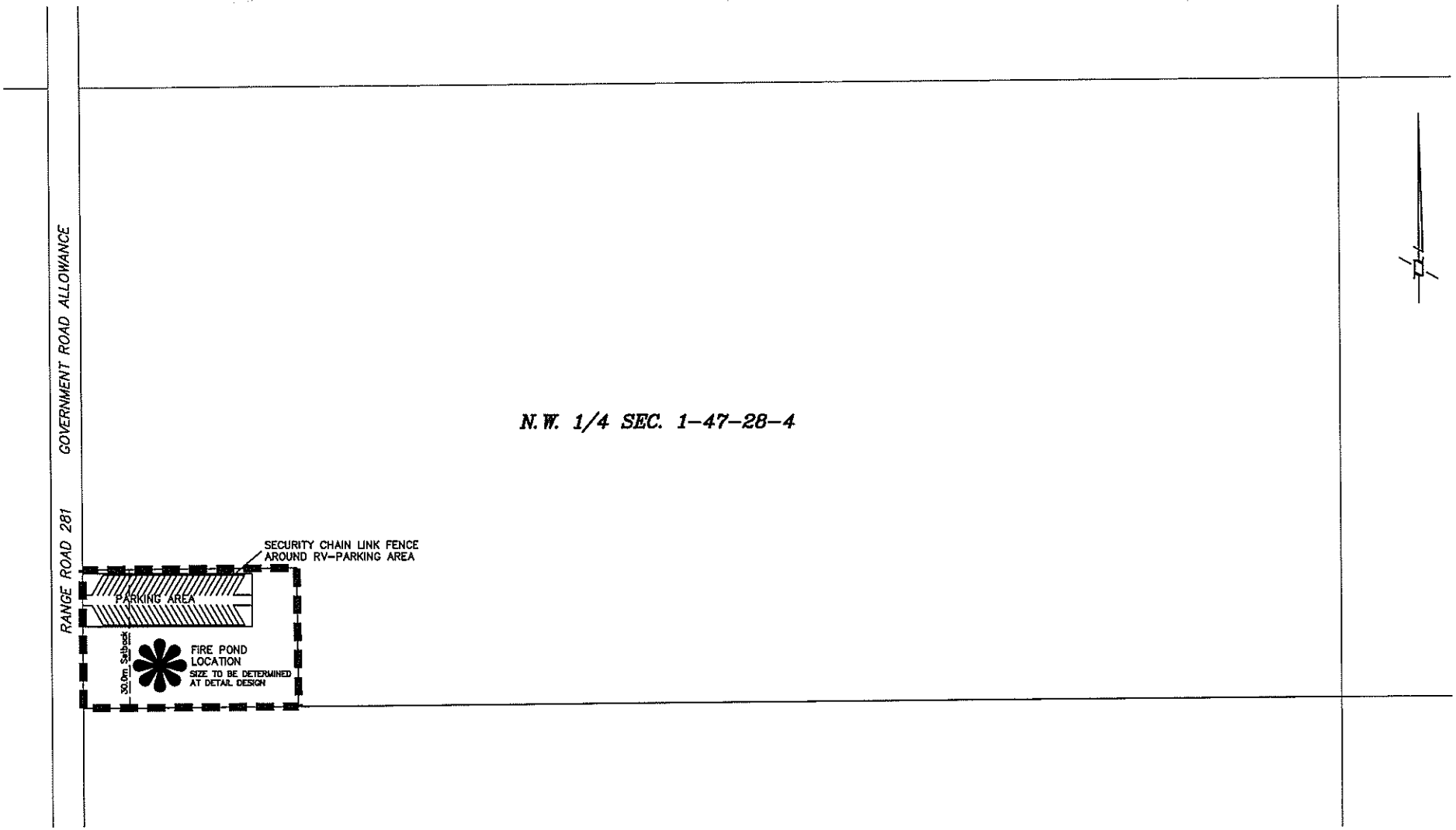

Area Structure Plan Boundary

Proposed Location of Fire Pond

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 7

Preliminary Design Concept - Private Utility

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6.0 SERVICING

Servicing for the Area Structure Plan area will be undertaken in accordance with the County of Wetaskiwin No. 10 standards and good engineering practices. Engineering concepts, including cross sections and road profiles, presented in the ASP are conceptual only and may be required to be amended when final design drawings are submitted and reviewed by the County's Engineer. The plan proposes to provide for permanent municipally owned and operated water and sanitary servicing to each titled property.

6.1 Sanitary Servicing

As an interim measure, sanitary servicing will be provided by a gravity sewer collection system. The sewer will be sized to accommodate the development and will be directed to a communal holding tank. This system will be built to ensure compatibility with any future line construction to Mulhurst Lagoon **(Figure 8)**.

Pending completion of the Mulhurst Lagoon expansion, the ultimate system will involve replacement of the holding tank with a lift station wherein a forcemain will be installed and directed towards Mulhurst. The communal holding tank will be located within the plan area near Range Road 281 to accommodate future tie into this system.

Correspondence from the County anticipates the 'future line construction will involve a combined effort and associated benefit by several landowners along the route from the Cowles property to Mulhurst Lagoon'. The details of the sanitary servicing system are the subject of further study and regulatory approvals and have not been solidified. The developer will continue to work with the County to achieve the ultimate solution.

The developer recognizes that an off-site levy will be payable on a per lot/unit basis for the expansion of the Mulhurst Sewage Lagoon or other municipally and provincial approved facilities.

6.2 Stormwater Management

Currently there is no existing underground stormwater collection system available to connect into. A review of the area indicates, for the most part, that existing stormwater runoff is managed by surface drainage which utilizes roadways, ditches, swales and culverts.

The existing major overland drainage of the subject property extends from the east property line (Range Road 281) west to Pigeon Lake. The proposed stormwater collection system will utilize a private urban cross section roadway to collect and convey stormwater along concrete curb and gutter from east to west through the plan area. At the most western point of the private road, the stormwater will enter into a stormwater sewer system via catchbasins and conveyed through a stormceptor for treatment before it is discharged into an existing creek channel adjacent to the property's south boundary, prior to discharge into Pigeon Lake.

In certain areas of the Province, if the downstream receiving course has a limited hydraulic capacity there may be a need to restrict the additional stormwater runoff new development creates. Because stormwater is being discharged into Pigeon Lake in this case, there is sufficient capacity to accept the stormwater flows that the site will produce without requiring a stormwater detention pond. However, should any requirement to control the stormwater runoff from the subject property to a specified rate be deemed necessary, a flow control structure and surge pond at the low point of the surface drainage system will be incorporated. Specific details of the overall system, including conditions and direction from Alberta Environment, will be supplied once detailed engineering design plans have been submitted. All stormwater management must be designed in accordance with County of Wetaskiwin standards, and is subject to the approval of the County of Wetaskiwin.

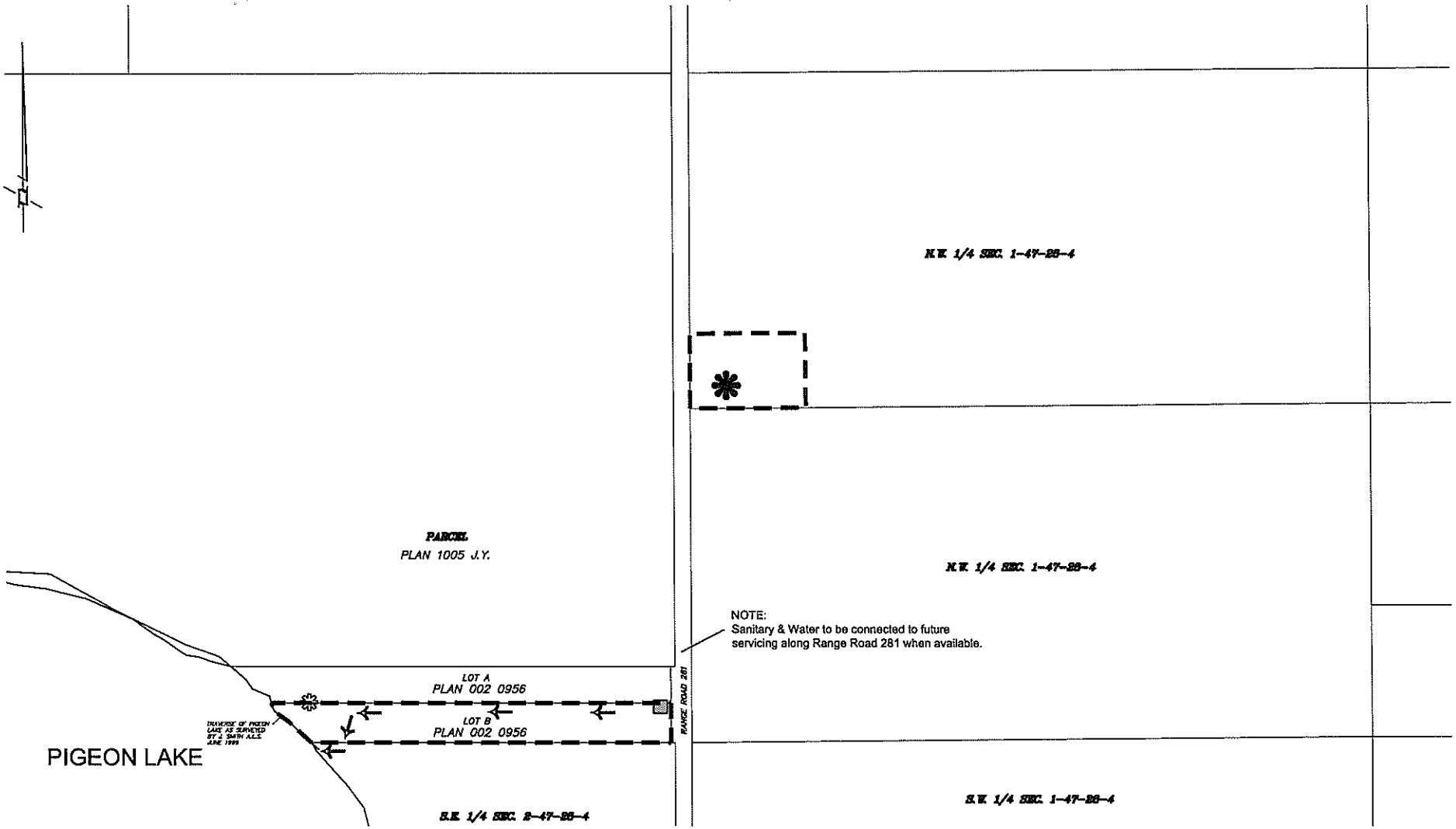
6.3 Water Distribution System and Fire Protection

The water system for this development will be a Bareland Condominium private syatem and will be designed to be compatible with the County's municipal system. Water servicing will be provided by a 50 mm watermain and connection to each property. The watermain will be extended to Range Road 281 where a future municipally owned watermain will provide daily potable water needs to the plan area residents. The municipal water line has not yet been constructed, so interim options for communal water systems will be provided and utilised until the municipally owned water line within Range Road 281 is completed. Details of the interim water service options will be confirmed through detailed engineering design and in accordance with County standards and good engineering practices.

Fire protection for the site will be accomplished by constructing a fire pond to be located on the land north-east of the residential development site. The fire pond will be located in the northwest portion of this site, setback a minimum of 30 metres from Range Road 281, to ensure convenient access and proximity to the residential site. The actual location, access, size and storage capacity of the fire pond will be finalized during the detailed design phase of the project and shall conform to the standards and specifications of the Fire Chief. The County will be allowed access to the fire pond for fire fighting purposes by access agreement or easement.

6.4 Shallow Utilities

Shallow utilities will be accommodated by a four metre wide utility easement paralleling the south side of the road.



Area Structure Plan Boundary

Direction of Stormwater Flow

Existing Water Well

Proposed Location of Fire Pond

Proposed Sanitary Communal Holding Tank

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 8

Proposed Servicing Concept

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7.0 TRANSPORTATION

7.1 Vehicular Access and Circulation

The eastern boundary of the plan area is defined by Range Road 281 that will serve as the access point to the development. Internal vehicle circulation will be accommodated by a private common property road along the north boundary from east to west. The private common property road will be a minimum carriageway of 10.0 metres as is the urban standard for a local residential road. Although this is a private road, it will be publically accessible. Public access will accommodated by a general access easement.

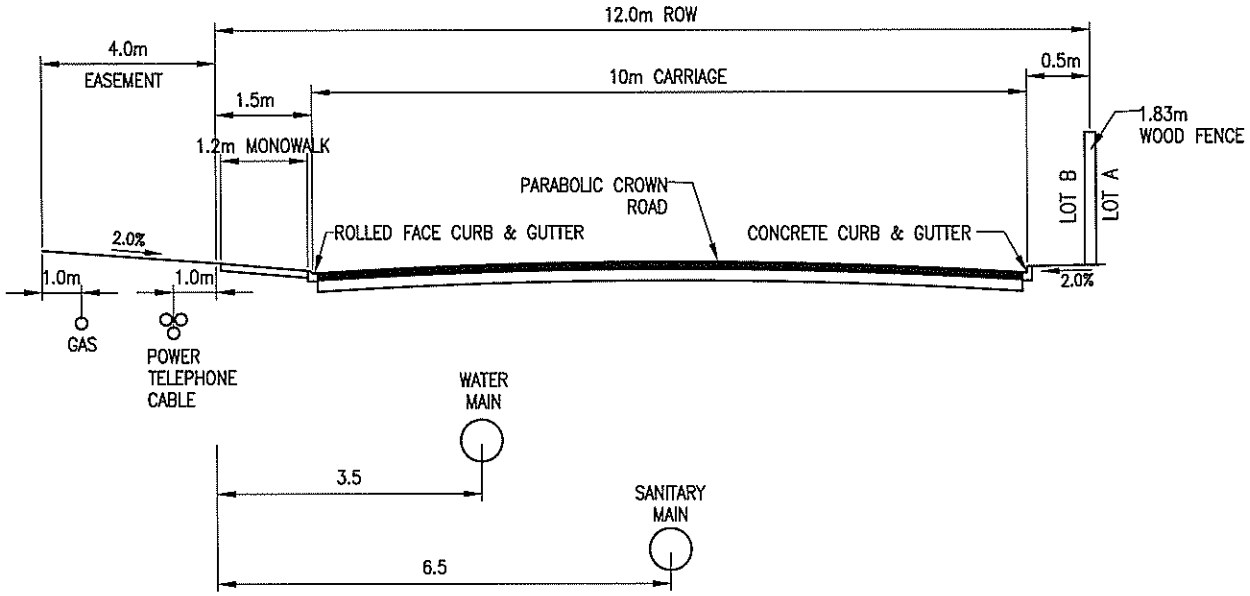
Parking on site will be accommodated by a double garage and a driveway that can accommodate two vehicles on each lot. Additional guest, recreational vehicle (RV) and overflow parking will be accommodated in the RV parking area on the east side of Range Road 281 as part of the utility lot.

An emergency access lane will connect the private road to the driveway that runs west to east on private property directly south of the Plan area west of Range Road 281. This will require that the developer obtain an easement registered on the Certificate of Title for that property, currently owned and operated by the Mulhurst Lutheran Church Camp Association.

Additional traffic using Range Road 281 will result from the development and the developer recognizes that a $2,000.00 Per Lot Road Contribution Fee is required in accordance with Policy 6615 which will be a contribution towards the improvement of Range Road 281 providing access to the subdivision. In lieu of paying the Road Contribution Fee, the developer may pave the portion of Range Road 281 from a point at the southeast corner of Lot B of the development area to the access point to the fire pond on NW1-47-28-W4M. Details of the Per Lot Road Contribution Fee or any pavement improvements to Range Road 281 will be specified in a development agreement at the subdivision stage.

7.2 Pedestrian Circulation

A pedestrian walkway and bicycle pathway will be accommodated adjacent to the private common property road leading to Pigeon Lake.



COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 9

Private Road Cross Section

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8.0 IMPLEMENTATION

Pursuant to Section 633(1) of the Municipal Government Act, the County of Wetaskiwin No. 10 shall adopt this ASP as the Cowles' Landing Area Structure Plan. In order to comply with the Land Use Bylaw, a redistricting application will be submitted upon approval to redistrict a portion of the Plan area to Lakeshore Residential (LR). All subdivision and development within the area shall be in accordance with the provisions and policies of this ASP.

8.1 Staging

The development will occur as one stage.

8.2 Subdivision and Land Use Reclassification

The proposed land use for the Plan area is identified in Figure 5. Subdivision and land use reclassification will be undertaken as part of the normal development process. Internal road plans are conceptual only and will be subject to refinement at the subdivision stage.

9.0 DEVELOPMENT STATISTICS

Development Statistics			
	Area (ha)		
Gross Area	**3.45**		
Environmental Reserve	0.14		
Gross Developable Area	**3.31**		
Municipal Reserve	0.21		
Private Utility Lot[2]	1.25		
Net Developable Area	**1.85**		
		Units	Population[1]
Low Density Residential	1.85	20	54
Total	**1.85**	**20**	**54**

Notes:

1. 2.7 persons/unit for LDR.
2. Fire pond to be located within the public utility lot.

10.0 PUBLIC CONSULTATION

As part of the public consultation process an information package for the Cowles Landing Area Structure Plan was sent out to land owners in the surrounding area of the subject development on July 30, 2010. This package informed landowners of the Cowles Landing Area Structure Plan that received conditional approval on July 7, 2005 and changes that had been made to the plan. As well, land owners were asked to provide their feedback regarding the plan and contact the County of Wetaskiwin or the Consultant with any questions they may have regarding the plan. A total of 23 notices were sent out of which one response was received. The comments were from the Estate of the deceased owner of Lot A, Art Reid, stating their opposition to this development. Since the passing of Art Reid the family has chosen to withdraw Mr. Reid's previous support and involvement in this development. No other comments have been received.

A second public notification package including the amended development concept for the Cowles Landing ASP plan area was sent out to surrounding landowners in the area on December 20, 2010 to inform them of a formal amendment to the plan that was being submitted to the County at that time. A total of 23 notices were sent out of which one response was received. These comments were also from the Estate of the deceased owner of Lot A, Art Reid, stating their opposition to this development. No other comments have been received.

See **Appendix B** for a copy of the Public July 30, 2010 and December 20, 2010 Public Consultation Mail-Out packages.

11.0 REFERENCES

Canada Land Inventory, National Soil DataBase, Agriculture and Agri-Food Canada. (1998). http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/faq7613?opendocument http://res.agr.ca/CANSIS/NSDB/CLI/_overview.html

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County of Wetaskiwin No. 10. (1998). Municipal Development Plan Bylaw No. 98/55. Wetaskiwin, Alberta.

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Province of Alberta. (2002). Municipal Government Act. Alberta Queen's Printer, Alberta.

The Association of Pigeon Lake Municipalities. (2000). Pigeon Lake Watershed Management Plan. County of Wetaskiwin, Alberta.

Appendix A ARCHITECTURAL GUIDELINES

COWLES' LANDING ARCHITECTURAL GUIDELINES

Background

The intent of this guideline is to maintain a common standard for the development of Cowles' Landing at Pigeon Lake. The lakefront development will support upwards of 50 individual residences and the following items will provide for a consistent level of minimum standards.

House Size

The house shall be at least 80% of the building pocket width. Offsets for garages may not exceed 2 feet for this calculation. The house may include cantilevered closets and bay windows, but these extensions will not account for house width, only house foundations will count for width.

Garages

All houses must be constructed with a minimum double front attached garage. Front access garages that are rotated 90 degrees to the road may be acceptable, but will require the express permission of the Developer.

Driveways shall be hard surfaced, not left gravel, within one (1) year of occupancy as the season allows.

Landscaping

A landscape deposit of $2000 shall be collected at the time of Architectural Approval submission and will be used towards compliance to these guidelines and landscape requirements.

Landscaping shall be completed by the owner within one (1) year of occupancy and shall include sod from the front of the house to the paved surface of the road.

A minimum of one (1) tree shall be provide in the front yard with a minimum of a 3" calliper trunk for deciduous trees and an minimum of 6 feet in height for evergreen trees.

In order to preserve the condition of the drainage and water systems within and adjacent to the plan area, no chemical fertilizers or any toxic substances shall be used to discharge on any of the lots within Cowles Landing.

Exterior Finish

Front elevations shall include architectural features such as, but not limited to: brick accents, shutters around windows, stucco build-outs, etc. All front elevation windows must include mullions or grills.

Architectural Approvals

No house shall be permitted to start construction without the written approval by an Agent of the Developer.

Architectural Approvals are to be requested in writing to the Developer. Two copies of the house plans, one copy of the Building Plot Plan, and the type and manufacturer of the exterior finish must be provided.

Upon acceptance and approval of the proposed house, the Developer will contact the surveyor for the subdivision and will approve the house for stake-out.

Appendix B PUBLIC CONSULTATION MAIL-OUT PACKAGES

FOCUS
Engineering - Geomatics - Planning

July 27, 2010 File No.: 020100591-110

Dear Current Resident:

RE: Cowles Landing Area Structure Plan

The Cowles Landing Area Structure Plan (ASP) involves a plan for a residential bareland condominium development on Lots A and B, Plan 0020956 within N.E. ¼ SEC. 2-47-28-4. The plan area is abutting Pigeon Lake on the eastern shore.

The original ASP was presented to Council on July 7, 2005 and received conditional approval at that time. On March 16, 2010 an amended Area Structure Plan was submitted to Administration which addressed the conditions of approval that were presented in 2005. The significant change made to the 2005 ASP was to allow the development to proceed in two stages rather than as one single development stage. Corresponding changes to the servicing and land use allocations were made to allow for staging of the development. After the submission of this revised document, a number of additional comments were made. As a result, small changes were made to the latest plan, which has been included in this package for your information. However, the general intent of the original plan remains intact. The plan continues to show a residential development with 20 lots located on Lot B to be developed as the first stage with Lot A remaining a single parcel with the option to develop at some future time to be determined.

An important part of the development process includes the consideration of residents who reside within proximity to the plan area. As one of those residents, we invite you to be a part of this process. Please take a moment to review this plan and provide us with your feedback by August 11, 2010. A comment sheet has been provided if you would like to reply by mail or fax. Please feel free to contact me by phone if you prefer at (780)412-2676 or David Blades, Planner at the County of Wetaskiwin at (780)361-6235.

Sincerely,

FOCUS CORPORATION

Audrey Zimmerman
Senior Planning Technologist
AAZ/le

Suite 300, 9925 - 109 Street, Edmonton AB T5K 2J8, Canada
Main 780.466.6555 • **Fax** 780.421.1397
Focus Corporation
www.focus.ca

FOCUS

Engineering - Geomatics - Planning

Please provide your written comments below and return by August 11, 2010 to:

Audrey Zimmerman
Focus Corporation
Suite 300, 9925, 109 Street
Edmonton, Alberta
T5K 2J8

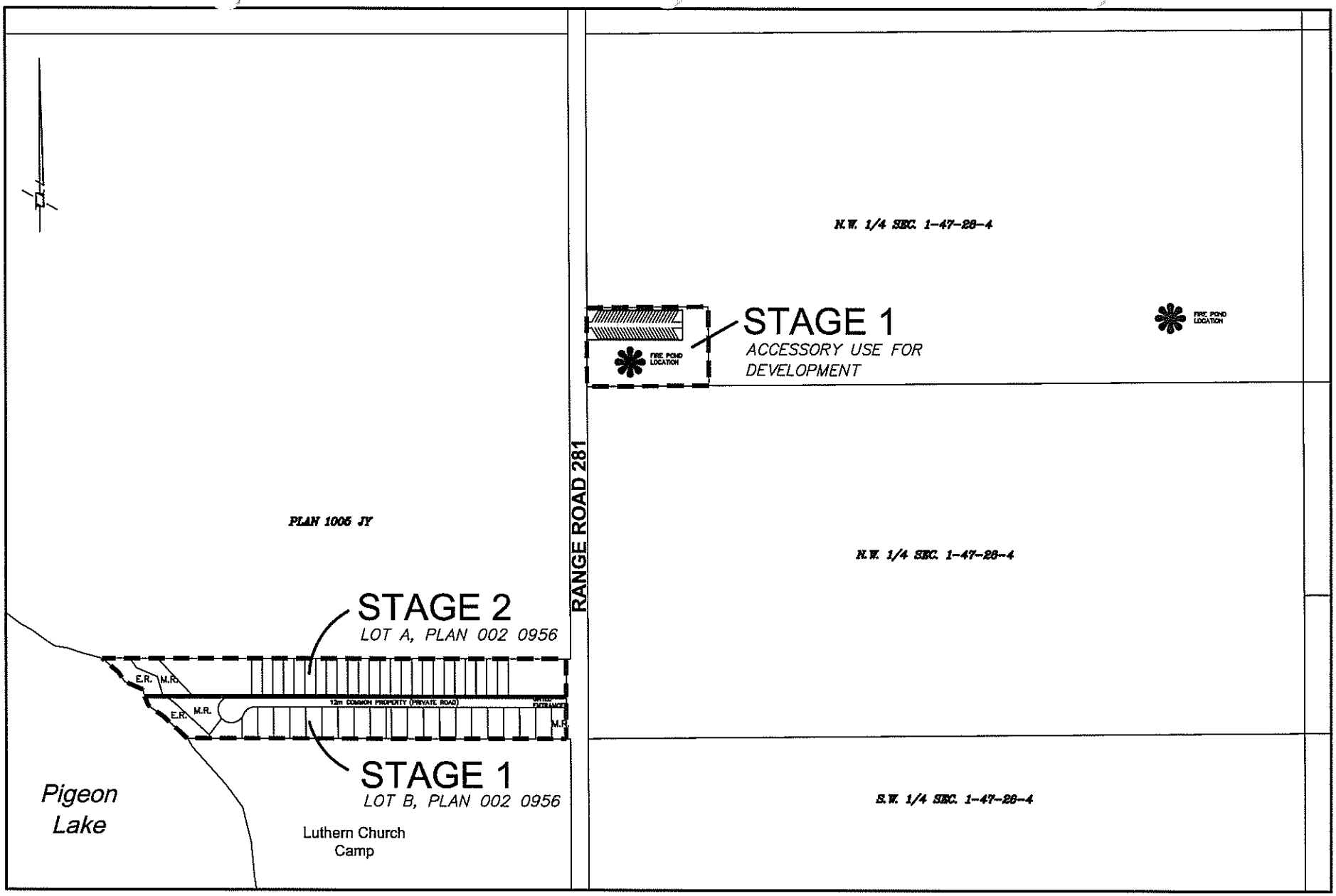
Or by fax to:

(780)421-1397

Alternatively, you can telephone the office and provide your comments directly to:

Audrey Zimmerman, Focus Corporation
(780)412-2676
OR
David Blades, Planner, County of Wetaskiwin
(780)361-6235

Please review and comment regarding the changes proposed to the Cowles Landing Area Structure Plan:



FOCUS

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Proposed Development Concept Plan

FOCUS
Engineering - Geomatics - Planning

December 20, 2010

File No.: 020100591-110

Dear Current Resident:

RE: Cowles Landing Area Structure Plan Amendment

An important part of the development process includes the consideration of residents who reside within proximity to the plan area. As one of those residents, your participation continues to be an important part of this process.

Further to the correspondence that you received in July, 2010 regarding the updates to the Cowles Landing Area Structure Plan, we wish to once again update you on the status of this proposal. Please take a moment to review the enclosed information and provide us with your feedback by January 14, 2011. A comment sheet has been provided if you would like to reply by mail or fax. Please feel free to contact me by phone if you prefer at (780)412-2676 or David Blades, Planner at the County of Wetaskiwin at (780) 361-6235.

Sincerely,

FOCUS CORPORATION

Audrey Zimmerman
Senior Planning Technologist
AAZ/le

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FOCUS

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Alternatively, you can telephone the office and provide your comments directly to:

Audrey Zimmerman, Focus Corporation
(780)412-2676
OR
David Blades, Planner, County of Wetaskiwin
(780)361-6235

Please review and comment regarding the changes proposed to the Cowles Landing Area Structure Plan:

Cowles Landing Area Structure Plan Amendment Public Feedback Opportunity

The Cowles Landing Area Structure Plan (ASP) was originally approved under Bylaw 2005/43 on July 7, 2005. At that time Council included a number of conditions which would be met with the implementation of the plan. Although it was the original intention of the two area landowners to develop the plan area together, the owner of the northern Lot A, passed away prior to any development proceeding. Thereafter, the estate has expressed a strong desire to remain undeveloped and has requested that Lot A, Plan 002 0956 be removed from the ASP. The owner of the southerly Lot B Plan 0020956 still wishes to proceed with development of his portion. As part of the public consultation process you have received this package of information regarding the changes being made to the plan and are being asked to respond in writing by January 14, 2011 using the attached comment sheet .

The primary goals of the development remain the same as in the original ASP document. This amendment addresses the conditions of approval from the 2005 ASP. In addition, this amendment will remove Lot A, Plan 0020956 and a portion of N1/2 N.W.1/4 1-47-28-4 which were previously included in the plan area. To facilitate orderly development of the remaining plan area, changes to the land use concept, servicing requirements and road configuration have been made.

The proposed plan provides a total of 20 lots to accommodate an estimated 54 residents. This is a reduction from 50 lots in the original ASP. A reconfiguration of the lots resulted in further reduction in the number of lots due to the change in the location of Municipal Reserve and the increased setback of Environmental Reserve adjacent to the Lake. The plan originally provided for two estate lots which will no longer be a part of the amended plan. A proposed common property lot was originally located within Lot A, which is no longer included in the plan area. A Municipal Reserve park will be located between the lake and residential lots for common use.

Municipal Reserve is proposed in the form of land in two locations. A portion of MR is adjacent to the Environmental Reserve (ER) next to the lake, and a portion will be dedicated along RR 281. The total MR dedication will be 10% of the total land area or any remainder paid as cash-in-lieu. In the MR parcel adjacent to RR 281, the developer will ensure that an appropriate tree buffer will be provided to assist with dust attenuation to the satisfaction of the County.

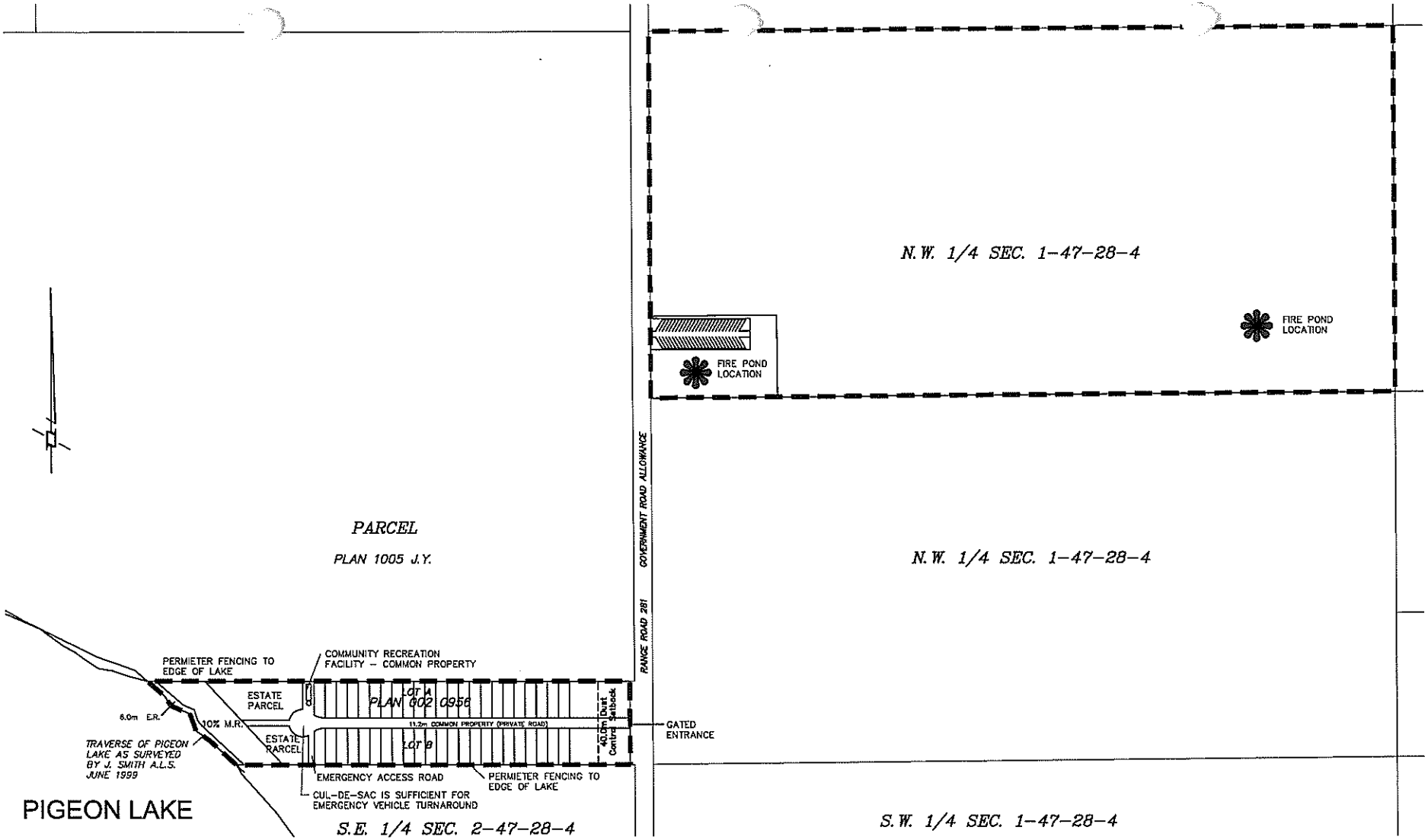
A 20 metre ER setback from the lakeshore rather than 6 metres will be provided, as per the County's standard. The developer will be required to construct a walkway along the length of the Environmental Reserve or the Municipal Reserve between the shore of Pigeon Lake and the Bareland Condominium.

At the request of the County of Wetaskiwin, no private structures are proposed within lands designated Municipal Reserve or Environmental Reserve within the plan area. The fence proposed to surround the development up to the waterfront in the original ASP will surround the residential area only, and not extend to the waterfront.

The land that remains in the plan area within N1/2 N.W. 1/4 1-47-28-4 will still provide supporting uses for the Bareland Condominium, but will be reduced in size (from 32.4 hectares to 1.25 hectares) The larger land area was initially included to accommodate a second fire pond which is not required for the reduced number of lots. As such, these lands are no longer necessary for this development.

The original ASP proposed that the development would be serviced by a communal water system which drew water from two existing wells on site. Instead of a communal system, potable water will now be accessed by an on-site well for each residential lot. There will still be an opportunity for these residential lots to connect to a future municipal water supply. The watermain that was originally proposed for the development will be provided along the private road ROW to accommodate for tie in of these lots to the municipally serviced water that should be available to this area in the future.

Please see the attached Existing Land Use Concept (figure 1) and Amended Land Use Concept (figure 2).



Area Structure Plan Boundary

Proposed Location of Fire Ponds

REID WORLDWIDE CORPORATION
COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 1

Existing Land Use Concept

FOCUS

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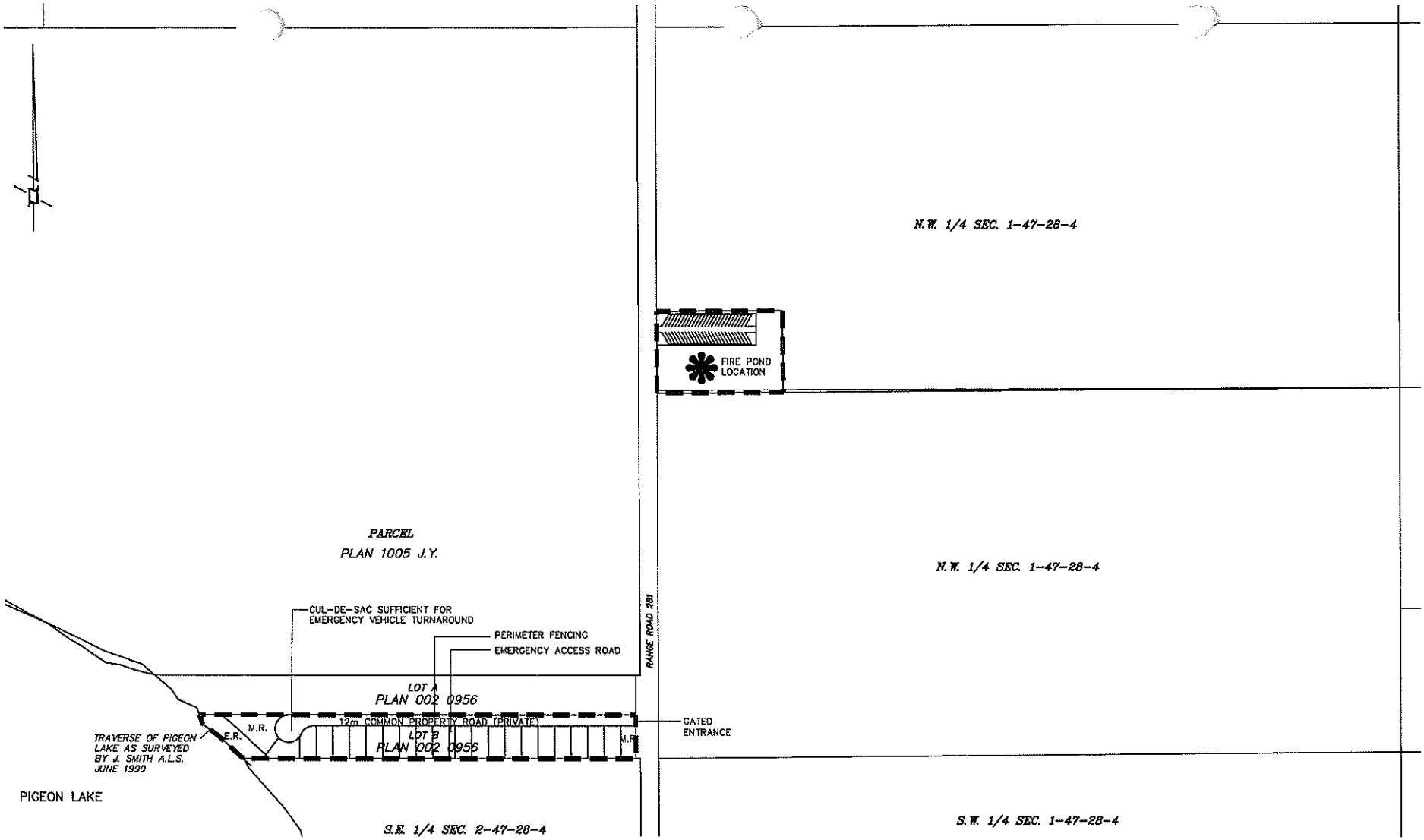

Area Structure Plan Boundary

Proposed Location of Fire Pond

COWLES' LANDING AREA STRUCTURE PLAN
PIGEON LAKE, COUNTY OF WETASKIWIN

Figure 2

Proposed Area Structure Plan Amendment

FOCUS

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Post-Commissioning Environmental Noise Study Of Co-Generation Expansion At Mulhurst 9-2-47-28W4 Facility

Prepared for:
Bredal Energy Corp.
Drayton Valley, AB

Prepared by:
C.J. Buma, M.Sc., P. Eng.
acl Acoustical Consultants Inc.
Edmonton, Alberta

acl Project #: 04-029
25 June 2004

Executive Summary

acl Acoustical Consultants Inc., of Edmonton AB, was retained by Bredal Energy Corp. of Drayton Valley, AB. to conduct a noise study for its 9-2-47-28W4 facility. The purposes of the work were:

(1) by means of environmental noise monitoring at two locations near the Facility determine whether, with the recent addition of co-generation, it is in compliance with the requirements of ID99-8 of the EUB (the "Noise Control Directive"); and

(2) to assess the noise impact, if any, of closing the south roll-up door on the co-generation building.

The environmental noise monitorings were conducted 17-19 May 2004. These indicated respective measured (un-adjusted) night-time L_{eq} sound levels of **50 dBA** at a fenceline location 150m due south of the co-gen building and **36 dBA** at a location 380m WSW of the co-gen building (entrance to Schwindt driveway). At the fenceline location the measured night-time L_{eq} sound level exceeded the Night-time Permissible Sound Level of 43 dBA L_{eq} while at the location 380m WSW it was below the PSL-Night of 40 dBA. The higher PSL-Night for the fenceline location was derived based on an allowance (per ID99-8) for higher dwelling-unit density should a condominium development be built south of the Bredal Energy site.

A series of spot measurements comparing the effect of the south roll-up door closed vs. opened disclosed a nominal sound level reduction of 15 dB for the door-closed scenario. Thus, if the co-gen facility is operated with the south roll-up door closed, the requirements of ID99-8 would be met at the fenceline location.

A alternative means of meeting the PSL-Night (as opposed to operating with the roll-up door(s) closed) is to construct a noise barrier just south of the south roll-up door. One such arrangement has been conveyed in schematic form. Whatever form the noise barrier would take, it would still be necessary to confirm that there will be adequate heat dissipation within the co-gen building.

1.0 Introduction

acl Acoustical Consultants Inc., of Edmonton AB, was retained by Bredal Energy Corp. of Drayton Valley, AB, to conduct a noise study for its 9-2-47-28W4 facility. The purposes of the work were to assess (1) compliance with Permissible Sound Levels and (2) the noise impact, if any, of closing a large roll-up door. Site work was conducted by Corjan Buma, M.Sc., P.Eng. of acl 17-19 May 2004.

2.0 Description

The 9-of-2 site is located approximately 3.5 km to the south-southeast of the town of Mulhurst, AB which is on the eastern shore of Pigeon Lake. The 9-of-2 site is situated just west of Range Road 281 and about 2 km south of Secondary Highway 616. Range Road 281 is gravel and not heavily travelled[1] at all times of day; Sec. Highway 616 is paved, 2-lane and considered heavily-travelled at all times. To the west (toward the Lake) and south of the 9-of-2 site there is continuous bush (mostly deciduous) and to the east and north of the site there is pasture-land. Prior to the co-gen expansion the Bredal 9-of-2 facility had resulted in negligible environmental noise.

acl had conducted a noise study, with noise-control recommendations, for the 9-of-2 facility prior to the co-gen expansion. This was done with respect to the Tizzard Residence which is located approximately 670 meters due west of the facility. Subsequent to commissioning of the co-gen expansion another resident living near the 9-of-2 , Mr. Cowles, had indicated the intent to introduce a condominium development on the land immediately to the south of the Bredal 9-of-2 facility. At the instruction of the Alberta Energy and Utilities Board ("AEUB"), Bredal Energy initiated the present study with a view to determining the resultant sound level due to the 9-of-2 facility at the boundary of the proposed development. The noise impact would be determined by means of environmental noise monitoring.

There is no line-of-sight exposure between the Bredal 9-of-2 site and the proposed development due to intervening bush.

A second noise monitoring was conducted at the entrance to the Schwindt driveway, located about 380 meters west-southwest of the 9-of-2 site. This second site was chosen as allowing a follow-up noise monitoring approximately centered between several permanently-occupied Residences nearest to the Bredal facility (Tizzard 670m W, Schwindt 520m W and Cowles 400m SW).

[1] As defined in ID99-8: a "heavily travelled" road is one with 10-or-more vehicle pass-bys per hour.

Table of Contents

List of Figures

Since the overall noise emission of the completed co-gen building is largely determined by two large roll-up doors, one each on the south and north faces of the co-gen building, some short-term sound level spot measurements were also made on-site and off-site with the south roll-up door either closed or opened.

3.0 Permissible Sound Levels

The Permissible Sound Levels in the area around the Bredal Energy 9-of-2 site are determined in accordance with the requirements of the Interim Directive on Noise Control ID99-8 of the AEUB. For the existing Residences the Night-time Permissible Sound Level (the "PSL-Night") is **40 dBA L_{eq}** (as determined for the pre-commissioning noise study and based on low dwelling-unit density, area not subject to frequent vehicle pass-bys, train passage or air-craft flyovers and area not, by definition, pristine). The fact that the Residences are located near a lake-shore has no bearing on deriving the PSL-Night. Further, if a condominium development were introduced, the PSL-Night would increase due to the higher dwelling-unit density to **43 dBA L_{eq}-Night.**

4.0 Noise Measurements

4.1. Noise Monitoring Times and Observations

The overnight environmental noise monitoring conducted at the north property line of the proposed condominium development was begun at 21:50 MDT on 17-May-2004 (Monday) and set to run for 16 hours (finishing 18-May at 13:50). This ensured that the entire night-time (22:00 to 07:00) would be monitored as well as several day-time hours after the completed night-time. The noise monitor was located along the barbed-wire fence just to the south of the gravel road providing access to the Schwindt and Tizzard residences, thus being about 150 meters due south of the co-gen building. (As the exact location of the façades of the condominium development are not yet known, monitoring along the fence-line was deemed reasonable.) At the time of equipment setup skies were clear, temperature was estimated at 15degC and winds appeared essentially calm at-grade; rustling of leaves was negligible (listings of Environment Canada weather data are given in Appendix B).

The Bredal Energy co-gen facility was clearly audible and noted to be the dominant sound source at this noise monitoring location, both during equipment setup and during other site-visits. Also when the south roll-up door was closed, the co-gen facility was still the dominant sound source here.

At the time of equipment retrieval (18-May, 14:00MDT) the Bredal Energy co-gen facility was audible but not as dominant as before due to increased winds. Atmospheric conditions at this time were: sky high wispy cloud, winds estimated at 15 km/hr from the west, temperature estimated at 22degC.

The second noise monitoring, at the entrance to the Schwindt driveway, was begun 18-May (Tuesday) at 15:15MDT and set to run for 19 hours (to terminate at 10:15MDT, 19-May). This captured the entire night-time and most of the day-time hours. Atmospheric conditions during setup were: sky high wispy cloud, winds estimated at 15 km/hr from the west, temperature estimated at 22degC. The 9-of-2 facility was inaudible at this site during setup of the noise monitor.

At the time of equipment retrieval (19-May, 10:30MDT) the Bredal Energy 9-of-2 facility was audible and there were consistent bird-calls in the vicinity of the noise monitor. Atmospheric conditions at this time were: sky about 40% overcast, winds estimated at 10 km/hr from the north, temperature estimated at 15degC.

At various times throughout the noise study 1/3-octave band sound level spot measurements were made, primarily to assess the effect of the co-gen building's south roll-up door being either opened or closed. The main set of these spot measurements was made 18-May between 13:30 and 15:00MDT, measuring mainly in the area south and west of the co-gen building at 15 and 30 meters. A spot measurement with the south roll-up door closed was also made at the location of the 17-18 May noise monitoring (north property line of proposed condominium development).

The equipment used throughout this noise study was a CEL Model 593 Precision Integrating Sound Level Meter, equipped with Bruel-&-Kjaer 4165 (1/2-inch) microphone. For the noise monitorings the microphone was equipped with the manufacturer's windscreen and mounted atop a tripod inside a rain-hood. The windscreen was also used during the 1/3-octave band sound level spot measurements. The equipment was calibrated prior to the start of each noise monitoring with the manufacturer's calibrator (CEL Model 284/2). Upon completion of each noise monitoring the equipment was checked for calibration drift. In both cases this was found to be negligible.

4.2. Weather Conditions

Listings of weather data obtained from the Environment Canada website are given in Appendix B. Precipitation effects were not observed on the equipment after either noise monitoring. While windspeeds were moderate with some gusting during the day-time hours of 18-May, windspeeds during the two night-times monitored were light.

While winds were reported as being light and generally from the south for the first night of noise monitoring, on-site observations at the time of equipment setup suggested this was of negligible noise impact at the fenceline location (attributed to the winds being light). For the final (morning) hours on 19-May winds were from the northeast, which is the "worst-case" wind direction with the respect to the second noise monitoring location.

5.0 Results and Discussion

The results of the two environmental noise monitorings are shown in Figures 1 – 4 (pages 8 – 10).

Figure 1 is the A-weighted sound level trace as-measured[2] and reported using one-half minute L_{eq} sampling. Figure 3 is the same data from Figure 1, now shown using one-hour L_{eq} sound levels. It is evident from both Figures 1 & 3 that the sound level at the fenceline due to the 9-of-2 facility is very consistently in the range of 50 dBA. The **L_{eq}-Night** sound level (un-adjusted) was **50 dBA**. Bredal Energy indicates that the co-gen facility ran continuously during this environmental noise monitoring.

[2] That is, the data have not been adjusted to remove abnormal data, as allowed in ID99-8.

It is evident from these data that, with the south roll-up door opened, the noise emission from the 9-of-2 facility exceeds the PSL-Night for the proposed development.

Similarly, Figures 2 and 4 are the data monitored at the second location (entrance to Schwindt driveway). Figure 2 (page 8) shows much more data-scatter than Figure 1 which is consistent with the observations at this location of (i) facility being inaudible at times and (ii) interference/dominance by animal sounds. The reduction of data-scatter between 21:00 and 04:30 is attributed to (i) cessation of animal sounds after night-fall and (ii) reduced wind-effects. Figure 4 shows the hourly results of the environmental noise monitoring. The un-adjusted **L_{eq}-Night** sound level was **36 dBA.**

(A brief subjective site-check of the sound levels near the Tizzard residence 18-May at 14:30MDT indicated that the 9-of-2 facility was inaudible. At the time of equipment retrieval on 19-May (10:30MDT) the 9-of-2 facility was faintly audible; this location was dominated by animal vocalizations at this time.)

Bredal Energy has further indicated that during the second noise monitoring there was an un-intended shut down of the co-gen facility between approximately 01:00 and 06:45MDT; see Figure 7. Also, the south roll-up door was closed between 07:00 and 08:15MDT; this was done intentionally to observe the effect, if any, in the noise monitoring trace. The effect of these two operational changes is not conclusively discernible in the data-trace of Figure 2: while there is a distinct decrease of sound level at approximately 23:45MDT, this does not match with the shut-down time of 01:00MDT. Similarly, given that animal sound appeared to be the dominant sound source at this location, the "spikes" in the data-trace occurring around 06:00 are more likely to have been due to animal sounds rather than co-gen start-up. Next, the effect of the roll-up door being adjusted at 07:00 (down) and 08:15 (up) cannot be correlated with the measurement data in Figure 2: it would be expected to observe a decrease, even if very small, in the lowest sound level after 07:00MDT and a corresponding increase after 08:15. However, such a pattern of decrease/increase is not present.

Lastly, since winds were from the worst-case direction for the early morning hours of 19-May, it could be expected to see (somewhat) elevated sound levels in these hours if the 9-of-2 facility were the dominant sound source. However, no such increase is observed in Figure 2; as well, the hourly L_{eq} sound levels (see Figure 4) remained below 40 dBA.

Thus, while the 9-of-2 facility was, at times, audible at the second noise monitoring location, the various measurements and observations suggest it was not the dominant sound source and that at this location the 9-of-2 Bredal Energy facility meets the requirements of ID99-8.

The results of the spot measurements near the co-gen building are summarized in Figure 5 (page 11). At each measurement location the sound level is indicated with the south roll-up door opened ("o") and closed ("c"). It is evident from the two sets of sound levels that closing the roll-up door resulted in reduction of the broadband A-weighted sound level by 13-to-16 dB directly south of the opened south roll-up door, both on-site and at the location of the fenceline noise monitoring.

6.0 Noise Mitigation

From the measurement results described above it is evident that if the south roll-up door could be kept closed, the 9-of-2 facility would meet the requirements of ID99-8 at the fenceline noise monitoring location (it is already in compliance at the second location). Normally the south roll-up door has been kept fully opened in order to maintain adequate cooling of the co-gen engines. If alternate means of cooling/ventilating the interior of the building were introduced, such as reconfiguring the engine cooling fans and/or adding suitable mechanical ventilation, one or both roll-up doors could be kept closed and no further noise mitigation would be required at this time. (It is considered that a better means of building ventilation could likely be realized for under $10,000.)

An alternative means to meet the PSL-Night at the fenceline location, is to construct a noise shield in front of the south door. A schematic of the recommended wall is indicated in Figure 6. As the barrier would be constructed of modules of sheet-steel (20ga), wood (3/4in) and sound-absorbing lining (3in QUASH), it is considered that this will provide both sound-barrier and sound-absorber effects such that the target sound level can be met.

It is estimated that construction of a noise barrier as sketched would cost in the range of $15,000-to-$20,000 (budget pricing).

While Figure 6 indicates a recommended configuration for the noise barrier, other configurations can be designed by acl. For any type of noise shielding in front of the south roll-up door it will be necessary to verify that adequate ventilation of the interior of the building will still occur.

7.0 Conclusion

A post-commissioning noise study has been conducted for the co-generation expansion at the Bredal Energy 9-2-47-28W4 site. Environmental noise monitorings conducted 17/18-May and 18/19-May-2004 indicated measured night-time L_{eq} sound levels of **50 dBA** at the fenceline location 150m directly south of the co-gen building and **36 dBA** at the entrance to the Schwindt driveway (380m WSW), respectively. At the fenceline location this exceeds the Night-time Permissible Sound Level of 43 dBA L_{eq} (applicable if the proposed condominium development occurs) while at the second location it meets the PSL-Night of 40 dBA L_{eq}.

A series of spot measurements comparing the effect of the south roll-up door closed vs. opened disclosed a nominal sound level reduction of 15 dB for the door-closed scenario. Thus, if the co-gen facility is operated with the south roll-up door closed, the requirements of ID99-8 would be met at the fenceline location.

An alternative means of meeting the PSL-Night (as opposed to operating with the roll-up door(s) closed) is to construct a noise barrier just south of the south roll-up door. One such arrangement has been conveyed in schematic form (Figure 6); other possible layouts would have to be carefully designed in order to meet both noise- and building-ventilation requirements.

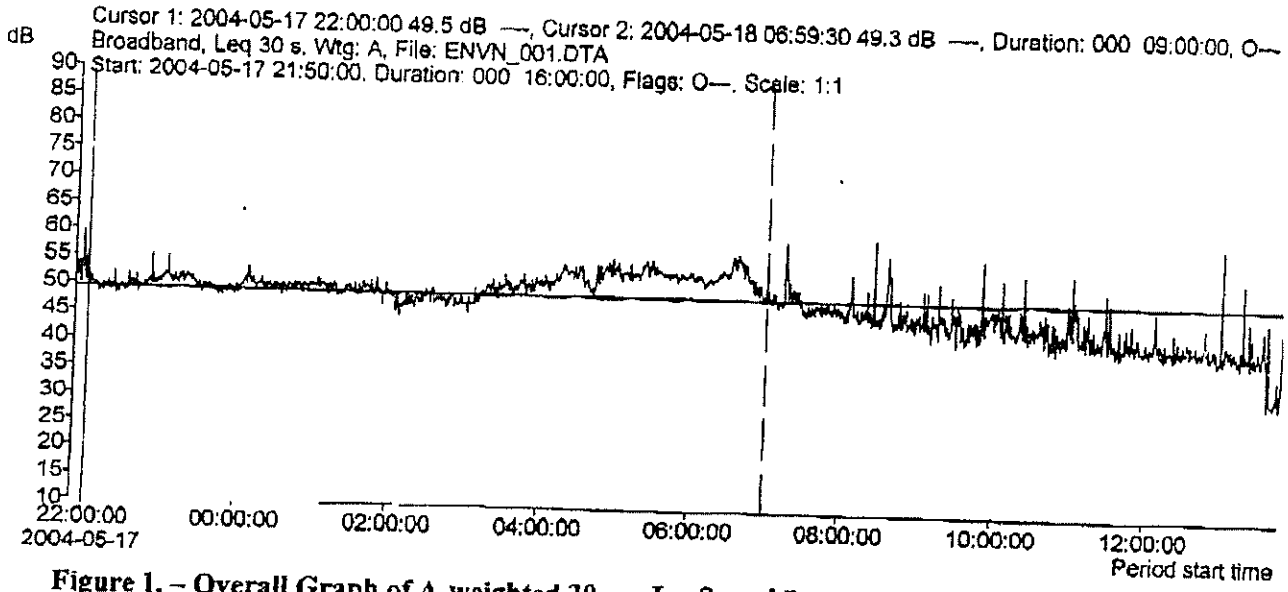


Figure 1. – Overall Graph of A-weighted 30-sec L_{eq} Sound Level, Dir. S of Bldg (17/18 May 04)

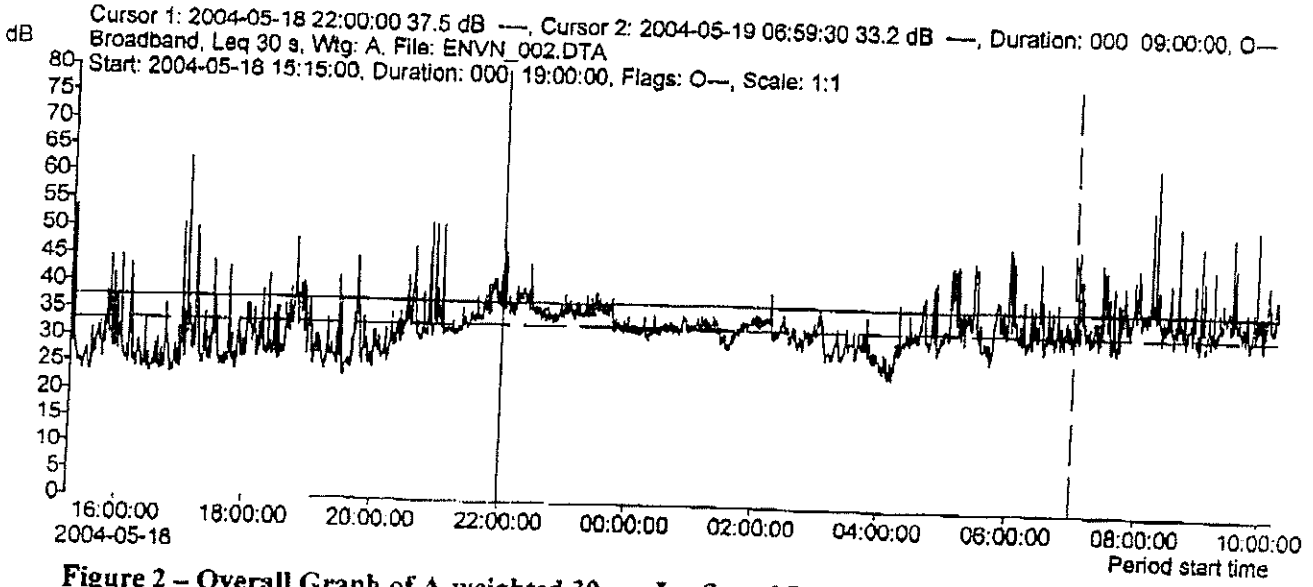
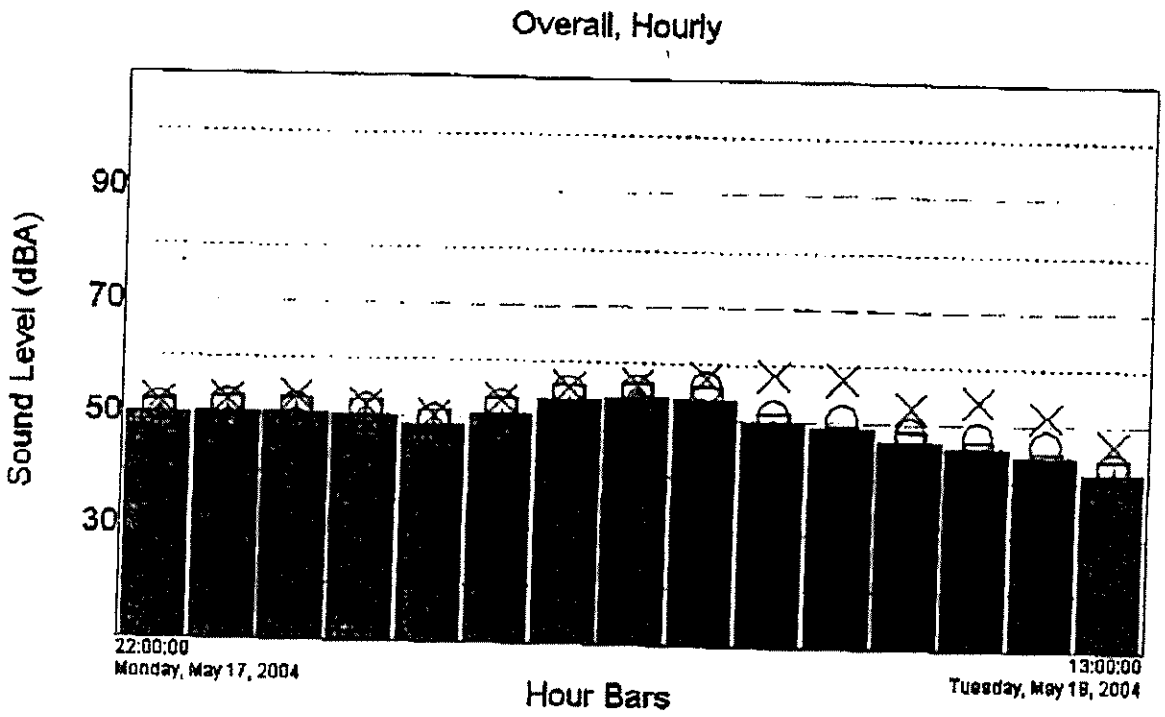


Figure 2 – Overall Graph of A-weighted 30-sec L_{eq} Sound Level, SW of Plant (18/19 May 04)



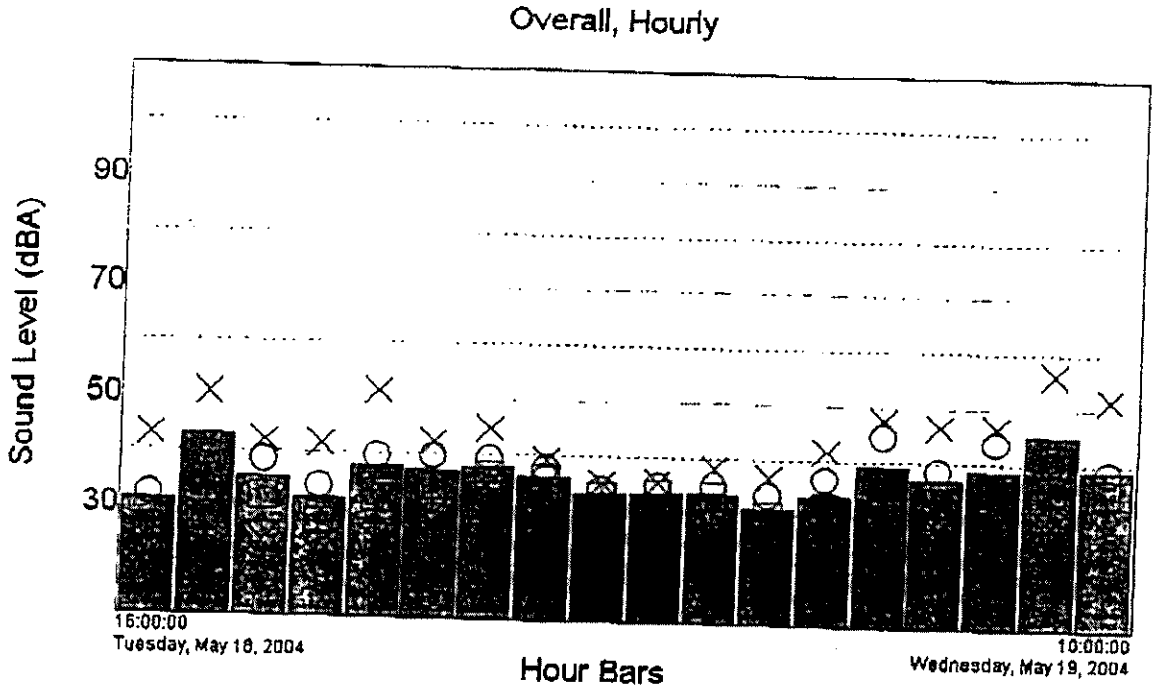
Title : Bredal Mulhurst 9-of-2
Description : Cowles Fenceline
Start Time : 21:50:00

Execution Date : 05-17-2004
Start Date : 05-17-2004
Duration : 15:59:59

Sound Level Icons: L_{eq} ⊡ , L_1 X, L_{10} O, L_{50} □, L_{90} ⌖, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	HI	Under
1	22:00:00 Monday, May 17, 2004	49.94	52.20	51.10	49.70	48.70	48.20	3601	0	0	0
2	23:00:00 Monday, May 17, 2004	50.36	52.70	51.70	50.10	48.70	48.20	3601	0	0	0
3	00:00:00 Tuesday, May 18, 2004	50.33	53.30	51.10	50.20	49.30	48.70	3601	0	0	0
4	01:00:00 Tuesday, May 18, 2004	50.00	51.80	51.10	50.00	48.80	47.70	3601	0	0	0
5	02:00:00 Tuesday, May 18, 2004	48.30	50.20	49.30	48.30	47.10	46.20	3601	0	0	0
6	03:00:00 Tuesday, May 18, 2004	50.67	53.20	52.10	50.70	49.20	48.80	3601	0	0	0
7	04:00:00 Tuesday, May 18, 2004	53.32	55.70	54.80	53.20	51.10	49.70	3601	0	0	0
8	05:00:00 Tuesday, May 18, 2004	53.94	58.20	55.10	53.70	53.10	52.30	3601	0	0	0
9	06:00:00 Tuesday, May 18, 2004	53.69	57.50	55.80	53.10	50.50	49.20	3601	0	0	0
10	07:00:00 Tuesday, May 18, 2004	49.96	58.20	51.00	48.60	47.10	46.70	3601	0	0	0
11	08:00:00 Tuesday, May 18, 2004	48.89	57.80	50.50	46.70	46.20	44.30	3601	0	0	0
12	09:00:00 Tuesday, May 18, 2004	46.80	53.00	48.20	46.80	43.20	42.00	3601	0	0	0
13	10:00:00 Tuesday, May 18, 2004	45.86	54.10	47.70	44.30	42.30	41.00	3601	0	0	0
14	11:00:00 Tuesday, May 18, 2004	44.25	51.70	46.30	42.30	41.00	40.20	3601	0	0	0
15	12:00:00 Tuesday, May 18, 2004	41.74	46.60	42.70	41.20	40.10	39.30	3601	0	0	0

Figure 3 – Overall Hourly Sound Levels at Fenceline 150m South of Co-Gen



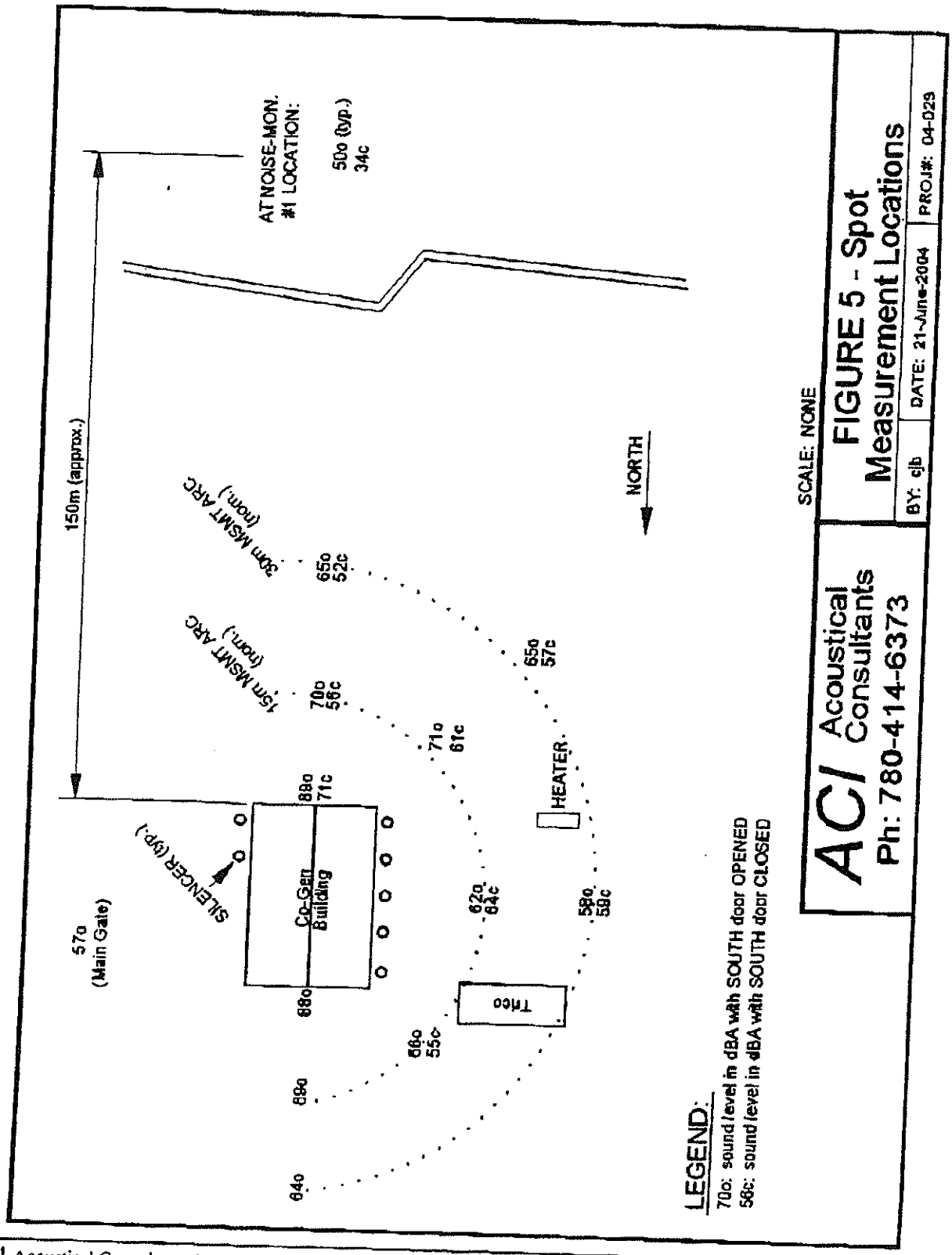
Title : Bredal Mulhurst 9-of-2
Description : Schwindt Dwwa
Start Time : 15:15:00

Execution Date : 05-18-2004
Start Date : 05-18-2004
Duration : 18:59:59

Sound Level Icons: L_{eq} ▣ L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	16:00:00 Tuesday, May 18, 2004	31.08	43.10	32.20	25.80	24.00	23.10	3601	0	0	0
2	17:00:00 Tuesday, May 18, 2004	42.97	50.50	37.00	28.00	25.30	24.50	3601	0	0	0
3	18:00:00 Tuesday, May 18, 2004	35.22	42.00	38.30	31.80	27.10	26.10	3601	0	0	0
4	19:00:00 Tuesday, May 18, 2004	31.73	41.70	33.70	27.30	25.30	23.60	3601	0	0	0
5	20:00:00 Tuesday, May 18, 2004	37.51	51.30	39.50	31.80	27.80	26.60	3601	0	0	0
6	21:00:00 Tuesday, May 18, 2004	37.06	42.20	39.50	34.20	31.80	31.30	3601	0	0	0
7	22:00:00 Tuesday, May 18, 2004	37.45	44.70	39.30	36.20	34.70	34.20	3601	0	0	0
8	23:00:00 Tuesday, May 18, 2004	35.05	39.20	37.70	35.80	33.10	32.60	3601	0	0	0
9	00:00:00 Wednesday, May 19, 2004	33.17	36.30	34.20	33.10	32.20	31.50	3601	0	0	0
10	01:00:00 Wednesday, May 19, 2004	33.46	35.50	34.80	33.80	30.60	29.60	3601	0	0	0
11	02:00:00 Wednesday, May 19, 2004	33.54	36.20	35.20	33.20	31.00	30.10	3601	0	0	0
12	03:00:00 Wednesday, May 19, 2004	30.94	36.70	33.50	30.00	28.00	26.30	3601	0	0	0
13	04:00:00 Wednesday, May 19, 2004	33.49	41.80	36.60	31.80	28.30	24.80	3601	0	0	0
14	05:00:00 Wednesday, May 19, 2004	39.31	47.70	44.70	34.80	30.50	28.50	3601	0	0	0
15	06:00:00 Wednesday, May 19, 2004	36.90	46.60	38.50	33.20	31.50	30.50	3601	0	0	0
16	07:00:00 Wednesday, May 19, 2004	38.62	46.70	43.70	35.00	31.60	30.80	3601	0	0	0
17	08:00:00 Wednesday, May 19, 2004	45.28	56.30	48.30	35.70	32.60	31.30	3601	0	0	0
18	09:00:00 Wednesday, May 19, 2004	38.84	51.80	38.50	35.20	32.30	30.90	3601	0	0	0

Figure 4 – Overall Hourly Sound Levels at entrance To Schwindt Driveway


AT NOISE-MON. #1 LOCATION:
50o (typ.)
34c
150m (approx.)
NORTH
30m MSMT ARC (nom.)
65o
52c
15m MSMT ARC (nom.)
70o
56c
65o
57c
71o
61c
HEATER
88o
71c
SILENCER (typ.)
Co-Gen Building
57o
(Main Gate)
62o
64c
58o
59c
88o
Trfco
66o
55c
89o
64o
LEGEND:
70o: sound level in dBA with SOUTH door OPENED
58c: sound level in dBA with SOUTH door CLOSED
SCALE: NONE
FIGURE 5 - Spot Measurement Locations
BY: cjb
DATE: 21-Jun-2004
PROJ#: 04-029
ACI Acoustical Consultants
Ph: 780-414-6373

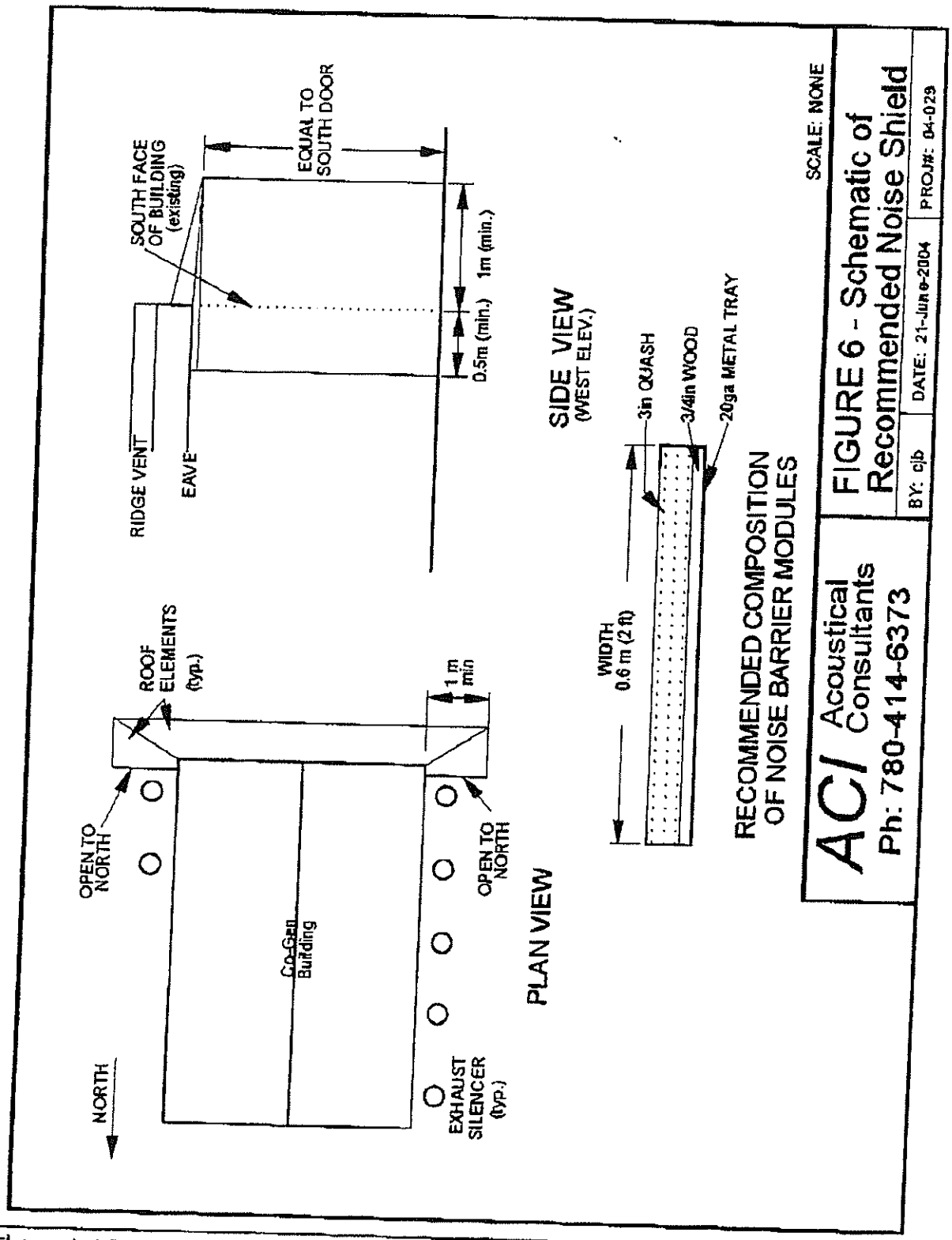

SOUTH FACE OF BUILDING (existing)
EQUAL TO SOUTH DOOR
RIDGE VENT
EAVE
0.5m (min.)
1m (min.)
SIDE VIEW (WEST ELEV.)
3in QUASH
3/4in WOOD
20ga METAL TRAY
WIDTH 0.6 m (2 ft)
RECOMMENDED COMPOSITION OF NOISE BARRIER MODULES
ROOF ELEMENTS (typ.)
1 m min
OPEN TO NORTH
OPEN TO NORTH
Co-Gen Building
PLAN VIEW
NORTH
EXHAUST SILENCER (typ.)
SCALE: NONE
FIGURE 6 - Schematic of Recommended Noise Shield
BY: cjb
DATE: 21-June-2004
PROJ#: 04-029
ACI Acoustical Consultants
Ph: 780-414-6373

Figure 7 – Printout of Gas Consumption, Bredal Energy 9-of-2 Site
(Received by fax from Bredal Energy)

Appendices

APPENDIX A

THE ASSESSMENT OF ENVIRONMENTAL NOISE

Sound levels are normally measured on a logarithmic or **deciBel** scale. This is done to reflect the response of the human ear to increases in sound level. If a certain sound is first increased by a factor of ten and then by a further factor of ten, or one hundred times the original, the human ear would perceive these two increments as being equal. Use of a logarithmic scale also presents the two increments as being equal.

The range of frequencies audible to the human ear ranges from approximately 20 Hz to 16,000 Hz ("Hertz"; oscillations per second). Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. An important step in environmental noise assessment is modification of the frequency characteristic of the sound field reaching the microphone to correspond to the hearing characteristic of the human ear. To achieve this result, the A-weighting network is used. Sound levels are thus usually measured in terms of A-weighted deciBels or dBA. When this (or any other) weighting is omitted the sound levels are sometimes referred to as "un-weighted", "Linear" or "flat".

As sound in the environment is rarely constant, the next step in environmental sound assessment is the treatment of time-varying sound levels. Up to the 1960's, sounds which vary with time were described by a set of statistical descriptors, the most important of which are as follows:

- L99 The level exceeded 99% of the time. This corresponds to the lowest or background sound level.
- L50 The level exceeded 50% of the time. This corresponds to the average sound level.
- L10 The level exceeded 10% of the time. This level was considered to be a good descriptor of traffic noise.
- L1 The level exceeded 1% of the time. This level gives an indication of the higher sound levels.
- Lmax The highest sound level which occurred.

In the 1970's a new descriptor resulted from research into the human response to time-varying sound levels. This was the Equivalent Energy Sound Level or $\mathbf{L_{eq}}$. To determine the L_{eq}, a time-varying sound is replaced with a constant sound level, which has the same or equivalent energy. That constant level then replaces the time varying level in terms of the assessment of human response. Sound levels measured in this way are presented as dBA L_{eq}.

Before L_{eq} can be used to describe the noise of the Plant, the engineer performing the measurement must be convinced that the Plant is the dominant noise source in the community. Often this is likely as the Plant noise is always present, whereas other noise sources come and go. If the engineer is not convinced that the Plant is the major source, the only solution is to perform measurements with the Plant out of operation and then in operation and compare the two sets of results. The difference, if any, will be the effect of the Plant.

APPENDIX B

WEATHER DATA AS OBTAINED FROM ENVIRONMENT CANADA WEBSITE

For Stony Plain, 17-18 May 2004

Date:	Hour	Weather	Temp. (°C)	Humidity (%)	DewPoint (°C)	Wind (km/h)	Pressure (kPa)	Visibility (km)
18 May 2004	16:00 MDT	Partly Cloudy	25	15	-4	NW 15	100.9	24
18 May 2004	15:00 MDT	Partly Cloudy	24	16	-4	NNW 13 gusting to 31	100.9	24
18 May 2004	14:00 MDT	Mainly Sunny	23	17	-3	NW 10	101.0	24
18 May 2004	12:00 MDT	Mainly Sunny					101.0	24
18 May 2004	12:00 MDT	Sunny	22	19	-2	W 18	101.0	24
18 May 2004	11:00 MDT	Sunny	22	28	2	W 14	101.1	24
18 May 2004	10:00 MDT	Sunny	19	32	2	WNW 15	101.1	24
18 May 2004	09:00 MDT	Sunny	16	38	2	W 14	101.1	24
18 May 2004	08:00 MDT	Sunny	13	45	2	W 14	101.2	24
18 May 2004	07:00 MDT	Sunny	11	50	1	W 12	101.2	24
18 May 2004	06:00 MDT	Sunny	9	56	1	W 11	101.1	24
18 May 2004	05:00 MDT	Clear	10	53	1	WSW 12	101.1	15
18 May 2004	04:00 MDT	Clear	11	49	1	WSW 12	101.1	15
18 May 2004	03:00 MDT	Clear	12	45	0	SW 9	101.2	15
18 May 2004	02:00 MDT	Clear	12	41	-1	SW 9	101.2	15
18 May 2004	01:00 MDT	Clear	13	39	0	SW 11	101.2	15
18 May 2004	00:00 MDT	Clear	14	36	-1	SW 8	101.2	15
17 May 2004	23:00 MDT	Clear	16	30	-2	SSW 7	101.2	24
17 May 2004	22:00 MDT	Clear	17	28	-2	SSW 6	101.2	24

For Edmonton International Airport, 18 May 2004

Weather Trends for Edmonton International

Date	Hour	Weather	Temp. (°C)	Humidity %	DewPt. (°C)	Wind (km/h)	Pres. (kPa)	Visib. (km)
19 May 2004	00:00 MDT	Mainly Clear	17	33	1	NNE 22 gusting to 32	101.2	24
18 May 2004	23:00 MDT	Mainly Clear	18	27	-1	NNE 28	101.1	24
18 May 2004	22:00 MDT	Partly Cloudy	19	26	-2	N 18	101.1	24
18 May 2004	21:00 MDT	Mostly Cloudy	21	21	-2	NNE 17	101.0	24
18 May 2004	20:00 MDT	Partly Cloudy	24	18	-2	NW 11	101.0	24
18 May 2004	19:00 MDT	Partly Cloudy	24	16	-3	NNW 13	101.0	24
18 May 2004	18:00 MDT	Partly Cloudy	25	16	-3	NNW 13	101.0	24
18 May 2004	17:00 MDT	Mostly Cloudy	25	17	-2	WNW 21	101.0	24
18 May 2004	16:00 MDT	Partly Cloudy	25	18	-1	NW 17	101.0	24
18 May 2004	15:00 MDT	Partly Cloudy	24	17	-2	NW 15 gusting to 30	101.0	24
18 May 2004	14:00 MDT	Partly Cloudy	24	17	-3	W 17 gusting to 28	101.1	24
18 May 2004	13:00 MDT	Partly Cloudy	23	20	-1	WNW 13 gusting to 33	101.1	24
18 May 2004	12:00 MDT	Sunny	23	23	1	W 11	101.2	24
18 May 2004	11:00 MDT	Sunny	21	27	2	WNW 15	101.2	24
18 May 2004	10:00 MDT	Sunny	19	31	2	WNW 15	101.2	24
18 May 2004	09:00 MDT	Sunny	17	37	2	WNW 15	101.2	24
18 May 2004	08:00 MDT	Sunny	14	43	2	W 13	101.2	24
18 May 2004	07:00 MDT	Sunny	9	60	2	SSW 8	101.2	24
18 May 2004	06:00 MDT	Sunny	6	68	0	S 15	101.2	24
18 May 2004	05:00 MDT	Clear	6	68	0	S 15	101.2	24
18 May 2004	04:00 MDT	Clear	9	56	1	S 18	101.2	24
18 May 2004	03:00 MDT	Clear	7	58	-1	S 17	101.2	24
18 May 2004	02:00 MDT	Clear	7	56	-2	S 15	101.3	24
18 May 2004	01:00 MDT	Clear	8	49	-2	S 15	101.3	24

Wind chill : Value not significant. See FAQ.

Url of this page : http://www.weatheroffice.ec.gc.ca/forecast/24_hour_conditions_e.html?yeg&unit=m
http://www.gc.ca/

The Green Lane™,
Environment Canada's World Wide Web Site.

For Edmonton International Airport, 19 May 2004

Weather Trends for Edmonton International

Date	Time	Weather	Temp. (°C)	Humidity (%)	DewPt. (°C)	Wind (km/h)	Pres. (kPa)	Visib. (km)
19 May 2004	12:00 MDT	Cloudy	14	50	4	NE 9	101.9	24
19 May 2004	11:00 MDT	Mostly Cloudy	14	54	5	ENE 9	101.9	24
19 May 2004	10:00 MDT	Light Rainshower	10	75	6	NE 17	101.9	24
19 May 2004	09:00 MDT	Distant Precipitation	11	61	4	NE 17	101.9	19
19 May 2004	08:00 MDT	Cloudy	11	57	3	NNE 18	101.8	19
19 May 2004	07:00 MDT	Cloudy	11	59	3	NNE 17	101.7	24
19 May 2004	06:00 MDT	Partly Cloudy	6	74	2	N 9	101.6	24
19 May 2004	05:00 MDT	Mainly Clear	8	66	0	N 8	101.5	24
19 May 2004	04:00 MDT	Partly Cloudy	10	57	2	N 11	101.4	24
19 May 2004	03:00 MDT	Mostly Cloudy	10	52	1	0	101.4	24
19 May 2004	02:00 MDT	Mostly Cloudy	12	50	2	N 11	101.3	24

Wind chill : Value not significant. See FAQ.

Url of this page :
http://www.weatheroffice.ec.gc.ca/forecast/24_hour_conditions_e.html?yeg&unit=m
http://www.gc.ca/

The Green Lane™,
Environment Canada's World Wide Web Site.

APPENDIX C

SOUND LEVELS OF FAMILIAR NOISE SOURCES

Used with Permission Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[3]	Sound Level (dBA)
Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

[3] Cottrell, Tom, 1980, *Noise in Alberta*, Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).

SOUND LEVELS GENERATED BY COMMON APPLIANCES

Used with Permission Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[4]	Sound level at 3 feet (dBA)
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

[4] Reif, Z. F., and Vermeulen, P. J., 1979, "Noise from domestic appliances, construction, and industry," Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).

acoustical consultants inc

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Suite 107, 9920 – 63Ave
Edmonton, Alberta, Canada T6E 0G9
Phone: (780) 414-6373, Fax: (780) 414-6376
www.aciacoustical.com

To: Bredal Energy Corp
Drayton Valley, Alberta, T7A 1S9
Fax#: 985-3158

Wednesday, 19 Jan 2005

Attn: Mr. Glenn Carson

re: **December-2004 Sound Level Study, Mulhurst 9-of-2 CoGen Facility**

Dear Glenn,

Attached please find the summary of the Dec-2004 noise study conducted at the 9-of-2 Mulhurst facility.

In a nutshell, the study found (1) sound level compliance at existing residences (2) at fenceline location: compliance if 22 condo's are built, but exceedance if only a limited number of residences were built. Further, the new data suggests that the new engines are overall louder, as to both mechanical noise radiation within the building and exhaust noise emissions, and have a different sound quality than the original engines.

Please call after you have read the Report and we can discuss further the details of the suggested upgrade.

Yours very truly,
aci Acoustical Consultants Inc.,

Corjan Buma, M.Sc., P.Eng.
Associate Consultant

cc. Mr. Neil Torry (fax# 780-542-2550)

INTRODUCTION

ACI Acoustical Consultants Inc., of Edmonton AB, was retained by Bredal Energy Corp. of Drayton Valley, AB, to conduct additional noise monitoring for its Mulhurst facility located at LSD 9-2-47-28W4. The purpose of the work was to determine the sound levels resulting from recent noise control modifications at two locations south and southwest of the 9-of-2 facility. Verbal authorization to commence the work was received from Mr. Glenn Carson of Bredal. Site work was conducted by Corjan Buma, M.Sc., P.Eng. of ACI 15-16 December 2004 (Wednesday-Thursday). The locations of the noise monitoring equipment was observed, at the time of equipment retrieval, by a representative of the Alberta Energy and Utilities Board ("EUB"), Mr. Jacob Handel.

Environmental noise monitoring had previously been conducted at the two locations on 17-18 May 2004. From that study it had been determined that the night-time L_{eq}[1] sound level due to the 9-of-2 facility at one location would exceed its Night-time Permissible Sound Level (the "PSL-Night"[2]) of 43 dBA if a proposed condominium were built. The modifications at the 9-of-2 facility were such that its south roll-up door could now be kept closed under normal operating conditions.

Sound Level Measurements

Two types of sound level measurements were conducted, namely, environmental noise monitoring at two locations off-site and a series of short-duration spot measurements at several key locations on the facility lease. Environmental noise monitoring is done to assess compliance with the Noise Directive; spot measurements are a diagnostic tool to help identify dominant noise sources.

Environmental noise monitoring was conducted at locations 150 meters due south of the 9-of-2 facility (the "fenceline" location, forming the northern boundary of the proposed condominium development) and 380 meters west-southwest of the facility (at the entrance to the Schwindt driveway). These were the identical locations used in the May-2004 study. The fenceline noise monitor was run from 17:20MST on Wednesday, 2004-Dec-15 to 10:20MST on Thursday, 2004-Dec-16 (for a total noise monitoring time of 17 hours). The Schwindt-driveway noise monitor was run from 16:32MST on Wednesday, 2004-Dec-15 to 10:32MST on Thursday, 2004-Dec-16 (for a total noise monitoring time of 18 hours).

[1] Leq-Night = energy-averaged sound level for entire night (22:00 to 07:00), in this case not adjusted for abnormal data.
[2] PSL-Night = night-time Permissible Sound Level, as per Interim Directive ID99-8 of the EUB.

For the fenceline noise monitoring the equipment used was a CEL Model 593 Precision Integrating Sound Level Analyzer equipped with a Bruel-and-Kjaer Type 4165 (1/2-inch) microphone. This system was calibrated at the start of the noise monitoring with a CEL Model 284/2 calibrator (to 114.3 dB – as per Calibration Laboratory instructions) and the calibration rechecked at the completion of monitoring (114.2 dB; this degree of calibration drift is within tolerance). This system had been programmed to log the broadband un-weighted, broadband A-weighted and 1/3-octave band sound levels in 30-second samples.

For the Schwindt driveway noise monitoring the equipment used consisted of a Larson-Davis Model 800B Precision Integrating Sound Level meter controlled by a Poqet PC palm-top computer. The microphone used was a Larson-Davis Model 2510 (1-inch) attached to a Larson-Davis Model 825 Pre-Amp. This system was calibrated with a Bruel-&-Kjaer Type 4230 Sound Level Calibrator prior to the start of noise monitoring (at 93.6 dB), and its calibration rechecked with the same calibrator at the completion of noise monitoring (at 93.6 dB). The data measured by this system consisted of the broadband, A-weighted L_{eq} sound level logged once per second. The data were measured-and-stored for subsequent post-processing.

Both noise monitors were equipped with their standard windscreen and weather-hoods.

Weather conditions reported for the noise monitoring period (as recorded at the Edmonton International Airport) were overcast, winds light and generally from the south or southwest and temperature ranging between a low of –7degC and a high of +3degC (listing of weather data contained in Appendix). Subjectively, during both the set-up and retrieval site visits winds appeared calm. The weather conditions were within the limits specified in ID99-8 for this type of environmental noise monitoring.

The short-duration spot measurements were conducted Wednesday, 2004-Dec-15 between 15:40 and 16:00MST. The measurements were conducted using the CEL Model 593 sound level meter which had been programmed to record the 1/3-octave band L_{eq} sound level spectra as 15-second samples. The spot measurements were conducted adjacent to the roll-up door, at distances of 7, 15 and 30 meters directly south of the closed south roll-up door of the co-gen building, centered on the Main Gate, 1 meter away from one of the co-gen unit's exhaust systems and at 7, 15 and 30 meters north of the co-gen unit's partially-opened north roll-up door.

Permissible Sound Levels

As determined in earlier studies and applying the methodology of ID99-8, the Night-time Permissible Sound Level (the "PSL-Night") is **40 dBA L_{eq}** for the existing Residences (Tizzard, Schwindt and Cowles) in the vicinity of the 9-of-2 facility. If the proposed condominium development is completed, the PSL-Night at the fenceline location increases to **43 dBA** due to the higher dwelling-unit density. However, if a lesser number of residences were built on the proposed condominium site a PSL-Night of 40 dBA might apply, depending on the exact number of Residences built. In the existing configuration (vacant land with bush) a ruling by the EUB might be required to establish the correct PSL-Night.

Measurement Study Results

Graphs of the results of the two environmental noise monitorings are shown in Figures 1 – 3 (page 9ff). Note that Figures 1 and 2 contain the same sound level data ("fenceline") but are conveyed in alternate formats. Figure 3 contains the Schwindt-driveway data.

The as-measured L_{eq}-Night sound levels were 42 dBA (9-hour L_{eq}) at the fenceline due south of the 9-of-2 facility and 37 dBA (9-hour L_{eq}) at the entrance to the Schwindt driveway. Note that these results have not been adjusted for abnormal events as allowed per ID99-8. Closer inspection of the detailed noise monitoring results disclosed an abnormal event at the Schwindt-driveway noise monitoring at about 03:06 on 16-Dec (see Figure 4). Given that there was no change in the throughput at the Plant at that time, this event is considered abnormal. When this event is removed the L_{eq}-Night at the Schwindt-driveway location becomes **29 dBA**. Table 1 below shows the adjusted L_{eq}-Night sound levels. Included in Table 1 (for convenience) are the corresponding results obtained in the 2004-May study.

Table 1 – Monitored L_{eq}-Night Sound Levels (all values in dBA; adjusted for abnormal data)

Location		L_{eq}-Night 2004-Dec	L_{eq}-Night 2004-May
Fenceline south of 9-of-2		42	50
Schwindt Driveway		29	36

As a further comment on adjustment of the Schwindt-driveway data, note that the hourly L50, the average sound level, for this location, as observed in Figure 3, was typically in the order of 23 dBA. further supporting the 03:06 event being considered "abnormal". Also, subjective observations during the site visits indicated consistently that one had to listen intently in order to faintly distinguish the sound of the Bredal 9-of-2 facility at this location. Thus, an L_{eq}-Night of 29 dBA is considered reasonable for the Schwindt-driveway location.

Although no abnormal data were found in the results at the fenceline location, the L_{eq}-Night value shown in Table 1 above was obtained for the period 22:00 to 06:53 (i.e. 7 minutes short of the full night-time period). The reason for this is that, at ACI's request, Bredal staff had opened the south roll-up door to observe the effect of this change in the noise monitorings. The south roll-up door was left open for the period 06:53 to 08:10, as confirmed by Bredal staff. Considering Figure 1 it is evident that the typical 30-second L_{eq} sound level before 06:53 was in the order of 44 dBA while after 06:53, with the door opened, the typical sound level was 59 dBA. Thus, opening the door now results in a typical 15 dB increase at the fenceline location (a similar increase had been observed during the 2004-May noise study). While an increase in the hourly sound level at the Schwindt-driveway location was observed (Figure 3), the effect of opening the south roll-up door is far less dramatic and does not lead to exceedance of the PSL-Night sound level of 40 dBA.

The spot measurements indicated in the near vicinity of the co-gen building dominance of the 1/3-octave bands centered at 50 Hz, 100 Hz and 200 Hz (suggesting, for example, engine noise associated with rotational speed). At the fenceline noise monitoring location, while the 50 Hz and 100 Hz bands remained constant throughout the noise monitoring (with no change in band-level even when the south roll-up door was opened), the dominant region of the frequency spectrum in terms of A-weighted sound levels was between 400 Hz and 1250 Hz (which suggests general Plant noise, not specifically engine-rotational noise). Figure 5 shows a graph of a short-duration spot measurement at the fenceline noise monitoring location.

Lastly, a spot measurement 1 meter south of the closed south roll-up door disclosed a sound level of 76.2 dBA, which compares to 70.5 dBA measured at the same location in 2004-May.

RECOMMENDATION FOR INTERIM NOISE CONTROL

From the study completed as described above, it is noted that with respect to the possible condominium development, the resultant L_{eq}-Night Sound level at the fenceline location is "in compliance" at 42 dBA (PSL-Night = 43 dBA). However, if only a few residences were built on the land immediately south of the fenceline, the PSL-Night of 40 dBA would still apply and facility noise levels, at 42 dBA L_{eq}-Night, would be deemed "in exceedance". Further, the "margin-of-safety" for the condominium scenario, at 1 dB in neutral atmospheric noise propagation conditions, is considered too small. (At all existing residential locations near the 9-of-2 facility, the resultant sound level is clearly within compliance.)

Our review of the 2004-Dec measurement results suggest:

1. new engines louder than original engines, both as to mechanical noise radiating into building and as to combustion-related noise propagating into exhaust systems;
2. likely having more breakout noise emitted from bodies of silencers and associated piping (breakout noise is what transmits directly through the steel-wall bodies);
3. composition of roll-up door may not be providing adequate attenuation of indoor sound levels.

Therefore the following process is suggested, both to verify the specific avenue of co-gen building noise emission and with a view to increasing the margin-of-safety on PSL-Night compliance. It is both a "quick fix" and relatively inexpensive to lag the two exhaust systems on the **east side only** of the co-gen building. It is recommended to (1) lag these two exhaust systems with a 1-inch thick Noise Control Blanket made by SUM Canada and (2) with the two systems in normal, at-capacity operation have several follow-up spot measurements conducted on the east side of the building to compare to the 2004-Dec data. This will provide immediate verification as to whether this is now the dominant source of co-gen noise emission (instead of the roll-up door) and, if so, justify lagging the remaining (west side) exhaust systems. Note that the SUM Canada Noise Control Blankets are specifically designed as a lagging for high temperature exhaust systems and provide high levels of sound attenuation in exactly that frequency range dominating the fenceline location. (Further noise monitoring at the fenceline location should be deferred until the impact of exhaust system noise breakout has been confirmed.)

CONCLUSION

The sound level study completed for the Bredal Energy Corp Mulhurst facility (LSD 9-2-47-28W4) has resulted in the following findings:

- the L_{eq}-Night sound level at the fenceline location 150 meters due south of the 9-of-2 facility was **42 dBA** (no adjustment for abnormal sound level events required); this is in compliance with the PSL-Night of 43 dBA with respect to the proposed condominium development on the land immediately south of this noise monitoring location; however, it might be in exceedance of a PSL-Night of 40 dBA applicable if only a limited number of Residences were built;
- the L_{eq}-Night (after adjustment for one abnormal event) at the entrance to the Schwindt driveway 380 meters west-southwest of the 9-of-2 facility was **29 dBA**; this is in compliance with the PSL-Night for this location of 40 dBA;
- the spot measurements disclosed that noise emissions due to the new engines are higher than those of the original co-gen engines (by about 5-to-6 dB), with dominant frequency-bands occurring for 100 Hz (exhaust noise); at the fenceline noise monitoring location the frequency range of 400 Hz to 1250 Hz was dominant (implying general Plant noise);
- closing the south roll-up door results in a decrease of emitted noise level of about 15 dB (as was also found during the 2004-May similar noise study);
- it is recommended as a further interim noise control treatment to lag the two exhaust systems on the east side of the co-gen building and verify the effect of this (by means of sound level spot measurements) before implementing larger-scale treatments and conducting further noise monitoring.

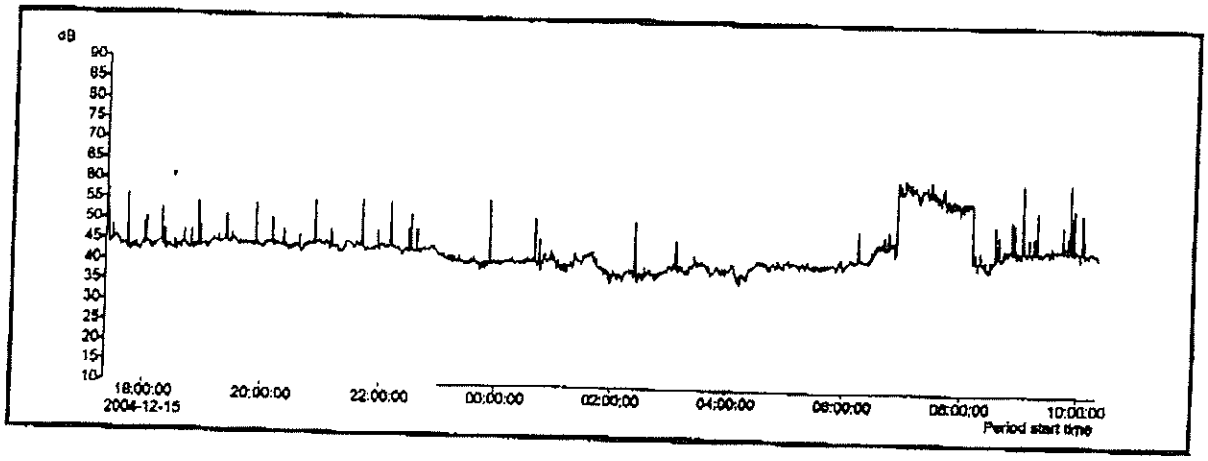
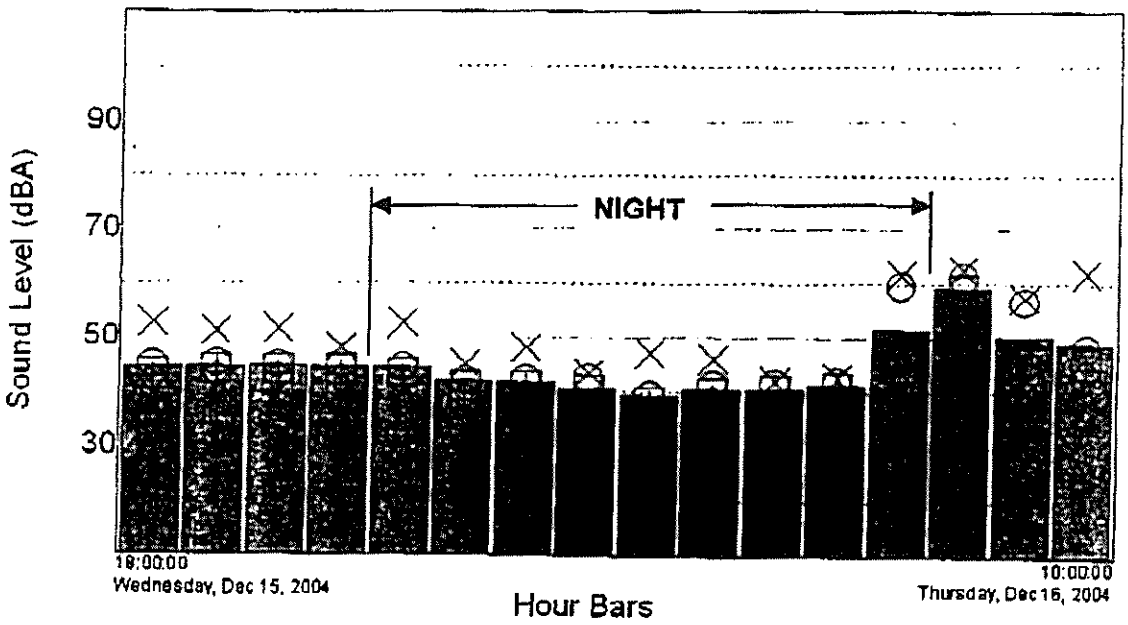


Figure 1 – Noise Monitoring at Fenceline 150 m South of 9-of-2 Plant
(Progression of ½-minute A-weighted L_{eq} sound levels; un-edited data)

FENCELINE – Overall Hourly



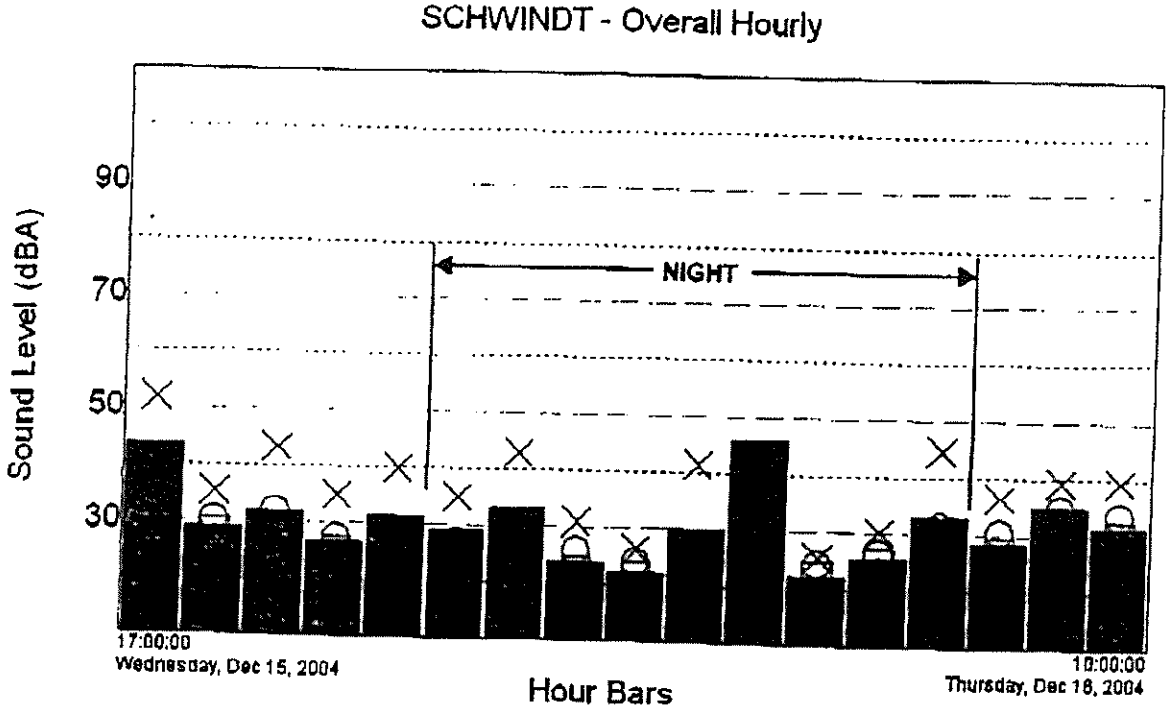
Title : Bredal - Mulhurst (follow-up)
Description : Fenceline S of Plant
Start Time : 17:20:00

Execution Date : 12-15-2004
Start Date : 12-15-2004
Duration : 17:00:00

Sound Level Icons: L_{eq} ⊠ , L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Start	Stop	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
18:00:00	19:00:00	44.6	52.7	45.0	43.3	42.7	42.5	3601	0	0	0
19:00:00	20:00:00	44.8	51.2	45.3	44.2	43.6	43.2	3601	0	0	0
20:00:00	21:00:00	44.9	51.7	45.1	44.2	43.2	42.7	3601	0	0	0
21:00:00	22:00:00	44.6	48.2	45.0	44.0	43.1	42.5	3601	0	0	0
22:00:00	23:00:00	44.6	52.7	44.5	43.6	42.7	42.2	3601	0	0	0
23:00:00	00:00:00	42.2	45.1	42.2	41.1	40.1	39.2	3601	0	0	0
00:00:00	01:00:00	42.0	48.3	42.5	41.2	40.6	39.8	3601	0	0	0
01:00:00	02:00:00	40.9	43.7	42.7	40.5	38.5	36.8	3601	0	0	0
02:00:00	03:00:00	39.4	47.3	39.6	38.5	37.7	37.0	3601	0	0	0
03:00:00	04:00:00	40.5	46.2	41.5	40.1	39.1	38.6	3601	0	0	0
04:00:00	05:00:00	40.6	42.2	41.7	40.7	38.1	36.6	3601	0	0	0
05:00:00	06:00:00	41.3	42.7	42.0	41.2	40.6	40.2	3601	0	0	0
06:00:00	07:00:00	51.8	61.7	59.5	44.8	42.5	41.3	3601	0	0	0
07:00:00	08:00:00	59.2	62.7	61.1	59.0	56.2	55.3	3601	0	0	0
08:00:00	09:00:00	50.4	57.5	56.7	44.7	41.8	40.7	3601	0	0	0
09:00:00	10:00:00	48.9	62.0	48.3	45.7	44.8	44.2	3601	0	0	0

Figure 2 – Progression of Hourly Sound Levels Monitored at Fenceline 150m South of Plant



Title : Bredal - Mulhurst
Description : Schwindt Driveway
Start Time : 16:32:00

Execution Date : 12-15-2004
Start Date : 12-15-2004
Duration : 18:00:00

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Start	Stop	Leq	L1	L10	L50	L90	L99	Good	Over	HI	Under
17:00:00	18:00:00	43.6	51.8	35.5	28.5	26.8	25.5	3634	4	0	4
18:00:00	19:00:00	28.8	35.3	30.3	28.0	26.5	25.5	3643	0	0	0
19:00:00	20:00:00	31.5	43.3	31.8	25.5	23.3	22.5	3642	0	0	0
20:00:00	21:00:00	26.4	34.8	27.3	25.0	23.8	22.8	3642	0	0	0
21:00:00	22:00:00	31.3	39.8	25.5	23.8	22.3	21.3	3643	0	0	0
22:00:00	23:00:00	28.9	34.8	27.0	24.8	23.0	21.8	3642	0	0	0
23:00:00	00:00:00	33.1	43.0	24.0	21.3	19.8	19.3	3642	0	0	0
00:00:00	01:00:00	23.6	31.0	25.8	22.3	20.5	19.5	3642	0	0	0
01:00:00	02:00:00	22.1	26.3	24.0	21.5	19.8	19.3	3643	0	0	0
02:00:00	03:00:00	29.9	41.5	24.3	20.8	19.5	19.0	3642	0	0	0
03:00:00	04:00:00	46.0	38.3	23.0	21.0	19.5	18.8	3618	10	2	12
04:00:00	05:00:00	22.2	25.5	24.3	22.3	19.0	18.3	3643	0	0	0
05:00:00	06:00:00	25.3	30.3	26.3	24.8	23.3	22.0	3642	0	0	0
06:00:00	07:00:00	32.9	44.8	31.3	25.0	23.3	22.3	3642	0	0	0
07:00:00	08:00:00	28.4	36.5	30.3	27.0	25.3	23.8	3643	0	0	0
08:00:00	09:00:00	34.9	39.3	34.5	30.5	27.8	24.8	3642	0	0	0
09:00:00	10:00:00	31.3	39.5	33.3	30.0	27.0	25.5	3642	0	0	0

Figure 3 – Progression of Hourly Sound Levels Monitored at Schwindt Driveway Entrance

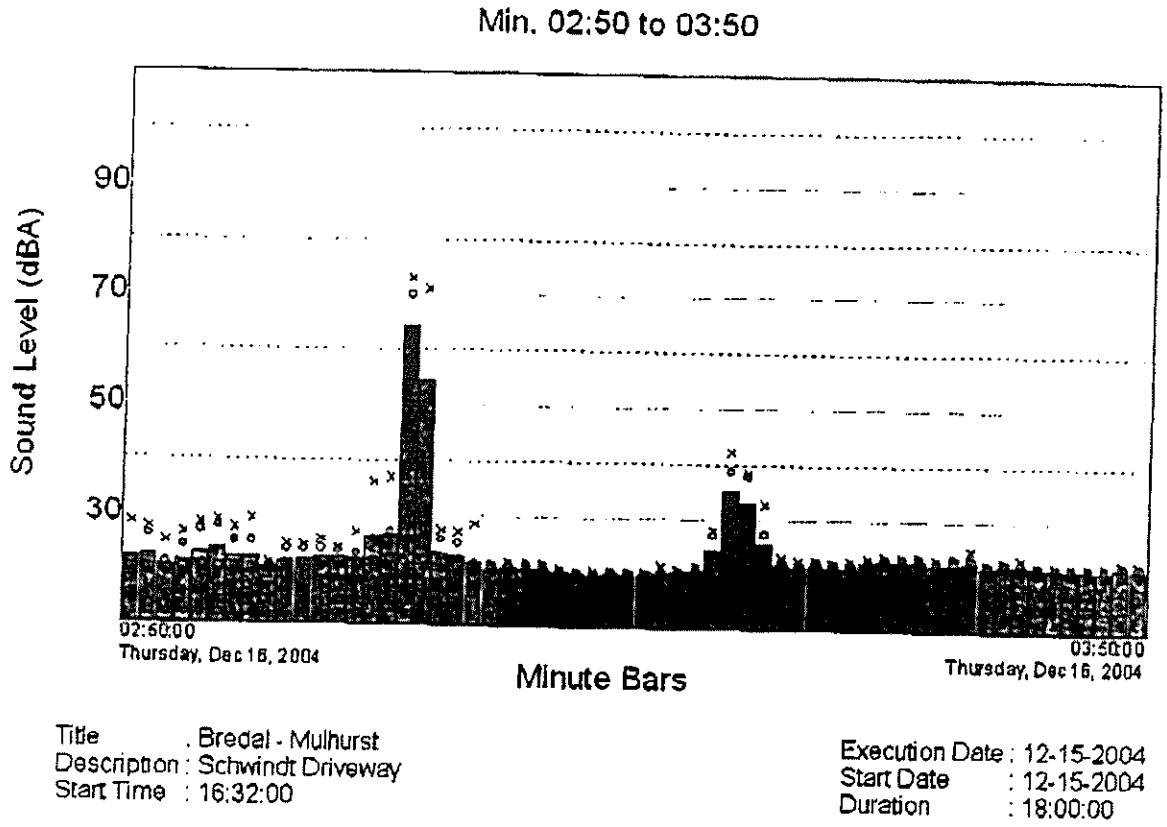


Figure 4 – Abnormal Noise Event at 03:06

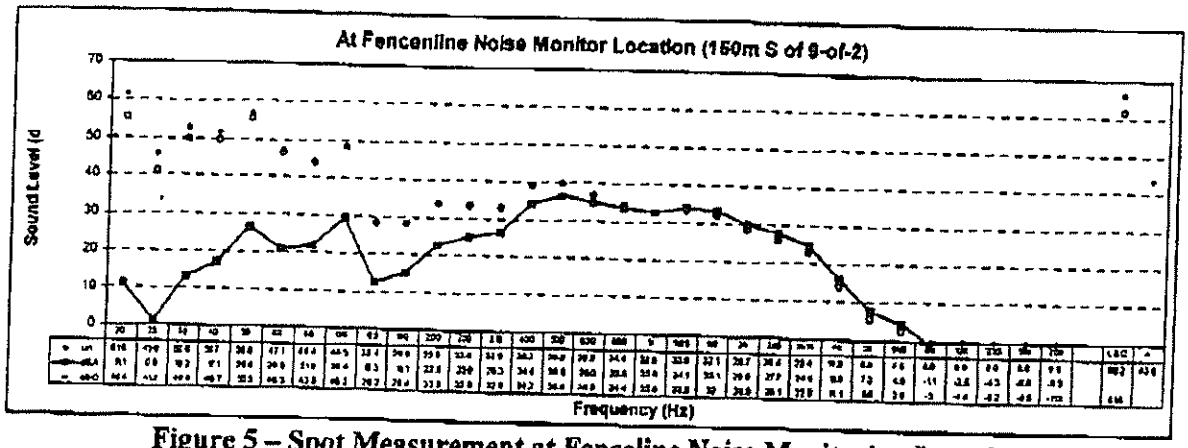


Figure 5 – Spot Measurement at Fenceline Noise Monitoring Location

APPENDIX

Weather Trends for Edmonton International Airport

15 to 16 December 2004

(Source: Environment Canada Website)

Date	Hour	Weather	Temp (°C)	RH (%)	DewPt. (°C)	Wind (km/h)	Pressure (kPa)	Visib. (km)	Wind Chill
16 Dec. 2004	14:00 MST	Cloudy	3	71	-2	S 15	102.1	24	*
16 Dec. 2004	13:00 MST	Mostly Cloudy	3	67	-2	S 8	102.3	24	*
16 Dec. 2004	12:00 MST	Mostly Cloudy	2	70	-3	SSW 5	102.5	24	*
16 Dec. 2004	11:00 MST	Mostly Cloudy	1	69	-4	SSW 8	102.6	24	*
16 Dec. 2004	10:00 MST	Partly Cloudy	-1	72	-5	SSW 5	102.6	24	*
16 Dec. 2004	09:00 MST	Mostly Cloudy	-1	73	-5	SW 5	102.5	24	*
16 Dec. 2004	08:00 MST	Mostly Cloudy	-1	74	-5	SSW 5	102.6	24	*
16 Dec. 2004	07:00 MST	Partly Cloudy	-2	79	-5	SW 5	102.6	24	*
16 Dec. 2004	06:00 MST	Partly Cloudy	-1	84	-3	SW 4	102.6	24	*
16 Dec. 2004	05:00 MST	Cloudy	0	81	-3	S 11	102.5	24	-4
16 Dec. 2004	04:00 MST	Cloudy	-1	78	-5	S 18	102.5	24	-6
16 Dec. 2004	03:00 MST	Cloudy	-1	78	-4	S 15	102.6	24	-6
16 Dec. 2004	02:00 MST	Cloudy	-2	79	-5	S 17	102.6	24	-7
16 Dec. 2004	01:00 MST	Mainly Clear	-3	88	-8	S 15	102.8	24	-13
16 Dec. 2004	00:00 MST	Partly Cloudy	-5	85	-7	S 15	102.8	24	-11
15 Dec. 2004	23:00 MST	Partly Cloudy	-5	86	-7	S 13	102.8	24	-10
15 Dec. 2004	22:00 MST	Mostly Cloudy	-4	85	-6	S 13	102.9	24	-9
15 Dec. 2004	21:00 MST	Cloudy	-4	85	-6	S 9	102.9	24	*
15 Dec. 2004	20:00 MST	Mostly Cloudy	-5	86	-7	SSW 13	103.0	24	-10
15 Dec. 2004	19:00 MST	Partly Cloudy	-5	88	-7	SSW 9	103.0	24	*
15 Dec. 2004	18:00 MST	Mostly Cloudy	-4	87	-6	SW 8	103.0	24	*
15 Dec. 2004	17:00 MST	Mostly Cloudy	-4	85	-6	SW 5	103.0	24	*
15 Dec. 2004	16:00 MST	Partly Cloudy	-1	82	-4	WSW 8	102.9	24	*

GRAPH OF THROUGHPUT OF 9-of-2 PLANT, PERIOD INCLUDING 2004DEC 15-16

THE ASSESSMENT OF ENVIRONMENTAL NOISE

Sound levels are normally measured on a logarithmic or **deciBel** scale. This is done to reflect the response of the human ear to increases in sound level. If a certain sound is first increased by a factor of ten and then by a further factor of ten, or one hundred times the original, the human ear would perceive these two increments as being equal. Use of a logarithmic scale also presents the two increments as being equal.

The range of frequencies audible to the human ear ranges from approximately 20 Hz to 16,000 Hz ("Hertz"; oscillations per second). Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. An important step in environmental noise assessment is modification of the frequency characteristic of the sound field reaching the microphone to correspond to the hearing characteristic of the human ear. To achieve this result, A-weighting is used. Sound levels are thus usually measured in terms of A-weighted deciBels or dBA. When this (or any other) weighting is omitted the sound levels are sometimes referred to as "un-weighted", "Linear" or "flat".

As sound in the environment is rarely constant, the next step in environmental sound assessment is the treatment of time-varying sound levels. Up to the 1960's, sounds which vary with time were described by a set of statistical descriptors, the most important of which are as follows:

- L99 The level exceeded 99% of the time. This corresponds to the lowest or background sound level.
- L50 The level exceeded 50% of the time. This corresponds to the average sound level.
- L10 The level exceeded 10% of the time. This level was considered to be a good descriptor of traffic noise.
- L1 The level exceeded 1% of the time. This level gives an indication of the higher sound levels.
- Lmax The highest sound level which occurred.

In the 1970's a new descriptor resulted from research into the human response to time-varying sound levels. This was the Equivalent Energy Sound Level or $\mathbf{L_{eq}}$. To determine the L_{eq}, a time-varying sound is replaced with a constant sound level, which has the same or equivalent energy. That constant level then replaces the time varying level in terms of the assessment of human response. Sound levels measured in this way are presented as dBA L_{eq}.

Before L_{eq} can be used to describe the noise of the Plant, the engineer performing the measurement must be convinced that the Plant is the dominant noise source in the community. Often this is likely as the Plant noise is always present, whereas other noise sources come and go. If the engineer is not convinced that the Plant is the major source, the only solution is to perform measurements with the Plant out of operation and then in operation and compare the two sets of results. The difference, if any, will be the effect of the Plant.

Sound Levels of Familiar Noise Sources

Used with Permission: Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[3]	Sound Level (dBA)
Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

[3] Cottrell, Tom, 1980, *Noise in Alberta*, Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).

SOUND LEVELS GENERATED BY COMMON APPLIANCES

Used with Permission; Obtained from EUB Guide 38: Noise Control Directive User Guide (November 1999)

Source[4]	Sound level at 3 feet (dBA)
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

[4] Reif, Z. F., and Vermeulen, P. J., 1979, "Noise from domestic appliances, construction, and industry," Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).

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To: Bredal Energy Corp
Drayton Valley, Alberta. T7A 1S9

Tuesday, 4 Oct 2005

Attn: Mr. Glenn Carson / **Fax#: 985-3158**
Attn: Mr. Neil Torry / **Fax#: 780-542-2550**

re: Mulhurst 9-of-2 CoGen Facility; Sept-2005 Noise Monitorings

Dear Sirs,

This Letter-Report summarizes the findings of the recent noise monitoring study for the above-named facility. These cover-pages convey a succinct summary of the results, and pages 3 – 14 contain the detailed results and related discussion.

In a nutshell, the L_{eq}-Night sound levels were:

Fenceline 150 m south of Co-Gen Building: ..... 46.5 dBA (9-hour L_{eq})
Entrance to Schwindt Driveway (380 m WSW of Co-Gen): ..... 32.6 dBA (9-hour L_{eq})
Site of original Cowles Residence (370 m SW of Co-Gen): ..... 32.6 dBA (9-hour L_{eq})

The monitored results required no adjustment for abnormal noise events.

Thus it is evident that the night-time L_{eq} sound levels at the two residential locations were below the **PSL-Night of 40 dBA**. Note that this occurred during a night in which there was a worst-case wind direction (generally from Plant toward Residences) for several portions of the noise monitoring period. Throughout the night monitored there were five (of the usual six) Co-Gen engines running; to have had a sixth engine running would be expected to cause less than a 1-dB increase of the monitored sound levels.

At the Fenceline location south of the Plant, the L_{eq}-Night sound level had increased, compared to the previous overnight noise monitoring, by 4.5 dB, thereby exceeding the applicable PSL-Night by 3.5 dB. It was noted at this location that the noise climate throughout the entire noise monitoring was dominated by a low-frequency signal (100 Hz) from the 9-of-2 Plant. The dominance and consistency of this signal suggested that further attention may be required for the silencers on the CoGen engines, HOWEVER: ***it should first be verified that no other Plant operating conditions had changed, resulting in this significant increase of low frequency.***

Regarding introduction of the set of spruce trees, the noise monitoring study was inconclusive because the operating conditions of the Plant (observed in the dominant low-frequency component) masked any gains attributable to the presence of the trees.

Thank you for again retaining aci to assist you in this work. If you have questions about this LetterReport or require further assistance, please do not hesitate to call.

Yours very truly,
aci Acoustical Consultants Inc.,

CJ Buma

Corjan Buma, M.Sc., P.Eng.
Associate Consultant

INTRODUCTION

acl Acoustical Consultants Inc. conducted a series of follow-up overnight noise monitorings 14/15 Sept-2005 (Wedn/Thurs) at the 9-of-2 Mulhurst facility of Bredal Energy. The purposes of this study were to

(1) determine the effect, if any, of adding a series of spruce trees along the east and south of the Co-Gen building and

(2) conduct a noise-monitoring at the Cowles Residence in response to a noise complaint registered with the EU-Board.

To assess the effect of the newly-added trees, noise monitoring was conducted at the entrance to the Schwindt Driveway and at the south fenceline along the gravel path due south of the Co-Gen building; these two locations had been used for noise monitorings in May-2004 and Dec-2004.

For the noise monitoring on the Cowles property, while at the time of this study no permanent residence was present (there was a large RV), the Owner has expressed the full intention of rebuilding a residence on this site. The noise complaint lodged with the Alberta Energy and Utilities Board was understood to apply to this residential location, based on the Owner's previous experience of facility noise while living at this site. In a telephone conversation with Mr. Cowles (6-August-2005), it was indicated that facility noise tended to be more bothersome on nights with cooler temperatures.

The noise monitoring study and this summary LetterReport were conducted/compiled by Mr. Corjan Buma, M.Sc., P.Eng. of acl.

PERMISSIBLE SOUND LEVELS

The Night-time Permissible Sound Levels at the three noise monitoring locations are:

Fenceline 150 m south of Co-Gen Building: ..... 43 dBA (9-hour L_{eq})
Entrance to Schwindt Driveway (380 m WSW of Co-Gen): ..... 40 dBA (9-hour L_{eq})
Site of original Cowles Residence (370 m SW of Co-Gen): ..... 40 dBA (9-hour L_{eq}).

The 43-dBA L_{eq}-Night at the Fenceline location is based on the possible presence of a set of condominiums proposed for the land south of the 9-of-2 facility. As there is currently bush on this land, the Fenceline location 1.5 meter south of the east-west gravel path is considered the closest possible placement of condo-structures near the 9-of-2 facility.

There is no line-of-sight exposure between the 9-of-2 facility and any of the three noise monitoring locations due to the presence of nearly-continuous deciduous bush. Even in winter with foliage absent, it is not possible to see through the bush from any monitoring location to the 9-of-2 facility (or *vice versa*). Bredal Energy had introduced a set of about 20 (nominally) 5-meter tall spruce trees along the east and south of its Co-Gen building.

NOISE MONITORING TIMES AND INSTRUMENTATION

The start and stop times of the three noise monitorings were:

- Cowles Res.: Wedn, 14-Sept 16:30 to Thurs, 15-Sept 12:05 (total of 19½ hrs)
- Schwindt Driveway entrance: Wedn, 14-Sept 17:50 to Thurs, 15-Sept 10:50 (total of 17 hrs)
- Fenceline: Wedn, 14-Sept 18:15 to Thurs, 15-Sept 11:52 (total of 17½ hrs)

At each location a noise monitor was set up to log the sound levels in both broadband and one-third octave band resolution using 30-second L_{eq}-averaging. A full-length audio recording was completed for the monitorings at the Cowles and Fenceline locations.

The equipment used to conduct the three noise monitorings were two identical systems containing a Larson-Davis 824 sound level meter equipped with Larson-Davis ½-inch model 2551 microphone and calibrated with Larson-Davis model CAL200 calibrator (used at Cowles and Fenceline locations) and a Bruel-&-Kjaer Type 2250 sound level meter equipped with ½-inch Type 4189 microphone and calibrated with Bruel-&-Kjaer Type 4231 calibrator (used at Schwindt driveway entrance). All equipment including sound level meters and calibrators had been factory re-certified within the past 12 months. Before-and-after calibrations/checks were as follows:

Time	Start	Stop
Cowles	114.0	113.9
Schwindt	93.86	93.83
Fenceline	114.0	113.8

A localized weather monitor was set up in a clearing on the Bredal Energy 9-of-2 lease. As there is no single location on this lease that gives unrestricted wind-access from all directions, the weather monitor was set up in the south half of the lease in a location not likely to cause interference on staff activities. The on-site weather data were compared to hourly data obtained from the Environment Canada website for the Edmonton International Airport (nearest continuously monitored met-station). The weather monitoring equipment used for the study consisted of a NovaLynx 110-WS-16D data acquisition box, with a 200-WS-02E wind-speed and wind-direction sensor, a 110-WS-16TH temperature and relative humidity sensor and a 110-WS-16THS solar radiation shield. The data acquisition box and a battery were located in a weather protective case. The sensors were mounted on a tripod at approximately 2.5m above ground. The system was set up to sample data in 5-minute averages obtaining average wind-speed, peak wind-speed, wind-direction, temperature and relative humidity.

Subjective observations of the weather on-site were: at time of setup, overcast, moderate wind from the west; at time of equipment retrieval, heavy overcast, light wind from southeast, light shower just beginning.

SUMMARY OF FINDINGS

The results of the three noise monitorings were as follows.

- The L_{eq}-Night sound levels monitored at the three study locations were as shown in Table 1 (see next page). Note that historical data have been included in Table 1 to provide an overview of the noise trend at each location. It is evident from the Sept-2005 data that at the Cowles and Schwindt-driveway entrance the L_{eq}-Night sound levels were below the applicable PSL-Night. The L_{eq}-Night sound level monitored at the Fenceline due south of the CoGen building was (a) over the PSL-Night for that location (assuming presence of condo's) by 3.5 dB and (b) 4.5 dB higher than during the previous overnight noise monitoring.
- Note that the sound levels for the Sept-2005 data in Table 1 are the un-adjusted L_{eq}-Night sound levels: inspection of the measurement data combined with review of the audio recordings disclosed that adjustment for abnormal noise events was not required.

Table 1 – Overview Table of Monitored Leq-Night Sound Levels

OVERVIEW TABLE OF L_{eq}-NIGHT NOISE MONITORING RESULTS AT BREDAL MULHURST 9-of-2 CO-GEN PLANT (Sound levels are L_{eq}-9hour in dBA; unless noted otherwise)						
DATE / LOCATION	Sep-05	May-05	Dec-04	May-04	Sep-03	Notes:
TIZZARD	---	---	---	---	29	- monitored only in baseline
SCHW-DVW	32.6	---	29	36	---	
FENCELINE	46.5	39 *	42	50	---	* short-term spot msmt only
COWLES	32.6	---	---	---	---	

- A graph of the hourly L_{eq} sound levels for each of the noise monitoring locations is shown in, respectively, Figures 1 – 3 below. Note that at the Cowles Residence (Figure 3) and at the Schwindt-driveway entrance (Figure 2) the hourly L_{eq} sound levels during all night-time hours were consistently below 40 dBA. Subjective observations at these two sites during the various site visits and review of the audio recording (Cowles site) affirmed that these measured sound levels are reasonable.

- At the Fenceline location (Figure 1) the relatively constant hourly sound levels with only a gradual decrease (a) suggests the dominance (for noise) of the 9-of-2 Facility and (b) indicates that the Facility ran very consistently throughout the time of the noise monitoring.

- A review of the 1/3-octave band results monitored at the Fenceline location disclosed a strong tonal component at 100Hz (considered "low frequency"). Figure 5 (page 14)is a graph of the audible spectrum taken from the data measured 03:27:30 to 03:28:00 (15 Sept); the dominance of the 100 Hz band is obvious in this graph (solid trace = A-weighted data; this is how a person with normal hearing would perceive this noise spectrum). A review of the progression-with-time for the 100 Hz band indicated a plot virtually identical with that for Figure 1 for the broadband A-weighted L_{eq} sound level.

From this it is concluded that Facility noise was the sole dominant noise source at the Fenceline noise monitoring location. Comparison of this (Sept-2005) spectrum with that from previous studies indicated that previously the 100 Hz (and 200 Hz) bands stood out in the measured noise spectrum but not to the same degree; these bands were not at all tonal during previous studies. **The dominance of the 100 Hz 1/3-octave band in the current data suggests that some Facility operating condition(s) had changed such that silencer exhaust noise emissions from the Co-Gen engines (OR from other equipment) have increased significantly since previous noise studies.**

- Table 2 and Figure 4 contain the weather data for the times of noise monitoring. The data obtained for the Edmonton International Airport (Table 2) indicate that winds were from a "worst-case" direction (i.e. from NNW, across N, through ENE) for several of the night-time hours. Given that a complaint had been lodged for a Residence to the SW of the 9-of-2 Facility, and that capturing a condition of a "cooler night" is difficult to guarantee, it is considered that the wind conditions (including some wind-calm hours) for the night monitored were optimal.

- Review of on-site weather data, Figure 4, disclosed that winds steadily decreased throughout the evening and were calm for most of the night. This tends to confirm the very consistent sound levels monitored at the Fenceline location. The "set" at 140deg (02:15 to 06:00) and at 205deg (06:20 to 08:20) are meaningless, given that windspeed was 0 (the wind-direction vane would have adopted one position and not moved for a long time). (The slightly elevated L_{eq} sound level for the hour 03:00 to 04:00 observed in Figures 2 & 3 was due to coyote noise and a passing truck, as observed in the audio recordings, and not due to wind effects.)

- Throughout the night monitored there were five (of the usual six) Co-Gen engines running. Had a sixth engine been running this would be expected to cause less than a 1-dB increase of the monitored sound levels (assuming identical operation of all engines).

Regarding introduction of the set of spruce trees, note that Plant operating conditions (observed in the dominant low-frequency component) masked any gains attributable to the trees (in addition, the worst-case wind likely was of greater influence to slightly *increase* the monitored sound level than that the presence of the trees reduced it). Subjectively, at the Fenceline location there was less mid- and high-frequency noise discernible than during the site visits of previous studies, but it was not clear if this was due to the presence of the trees (which would be expected, theoretically) or due to altered engine/Plant operating conditions.

CONCLUSION

In summary, the noise monitoring study for the Mulhurst 9-of-2 Plant disclosed the following.

(1) L_{eq}-Night sound levels were below the PSL-Night (of 40 dBA) at both the Cowles Residence and at the entrance to the Schwindt property.

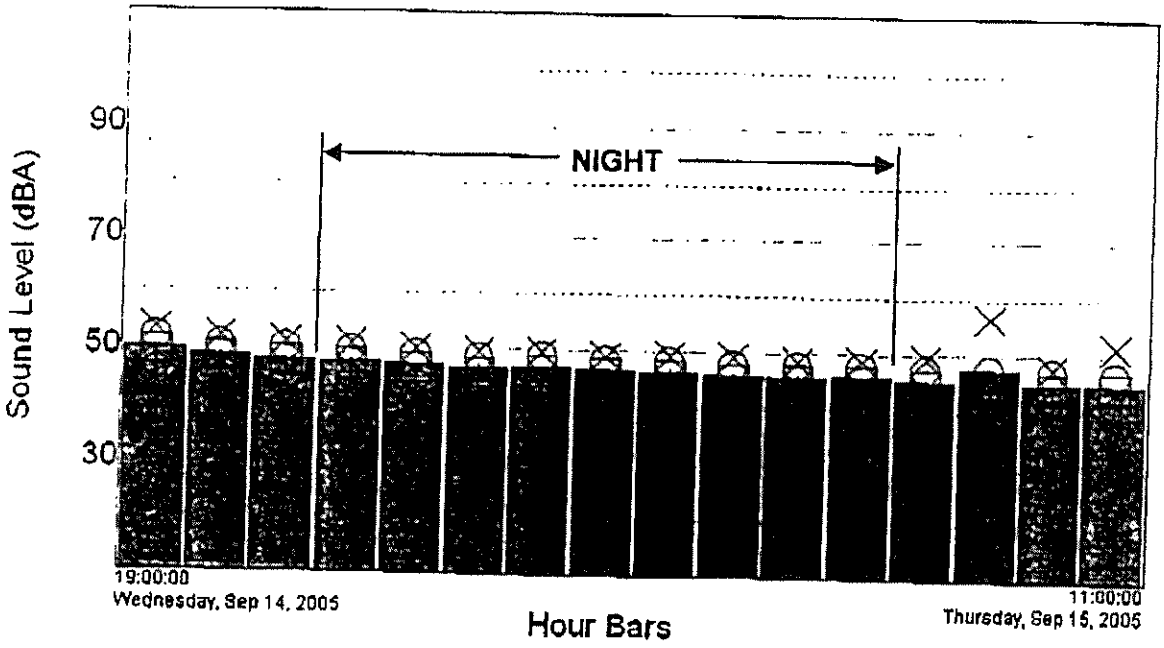
(2) The L_{eq}-Night sound level exceeded the PSL-Night (of 43 dBA) at the Fenceline location by 3.5 dB.

(3) The hourly L_{eq} sound levels during all night-time hours were consistently below 40 dBA at both the Cowles and Schwindt properties.

(4) It was concluded that Facility noise was clearly the dominant noise at the Fenceline monitoring location and that it was likely that exhaust-noise emissions had increased significantly since previous noise monitorings.

(5) The noise monitorings were inconclusive concerning the effect of introducing the set of spruce trees immediately near the CoGen building.

FENCELINE, Overall Hourly Leq



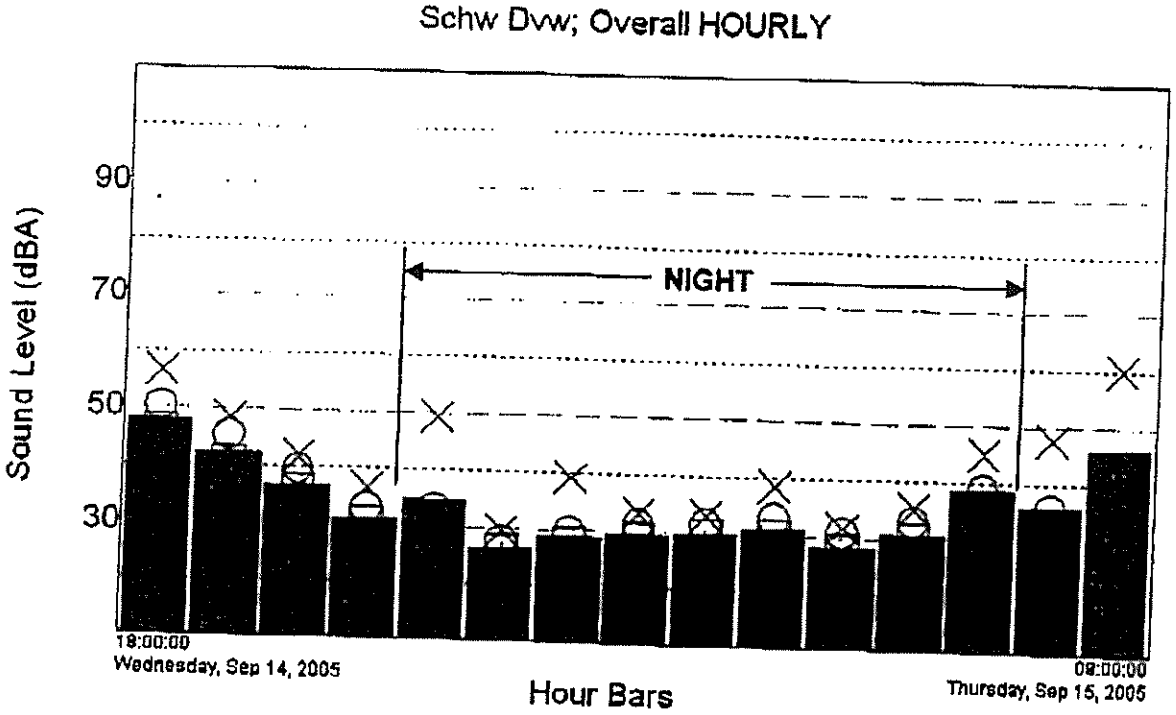
Title : Bredal - Mulhurst (follow-up)
Description : Fenceline S of Plant
Start Time : 18:15:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 17:37:30

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	19:00:00 Wednesday, Sep 14, 2005	49.71	53.30	51.70	49.30	46.70	45.20	3601	0	0	0
2	20:00:00 Wednesday, Sep 14, 2005	48.55	52.10	50.50	48.20	46.30	45.00	3601	0	0	0
3	21:00:00 Wednesday, Sep 14, 2005	48.01	51.10	50.00	47.60	45.50	44.30	3601	0	0	0
4	22:00:00 Wednesday, Sep 14, 2005	47.83	50.80	49.60	47.10	45.30	44.50	3601	0	0	0
5	23:00:00 Wednesday, Sep 14, 2005	47.32	50.10	49.10	46.70	44.80	44.30	3601	0	0	0
6	00:00:00 Thursday, Sep 15, 2005	46.45	49.60	48.50	45.80	44.70	43.70	3601	0	0	0
7	01:00:00 Thursday, Sep 15, 2005	46.80	49.60	48.60	46.20	44.50	44.00	3601	0	0	0
8	02:00:00 Thursday, Sep 15, 2005	46.40	49.10	48.20	46.10	44.00	43.30	3601	0	0	0
9	03:00:00 Thursday, Sep 15, 2005	46.24	49.20	48.20	45.80	44.00	43.50	3601	0	0	0
10	04:00:00 Thursday, Sep 15, 2005	45.87	49.20	47.70	45.30	43.70	43.00	3601	0	0	0
11	05:00:00 Thursday, Sep 15, 2005	45.70	48.60	47.60	45.20	43.30	42.70	3601	0	0	0
12	06:00:00 Thursday, Sep 15, 2005	45.89	48.80	47.60	45.30	43.20	42.60	3601	0	0	0
13	07:00:00 Thursday, Sep 15, 2005	45.41	49.30	47.30	44.80	42.80	42.20	3601	0	0	0
14	08:00:00 Thursday, Sep 15, 2005	47.50	58.70	47.50	44.70	42.60	42.10	3601	0	0	0
15	09:00:00 Thursday, Sep 15, 2005	44.90	47.70	47.00	44.20	42.50	42.00	3601	0	0	0
16	10:00:00 Thursday, Sep 15, 2005	44.91	51.60	46.50	44.30	42.20	41.20	3601	0	0	0

FIGURE 1



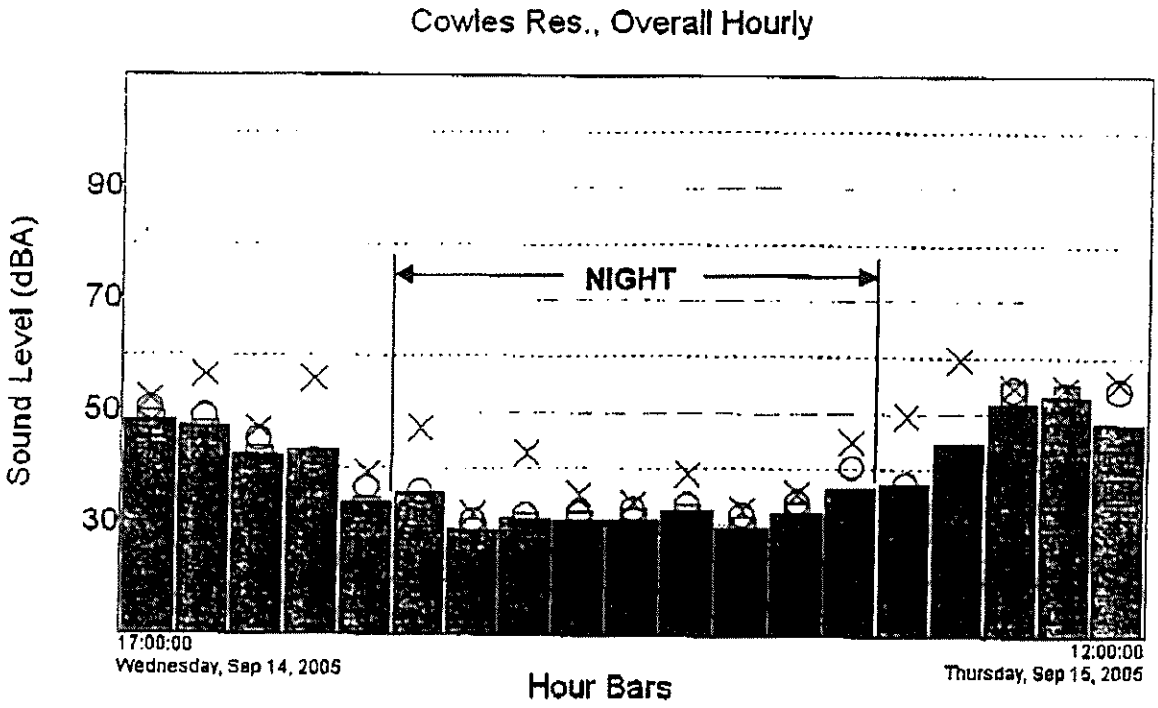
Title : Bredal - Mulhurst (follow-up)
Description : Entr to Schw Drvw
Start Time : 18:00:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 15:50:00

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	HI	Under
1	18:00:00 Wednesday, Sep 14, 2005	47.99	56.60	50.30	46.00	42.70	40.80	3601	0	0	0
2	19:00:00 Wednesday, Sep 14, 2005	42.31	48.70	45.30	40.50	36.20	34.20	3601	0	0	0
3	20:00:00 Wednesday, Sep 14, 2005	36.64	41.70	39.50	35.70	32.30	30.10	3601	0	0	0
4	21:00:00 Wednesday, Sep 14, 2005	30.92	36.70	33.00	30.30	27.80	26.60	3601	0	0	0
5	22:00:00 Wednesday, Sep 14, 2005	34.64	49.30	33.20	29.60	25.60	24.80	3601	0	0	0
6	23:00:00 Wednesday, Sep 14, 2005	26.35	29.60	27.80	26.00	24.30	23.60	3601	0	0	0
7	00:00:00 Thursday, Sep 15, 2005	28.65	39.20	29.60	27.80	25.50	24.60	3601	0	0	0
8	01:00:00 Thursday, Sep 15, 2005	29.38	39.20	31.10	28.80	26.60	26.00	3601	0	0	0
9	02:00:00 Thursday, Sep 15, 2005	29.74	33.00	31.50	29.50	27.30	25.60	3601	0	0	0
10	03:00:00 Thursday, Sep 15, 2005	30.99	38.50	32.80	30.00	27.80	27.00	3601	0	0	0
11	04:00:00 Thursday, Sep 15, 2005	28.17	31.60	30.60	27.80	24.90	23.00	3601	0	0	0
12	05:00:00 Thursday, Sep 15, 2005	30.58	35.20	32.70	30.00	27.30	26.00	3601	0	0	0
13	06:00:00 Thursday, Sep 15, 2005	38.66	45.00	38.80	33.20	30.30	28.80	3601	0	0	0
14	07:00:00 Thursday, Sep 15, 2005	35.66	47.70	35.80	32.00	29.30	27.80	3601	0	0	0
15	08:00:00 Thursday, Sep 15, 2005	45.68	60.20	40.10	33.00	29.80	28.30	3601	0	0	0

FIGURE 2



Title : Bredal - Mulhurst (follow-up)
Description : Fenceline S of Plant
Start Time : 16:30:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 15:30:00

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	17:00:00 Wednesday, Sep 14, 2005	48.29	52.30	50.60	47.80	44.20	41.50	3601	0	0	0
2	18:00:00 Wednesday, Sep 14, 2005	47.22	58.80	49.10	45.80	43.50	42.00	3601	0	0	0
3	19:00:00 Wednesday, Sep 14, 2005	42.26	47.10	45.10	41.80	38.20	36.60	3601	0	0	0
4	20:00:00 Wednesday, Sep 14, 2005	43.22	55.80	41.20	38.20	34.30	32.30	3601	0	0	0
5	21:00:00 Wednesday, Sep 14, 2005	33.43	39.10	36.20	32.30	30.00	28.80	3601	0	0	0
6	22:00:00 Wednesday, Sep 14, 2005	35.34	47.20	35.60	31.60	28.00	27.10	3601	0	0	0
7	23:00:00 Wednesday, Sep 14, 2005	28.81	31.80	30.50	28.60	26.60	25.80	3601	0	0	0
8	00:00:00 Thursday, Sep 15, 2005	31.11	42.80	31.60	29.50	27.30	26.80	3601	0	0	0
9	01:00:00 Thursday, Sep 15, 2005	30.37	35.20	31.80	30.00	27.80	27.00	3601	0	0	0
10	02:00:00 Thursday, Sep 15, 2005	30.67	33.70	32.60	30.30	28.30	27.00	3601	0	0	0
11	03:00:00 Thursday, Sep 15, 2005	32.27	39.10	33.50	31.30	29.60	28.80	3601	0	0	0
12	04:00:00 Thursday, Sep 15, 2005	29.49	32.60	31.60	29.10	26.80	23.80	3601	0	0	0
13	05:00:00 Thursday, Sep 15, 2005	32.11	36.60	34.00	31.80	29.50	28.80	3601	0	0	0
14	06:00:00 Thursday, Sep 15, 2005	36.60	45.00	40.30	33.50	31.10	30.10	3601	0	0	0
15	07:00:00 Thursday, Sep 15, 2005	37.39	49.60	37.30	32.50	29.80	28.50	3601	0	0	0
16	08:00:00 Thursday, Sep 15, 2005	44.83	59.70	41.80	33.70	30.50	29.30	3601	0	0	0
17	09:00:00 Thursday, Sep 15, 2005	51.62	54.70	54.20	53.50	32.30	30.10	3601	0	0	0
18	10:00:00 Thursday, Sep 15, 2005	53.07	54.70	53.30	53.00	52.70	52.50	3601	0	0	0
19	11:00:00 Thursday, Sep 15, 2005	48.17	55.70	54.00	36.20	31.10	29.50	3601	0	0	0

FIGURE 3

Table 2 – Weather Conditions as obtained from Environment Canada Website

Edmonton International Airport (CYEG)

Date & Hour	Conditions	Temp (°C)	RH (%)	Dew Pt (°C)	Wind (km/h)	Pressure (kPa)	Visib. (km)
15 Sep 2005 13:00 MDT	Cloudy	8	82	5	E 8	101.8	24
15 Sep 2005 12:00 MDT	Cloudy	8	84	5	SE 5	101.8	24
15 Sep 2005 11:00 MDT	Cloudy	7	86	5	ESE 8	101.8	24
15 Sep 2005 10:00 MDT	Cloudy	6	91	5	SE 9	101.9	24
15 Sep 2005 09:00 MDT	Cloudy	6	97	5	ESE 11	101.9	24
15 Sep 2005 08:00 MDT	Cloudy	5	98	5	ESE 9	101.8	24
15 Sep 2005 07:00 MDT	Cloudy	5	97	5	E 11	101.8	24
15 Sep 2005 06:00 MDT	Cloudy	5	100	5	SE 5	101.8	24
15 Sep 2005 05:00 MDT	Cloudy	5	100	5	E 8	101.8	24
15 Sep 2005 04:00 MDT	Cloudy	6	100	6	ENE 9	101.8	24
15 Sep 2005 03:00 MDT	Cloudy	5	100	5	Calm	101.8	24
15 Sep 2005 02:00 MDT	Cloudy	6	100	6	Calm	101.8	24
15 Sep 2005 01:00 MDT	Cloudy	6	99	6	N 4	101.8	24
15 Sep 2005 00:00 MDT	Cloudy	6	98	6	N 4	101.8	24
14 Sep 2005 23:00 MDT	Cloudy	7	96	7	NNW 8	101.8	24
14 Sep 2005 22:00 MDT	Cloudy	7	97	6	NNW 5	101.7	24
14 Sep 2005 21:00 MDT	Cloudy	8	89	7	N 9	101.7	24
14 Sep 2005 20:00 MDT	Cloudy	9	86	7	N 13	101.6	24
14 Sep 2005 19:00 MDT	Cloudy	10	85	7	NNW 18 G 28	101.5	24
14 Sep 2005 18:00 MDT	Cloudy	10	81	7	NNW 22 G 33	101.5	24
14 Sep 2005 17:00 MDT	Cloudy	11	74	7	NW 22 G 32	101.3	24
14 Sep 2005 16:00 MDT	Cloudy	12	69	7	NW 33 G 45	101.2	24

URL of this page : http://weatheroffice.ec.gc.ca/trends_table/pages/yeg_metric_e.html

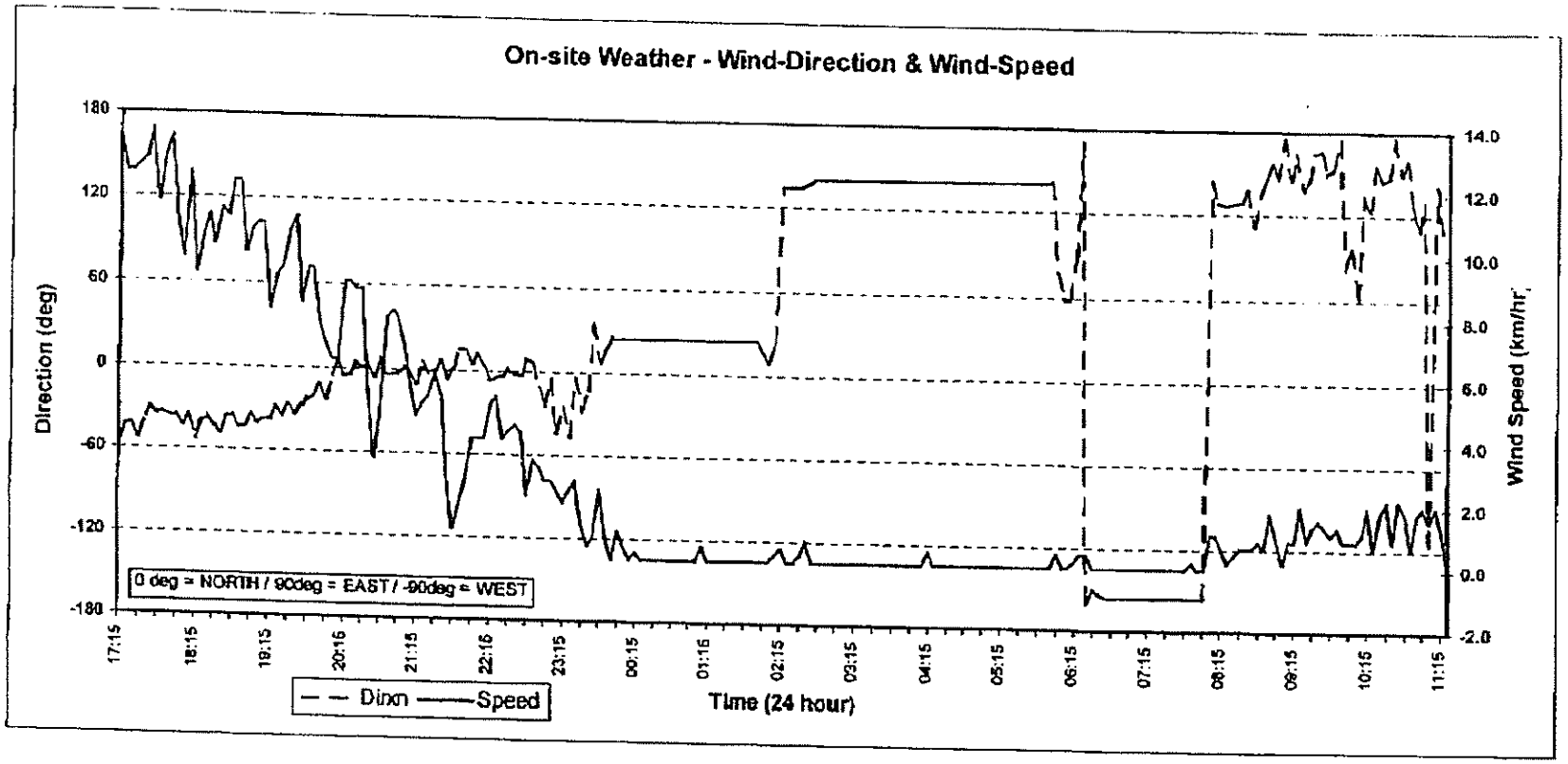


FIGURE 4

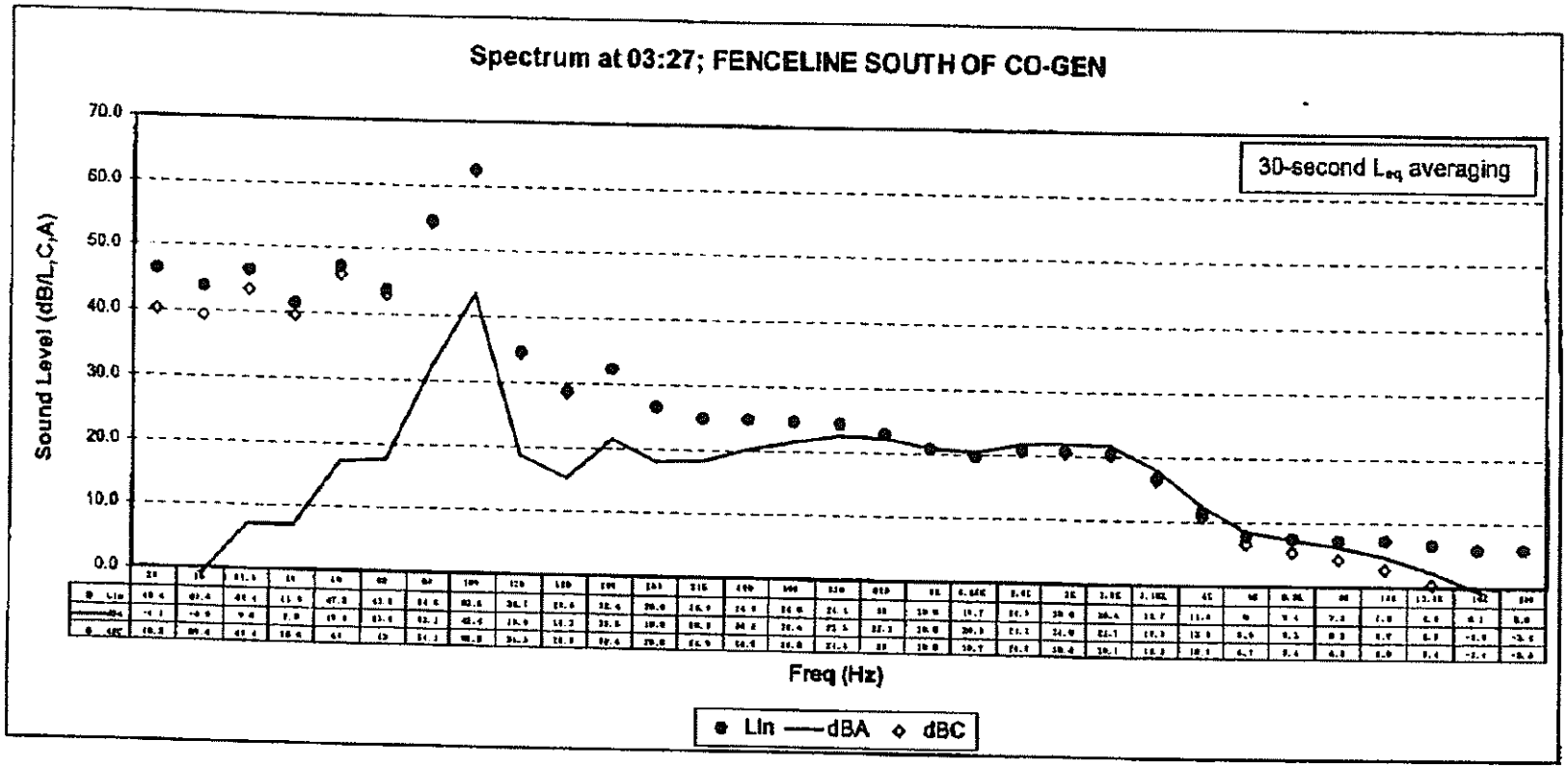

Spectrum at 03:27; FENCELINE SOUTH OF CO-GEN
30-second L_{eq} averaging
Sound Level (dB/L,C,A)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Freq (Hz)
Lin —dBA ◇ dBC

FIGURE 5

acoustical consultants inc

aci Acoustical Consultants Inc.
Suite 107, 9920 – 63Ave
Edmonton, Alberta, Canada T6E 0G9
Phone: (780) 414-6373, Fax: (780) 414-6376
www.aciacoustical.com

To: Bredal Energy Corp
Drayton Valley, Alberta, T7A 1S9

Tuesday, 4 Oct 2005

Attn: Mr. Glenn Carson / **Fax#: 985-3158**
Attn: Mr. Neil Torry / **Fax#: 780-542-2550**

re: **Mulhurst 9-of-2 CoGen Facility; Sept-2005 Noise Monitorings**

Dear Sirs,

This Letter-Report summarizes the findings of the recent noise monitoring study for the above-named facility. These cover-pages convey a succinct summary of the results, and pages 3 – 14 contain the detailed results and related discussion.

In a nutshell, the L_{eq}-Night sound levels were:

Fenceline 150 m south of Co-Gen Building: ..... 46.5 dBA (9-hour L_{eq})
Entrance to Schwindt Driveway (380 m WSW of Co-Gen): ..... 32.6 dBA (9-hour L_{eq})
Site of original Cowles Residence (370 m SW of Co-Gen): ..... 32.6 dBA (9-hour L_{eq})

The monitored results required no adjustment for abnormal noise events.

Thus it is evident that the night-time L_{eq} sound levels at the two residential locations were below the **PSL-Night of 40 dBA**. Note that this occurred during a night in which there was a worst-case wind direction (generally from Plant toward Residences) for several portions of the noise monitoring period. Throughout the night monitored there were five (of the usual six) Co-Gen engines running; to have had a sixth engine running would be expected to cause less than a 1-dB increase of the monitored sound levels.

At the Fenceline location south of the Plant, the L_{eq}-Night sound level had increased, compared to the previous overnight noise monitoring, by 4.5 dB, thereby exceeding the applicable PSL-Night by 3.5 dB. It was noted at this location that the noise climate throughout the entire noise monitoring was dominated by a low-frequency signal (100 Hz) from the 9-of-2 Plant. The dominance and consistency of this signal suggested that further attention may be required for the silencers on the CoGen engines, HOWEVER: ***it should first be verified that no other Plant operating conditions had changed, resulting in this significant increase of low frequency.***

Regarding introduction of the set of spruce trees, the noise monitoring study was inconclusive because the operating conditions of the Plant (observed in the dominant low-frequency component) masked any gains attributable to the presence of the trees.

Thank you for again retaining acl to assist you in this work. If you have questions about this LetterReport or require further assistance, please do not hesitate to call.

Yours very truly,
acl Acoustical Consultants Inc.,

CJ Buma

Corjan Buma, M.Sc., P.Eng.
Associate Consultant

INTRODUCTION

acl Acoustical Consultants Inc. conducted a series of follow-up overnight noise monitorings 14/15 Sept-2005 (Wedn/Thurs) at the 9-of-2 Mulhurst facility of Bredal Energy. The purposes of this study were to

(1) determine the effect, if any, of adding a series of spruce trees along the east and south of the Co-Gen building and

(2) conduct a noise-monitoring at the Cowles Residence in response to a noise complaint registered with the EU-Board.

To assess the effect of the newly-added trees, noise monitoring was conducted at the entrance to the Schwindt Driveway and at the south fenceline along the gravel path due south of the Co-Gen building; these two locations had been used for noise monitorings in May-2004 and Dec-2004.

For the noise monitoring on the Cowles property, while at the time of this study no permanent residence was present (there was a large RV), the Owner has expressed the full intention of rebuilding a residence on this site. The noise complaint lodged with the Alberta Energy and Utilities Board was understood to apply to this residential location, based on the Owner's previous experience of facility noise while living at this site. In a telephone conversation with Mr. Cowles (6-August-2005), it was indicated that facility noise tended to be more bothersome on nights with cooler temperatures.

The noise monitoring study and this summary LetterReport were conducted/compiled by Mr. Corjan Buma, M.Sc.. P.Eng. of acl.

PERMISSIBLE SOUND LEVELS

The Night-time Permissible Sound Levels at the three noise monitoring locations are:

Fenceline 150 m south of Co-Gen Building: ..... 43 dBA (9-hour L_{eq})
Entrance to Schwindt Driveway (380 m WSW of Co-Gen): ..... 40 dBA (9-hour L_{eq})
Site of original Cowles Residence (370 m SW of Co-Gen): ..... 40 dBA (9-hour L_{eq}).

The 43-dBA L_{eq}-Night at the Fenceline location is based on the possible presence of a set of condominiums proposed for the land south of the 9-of-2 facility. As there is currently bush on this land, the Fenceline location 1.5 meter south of the east-west gravel path is considered the closest possible placement of condo-structures near the 9-of-2 facility.

There is no line-of-sight exposure between the 9-of-2 facility and any of the three noise monitoring locations due to the presence of nearly-continuous deciduous bush. Even in winter with foliage absent, it is not possible to see through the bush from any monitoring location to the 9-of-2 facility (or *vice versa*). Bredal Energy had introduced a set of about 20 (nominally) 5-meter tall spruce trees along the east and south of its Co-Gen building.

NOISE MONITORING TIMES AND INSTRUMENTATION

The start and stop times of the three noise monitorings were:

- Cowles Res.: Wedn, 14-Sept 16:30 to Thurs, 15-Sept 12:05 (total of 19½ hrs)
- Schwindt Driveway entrance: Wedn, 14-Sept 17:50 to Thurs, 15-Sept 10:50 (total of 17 hrs)
- Fenceline: Wedn, 14-Sept 18:15 to Thurs, 15-Sept 11:52 (total of 17½ hrs)

At each location a noise monitor was set up to log the sound levels in both broadband and one-third octave band resolution using 30-second L_{eq}-averaging. A full-length audio recording was completed for the monitorings at the Cowles and Fenceline locations.

The equipment used to conduct the three noise monitorings were two identical systems containing a Larson-Davis 824 sound level meter equipped with Larson-Davis ½-inch model 2551 microphone and calibrated with Larson-Davis model CAL200 calibrator (used at Cowles and Fenceline locations) and a Bruel-&-Kjaer Type 2250 sound level meter equipped with ½-inch Type 4189 microphone and calibrated with Bruel-&-Kjaer Type 4231 calibrator (used at Schwindt driveway entrance). All equipment including sound level meters and calibrators had been factory re-certified within the past 12 months. Before-and-after calibrations/checks were as follows:

Time	Start	Stop
Cowles	114.0	113.9
Schwindt	93.86	93.83
Fenceline	114.0	113.8

A localized weather monitor was set up in a clearing on the Bredal Energy 9-of-2 lease. As there is no single location on this lease that gives unrestricted wind-access from all directions, the weather monitor was set up in the south half of the lease in a location not likely to cause interference on staff activities. The on-site weather data were compared to hourly data obtained from the Environment Canada website for the Edmonton International Airport (nearest continuously monitored met-station). The weather monitoring equipment used for the study consisted of a NovaLynx 110-WS-16D data acquisition box, with a 200-WS-02E wind-speed and wind-direction sensor, a 110-WS-16TH temperature and relative humidity sensor and a 110-WS-16THS solar radiation shield. The data acquisition box and a battery were located in a weather protective case. The sensors were mounted on a tripod at approximately 2.5m above ground. The system was set up to sample data in 5-minute averages obtaining average wind-speed, peak wind-speed, wind-direction, temperature and relative humidity.

Subjective observations of the weather on-site were: at time of setup, overcast, moderate wind from the west; at time of equipment retrieval, heavy overcast, light wind from southeast, light shower just beginning.

SUMMARY OF FINDINGS

The results of the three noise monitorings were as follows.

- The L_{eq}-Night sound levels monitored at the three study locations were as shown in Table 1 (see next page). Note that historical data have been included in Table 1 to provide an overview of the noise trend at each location. It is evident from the Sept-2005 data that at the Cowles and Schwindt-driveway entrance the L_{eq}-Night sound levels were below the applicable PSL-Night. The L_{eq}-Night sound level monitored at the Fenceline due south of the CoGen building was (a) over the PSL-Night for that location (assuming presence of condo's) by 3.5 dB and (b) 4.5 dB higher than during the previous overnight noise monitoring.

- Note that the sound levels for the Sept-2005 data in Table 1 are the un-adjusted L_{eq}-Night sound levels: inspection of the measurement data combined with review of the audio recordings disclosed that adjustment for abnormal noise events was not required.

Table 1 – Overview Table of Monitored Leq-Night Sound Levels

OVERVIEW TABLE OF L_{eq}-NIGHT NOISE MONITORING RESULTS AT BREDAL MULHURST 9-of-2 CO-GEN PLANT (Sound levels are L_{eq}-9hour in dBA; unless noted otherwise)								
DATE		Sep-05	May-05	Dec-04	May-04	Sep-03		Notes:
LOCATION								
TIZZARD		---	---	---	---	29		- monitored only in baseline
SCHW-DVW		32.6	---	29	36	---		
FENCELINE		46.5	39 *	42	50	---		* short-term spot msmt only
COWLES		32.6	---	---	---	---		

- A graph of the hourly L_{eq} sound levels for each of the noise monitoring locations is shown in, respectively, Figures 1 – 3 below. Note that at the Cowles Residence (Figure 3) and at the Schwindt-driveway entrance (Figure 2) the hourly L_{eq} sound levels during all night-time hours were consistently below 40 dBA. Subjective observations at these two sites during the various site visits and review of the audio recording (Cowles site) affirmed that these measured sound levels are reasonable.

- At the Fenceline location (Figure 1) the relatively constant hourly sound levels with only a gradual decrease (a) suggests the dominance (for noise) of the 9-of-2 Facility and (b) indicates that the Facility ran very consistently throughout the time of the noise monitoring.

- A review of the 1/3-octave band results monitored at the Fenceline location disclosed a strong tonal component at 100Hz (considered "low frequency"). Figure 5 (page 14)is a graph of the audible spectrum taken from the data measured 03:27:30 to 03:28:00 (15 Sept); the dominance of the 100 Hz band is obvious in this graph (solid trace = A-weighted data; this is how a person with normal hearing would perceive this noise spectrum). A review of the progression-with-time for the 100 Hz band indicated a plot virtually identical with that for Figure 1 for the broadband A-weighted L_{eq} sound level.

From this it is concluded that Facility noise was the sole dominant noise source at the Fenceline noise monitoring location. Comparison of this (Sept-2005) spectrum with that from previous studies indicated that previously the 100 Hz (and 200 Hz) bands stood out in the measured noise spectrum but not to the same degree; these bands were not at all tonal during previous studies. **The dominance of the 100 Hz 1/3-octave band in the current data suggests that some Facility operating condition(s) had changed such that silencer exhaust noise emissions from the Co-Gen engines (OR from other equipment) have increased significantly since previous noise studies.**

- Table 2 and Figure 4 contain the weather data for the times of noise monitoring. The data obtained for the Edmonton International Airport (Table 2) indicate that winds were from a "worst-case" direction (i.e. from NNW, across N, through ENE) for several of the night-time hours. Given that a complaint had been lodged for a Residence to the SW of the 9-of-2 Facility, and that capturing a condition of a "cooler night" is difficult to guarantee, it is considered that the wind conditions (including some wind-calm hours) for the night monitored were optimal.

- Review of on-site weather data, Figure 4, disclosed that winds steadily decreased throughout the evening and were calm for most of the night. This tends to confirm the very consistent sound levels monitored at the Fenceline location. The "set" at 140deg (02:15 to 06:00) and at 205deg (06:20 to 08:20) are meaningless, given that windspeed was 0 (the wind-direction vane would have adopted one position and not moved for a long time). (The slightly elevated L_{eq} sound level for the hour 03:00 to 04:00 observed in Figures 2 & 3 was due to coyote noise and a passing truck, as observed in the audio recordings, and not due to wind effects.)

- Throughout the night monitored there were five (of the usual six) Co-Gen engines running. Had a sixth engine been running this would be expected to cause less than a 1-dB increase of the monitored sound levels (assuming identical operation of all engines).

Regarding introduction of the set of spruce trees, note that Plant operating conditions (observed in the dominant low-frequency component) masked any gains attributable to the trees (in addition, the worst-case wind likely was of greater influence to slightly *increase* the monitored sound level than that the presence of the trees reduced it). Subjectively, at the Fenceline location there was less mid- and high-frequency noise discernible than during the site visits of previous studies, but it was not clear if this was due to the presence of the trees (which would be expected, theoretically) or due to altered engine/Plant operating conditions.

CONCLUSION

In summary, the noise monitoring study for the Mulhurst 9-of-2 Plant disclosed the following.

(1) L_{eq}-Night sound levels were below the PSL-Night (of 40 dBA) at both the Cowles Residence and at the entrance to the Schwindt property.

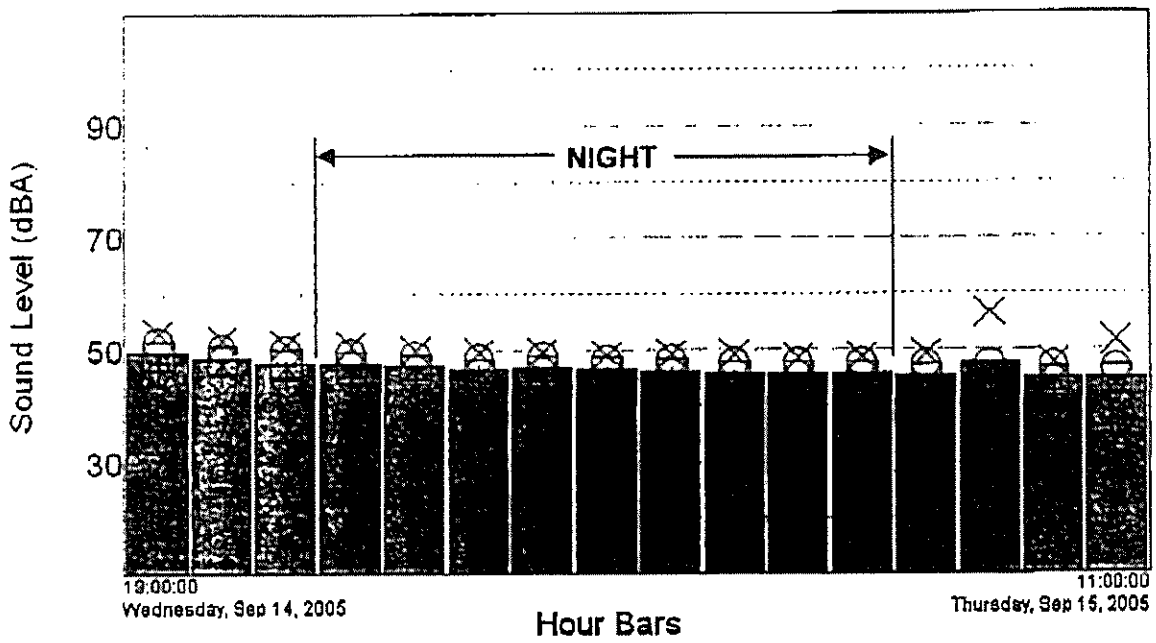
(2) The L_{eq}-Night sound level exceeded the PSL-Night (of 43 dBA) at the Fenceline location by 3.5 dB.

(3) The hourly L_{eq} sound levels during all night-time hours were consistently below 40 dBA at both the Cowles and Schwindt properties.

(4) It was concluded that Facility noise was clearly the dominant noise at the Fenceline monitoring location and that it was likely that exhaust-noise emissions had increased significantly since previous noise monitorings.

(5) The noise monitorings were inconclusive concerning the effect of introducing the set of spruce trees immediately near the CoGen building.

FENCELINE, Overall Hourly Leq



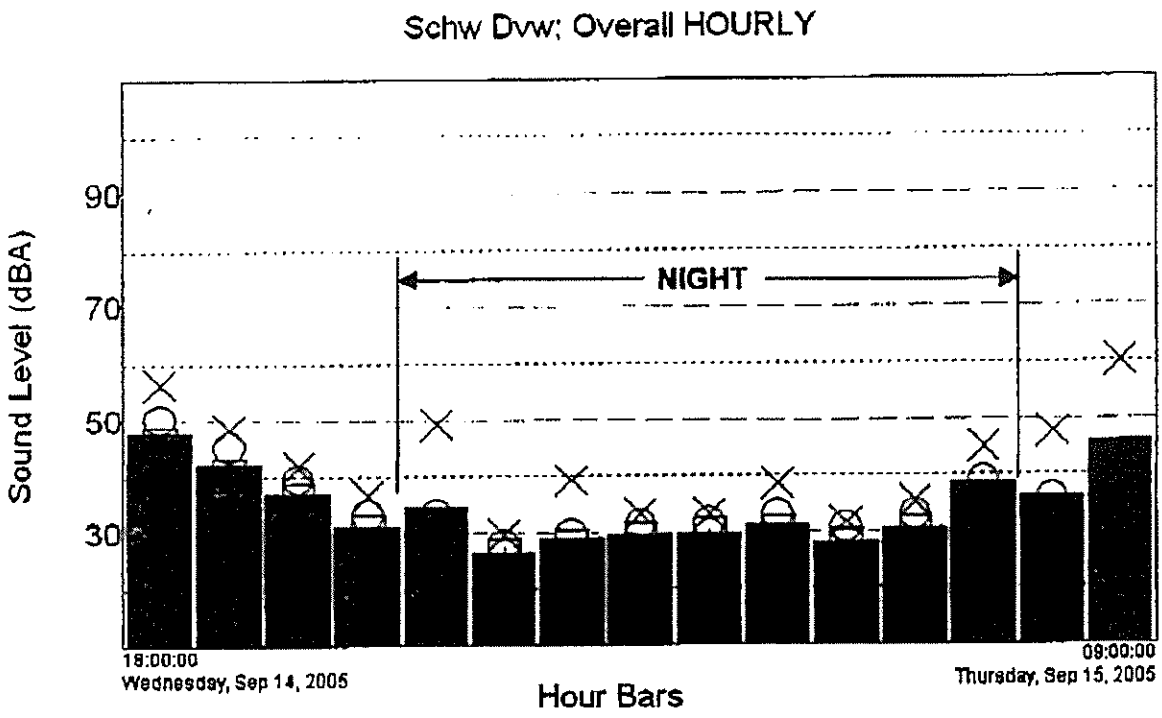
Title : Bredal - Mulhurst (follow-up)
Description : Fenceline S of Plant
Start Time : 18:15:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 17:37:30

Sound Level Icons: L_{eq} ⊠ , L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	19:00:00 Wednesday, Sep 14, 2005	49.71	53.30	51.70	49.30	46.70	46.20	3601	0	0	0
2	20:00:00 Wednesday, Sep 14, 2005	48.55	52.10	50.50	48.20	46.30	45.00	3601	0	0	0
3	21:00:00 Wednesday, Sep 14, 2005	48.01	51.10	50.00	47.80	46.50	44.30	3601	0	0	0
4	22:00:00 Wednesday, Sep 14, 2005	47.63	50.80	49.60	47.10	45.30	44.50	3601	0	0	0
5	23:00:00 Wednesday, Sep 14, 2005	47.32	50.10	49.10	46.70	44.80	44.30	3601	0	0	0
6	00:00:00 Thursday, Sep 15, 2005	46.45	49.60	48.50	45.80	44.70	43.70	3601	0	0	0
7	01:00:00 Thursday, Sep 15, 2005	46.80	49.60	48.80	46.20	44.50	44.00	3601	0	0	0
8	02:00:00 Thursday, Sep 15, 2005	46.40	48.10	48.20	46.10	44.00	43.30	3601	0	0	0
9	03:00:00 Thursday, Sep 15, 2005	46.24	49.20	48.20	45.80	44.00	43.50	3601	0	0	0
10	04:00:00 Thursday, Sep 15, 2005	45.87	49.20	47.70	45.30	43.70	43.00	3601	0	0	0
11	05:00:00 Thursday, Sep 15, 2005	45.70	48.60	47.80	45.20	43.30	42.70	3601	0	0	0
12	06:00:00 Thursday, Sep 15, 2005	45.89	48.80	47.80	45.30	43.20	42.80	3601	0	0	0
13	07:00:00 Thursday, Sep 15, 2005	45.41	49.30	47.30	44.80	42.80	42.20	3601	0	0	0
14	08:00:00 Thursday, Sep 15, 2005	47.50	58.70	47.50	44.70	42.60	42.10	3601	0	0	0
15	09:00:00 Thursday, Sep 15, 2005	44.90	47.70	47.00	44.20	42.50	42.00	3601	0	0	0
16	10:00:00 Thursday, Sep 15, 2005	44.91	51.60	46.50	44.30	42.20	41.20	3601	0	0	0

FIGURE 1



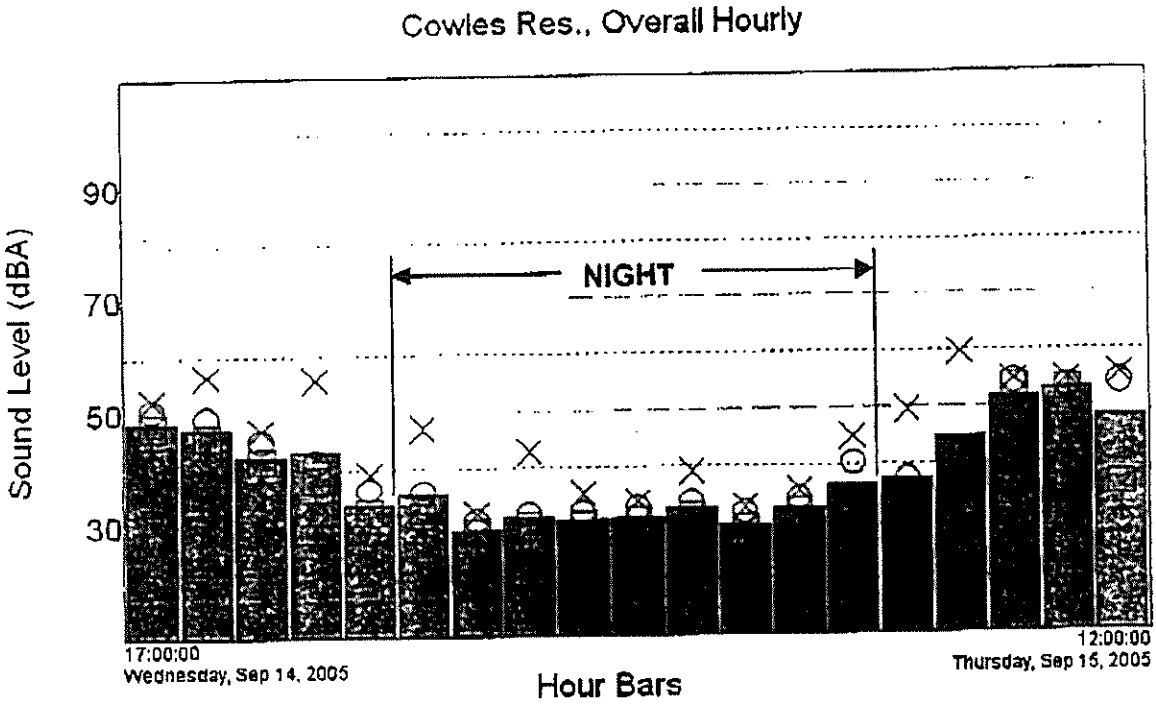
Title : Bredal - Mulhurst (follow-up)
Description : Entr to Schw Drw
Start Time : 18:00:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 15:50:00

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	18:00:00 Wednesday, Sep 14, 2005	47.99	58.60	50.30	46.00	42.70	40.80	3601	0	0	0
2	19:00:00 Wednesday, Sep 14, 2005	42.31	48.70	45.30	40.50	36.20	34.20	3601	0	0	0
3	20:00:00 Wednesday, Sep 14, 2005	38.64	41.70	39.50	35.70	32.30	30.10	3601	0	0	0
4	21:00:00 Wednesday, Sep 14, 2005	30.92	36.70	33.00	30.30	27.90	26.60	3601	0	0	0
5	22:00:00 Wednesday, Sep 14, 2005	34.64	49.30	33.20	29.60	25.80	24.80	3601	0	0	0
6	23:00:00 Wednesday, Sep 14, 2005	26.35	29.60	27.80	26.00	24.30	23.80	3601	0	0	0
7	00:00:00 Thursday, Sep 15, 2005	28.85	39.20	28.60	27.80	25.60	24.80	3601	0	0	0
8	01:00:00 Thursday, Sep 15, 2005	29.38	33.20	31.10	28.80	26.80	26.00	3601	0	0	0
9	02:00:00 Thursday, Sep 15, 2005	29.74	33.00	31.50	29.60	27.30	25.60	3601	0	0	0
10	03:00:00 Thursday, Sep 15, 2005	30.99	36.50	32.80	30.00	27.60	27.00	3601	0	0	0
11	04:00:00 Thursday, Sep 15, 2005	28.17	31.60	30.60	27.80	24.80	23.00	3601	0	0	0
12	05:00:00 Thursday, Sep 15, 2005	30.56	35.20	32.70	30.00	27.30	26.00	3601	0	0	0
13	06:00:00 Thursday, Sep 15, 2005	38.66	45.00	36.80	33.20	30.30	28.80	3601	0	0	0
14	07:00:00 Thursday, Sep 15, 2005	35.86	47.70	35.60	32.00	29.30	27.60	3601	0	0	0
15	08:00:00 Thursday, Sep 15, 2005	45.88	60.20	40.10	33.00	29.80	28.30	3601	0	0	0

FIGURE 2



Title : Bredal - Mulhurst (follow-up)
Description : Fenceline S of Plant
Start Time : 16:30:00

Execution Date : 09-14-2005
Start Date : 09-14-2005
Duration : 15:30:00

Sound Level Icons: L_{eq} ⊠, L_1 X, L_{10} O, L_{50} □, L_{90} +, L_{99} ◊

Bar	Start	Leq	L1	L10	L50	L90	L99	Good	Over	Hi	Under
1	17:00:00 Wednesday, Sep 14, 2005	48.29	52.30	50.60	47.80	44.20	41.50	3601	0	0	0
2	18:00:00 Wednesday, Sep 14, 2005	47.22	56.60	49.10	45.90	43.50	42.00	3601	0	0	0
3	19:00:00 Wednesday, Sep 14, 2005	42.26	47.10	45.10	41.60	38.20	36.60	3601	0	0	0
4	20:00:00 Wednesday, Sep 14, 2005	43.22	55.80	41.20	38.20	34.30	32.30	3601	0	0	0
5	21:00:00 Wednesday, Sep 14, 2005	33.43	39.10	36.20	32.30	30.00	28.60	3601	0	0	0
6	22:00:00 Wednesday, Sep 14, 2005	35.34	47.20	35.60	31.60	29.00	27.10	3601	0	0	0
7	23:00:00 Wednesday, Sep 14, 2005	28.81	31.80	30.50	28.60	28.80	25.80	3601	0	0	0
8	00:00:00 Thursday, Sep 15, 2005	31.11	42.60	31.60	29.50	27.30	26.80	3601	0	0	0
9	01:00:00 Thursday, Sep 15, 2005	30.37	35.20	31.80	30.00	27.60	27.00	3601	0	0	0
10	02:00:00 Thursday, Sep 15, 2005	30.67	33.70	32.60	30.30	28.30	27.00	3601	0	0	0
11	03:00:00 Thursday, Sep 15, 2005	32.27	39.10	33.50	31.30	29.60	28.80	3601	0	0	0
12	04:00:00 Thursday, Sep 15, 2005	29.49	32.60	31.60	29.10	25.80	23.80	3601	0	0	0
13	05:00:00 Thursday, Sep 15, 2005	32.11	35.60	34.00	31.80	29.50	28.80	3601	0	0	0
14	06:00:00 Thursday, Sep 15, 2005	38.80	45.00	40.30	33.50	31.10	30.10	3601	0	0	0
15	07:00:00 Thursday, Sep 15, 2005	37.39	49.60	37.30	32.50	29.80	28.50	3601	0	0	0
16	08:00:00 Thursday, Sep 15, 2005	44.83	59.70	41.80	33.70	30.50	29.30	3601	0	0	0
17	09:00:00 Thursday, Sep 15, 2005	51.82	54.70	54.20	53.50	32.30	30.10	3601	0	0	0
18	10:00:00 Thursday, Sep 15, 2005	53.07	54.70	53.30	53.00	52.70	52.60	3601	0	0	0
19	11:00:00 Thursday, Sep 15, 2005	48.17	55.70	54.00	36.20	31.10	29.50	3601	0	0	0

FIGURE 3

Table 2 – Weather Conditions as obtained from Environment Canada Website

Edmonton International Airport (CYEG)

Date & Hour	Conditions	Temp (°C)	RH (%)	Dew Pt (°C)	Wind (km/h)	Pressure (kPa)	Visib. (km)
15 Sep 2005 13:00 MDT	Cloudy	8	82	5	E 8	101.8	24
15 Sep 2005 12:00 MDT	Cloudy	8	84	5	SE 5	101.8	24
15 Sep 2005 11:00 MDT	Cloudy	7	86	5	ESE 8	101.8	24
15 Sep 2005 10:00 MDT	Cloudy	6	91	5	SE 9	101.9	24
15 Sep 2005 09:00 MDT	Cloudy	6	97	5	ESE 11	101.9	24
15 Sep 2005 08:00 MDT	Cloudy	5	98	5	ESE 9	101.8	24
15 Sep 2005 07:00 MDT	Cloudy	5	97	5	E 11	101.8	24
15 Sep 2005 06:00 MDT	Cloudy	5	100	5	SE 5	101.8	24
15 Sep 2005 05:00 MDT	Cloudy	5	100	5	E 8	101.8	24
15 Sep 2005 04:00 MDT	Cloudy	6	100	6	ENE 9	101.8	24
15 Sep 2005 03:00 MDT	Cloudy	5	100	5	Calm	101.8	24
15 Sep 2005 02:00 MDT	Cloudy	6	100	6	Calm	101.8	24
15 Sep 2005 01:00 MDT	Cloudy	6	99	6	N 4	101.8	24
15 Sep 2005 00:00 MDT	Cloudy	6	98	6	N 4	101.8	24
14 Sep 2005 23:00 MDT	Cloudy	7	96	7	NNW 8	101.8	24
14 Sep 2005 22:00 MDT	Cloudy	7	97	6	NNW 5	101.7	24
14 Sep 2005 21:00 MDT	Cloudy	8	89	7	N 9	101.7	24
14 Sep 2005 20:00 MDT	Cloudy	9	86	7	N 13	101.6	24
14 Sep 2005 19:00 MDT	Cloudy	10	85	7	NNW 18 G 28	101.5	24
14 Sep 2005 18:00 MDT	Cloudy	10	81	7	NNW 22 G 33	101.5	24
14 Sep 2005 17:00 MDT	Cloudy	11	74	7	NW 22 G 32	101.3	24
14 Sep 2005 16:00 MDT	Cloudy	12	69	7	NW 33 G 45	101.2	24

URL of this page : http://weatheroffice.ec.gc.ca/trends_table/pages/yeg_metric_e.html

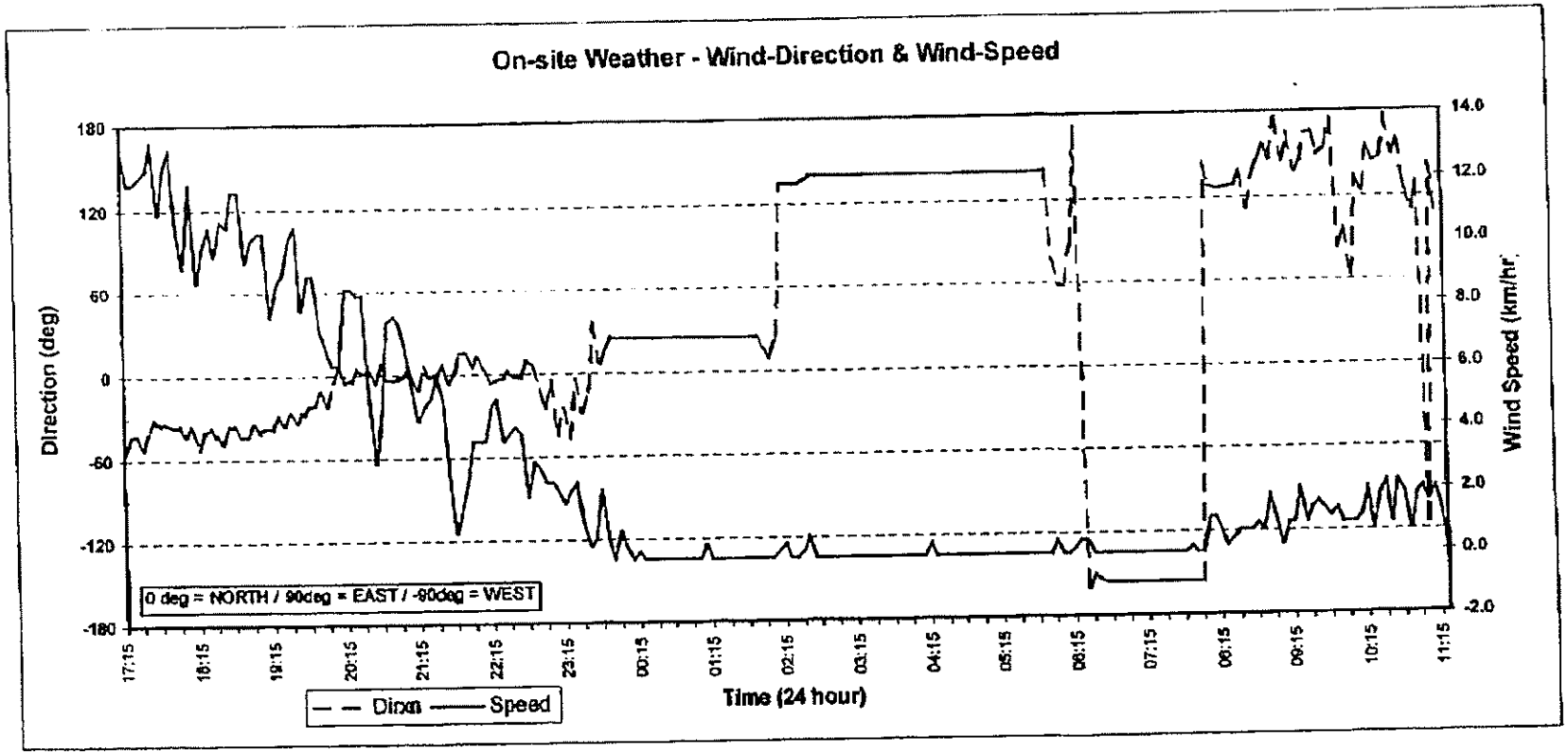


FIGURE 4

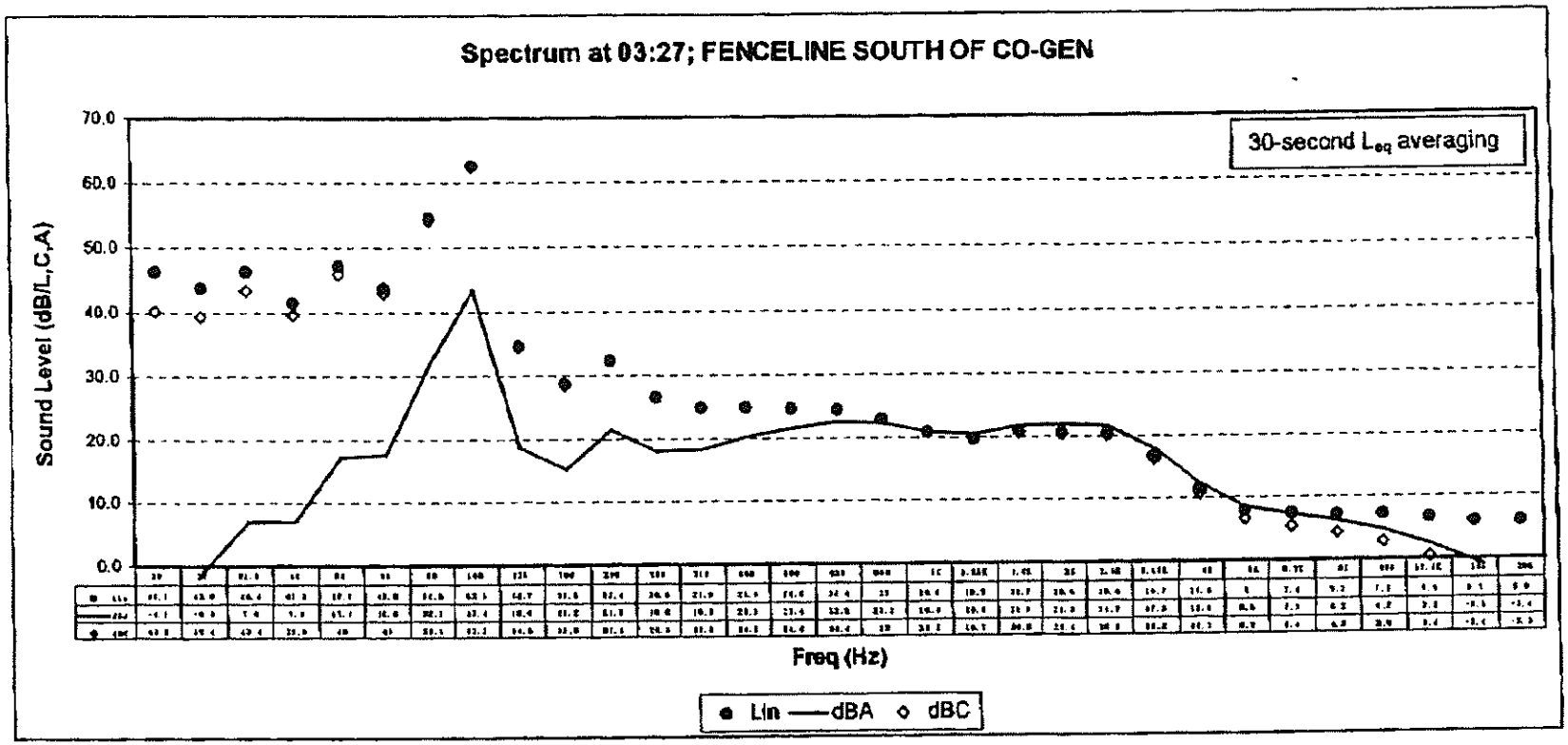

Spectrum at 03:27; FENCELINE SOUTH OF CO-GEN
30-second Leq averaging
Sound Level (dB/L,C,A)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Freq (Hz)
Lin —dBA ◇ dBC

FIGURE 5

DONALD OLYNYK
ACOUSTICAL ENGINEER
9224 – 90 Street, Edmonton, Alberta T6C 3M1
Telephone (780) 465-4125 ▪ Fax (780) 465-4169

February 3, 2011

Ken Cowles
Box 25
Site 6
RR2
Thorsby, Alberta T0C 2P0

Dear Sir:

RE: NOISE SURVEY, BREDAL COGENERATION PLANT

This letter describes a noise survey carried out on Wednesday February 2 in the vicinity of the Bredal Energy Corporation plant and on your undeveloped property adjacent to Pigeon Lake.

Noise measurements were carried during the day between 11:00 am and 12:00 am. The instrumentation consisted of the following: Rion Sound Level Calibrator NC-73, Serial No. 10800156 and Bruel & Kjaer Sound Level Meter, 2260 Observer, Serial No. 2375522. The last complete laboratory calibration was done in July 2010 for the calibrator and May 2009 for the sound level meter.

Measurements consisted of energy-averaged C-weighted sound levels i.e. dBC L_{eq} or L_{eqC} over a specified period of time. The $^1/_3$ octave bands were converted from C-weighted bands to linear weighted bands and then to A-weighted bands. The microphone was placed at 1.2 m above the ground. The area around the plant consisted mostly of trees. Cover on the ground consisted of about 600 mm snow.

The following weather conditions were obtained from the Environment Canada website (www.weatheroffice.gc.ca) for Edmonton International Airport located about 40 km (25 miles) to the northeast:

- 2 Feb 2011 11:00 MST Mostly cloudy 0° C 71% R.H. Wind W17 km/h
- 2 Feb 2011 12:00 MST Mostly cloudy 3° C 61% R.H. Wind W20 km/h

The Energy Utility Board Directive 038: Noise Control (February 2007) states that favorable weather conditions for wind speed for measurement positions less than 500 m from noise source are a) upwind: 10 km/hr limit b) crosswind: 15 km/hr limit and c) downwind: 15 km/hr limit. Corresponding favorable weather conditions for wind speed at 500 – 1000 m from noise source are a) upwind: 5 km/hr limit b) crosswind: 10 km/hr limit and c) downwind 10 km/hr limit. It is estimated that distances between plant and measurement position are ½ mile (804 m) for Position 1 and ¼ mile (402 m) for Position 2.

Details of the noise measurements carried out at the two positions around the cogeneration plant are summarized below:

1. West end of property: 30' from garage, about 100 yd east of Pigeon Lake, about ½ mile southeast of plant ...L_{eqA} = 35.8 dBA (5 minute noise sample)

2. East end of property: on the development roadway with dense mature trees and bush on each side of the roadway, about 100 yards west of county road, about ¼ mile south of plant ...L_{eqA} = 36.9 dBA (11 minute noise sample)

Position 1 was dominated by wind noise and it was difficult to discern the plant noise from this location. Intruding plant noise characterized by a humming sound was just discernible at Position 2; the wind appeared calm at this position on account of the large number of fully grown poplar trees around.

See Charts 1 and 2 for A-weighted, $^1/_3$ octave bands throughout the audio frequency range. According to the current Noise Control Directive User Guide, Guide 38 by EUB each of the noise samples at the two positions did not meet the test for the presence of a low frequency tonal component.

The EUB Basic Sound Level for nighttime is stated to be L_{eqA} = 40 for 1- 8 dwellings/quarter section land and L_{eqA} = 43 for 9 – 160 dwellings/quarter section land. The EUB Permissible Sound Level would also be L_{eqA} = 40 and 43 for these two dwelling densities if tonal components in plant operation were absent and the average rural ambient noise level is 5 dBA less than the BSL.

The EUB also acknowledges that in pure natural areas the background noise may be less than L_{eqA} = 40. An Ambient Monitoring Adjustment can be applied if the measured average sound environment in a given area (without any energy-related industrial component) is less than the Basic Sound Level.

Reference

1. Directive 038: Noise Control, EUB www.ercb.ca

Yours truly,

Donald Olynyk M.Sc. P.Eng.

Chart 1: Spectral analysis of noise in the vicinity of Bredal Cogen Plant

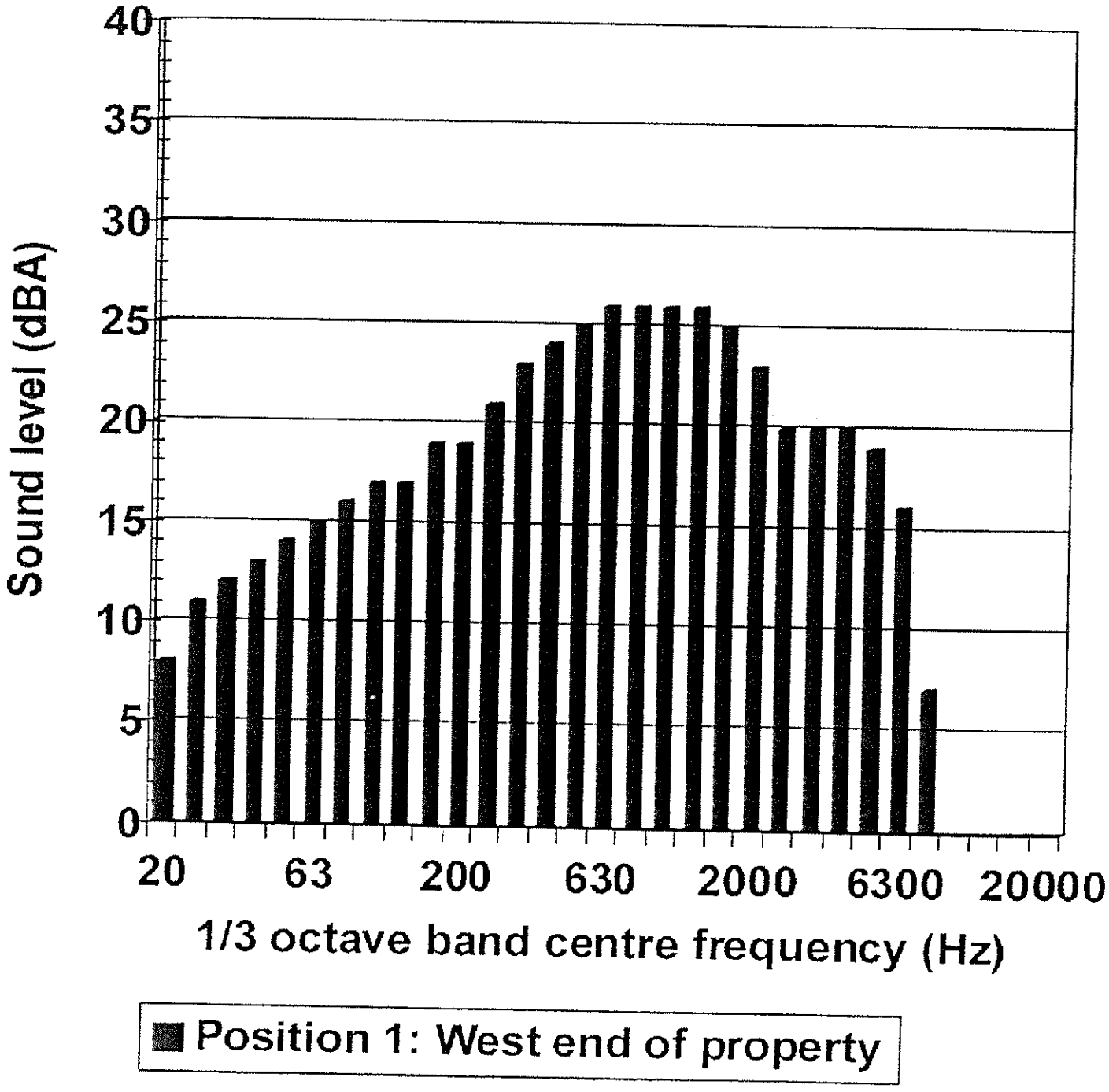
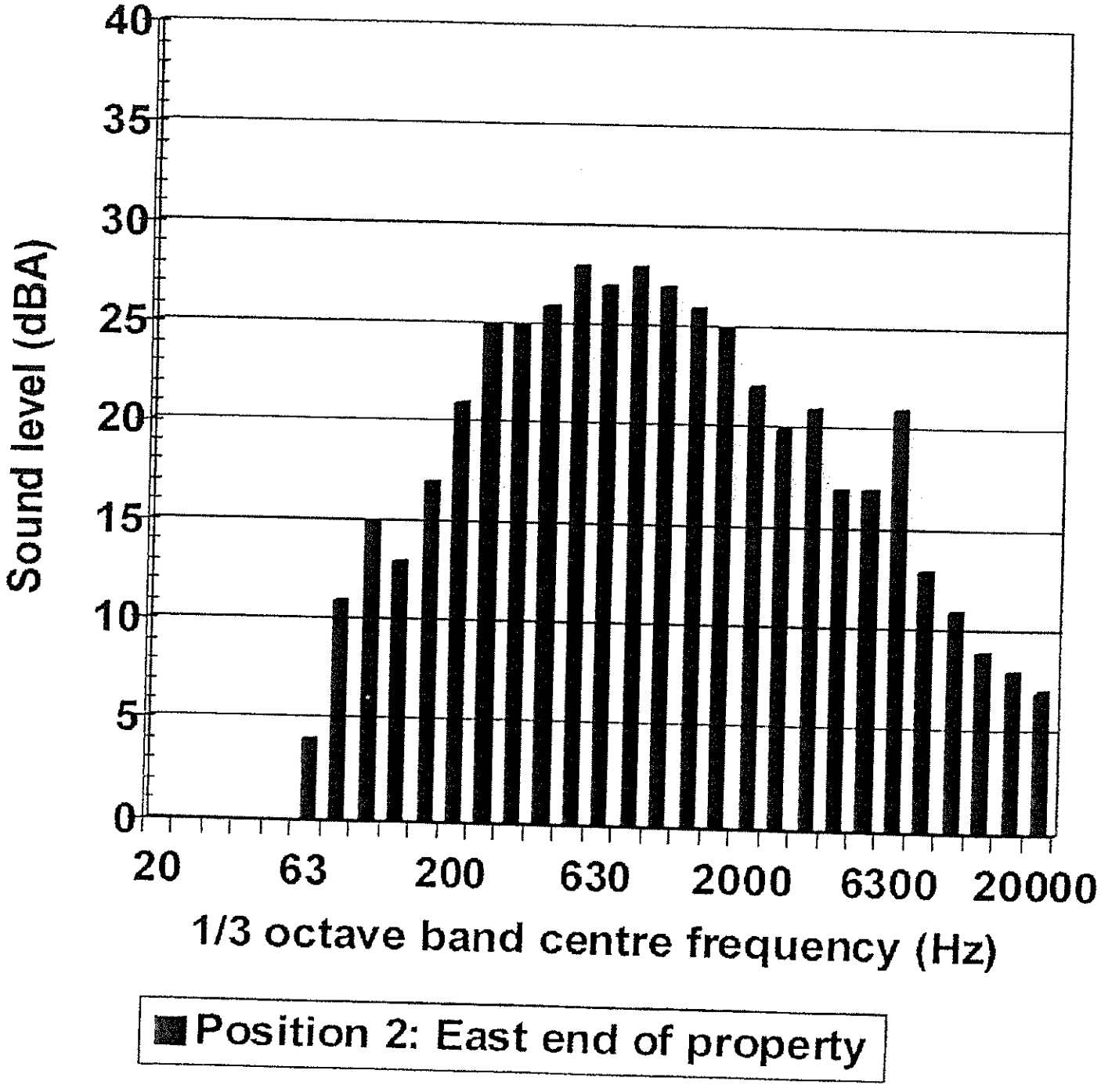


Chart 2: Spectral analysis of noise in the vicinity of Bredal Cogen Plant



DONALD OLYNYK
ACOUSTICAL ENGINEER

9224 - 90 Street, Edmonton, Alberta T6C 3M1
Telephone (780) 465-4125 ▪ Fax (780) 465-4169

February 7, 2011

Ken Cowles
Box 25
Site 6
RR2
Thorsby, Alberta T0C 2P0

Dear Sir:

RE: NOISE SURVEY, BREDAL COGENERATION PLANT

Here is a further comment on the noise survey carried out on Wednesday February 2 in the vicinity of the Bredal Energy Corporation plant and on your undeveloped property adjacent to Pigeon Lake.

In regard to noise monitoring conditions the EUB Directive 038, page 21, recommends that wind speed and direction be measured at the monitoring location at a height of between 1.2 and 10 m. The EUB states that data from a location nearby (nearest meteorological station) may serve as an indicator but that does not guarantee the same conditions at the measurement position. However, I feel that the wind conditions reported by the Edmonton International Airport weather station were representative of the wind conditions during our noise survey.

Yours truly,

Donald Olynyk

Donald Olynyk M.Sc. P.Eng.

Crescent Point
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Suite 2800, 111 - 5th Ave SW
Calgary, Alberta, Canada T2P 3Y6

May 25/2010

Ken Cowles
Box 25 Site 6 RR 2
Thorsby, AB
T0C 2P0

Dear Sir,

As per our conversation on May 17/2010, to Crescent Point Energy's knowledge the engines at 9-2-47-28W4 that run the CoGen Facility have been the same since 2003. This is what we have been told by Triaxon Resources; the previous operator of the site. As Crescent Point Energy acquired this property on December 15, 2009 from Triaxon Resources, we know that the engines have been the same since we took the property over on that date.

Sincerely,

Lee Walz
Foreman Alberta Oil
Crescent Point Energy