MEG Energy Corp.

MITIGATION AND HABITAT ENHANCEMENT PLAN FOR THE MEG ENERGY CORP. CHRISTINA LAKE REGIONAL PROJECT PHASE 2/2B

Submitted to:

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1 INTRODUCTION

In July 2007, MEG Energy Corp. (MEG) received the *Environmental Protection and Enhancement Act* (EPEA) amending approval (Approval No. 216466-00-01) to construct and operate the Christina Lake Regional Project (CLRP) Phase 2 (the Project). In March 2009, MEG received the EPEA amending approval (Approval No. 216466-00-02) to construct and operate Phase 2B of the CLRP. Under Sections 3.8.3 – 3.8.5 of the Phase 2 approval, MEG is required to submit a mitigation plan to Alberta Environment (AENV) addressing wildlife mitigation for the Project. Under Sections 4.8.7 -4.8.10 of the Phase 2 approval, MEG is required to submit a habitat enhancement plan to AENV which outlines wildlife habitat enhancement measures for species of concern.

In January 2009, MEG attended a meeting with AENV and Alberta Sustainable Resource Development (ASRD) to discuss MEG's approach to wildlife monitoring and mitigation. At that time, MEG had not developed a comprehensive mitigation plan and AENV requested a detailed mitigation plan for the Project.

1.1 Mitigation and Habitat Enhancement Plan Objectives

The objectives of the mitigation and habitat enhancement plan are to:

- outline MEG's efforts to minimize and offset the potential negative impacts to wildlife at the Christina Lake Regional Project consistent with the terms and conditions of the Phase 2 approval outlined in Section 1.2;
- provide information on prior and ongoing mitigation commitments at CLRP;
- provide further detail on mitigation MEG will implement to minimize effects on wildlife including above-ground pipeline crossing design and placement; and,
- identify wildlife habitat enhancement measures that will be used to reduce Project effects in disturbed areas for species of concern.

1.2 Terms and Conditions

The Wildlife Mitigation Plan Phase 2 approval conditions (Sections 3.8.3 - 3.8.5) are outlined as follows:

3.8.3 The approval holder shall submit a Wildlife Mitigation Plan to the Director by November 30, 2007, unless otherwise authorized in writing by the Director.

3.8.4 The focus of the Wildlife Mitigation Plan required in 3.8.3 shall include, but not limited to, mitigation strategies for above-ground pipelines which outline the design and placement of effective crossings and passageways for wildlife, considering the following criteria:

a) location (or habitat features);

b) specifications (height and width);

c) type of passageway (above or beneath);

d) frequency of crossing placement.

3.8.5 The approval holder shall implement the Wildlife Mitigation Plan submitted pursuant to 3.8.3 as authorized in writing by the Director.

The Wildlife Habitat Enhancement Plan Phase 2 approval conditions (Sections 4.8.7 - 4.8.10) are outlined as follows:

4.8.7 The approval holder shall submit a Wildlife Habitat Enhancement Plan to the Director by November 30, 2007, unless otherwise authorized in writing by the Director.

4.8.8 The plan referred to in 4.8.7 shall provide:

a) details for simple, cost-effective wildlife habitat enhancement measures in the project area, as appropriate for wildlife species of concern as identified in The General Status of Alberta Wild Species 2005, as amended; and

b) a schedule to monitor the effectiveness of these wildlife habitat enhancement measures.

4.8.9 The approval holder shall implement the Wildlife Habitat Enhancement Plan referred to in 4.8.7 as authorized in writing by the director.

4.8.10 The approval holder shall apply the Best Management Practices for Camps, Fences, and Barriers as described in BearSmart: Best Management Practices for Camps (Alberta Sustainable Resource Development, 2004)

a) garbage shall be stored in secure bear proof containers.

2 BACKGROUND

Construction of the CLRP began in 2005 and is ongoing as new phases are developed. Based on the assessment of activities related to the construction, operation and decommissioning of the CLRP, effects to wildlife could include:

- habitat loss and alteration;
- sensory disturbance;
- blockage of movements; and,
- direct and indirect wildlife mortalities.

In order to minimize the effects of the CLRP on wildlife, mitigation has been developed and outlined in previous submissions to AENV/ASRD, including MEG's:

- CLRP EPEA Regulatory Approvals;
- CLRP Caribou Protection Plans (CPP);
- Above Ground Pipeline (AGP) Crossing Structure Placement and Design reports;
- Bear Management Plans; and,
- Bird Deterrent Management Plan and Memo.

2.1 Christina Lake Regional Project EPEA Regulatory Approvals

MEG has submitted four applications relevant to the CLRP for regulatory approval under the EPEA (Table 1). Each application included mitigation measures to reduce effects to wildlife. An adaptive management approach was applied with the initial mitigation measures and updated for subsequent applications. To date, approval has been provided to construct and operate the Pilot, Phase 2 and Phase 2B.

TABLE 1. MEG CLRP Applications, Mitigation Measures and Milestones

Project	Date of Application Submission	Application Type	Mitigation Measures	Start of Construction	Start of Operation
Pilot	2004	Pilot Application to Energy Resources Conservation Board (ERCB)	Conceptual Conservation and Reclamation Plan (C&R), which included general wildlife mitigation.	2005	2007
Phase 2	2005	Environmental Impact Assessment (EIA)	Wildlife mitigation in the soils, vegetation, wildlife, biodiversity and C&R sections. Key learnings from the Pilot construction and operation and changes to CPPs were included.	2007	2009
Phase 2B	2007	Amendment to Phase 2 EIA	Expansion to facilities – no new mitigation proposed.	2007	2009
Phase 3	2008	EIA	Wildlife mitigation in the soils, vegetation, wildlife, biodiversity and C&R sections. Changes to mitigation provided in Phase 2 EIA based on key learnings.	Not started	Not started

2.2 Caribou Protection Plans

Caribou protection plans are part of the overall provincial strategy to minimize effects from industry on caribou populations and are completed annually by operators working in caribou ranges (Boreal Caribou Committee [BCC] 2001). A CPP outlines activities that could affect caribou and the mitigation measures being employed to minimize these effects. MEG has submitted the following CPPs for the CLRP and associated developments:

- 2003-2004 Caribou Protection Plan NEB2C-011-03-MEG Energy North Christina Lake Project (MEG 2003);
- Christina Lake Regional Project 2004/2005 Caribou Protection Plan NE1-017-04/05-MEG (Golder 2004);
- Christina Lake, May River, Jackfish, Surmont and West Exploration Caribou Protection Plan Amendment to CPP # NE1-0014-06/07-MEG (Lorrnel 2006);
- Lac La Biche Region Caribou Protection Plan Part II – Annual Operations 2007/08 (Lorrnel 2007); and,
- Christina Lake Region Caribou Protection Plan – Annual Operations 2008/09 (Lorrnel 2008).

Among key mitigation measures presented in its CPP, MEG has committed to the 'early in/early out' strategy proposed by the BCC (2001) and will ensure that no new clearing will occur between April 1 and August 15. Industrial activities between April 1 and August 15 will be restricted to cleared, active sites. If timing restrictions change in the future, MEG will conduct activities in accordance with the most current CPP.

2.3 Above Ground Pipeline Mitigation

MEG previously included the information required in Section 3.8.4 of the terms and conditions regarding AGP crossings into a technical memorandum and their recent pre-disturbance assessment (PDA) reports:

- Wildlife Crossing Structure Design/Location Evaluation Technical Memorandum (Golder 2005)
- MEG Energy Corp. Christina Lake Regional Project Pre-disturbance Assessment 13&14-04-077-05 W4M (Pad G and Associated Right-of-Way), dated April 2008 (Matrix 2008a); and,
- MEG Energy Corp. Christina Lake Regional Project Pre-disturbance Assessment 05&06-09-077-05 W4M (Pad H and Associated Right-of-Way), dated April 2008 (Matrix 2008b).

In previously submitted PDAs, site-specific information on topography, habitat features and engineering design was provided along with other information that may influence wildlife movement or suitability of crossing locations. Alberta Environment approval to include information on AGP wildlife crossing placement and design presented in the PDA reports was provided to MEG at the meeting in January 2009. However, MEG (in concern with process changes introduced by AENV) has chosen to make changes to their PDA process.

Detailed information (i.e., locations, structure design and monitoring) on AGP mitigation will now be provided in the annual wildlife mitigation report (Section 10).

MEG initiated monitoring along an AGP to determine the effectiveness of the crossing structures for facilitating wildlife movement. Based on the results of monitoring, changes to the design and placement of crossing structures have been developed (Section 2.3.1 and 2.3.2).

2.3.1 Crossing Structure Design

The changes to the crossing design are outlined in Table 2. A detailed crossing structure design is provided as Appendix A.

TABLE 2. Initial and Current Crossing Structure Design Parameters

Parameters	Initial Design Recommendations	Current Design Recommendations
Width	• At least 10 m wide	• At least 3 m wide (ASRD 2007)
Slope Ratio	• 3:1 slope	• Minimum 4:1 slope, use 6:1 slope where suitable conditions exist. Incorporate crossing into existing topography feature to minimize slope
Revegetation	• Use similar species to adjacent vegetation • Complete re-vegetation the spring following construction	• Use similar species to adjacent vegetation • Complete revegetation the spring following construction
Side walls	• No recommendations for side walls	• Incorporate side walls into crossing design to support soils at the edge of the crossing to decrease erosion potential
Maintenance	• Ensure access to the approach ramp is clear of snow berms and other materials that may block access for wildlife	• Ensure access to the approach ramp is clear of snow berms and other materials that may block access for wildlife

2.3.2 Crossing Structure Placement and Spacing

MEG's mitigation plan for AGPs includes undertaking pre-construction surveys to determine the location of wildlife crossings with respect to well-used game trails, high-quality habitat, riparian areas and topography. This information will be used to determine final pipeline design, including heights and locations of crossing structures. In addition, MEG is committed to constructing "over-the-pipe" crossing structures with spacing approximately every 400 m, as appropriate. Where topography permits, AGPs will be designed to facilitate under-pipe crossing opportunities, in consideration of the BCC (2001) guidelines and relevant research.

Ungulate crossing mitigation will be developed in consultation with AENV and ASRD and in consideration of the Alberta Caribou Committee guidance and other relevant research. This consultation will occur prior to pipeline construction. For AGPs, emphasis will be on optimizing opportunities for ungulates to cross pipelines, based on available research, site-

specific conditions and economic feasibility. MEG will monitor wildlife crossing structures for the Project, report the monitoring information to AENV and ASRD in the annual report (Section 10), and use the information to support adaptive management of its wildlife mitigation practices.

2.4 Bear Management

As outlined in Section 4.8.10 of the Phase 2 approval, MEG is committed to implementing a bear smart program at CLRP. In addition, ASRD indicates that bear management and appropriate bear management plans are needed for projects operating in northern Alberta (Powell 2009, pers. comm.). MEG has started construction and operation of certain phases of the Project (Table 1), increasing the potential for bear-human encounters. Bear encounters are a safety concern and can lead to property damage and death of individual bears. MEG developed two documents to mitigate potential effects to bears from the Project including:

- Bear Management Guideline – 2-page document given to on-site staff outlining procedures to minimize and deal with bear encounters on site (MEG 2008; Appendix B); and,
- Christina Lake Regional Project Bear Management Strategies – Detailed document outlining MEG's overall approach to bear management including dealing with problem bears, and reduction of odours from food, garbage, grey water, petroleum and landfills.

This past summer, MEG revisited both of these documents to ensure they were following recommendations provided in the BearSmart Program (ASRD 2010, internet site) and to evaluate whether they were appropriate for current conditions on site. The BearSmart Program recommends fencing camps; at this time MEG is still in the process of picking the most suitable locations for permanent camps for personnel and is not fencing the current camp perimeters. Once permanent camps are set up, MEG will monitor bear activity and bear encounters. If problems develop at permanent camp sites, the perimeters will be fenced.

Details on current bear mitigation measures are presented in Section 3.2.

2.5 Bird Deterrents

MEG recognizes that facilities with open water such as process ponds, stormwater runoff ponds, waste management cells, lime sludge ponds and any other open water source may be used as landing areas for birds. In the spring of 2008, over 1,000 ducks died after landing on a tailings pond in northern Alberta, prompting operators in the region to re-evaluate the effectiveness of current mitigation measures. As a result, MEG developed programs to mitigate the potential effects to birds from the Project.

MEG's bird deterrent program is being implemented at CLRP and includes specific deterrents for the process pond, storm water runoff pond, ecology pit and two waste management cells. Further details of the bird deterrent management plan and monitoring of the effectiveness of current deterrents are outlined in Appendix C and Appendix D.

MEG will evaluate the effectiveness of current deterrents annually and changes, if needed will be outlined in the annual wildlife mitigation report (Section 10). If monitoring of current deterrents indicates that they are not effective, additional methods of deterring wildlife recommended by ASRD such as cables may be placed on ponds (Powell 2009, pers. comm.).

3 GENERAL PROJECT MITIGATION MEASURES

- All personnel working on site participate in an orientation session that includes information on wildlife, including species of concern.
- Feeding or harassment of wildlife is prohibited.
- Hunting by MEG staff and contractors within the CLRP are prohibited.
- MEG commits to maintaining traditional use, hunting and fishing access to areas within and adjacent to CLRP and will ensure that MEG's approaches to access and security, to the extent practicable, support this commitment.
- All employees and contractors entering the CLRP are prohibited from possessing: firearms, pets and any motorized recreational vehicle unless authorized by MEG for safety purposes. MEG recognizes the constraints in minimizing use of firearms by local residents and First Nations who are working as staff or contractors. MEG encourages traditional land users to continue using the area.
- Caribou protection plans for activities in the caribou range have been developed and provided to ASRD, and are updated annually. The caribou protection plan describes the proposed construction and operation activities, the schedule, the lands and caribou habitat to be affected and emphasizes minimizing barriers to movement. A map showing the caribou range, the current developments and the proposed activities is included in each plan.
- Highline power as opposed to diesel/gas power generation is used where feasible.

3.1 Access Mitigation Measures

- Access may be restricted on pipelines through the use of a variety of techniques, excluding traditional access routes.
- Speed limits are posted and enforced on Project roads.
- Access will be controlled using manned check points and employee buses.
- Main access roads into caribou ranges and other important wildlife areas will be clearly signed.
- Access by Project staff into caribou ranges is restricted to those specifically given authority (e.g. staff, contractors, those permitted under road use agreements).

- Access to operating facilities including SAGD wellpads, above ground pipeline corridors, and source and disposal wells is controlled in accordance with Energy Resources Conservation Board (ERCB) Directive 57 unless otherwise approved by ERCB.
- Activities and new access will be integrated with existing disturbances where possible.
- Vehicular traffic volumes in caribou ranges is reduced by utilizing the existing airstrip;
- Dust control is undertaken on roads during dry conditions in the spring, summer and fall.
- Wooded buffers are maintained as appropriate to reduce noise.

3.2 Bear Mitigation Measures

- Persons working where the potential for bear encounters exist receive Bear Awareness Training and a copy of the Bear Management Guideline (Appendix B).
- Staff are equipped with appropriate bear deterrent devices (i.e., pepper spray, air horn, bangers) if working alone in remote areas of the CLRP.
- Food or food waste are securely contained, by storing all garbage and waste water in designated areas and/or enclosed and approved bear proof containers, to prevent scavenging by bears.
- All chemicals or petroleum products are stored properly to avoid access by bears.
- Bear warning signs are posted where problem bears have been reported
- All bear proof garbage containers are marked with "Bear Proof" signage to reinforce employee education.
- Long-term facilities are used to treat grey water along with sewage in an approved waste treatment system.
- A bear-resistant transfer station will be constructed that ships garbage outside of the area to a bear-resistant landfill or incinerator.
- Skirting is attached to permanent buildings and elevated walkways to prevent bears from taking refuge under them.
- Proper lighting is installed at building exits, along pathways and in outside work areas so people can move about the facility more safely in the dark and avoid chance encounters with bears.
- Fort McMurray Fish and Wildlife will be contacted to assist in removal of hibernating black bears if they are accidentally disturbed.

4 CONSTRUCTION MITIGATION MEASURES

- Clearing will be conducted during the winter period (September 1 through April 1) to avoid the main breeding, nesting and calving seasons for wildlife.
- During the April 1 through August 31 time period, MEG will attempt to concentrate activities at permanent sites, such as well pads, Central Plant Facilities (CPFs), utility corridors and camp areas. Construction activities will follow the timing restrictions outlined in the CPP.
- New construction activities during caribou calving seasons will be conducted in compliance with the most recent CPP.
- New construction activities will be completed within caribou ranges first whenever possible in an effort to achieve an early in – early out approach.
- Activities occurring in the late winter season (March 1 – April 1) will be clustered and occur at or adjacent to recent activities or permanently developed active areas (e.g., wellpads, CPF) to the extent possible.
- All work will be kept within surveyed rights-of-way (ROW) and other construction areas.
- Existing lines that are starting to regenerate will be used for access and installation of new infrastructure only when other reasonable options do not exist.
- Drilling of multiple wells on a single pad site will be used to reduce the total footprint on the landbase.
- Areas for facilities, well sites, multi-well pads and exploration well pads will be as small as reasonably possible.
- All ROW will be sized to the minimum width required, bearing in mind safety considerations.
- Well pad, source and disposal well access will follow seismic line clearings wherever possible.
- Where windrows are necessary, they will be intermittent so that wildlife movements along access routes are not blocked.
- Merchantable timber will be salvaged where possible, except where ASRD permits otherwise. No tree clearing will occur unless approved by regulatory authorities.
- Native vegetation will be preserved where possible.
- Adequate water movement will be maintained where all-weather roads cross peatland areas by using culverts or other drainage techniques as deemed appropriate.

- Natural drainage patterns will be maintained by ensuring appropriate spacing and number of culverts to at watercourse or wetland crossings as described in hydrology.
- Impacts from freshwater withdrawal for construction and drilling will be minimized through careful selection and management of surface water withdrawal locations.

4.1 Pipelines Construction Mitigation Measures

- Every reasonable effort will be made to reduce disturbance to the forest cover root mat (duff layer) during pipeline construction to promote accelerated reforestation along ROW (e.g., mulchers and hand slashing).
- Pre-construction surveys will be undertaken to determine the location of wildlife crossings with respect to well-used game trails, high-quality habitat, riparian areas and topography. This information, along with consultation with ASRD and AENV will be used to determine locations of crossing structures.
- MEG is committed to constructing "over-the-pipe" crossing structures with spacing approximately every 400 m, as appropriate. Where topography permits, above-ground pipelines will be designed to facilitate under-pipe crossing opportunities, in consideration of the BCC (2001) guidelines and relevant research.
- Crossings will be designed and constructed as specified in Table 2.
- During construction of pipelines, leave gaps in linear construction areas to allow animal movements across the work area.
- When a small gas pipeline or fibre-optic cable runs along an aboveground pipeline, they will not hang more than a few centimetres below the main pipeline.
- Access management and revegetation may occur on some existing linear disturbances in an effort to enhance habitat for moose and caribou.

5 OPERATIONS MITIGATION MEASURES

5.1 General Operations Mitigation Measures

- Roads will be monitored during winter to ensure that snowberms are not too high and that gaps are left to facilitate wildlife movement at regular intervals and at crossing structures.
- Corehole locations that are converted into permanent dispositions for the purposes of observation wells will be monitored using remote technology to eliminate the use of permanent roads and to minimize the activity required in these areas.
- MEG will design transmission lines using raptor-safe construction standards from the Avian Powerline Interaction Committee (APLIC 1996) or comparable requirements.

- Deterrents will be developed for industrial waterbodies to minimize effects to wildlife (Appendix B and C).
- Maintenance of bird deterrents including snow and debris removal, annual installation setup and take-down, and periodic setup and take-down for pond maintenance will be ongoing over the life of the Project.
- Reclamation will be done concurrently in an effort to replace wildlife habitat as soon as possible following completion of various activities.
- Infrastructure will be improved by constructing more gas tie-ins, electrical powerlines, a sewage treatment plant and fresh water wells for the camps to reduce the amount of traffic in the caribou zone, decrease noise pollution and decrease fire hazards.
- Obstructions at culverts from beaver activity will be removed regularly.
- MEG will employ environmental monitoring staff to ensure that the stated mitigation measures are implemented properly.

6 DECOMMISSIONING MITIGATION MEASURES

6.1 General Decommissioning Mitigation Measures

- Abandonment and reclamation will be in accordance with the "Strategic Plan and Industrial Guidelines for Boreal Caribou Ranges in Northern Alberta" (BCC 2001)
- Reclaimed areas will be blocked from vehicle access.
- Pipeline ROWs will be reclaimed according to revised Reforestation Guidelines when no longer needed for operations.
- Clean-up and remediation or disposal of contaminants will follow AENV requirements;
- Sites will be re-contoured to be compatible with end land use, and will provide proper drainage, stability and erosion control.
- Replacement of salvaged subsoil will be followed by replacement of salvaged topsoil according to depths prescribed in the C&R Plan for the site, unless otherwise directed by the Conservation and Reclamation Inspector.
- All buildings, equipment and foundations constructed for the Project will be removed.
- Wells will be decommissioned as per ERCB requirements.
- All decommissioning garbage and debris will be removed from the CLRP.

7 HABITAT ENHANCEMENT

7.1 Habitat Enhancement Objectives

A wildlife enhancement plan has been developed as required under section 4.8.8 of the Phase 2 approval (Section 1.2). The objective of the wildlife habitat enhancement plan is to provide habitat in the project area for wildlife species of concern as identified in *The General Status of Alberta Wild Species 2005*, as amended (ASRD 2006). Species of concern potentially occurring in the Project area are identified in Table 3. Many of these species were observed in the Project area, although some species are likely migratory since suitable breeding habitat does not occur.

Enhancing undisturbed areas for specific species may negatively affect species already using those habitats. Therefore, habitat enhancement will focus on reclaiming and improving habitat on disturbances (Project and non-Project) that are no longer being used and implement mitigation measures that can enhance the quality of habitats surrounding Project facilities. Enhancement measures will focus on species of concern; however, enhancement strategies are limited for many species (e.g., forest dwelling species). Therefore MEG will focus on a number of strategies as described in the following sections. This will include enhancing habitat for non-target species (e.g., prey species), that provide enhanced foraging habitat for some species of concern (e.g., hawks, owls, fisher, lynx).

As part of the mitigation measures for the project, lakes and streams will be avoided except for ROW crossings. Therefore impacts to aquatic species (e.g., amphibians, waterfowl, waterbirds) are minimized and enhancement is not necessary. However, the reclamation of borrow pits to wetlands with littoral zones and emergent vegetation will enhance habitat for many aquatic species (Garcia et al. 2004; Hamilton et al. 1998; McParland and Paszkowski 2007; Newbrey et al 2005; Niemuth and Solberg 2003; Schmetterling and Young 2008; White and Main 2005; Section 7.3).

Since enhancement will focus on disturbed areas, enhancement strategies for forest-dependant species are not possible in the short term. Progressive reclamation through the life of the Project or reclaiming non-Project disturbances will reduce the duration of Project effects for forest-dependant species. Enhancing habitat for non-target species (e.g., prey species) enhances habitat for raptors (Riper and Wagtendonk 2006; Section 7.5).

TABLE 3. Species at Risk Potentially Occurring in the Project Area including Provincial Status and Potential Enhancement Techniques

Common Name	Techniques Available to Enhance Habitat	ASRD Listing 2006
Reptiles and Amphibians		
Red-sided garter snake	No snakes observed in the region, no enhancement recommended	Sensitive
Western toad	Borrow pit reclamation may provide breeding habitat	Sensitive
Canadian toad	Borrow pit reclamation may provide breeding habitat	May be at risk
Birds		
Pied-billed grebe	Borrow pit reclamation may provide foraging habitat	Sensitive
Horned grebe	Large waterbodies required, therefore no enhancement recommended	Sensitive
Western grebe	Large waterbodies required, therefore no enhancement recommended	Sensitive
American white pelican	Large waterbodies required, therefore no enhancement recommended	Sensitive
American bittern	Large graminoid or shrub fens required, therefore no enhancement recommended	Sensitive
Great blue heron	Borrow pit reclamation may provide foraging habitat	Sensitive
Green-winged teal	Borrow pit reclamation may provide foraging habitat	Sensitive
Northern pintail	Borrow pit reclamation may provide foraging habitat	Sensitive
Lesser scaup	Borrow pit reclamation may provide foraging habitat	Sensitive
White-winged scoter	Waterbodies avoided by the Project	Sensitive
Osprey	Waterbodies avoided by the Project, progressive reclamation	Sensitive
Bald eagle	Waterbodies avoided by the Project, progressive reclamation	Sensitive
Northern harrier	Leave open sedge areas on cutlines	Sensitive
Northern goshawk	Progressive reclamation	Sensitive
Broad-winged hawk	Progressive reclamation	Sensitive
Sharp-tailed grouse	Large shrub fens or burns required, therefore no enhancement recommended	Sensitive
Yellow rail	Large graminoid or shrub fens required, therefore no enhancement recommended	Undetermined
Sora	Borrow pit reclamation may provide foraging habitat	Sensitive
Sandhill crane	Fens on large ROWs provide habitat	Sensitive
Black tern	Borrow pit reclamation may provide foraging habitat	Sensitive
Northern hawk owl	Microhabitats and graminoid areas on ROWs increase prey base	Sensitive
Barred owl	Microhabitats and graminoid areas on ROWs increase prey base	Sensitive
Great gray owl	Microhabitats and graminoid areas on ROWs increase prey base	Sensitive

Common Name	Techniques Available to Enhance Habitat	ASRD Listing 2006
Short-eared owl	Microhabitats and graminoid areas on ROWs increase prey base	May be at risk
Common nighthawk	Uses disturbance as well as rooftops for nesting	Sensitive
Black-backed woodpecker	Progressive reclamation and reclaiming cutlines	Sensitive
Pileated woodpecker	Progressive reclamation and reclaiming cutlines	Sensitive
Olive-sided flycatcher	Progressive reclamation and reclaiming cutlines	Secure
Least flycatcher	Progressive reclamation and reclaiming cutlines	Sensitive
Eastern phoebe	Progressive reclamation and reclaiming cutlines	Sensitive
Barn swallow	Fens and graminoid fens on large ROW provide habitat	Sensitive
Brown creeper	Progressive reclamation and reclaiming cutlines	Sensitive
Cape May warbler	Progressive reclamation and reclaiming cutlines	Sensitive
Black-throated green warbler	Progressive reclamation and reclaiming cutlines	Sensitive
Bay-breasted warbler	Progressive reclamation and reclaiming cutlines	Sensitive
Common yellowthroat	Progressive reclamation and borrow pit reclamation	Sensitive
Canada warbler	Progressive reclamation and borrow pit reclamation	Sensitive
Western tanager	Progressive reclamation and reclaiming cutlines	Sensitive
Rusty blackbird	Progressive reclamation and borrow pit reclamation	Sensitive
Mammals		
Northern long-eared bat	Progressive reclamation	May be at risk
Hoary bat	Progressive reclamation	Sensitive
Eastern red bat	Progressive reclamation	Sensitive
Silver-haired bat	Progressive reclamation	Sensitive
Fisher	Progressive reclamation, reclaiming cutlines, limit access, increase prey base with brush piles	Sensitive
Wolverine	Progressive reclamation, reclaiming cutlines, limit access, increase prey base with brush piles	May be at risk
Canada lynx	Progressive reclamation, reclaiming cutlines, limit access, increase prey base with brush piles	Sensitive
Woodland caribou	Progressive reclamation, reclaiming cutlines, limit access, reduce traffic, reduce line of sight	At risk

Notes:

Source: ASRD 2006.

For the wildlife species where habitat enhancement is possible, MEG will focus on the following:

- enhance habitat on linear features through revegetation, access restriction and minimizing line of sight;
- progressively revegetate and reclaim wellpads, borrow pits and other facilities through the life of the Project;

- reduce or remove sources of noise; and
- enhance microhabitats through brush piles and coarse woody debris.

Specific sites and a schedule to implement the above strategies will be selected by examining the existing disturbances on the landscape and Project needs to use existing disturbances to minimize the Project footprint. On-site staff and local regulators and stakeholders will be involved in site-selection, where appropriate.

7.2 Linear Feature Enhancement

Linear features on the landscape as a result of the Project can be beneficial for some species but are detrimental to others. The vegetation present shortly after creating a linear disturbance (e.g., grasses, forbs) provides habitat for small mammals (e.g., shrews, mice, voles) and may provide easier access for wolves. The linear features, therefore, may benefit raptors by increasing prey abundance but may be detrimental to ungulates due to predation (James and Stuart-Smith 2000, McKenzie 2006, Riper and Wagtendonk 2006, Wasser et al. 2009, submitted).

Habitat removal to create linear features can be detrimental to some species (e.g., some songbirds, moose and caribou) as it removes foraging and cover habitat and decreases connectivity on the landscape. In order to enhance habitat for those species, MEG will progressively revegetate cutlines, where possible. Vegetation species used will be similar to those found adjacent to the disturbed habitat which will reduce the line of sight along linear disturbances and increase connectivity among habitat patches. Revegetating with deciduous shrubs could benefit olive-sided flycatchers, least flycatchers, common yellowthroats, Canada warblers, and moose (Geboers and Nol 2009; Handel et al. 2009; Kulba and McGillivray 2001; Salt and Salt 1976; Piorecky et al. 1999; Peek 1975).

Increased access along linear features can be detrimental to some species including lynx, black bear, moose and caribou (Bayne et al. 2008; Fuller 1990; Boer 1990; James and Stuart-Smith 2000). Where revegetation of the entire linear feature is not possible, MEG will implement access controls such as planting vegetation at the intersection of linear features, blocking access with woody debris, or selective snow removal. In cases where access may still be needed, MEG will reclaim portions of the ROW to provide line of sight blocks (Appendix E).

7.3 Progressive Reclamation of Project Facilities

MEG will progressively reclaim facilities such as wellpads and borrow pits throughout the life of the Project. When developing reclamation and revegetation plans for facilities, where possible, MEG will use strategies to enhance habitat including:

- Create wetland habitats from borrow pits which include gentle slopes and littoral zones which provides habitat for aquatic species (e.g., amphibians, waterfowl, waterbirds, muskrat and beaver).

- Reclaim existing disturbances in riparian areas to enhance connectivity and provide habitat for species dependent on this habitat type, including moose.

7.4 Noise Reduction and Removal

Recent studies indicate negative responses by some songbirds to anthropogenic noise (Bayne et al. 2008; Brumm 2004; Habib et al. 2007; Rheindt 2003; Slabbekoorn and Peet 2003; Slabbekoorn and Ripmeester 2008; Swaddle and Page 2007). Specifically, chronic noise can reduce the efficacy of vocal communication among individuals by interfering with call or song transmission, potentially reducing pairing success (Habib et al. 2007; Swaddle and Page 2007) and impairing territory defense (Brumm 2004). In addition, for some species, chronic noise can increase vulnerability to nest predation by masking predator warning calls (Yong 2008). These effects therefore reduce habitat availability (Bayne et al. 2008), potentially decreasing reproductive success (Habib et al. 2007; Swaddle and Page 2007), and increasing predation risk (Slabbekoorn and Ripmeester 2008).

MEG has currently designed wellpads to use downhole pumps and other noise reducing strategies that will minimize noise impacts on songbirds. To further reduce noise, techniques such as limiting vehicle access on some features (Section 7.2) will also reduce or eliminate noise in some locations, enhancing habitat for those species that are affected by noise.

7.5 Microhabitat Enhancement

7.5.1 Brush Piles

Brush piles can provide shelter, den sites and foraging sites for small mammals such as shrews, mice, voles, snowshoe hare and weasels (Proctor et al. 1983 as cited in Green and Salter 1987; Maser et al 1979; Szafoni 1982; Tessman 1982). The creation of habitat for these species may increase prey abundance and therefore enhance habitat for wildlife species including raptors, fisher, lynx, and other predators.

Brush piles and coarse woody debris can provide high quality microhabitat for small wildlife species during the first few years following completion of reclamation activities, when vegetation cover is sparse. Brush piles can also promote snow accumulation and increase soil moisture (Tessman 1982 as cited in Green et al. 1987) that can aid in establishing vegetation on reclaimed areas. Larger brush piles provide subnivean environments for marten and their prey. Downed wood debris provides sites for insect colonization, thus aiding in nutrient cycling as well as providing a prey base for some birds and small mammals.

MEG will be creating brush piles from forests being cleared or from existing debris. Brush piles will be placed at varying distances from the edge of the disturbance where, together with shrub and grass growth, they will create a series of habitats valuable to small mammals. These brush piles will consist of varying-sized branches and logs, thereby providing habitat for animals of varying size. Management of brush will be conducted in accordance with forest management guidelines.

8 COMMUNITY INVOLVEMENT

MEG's on-site staff and local trappers are involved in the design and implementation of mitigation measures to maximize efficiency and performance based on local knowledge of the site. MEG's intent is to build the capacity of local residents and trappers to assist in combining relevant traditional practices and knowledge with current mitigation measures.

MEG plans to carry out these techniques along with enhancing community awareness of the monitoring initiatives for the CLRP. Currently, local trappers assist with Project development and exploration programs while Aboriginal students, whose ancestors lived off the land, put theory into practice by drawing on skills from both the past and present.

9 ADAPTIVE MANAGEMENT

In the event that monitoring shows an unforeseen or underestimated negative effect of the Project on wildlife, mitigation measures will be developed or altered to reduce this effect.

Adaptive management will focus on:

- strategies to reduce effects to caribou because this species has the highest conservation status of those listed in northern Alberta. Detailed action plans will be required in the event of a CLRP-caribou conflict; and,
- improvement of crossing structure design to facilitate movement across AGPs. If issues are identified, modifications to crossing structures, alternative locations and increased frequency of structures could be suggested.

10 REPORTING

Results of all changes and updates to mitigations and habitat enhancement will be compiled into MEG's annual Conservation and Reclamation (C&R) report. With respect to wildlife mitigations and habitat enhancement, the report will include:

- a brief summary of mitigation and enhancement programs;
- key learnings from monitoring of current mitigations and enhancement techniques; and,
- any proposed changes to mitigation measures and enhancement techniques (adaptive management).

Reporting will be submitted to ASRD and AENV by February 28th of each year. MEG will coordinate with ASRD and AENV to address revisions to wildlife mitigation measures.

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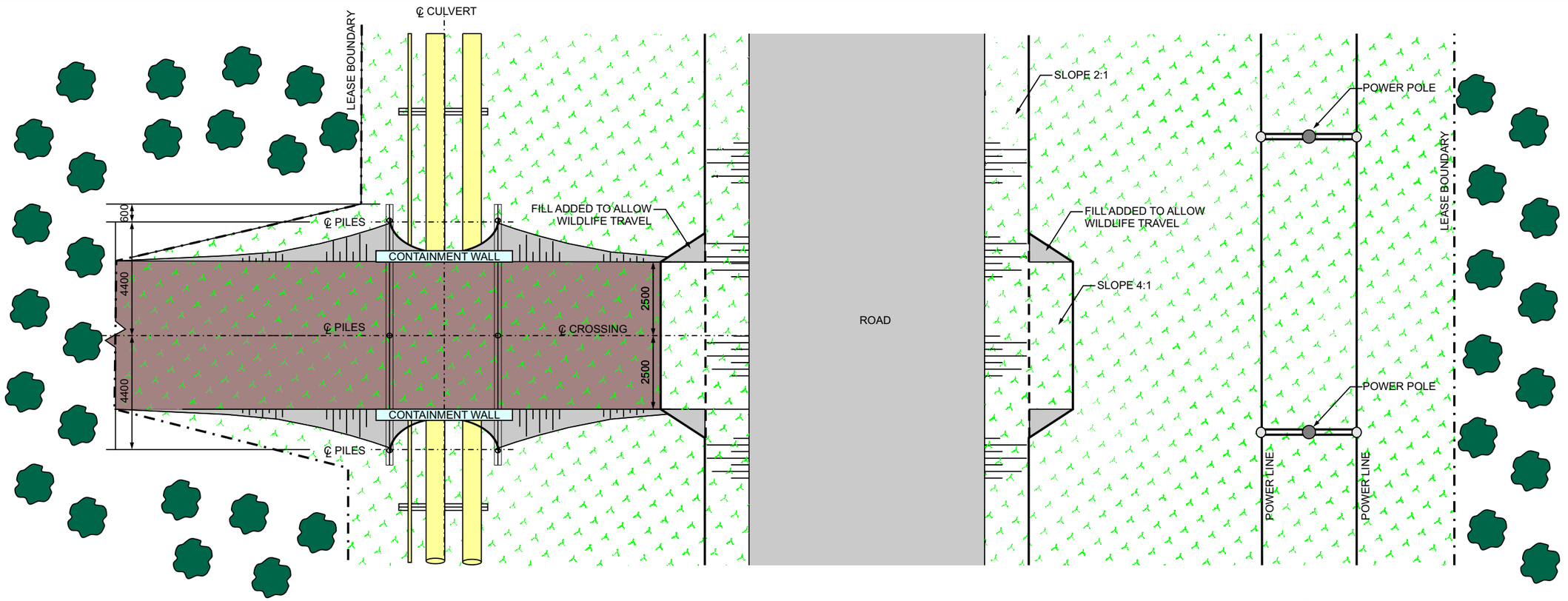
APPENDIX A

PIPELINE CROSSING DESIGNS

APPENDIX A - PIPELINE CROSSING DESIGNS

Design Notes:

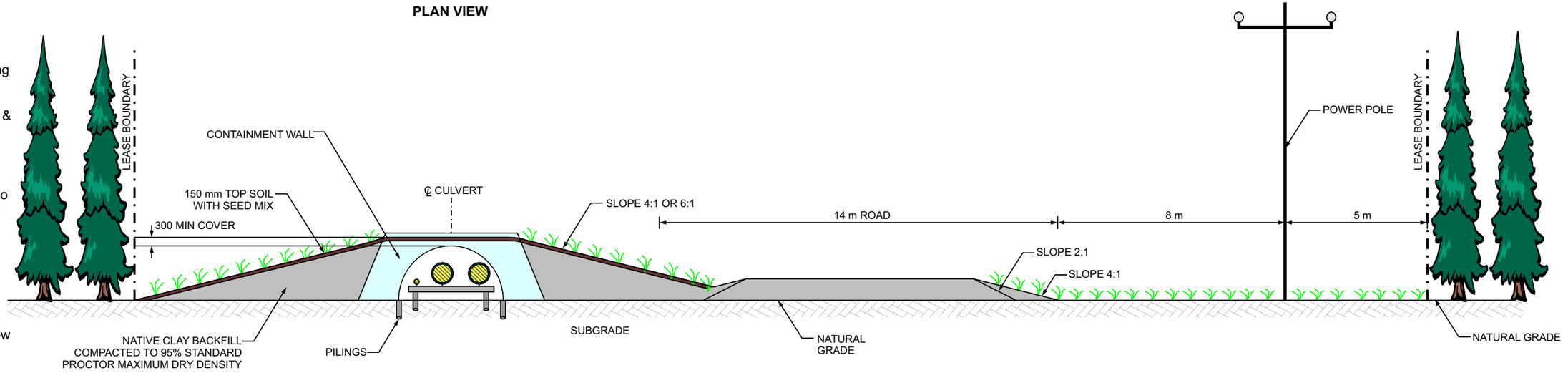
1. Plan view of crossing structure design to facilitate movement in areas with a powerline & road.
2. Crossing at least 3 m wide.
3. Minimum 4:1 slope ratio for crossing ramps; 6:1 will be used where possible.
4. Revegetation using similar species to adjacent vegetation.
5. Species used for revegetation must below powerline.
6. Revegetation will be completed the spring following construction.
7. Containment walls will be used to support soils and vegetation and to decrease erosion potential.



PLAN VIEW

Design Notes:

1. Section view of crossing structure design to facilitate movement in areas with a powerline & road.
2. Crossing at least 3 m wide.
3. Minimum 4:1 slope ratio for crossing ramps; 6:1 will be used where possible.
4. Revegetation using similar species to adjacent vegetation.
5. Species used for revegetation must below powerline.
6. Revegetation will be completed the spring following construction.
7. Containment walls will be used to support soils and vegetation and to decrease erosion potential.



SECTION VIEW

Notes:
1. All measurements are approximate and may change subject to engineering requirement.
2. Drawing is not to scale.

REFERENCE: ---

Matrix Solutions Inc.

MEG ENERGY CORP.

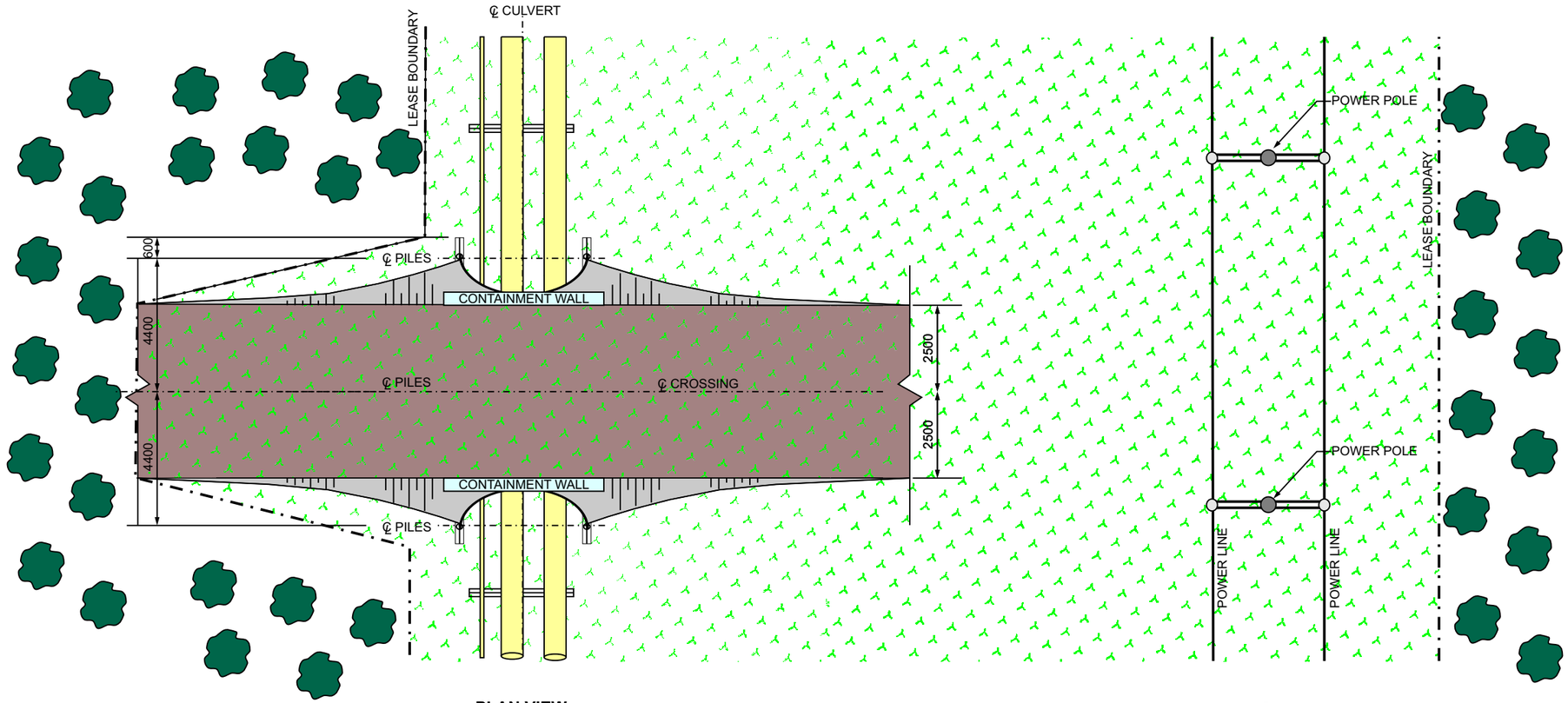
TYPICAL WILDLIFE CROSSING STRUCTURE WITH ROAD

CHRISTINA LAKE REGIONAL PROJECT

DATE:	DESIGN:	DRAWN:	FIGURE
DECEMBER 8, 2009	P. SWAN	F. SONG	A-1
FILE: 3459-XS1-09.CDR	CHECK: D. PLAYER	DATUM: N/A	

Design Notes:

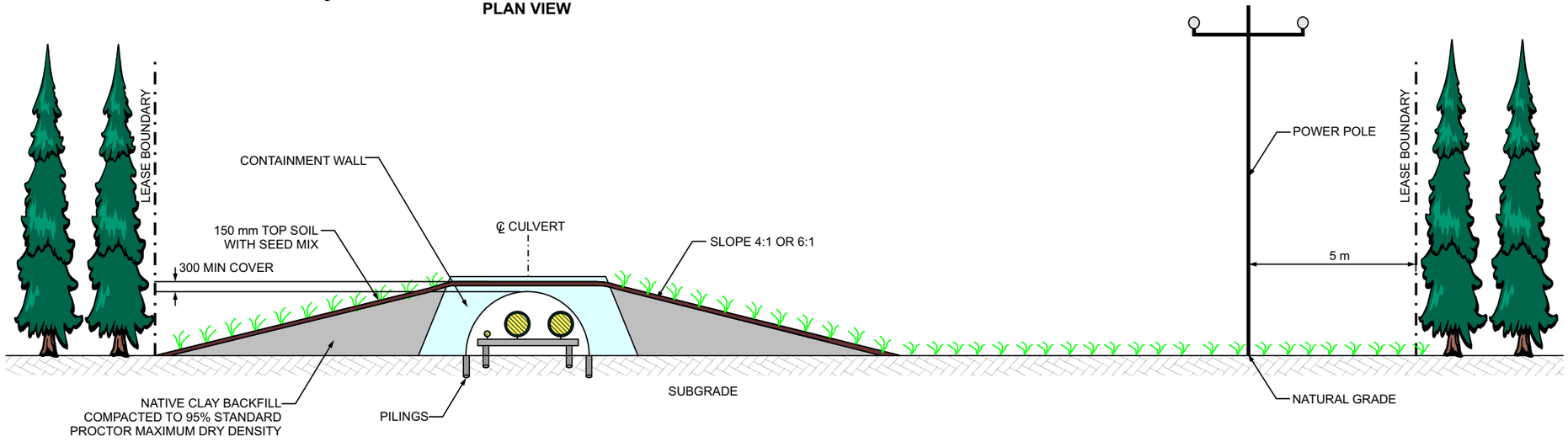
1. Plan view of crossing structure design to facilitate movement in areas with a powerline.
2. No road is associated with this design.
3. Crossing at least 3 m wide.
4. Minimum 4:1 slope ratio for crossing ramps; 6:1 will be used where possible.
5. Revegetation using similar species to adjacent vegetation.6. Species used for revegetation must below powerline.
7. Revegetation will be completed the spring following construction.
8. Containment walls will be used to support soils and vegetation and to decrease erosion potential.



PLAN VIEW

Design Notes:

1. Section view of crossing structure design to facilitate movement in areas with a powerline.
2. No road is associated with this design.
3. Crossing at least 3 m wide.
4. Minimum 4:1 slope ratio for crossing ramps; 6:1 will be used where possible.
5. Revegetation using similar species to adjacent vegetation.6. Species used for revegetation must below powerline.
7. Revegetation will be completed the spring following construction.
8. Containment walls will be used to support soils and vegetation and to decrease erosion potential.



SECTION VIEW

Notes:
1. All measurements are approximate and may change subject to engineering requirement.
2. Drawing is not to scale.

REFERENCE: ---

Matrix Solutions Inc.

MEG ENERGY CORP.

TYPICAL WILDLIFE CROSSING STRUCTURE

CHRISTINA LAKE REGIONAL PROJECT

DATE:	DESIGN:	DRAWN:	FIGURE
DECEMBER 8, 2009	P. SWAN	F. SONG	A-2
FILE: 3459-XS1-09.CDR	CHECK: D. PLAYER	DATUM: N/A	

Note:
Drawing is not to scale.

REFERENCE: ---

Matrix Solutions Inc.

MEG ENERGY CORP.

TYPICAL WILDLIFE CROSSING WITH ROAD

CHRISTINA LAKE REGIONAL PROJECT

DATE: DECEMBER 8, 2009	DESIGN: P. SWAN	DRAWN: F. SONG	FIGURE A-3
FILE: 3459-XS1-09.CDR	CHECK: D. PLAYER	DATUM: N/A	

APPENDIX B

WILDLIFE MANAGEMENT GUIDELINES:
BEAR MANAGEMENT GUIDELINES

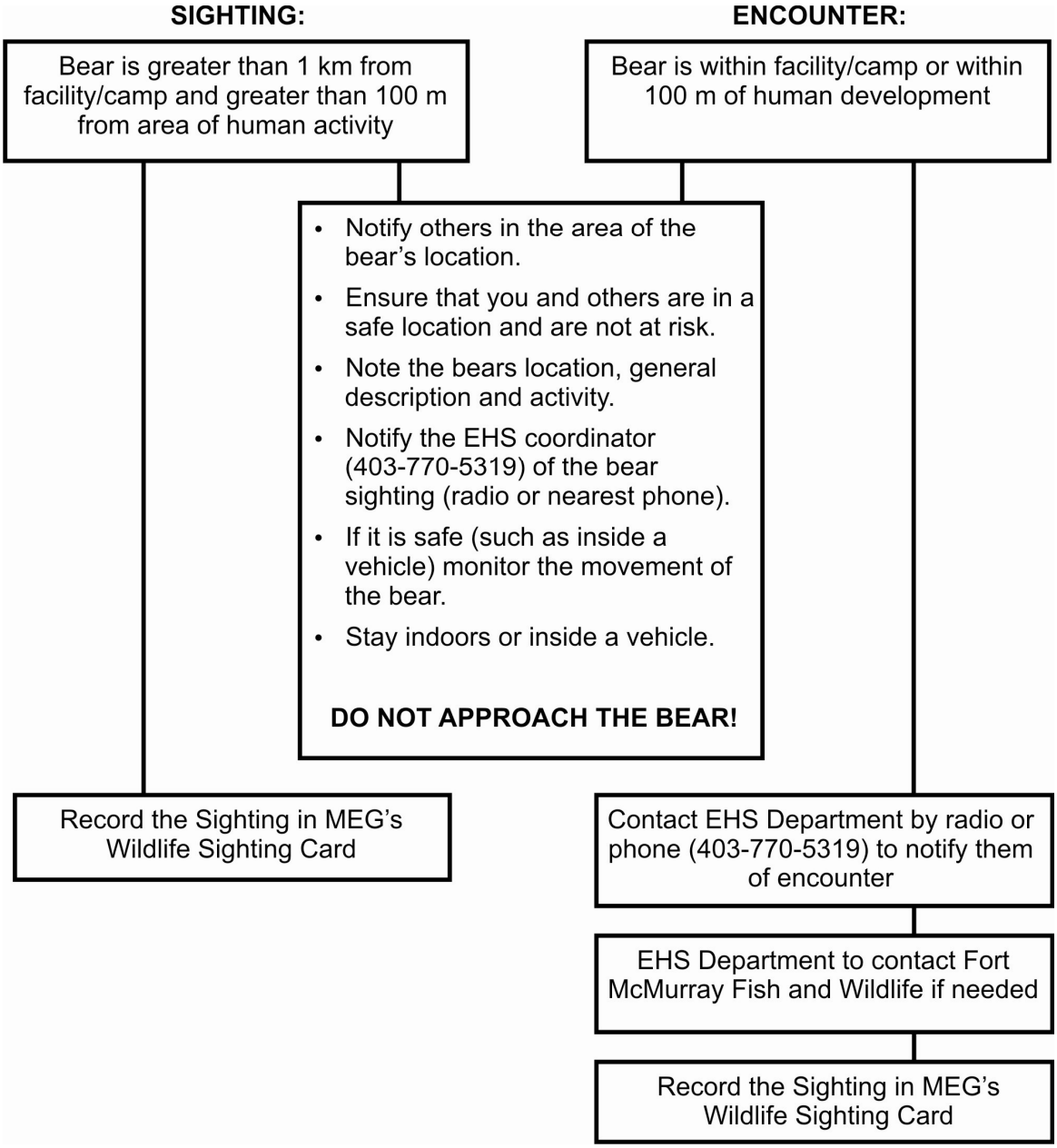
WILDLIFE MANAGEMENT GUIDELINES

Bear Management Guidelines

1.0 BEAR MANAGEMENT

Black bear *(Ursus americanus)* encounters with humans can pose a hazard to human safety, property, and bears. Due to the location of the Christina Lake Regional Project, (CLRP) encounters with bears are possible. To reduce human-bear conflicts the following procedures should be followed:

- **Be Bear Aware**. All persons who work in roles where the potential for bear encounters exist should receive Bear Awareness Training. Contact your Supervisor or the MEG EHS Coordinator for further information.
- If working alone in remote areas of the CLRP, staff should be equipped with appropriate bear deterrent devices (i.e., pepper spray, air horn, bangers).
- Make food or food waste unavailable to bears by storing all garbage and waste water in designated areas and/or enclosed and approved bear proof containers.
- Store all chemicals or petroleum products properly to avoid access.
- Post and adhere to bear warning signs where problem bears have been reported.
- Never approach a bear. Their behavior is unpredictable and they can attack if surprised or threatened or are defending territory, kills or cubs.
- If a bear is observed within the CLRP, staff should follow the procedure for reporting bear sightings and encounters as outlined below.
- All MEG staff should be aware of a Bear Sighting and Reporting Procedures that outline initial responses to bear encounters involving human injury.



Modified from Miramar Hope Bay Ltd. Emergency Response and Contingency Plans, May 2005.

APPENDIX C

BIRD DETERRENT MANAGEMENT PLAN

BIRD DETERRENT MANAGEMENT PLAN

1.0 INTRODUCTION

MEG Energy Corp. (MEG) recognizes that activities related to the development and operation of the Christina Lake Regional Project (CLRP) could adversely impact wildlife in the area. Facilities with open water such as process ponds, stormwater runoff ponds, waste management cells and any other open water source may be used as landing areas for birds. This Standard Operating Procedure (SOP) document identifies the CLRP facilities where migratory birds may land and outlines MEG's plan for deterring birds from these facilities, including chains of communication, bird deterrent methods and monitoring.

Adaptive management will be applied in the implementation of the methods outlined in this document; therefore this SOP shall be considered a living document and will be amended as applicable to reflect changing requirements.

2.0 CHRISTINA LAKE REGIONAL PROJECT – POND DESCRIPTIONS

MEG operates a process pond, a stormwater runoff pond, an ecology pit, and two waste management cells at its CLRP facility. The process pond contains warm to hot saline water from boiler blowdown. The stormwater runoff pond contains industrial runoff that must meet the following ERCB Directive 55 requirements:

- chlorides less than 500 ppm,
- no oily, sheen, and
- a pH between 6.0 and 9.0.

The ecology pit contains oily waste products from various processing activities. The two waste management cells contain drilled sand (bitumen and sand from horizontal drilling). A thin layer of water develops on top of the sand as settling occurs.

Due to the frequent use during operations, coupled with the composition or temperature of the materials, the ponds and cells may remain open (i.e., ice and snow free) year round. As a result, birds may be attracted to the man-made facilities as staging areas during migration because natural waterbodies may be frozen.

3.0 BIRD DETERRENT APPROACHES

Several methods have been used to deter birds from using specific areas. The most commonly used systems are visual and audio deterrents or a combination of the two (Bishop et al. 2003).

Visual deterrents are designed to represent a predator to birds such as a human or a larger bird. Scarecrows or raptor statues can be effective deterrents but birds can rapidly habituate to their presence (Bishop et al. 2003). To achieve the greatest effectiveness, visual deterrents should appear life-like (and animated, if possible), be highly visible, and the location of the deterrents moved frequently to deter habituation (Vaudry, 1979; Bishop et al., 2003). Adding dangling streamers or reflectors to scarecrows and using brightly coloured loose clothing may help increase effectiveness (Vaudry 1979). Mounting birds on floats placed within the facility allows the deterrent to move, again increasing effectiveness (Boag and Lewin 1980).

Audio deterrents are designed to either represent a predator, such as a hawk or owl, or to be loud enough to scare off birds. Similar to the visual deterrents, birds can become habituated to the noises and the effectiveness may decrease over time (Bishop et al. 2003).

Radar systems may also be used to deter birds; however, more research is needed into the effectiveness and limitations of this method. Radar systems are used to detect incoming birds and then use this information to determine what deterrent would be most effective. This system is more appropriate for larger sized ponds which could potentially be used all summer by birds, as opposed to smaller ponds that may only be used during the migratory period.

4.0 BIRD DETERRENT MANAGEMENT PLAN

4.1 Process and Stormwater Ponds

For each of the process and stormwater ponds, four visual deterrents (owl statues) will be placed on the fence surrounding the facility. Due to the materials within the ponds and the size of the ponds, impacts to birds are expected to be low. Monitoring of the ponds will be developed to ensure that the deterrents are effective and that no additional concerns develop.

4.2 Ecology Pit

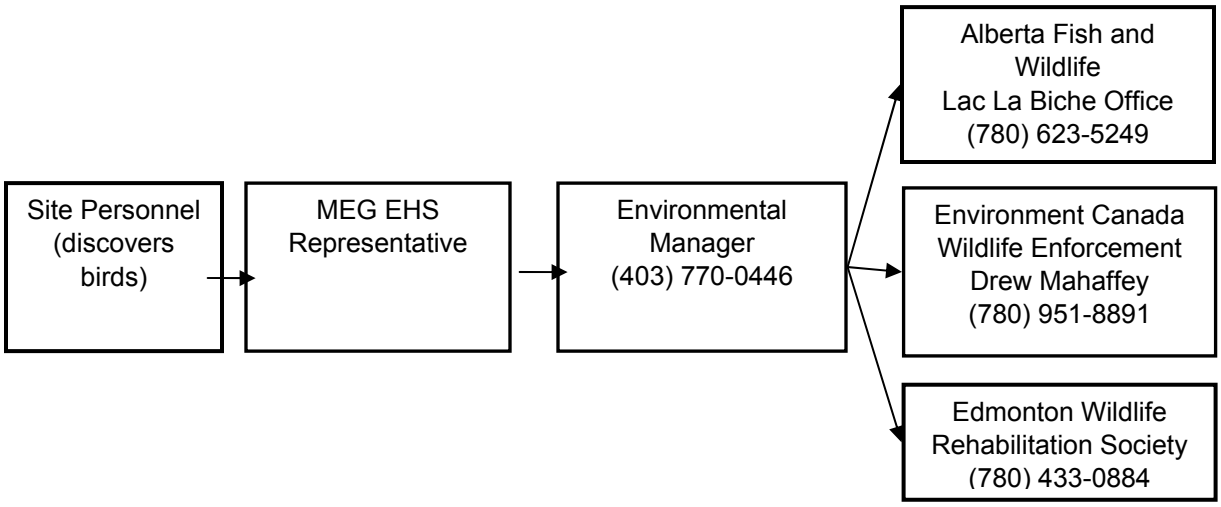
Netting will be placed over sump of the ecology pit when it is not in use and an owl deterrent with a moving head will placed near the pit. Due to the size of the pond, impacts to birds are expected to be low. Monitoring of the ponds will be developed to ensure that the deterrents are effective and that no additional concerns develop.

4.3 Waste Management Cells

Four visual deterrents (scarecrows with reflectors and loose clothing to flap in the wind) will be placed on the outside of the waste management cells. In addition, a grid of wire will be placed on top of the cells to decrease the ability of the birds to reach the ponds. Flagging will be put on the wire to ensure it is visible to birds from the air. Monitoring of the pond will be developed to ensure that the deterrents are effective and that no additional concerns develop.

4.4 Incident Reporting

In the event that a bird does land on any of the ponds or waste management cells, responsive management (i.e., handling or destruction of contaminated water birds) may be required. Information on the event needs to be communicated to the following people:



4.5 Wildlife Handling

If birds are found in or on the ponds, site personnel may be asked to retrieve the animal from the area. All safety procedures, including conducting a hazard id should be completed to assure that the task does not pose adverse risk to anyone's health or safety. Once a bird has been removed from the pond, try to reduce stress to the bird by finding a small enclosed space (cardboard box) for it away from disturbance and minimize handling. Place hot water bottles and towels around the bird to keep it warm and comfortable. Do not attempt to clean or wash the animal. The Environmental Field Coordinator and/or Environmental Manager will make arrangements for transport of the animal to the Edmonton Wildlife Rehabilitation Center.

4.6 Monitoring

Monitoring by area staff and facility operators is essential to determine the effectiveness of the deterrent program. If birds are found in or on the ponds, other alternative deterring methods should be investigated and implemented. The bird deterrent program should be reviewed annually and successes or inadequacies documented. Efforts should be made to develop, review, and incorporate new or more effective prevention measures to deterring water birds from the ponds, should the plan outlined above be deemed ineffective.

5.0 REFERENCES

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APPENDIX D

BIRD DETERRENT RECOMMENDATIONS FOR THE CHRISTINA LAKE REGIONAL PROJECT LIME SLUDGE PONDS

July 15, 2009

MEG ENERGY CORP.
10th Floor, 734 – 7 Avenue SW
Calgary, Alberta T2P 3P8

Attention: Mr. Mike Robbins

Re: Bird Deterrent Recommendations for the Christina Lake Regional Project Lime Sludge Ponds

Dear Mike:

1.0 INTRODUCTION

MEG Energy Corp. (MEG) retained Matrix Solutions Inc. (Matrix) to develop a bird deterrent management plan for three lime sludge ponds (the ponds) at the Christina Lake Regional Project (CLRP or the Project). Although wildlife could use these ponds at any time of the year, the potential for negative effects is greatest during spring migration when other natural waterbodies may not have thawed. A properly designed and monitored deterrent system can reduce the potential for birds to use the ponds, thereby reducing negative effects to birds.

The ponds currently are not operational (i.e., no waste materials are present in the pond); however, the ponds are full of fresh water and birds have been observed using them. In spring 2009, MEG set up visual deterrents to stop birds from using the area. These deterrents have not been entirely effective as a group of 50 gulls have been observed around and in the ponds. Based on the coming operational changes at the ponds and the evidence that the current visual deterrents are ineffective, Matrix has been retained to recommend alternate deterrents.

2.0 CHARACTERISTICS OF LIME SLUDGE PONDS

The lime sludge ponds are a group of three ponds that are 4,200 m^2, 4,495 m^2 and 4,495 m^2 in size. Starting in August 2009, each pond will begin holding waste material from the plant consisting of alkaline (pH 9.4-9.8) warm to hot water with an oil concentration above 2,000 ppm (wt/wt).

Currently, these three ponds are not operational lime sludge ponds and are just open freshwater bodies that pose minimal risk to wildlife. The ponds are shallow, have partially exposed ridges of sand (e.g., sandbars), and are lined with black polythene sheeting that may raise the water temperature slightly. The ponds are currently providing suitable habitat for local birds; approximately 50 gulls have been observed around and in the ponds.

In spring 2009, MEG installed two eagle effigies at each pond (six effigies total) as visual deterrents. These effigies show signs of damage from the local bird populations, suggesting habituation has

occurred. In addition, the noise level around the plant and the ponds is above ambient levels, suggesting that birds using the area may be habituated to elevated noise levels, potentially decreasing the effectiveness of audio deterrents that could be installed in the future.

3.0 AVAILABLE DETERRENT SYSTEMS

The types of deterrents commonly used and readily available include engineering alterations (e.g., eliminate vegetation, create steep slopes), visual deterrents (e.g., effigies and scarecrows), audio deterrents (e.g., predator calls or canons), RADAR systems that detect incoming birds and trigger appropriate visual and audio deterrents, and physical deterrents (e.g., netting). Each deterrent has pros and cons as presented in the table below.

Deterrent System	Pros	Cons
Engineering Alterations	• Cost effective • Fast and simple to install	• Ponds can remain attractive to migrating birds • Does not prevent birds from landing on the pond • Ongoing maintenance required
Visual Deterrents	• Cost effective • Fast and simple to install • Effective for waterfowl	• Not effective for shore birds • Not effective at night or during inclement weather • Ongoing maintenance required • Not effective for large area disturbances • Does not prevent birds from landing on the pond
Audio Deterrents	• Cost effective • Fast and simple to install • Effective for what bird type • Effective 24 hours a day and in all types of weather • Research indicates that audio deterrents may be more effective than effigies	• Not effective for shorebirds • Ongoing maintenance required • Noise can disturb other wildlife and people using the local area • Does not prevent birds from landing on the pond • Requires electrical power source and control at the pond
RADAR	• Effective 24 hours a day and in all types of weather • Mitigates habituation concerns • Limited maintenance required • More effective for shorebirds than either visual or audio deterrents alone • Effective for large disturbed areas	• More costly than most visual or audio deterrents • Complex installation requiring additional studies • Newer technology that is not fully proven at this time • Does not prevent birds from landing on the pond • May not be possible to design a system that is effective for all bird types simultaneously • Requires electrical power source and control at the pond

Deterrent System	Pros	Cons
Physical Deterrents (e.g., netting)	• Effective 24 hours a day and in all types of weather • No habituation concerns • Effective for all bird species • Effective for large disturbed areas • Less frequent and costly ongoing maintenance than visual or audio deterrents (subject to design) • Only method that prevents birds from landing on the pond	• Ongoing maintenance required (subject to design) • Initially more costly to install than most visual or audio deterrents (subject to design)

4.0 RECOMMENDATIONS

Matrix recommends installing physical deterrents, specifically netting, at the ponds. In making this recommendation, Matrix has considered the size of the ponds, the type of waste being stored, the potential risks to wildlife, and current wildlife behaviour, in combination with the pros and cons of the deterrent options listed in Section 3.0.

Of the deterrent options, only physical deterrents prevent habituation from occurring by stopping all bird species from landing directly on the ponds or accessing the shore. Habituation has been observed with the current bird population and is expected to occur with new individuals.

Netting does not require ongoing maintenance typical of other physical deterrents, which must be moved, altered or replaced occasionally to remain effective. Furthermore, using a deterrent system that prevents birds from landing on the pond eliminates the risk of any bird mortalities and potential breaches of the Alberta *Environmental Protection and Enhancement Act* and federal *Migratory Birds Convention Act*.

5.0 DESIGN AND MAINTENANCE CONSIDERATIONS

The netting design must take into consideration strength of net material, tension of net material, size of mesh, and visibility of netting to ensure that inadvertent bird mortalities are prevented. To ensure these considerations are properly addressed, Matrix further recommends that MEG's engineering department works with Matrix personnel prior to and during procurement and installation as Matrix can provide feedback on materials and netting design.

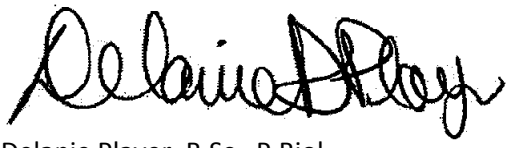
Netting requires ongoing maintenance including snow and debris removal, annual installation setup and take-down, and periodic setup and take-down for pond maintenance. MEG's engineering department may be able to minimize this concern through netting design (e.g., designing removable sections, using existing infrastructure for support).

6.0 CLOSURE

We trust that this memo suits your present requirements. If you have any questions or comments, please call either of the undersigned at (403) 237-0606.

Yours truly,

MATRIX SOLUTIONS INC.



Delanie Player, B.Sc., P.Biol.
Project Wildlife Biologist

Reviewed by

Liz Parkin, M.Sc., P.Ag.
Principal

DDP/njf

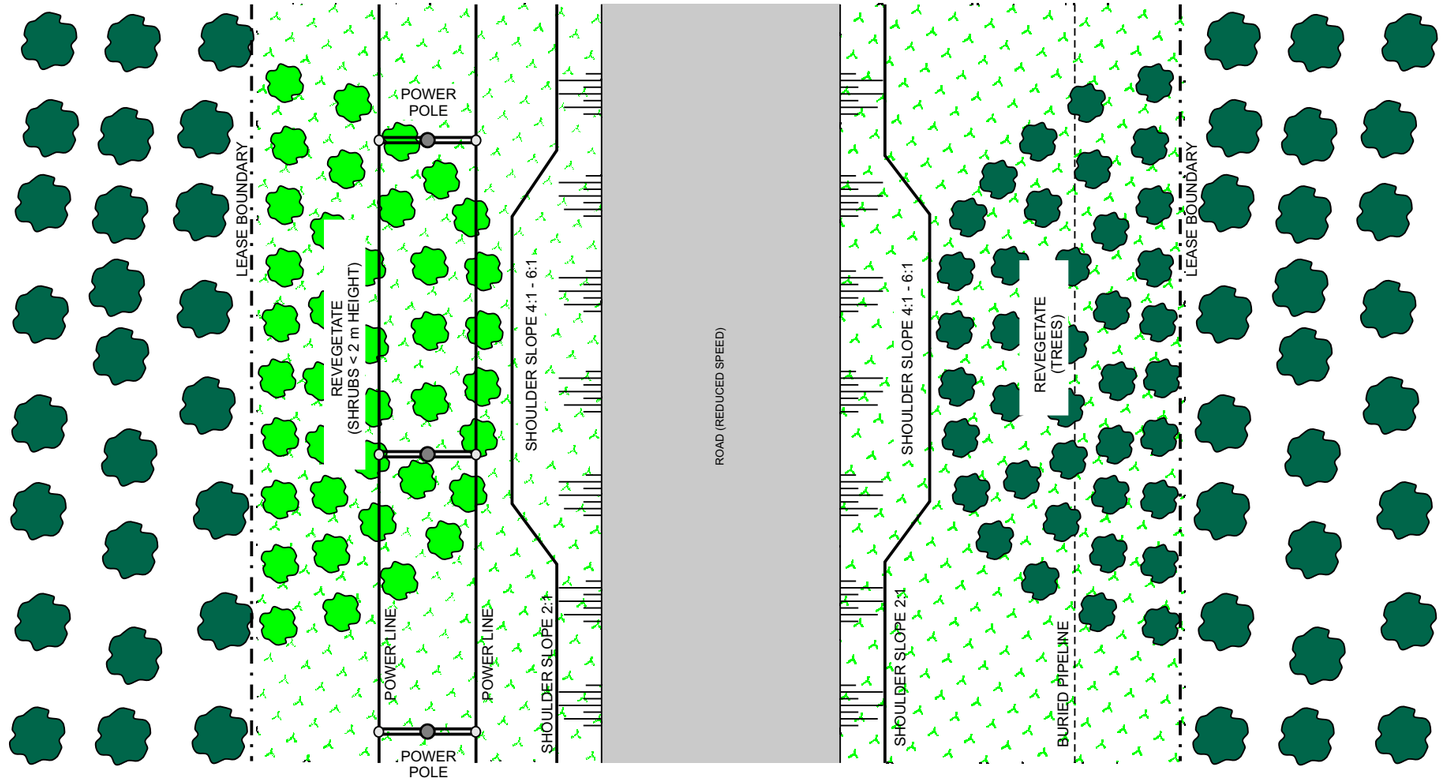
APPENDIX E

HABITAT ENHANCEMENT FIGURES

APPENDIX E - HABITAT ENHANCEMENT FIGURES

Design Notes:

1. Plan view of revegetation along existing road with powerline & buried pipeline.
2. Trees will be planted in ROW with buried pipeline.
3. Shrubs of suitable height will be planted below and adjacent to powerline.
4. Revegetated areas will reduce line of sight down the road corridor and provide cover for wildlife to facilitate crossing.
5. Posted speed limits will be reduced in these areas to minimize traffic-related wildlife mortalities.



PLAN VIEW

Design Notes:

1. Section view of revegetation along existing road with powerline & buried pipeline.
2. Trees will be planted in ROW with buried pipeline.
3. Shrubs of suitable height will be planted below and adjacent to powerline.
4. Revegetated areas will reduce line of sight down the road corridor and provide cover for wildlife to facilitate crossing.
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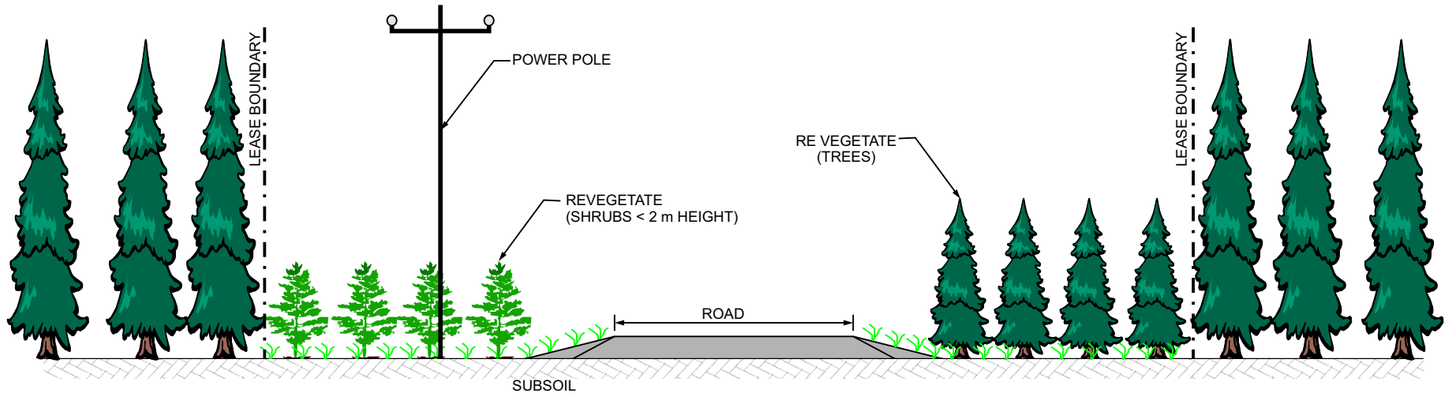


SECTION VIEW

Note:
Drawing is not to scale.

REFERENCE: ---

Matrix Solutions Inc.

MEG ENERGY CORP.

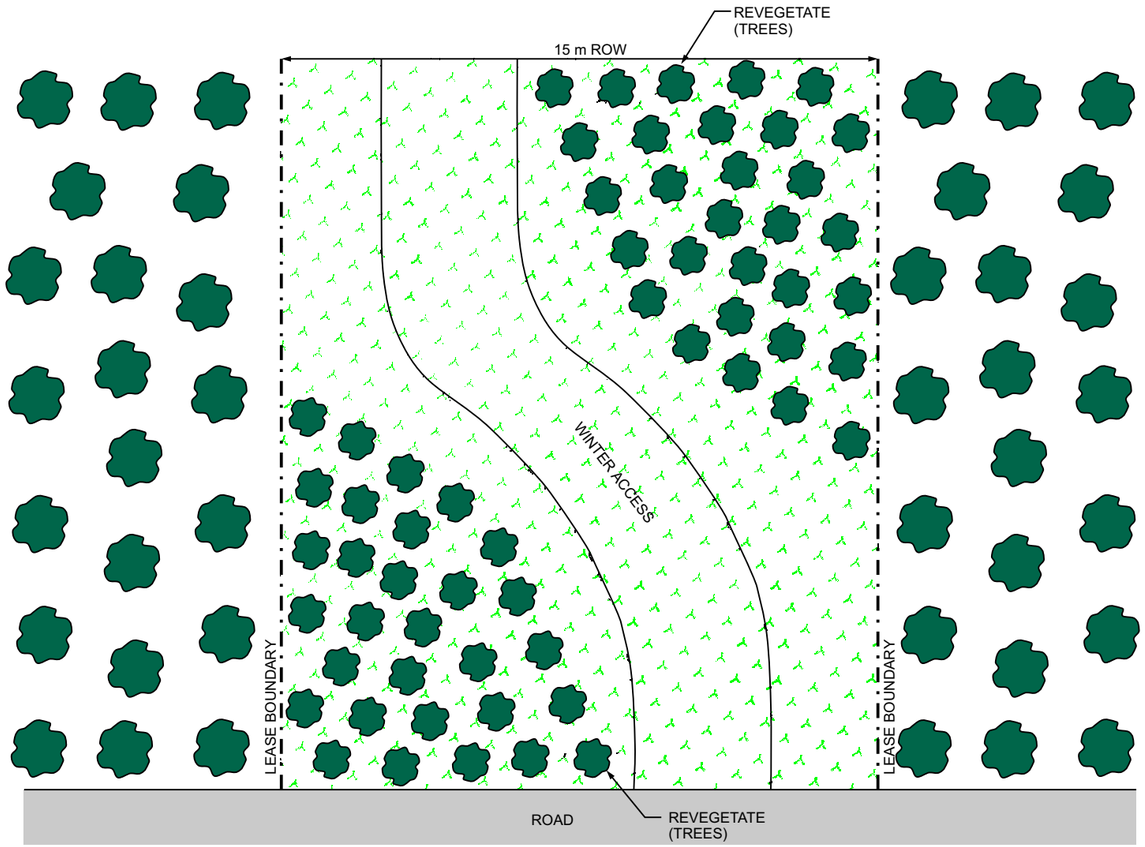
REVEGETATING ALONG ROAD TO REDUCE LINE OF SIGHT

CHRISTINA LAKE REGIONAL PROJECT

DATE: DECEMBER 8, 2009	DESIGN: P. SWAN	DRAWN: F. SONG	FIGURE E-1
FILE: 3459-XS1-09.CDR	CHECK: D. PLAYER	DATUM: N/A	

Design Notes:

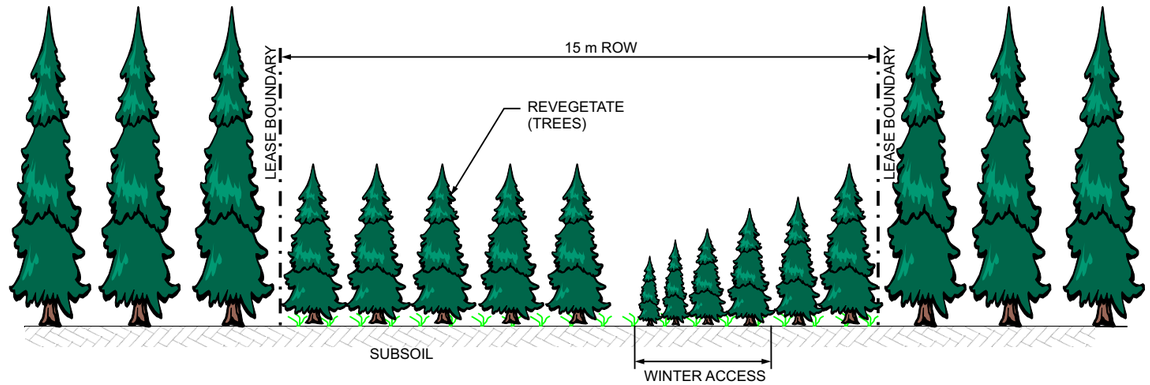
1. Plan view of revegetation along existing ROW.
2. Trees will be planted however winter access will still be possible between revegetated patche.
3. Revegetated areas will reduce line of sight down the road corridor and provide cover for wildlife to facilitate crossing.



PLAN VIEW

Design Notes:

1. Section view of revegetation along existing ROW.
2. Trees will be planted however winter access will still be possible between revegetated patche.
3. Revegetated areas will reduce line of sight down the road corridor and provide cover for wildlife to facilitate crossing.



SECTION VIEW

Note:
Drawing is not to scale.

REFERENCE: ---

Matrix Solutions Inc.

MEG ENERGY CORP.

REVEGETATING ALONG ROW TO REDUCE LINE OF SIGHT

CHRISTINA LAKE REGIONAL PROJECT

DATE: DECEMBER 8, 2009	DESIGN: P. SWAN	DRAWN: F. SONG	FIGURE E-2
FILE: 3459-XS1-09.CDR	CHECK: D. PLAYER	DATUM: N/A	