Bruce Power

Bruce Power New Build Project Environmental Assessment

Project Description

January 2007

next GENERATION
the evolution of nuclear

BRUCE POWER NEW BUILD PROJECT
ENVIRONMENTAL ASSESSMENT

PROJECT DESCRIPTION

Submission to:

CANADIAN NUCLEAR SAFETY COMMISSION

By:

Bruce Power
177 Tie Road, R.R. #2
P.O. Box 1540
Tiverton, ON
N0G 2T0

Version 3

January 2007

PROJECT DESCRIPTION

BRUCE POWER NEW BUILD PROJECT ENVIRONMENTAL ASSESSMENT

Version 3

Prepared by:

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2390 Argentia Road
Mississauga, ON, L5N 5Z7

Recommended by: [signature] January 19, 2007

Dr. Duncan Moffett — Date
Golder Associates Ltd.

Reviewed by: [signature] January 19, 2007

Frank Saunders — Date
Vice-President Safety, Environment and Assessment
Bruce Power

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1.0 INTRODUCTION

1.1 Background

In June 2006 the Ontario Government directed the Ontario Power Authority (OPA) to proceed with developing a 20-year Integrated Power System Plan. In the directive, the government outlined its view of the future role for nuclear power in Ontario. Under the government's plan, nuclear power will remain a key source of Ontario's electricity by maintaining the installed nuclear capacity at 14,000 MW[1]. In order to meet the government's policy framework, both refurbishment of existing facilities and building of new reactors needs to be considered as part of a long-term planning process by both the OPA and industry as a whole.

Consistent with the Ontario government's directive, Bruce Power is undergoing a multi-year planning process to evaluate its options for continued electricity supply over the long-term. Options being considered include refurbishment of existing reactors at the Bruce Power site or construction of new units to either replace existing units or augment output through construction of a third nuclear power plant at the site. The subject of this document is the siting, construction, operation and decommissioning of 4,000 MW of new nuclear capacity at the Bruce Power site.

Construction and operation of a new nuclear power station will require licensing decisions by the Canadian Nuclear Safety Commission (CNSC). Bruce Power understands that these licensing decisions necessitate an environmental assessment (EA) under the *Canadian Environmental Assessment Act* (CEAA). Furthermore, construction of any new nuclear reactors of the size proposed by Bruce Power is identified on the *Comprehensive Study List Regulations* and therefore requires a comprehensive study under CEAA and preparation of a Comprehensive Study Report.

This document provides a description of Bruce Power's proposal to construct and operate a new nuclear power station within the boundaries of the existing Bruce Power site. This document is intended to provide the CNSC with the information necessary to determine the EA requirements for the proposed project.

1.2 Purpose of Document

This document is the Project Description Report for new nuclear power generation at the Bruce Power site. Under the CEAA, a project description has four main functions:

1. Allowing the CNSC, as the responsible authority (RA), to determine the need for, and its role in, a federal EA of the Project under CEAA;

[1] For the purpose of this document, MW refers to net electrical output in Megawatts, unless otherwise noted.

2. Permitting other federal authorities (FAs), pursuant to the *Federal Coordination Regulations*, to determine their role in an EA of the Project under CEAA;
3. Providing the basis for the CNSC to consult with EA authorities in Ontario to determine any need for harmonization of the EA process with provincial requirements; and
4. Assisting in the early identification of potential environmental issues that should be considered in preparing the scope of the assessment document (i.e., EA Guidelines).

Bruce Power developed this project description with reference to the Canadian Environmental Assessment Agency's Operational Policy Statement OPS-EPO/5-2000, "Preparing Project Descriptions under the Canadian Environmental Assessment Act". Initial general discussions were held with CNSC staff to gain an understanding of the regulatory steps for a new build project and Version 1 of the Project Description was provided to the CNSC in September 2006, and Version 2 was prepared in December 2006 following further discussion and comments by CNSC staff (CNSC, 2006b). This version – Version 3 – incorporates the most recent information regarding the Project and further refines the information contained in earlier versions.

This Project Description Report provides:

- An introduction, providing background and purpose of this document (Section 1);
- General information on the new build project, including contact information, government involvement and an overview of the authorizations required by the Project (Section 2);
- Overview of Bruce Power site operational history and current status (Section 3);
- Project information (Section 4);
- Overview of existing environmental conditions (Section 5);
- Identification of potential interactions between the Project and the environment (Section 6);
- A summary of proposed and completed community and Aboriginal communication and consultation activities (Section 7); and
- A list of documents referenced in the report (Section 8).

2.0 GENERAL INFORMATION

2.1 Name of the Project

The name of the Project for purposes of the EA is the "**Bruce Power New Build Project**"[2].

2.2 Location of Project

The Project will be sited entirely within the Bruce Power site in the Municipality of Kincardine, Ontario. The location of the site is shown on Figure 1. Several alternative locations within the existing Bruce Power site are being considered for the new power station (see Section 4.5). The Bruce Power site is a secure and fenced facility and is the location of several currently-licensed nuclear facilities.

Siting a new nuclear power station on the Bruce Power site is consistent with the province's stated preference that new reactors are built on existing sites.

2.3 Nature of the Project

The Project will involve the construction and operation of up to four new nuclear reactors at the Bruce Power site for the generation of approximately 4,000 MW of electrical generating capacity for supply to the Ontario grid.

The proposed four reactors would be constructed as two twin-unit modules. New reactors being considered by Bruce Power include the state-of-the-art Generation III reactors of Canadian and foreign design as well as Atomic Energy of Canada Ltd.'s Enhanced CANDU 6 design. Although there is some variability in the electrical capacity of the various reactor designs (see Section 4.4), Bruce Power's planning is focussed on the construction of a sufficient number of reactors to achieve a new generating capacity of approximately 4,000 MW.

2.4 Need for the Project

Bruce Power currently operates four nuclear reactors at Bruce B (Units 5 through 8), two nuclear reactors at Bruce A (Units 3 and 4), and is in the process of conducting a mid-life refurbishment on the two remaining Bruce A reactors (Units 1 and 2). As shown on Figure 2, once the refurbishment at Bruce A is complete in 2010, Bruce Power can be expected to generate up to 6,200 MW at the Bruce Power site. The Bruce B station, which generates 3,200 MW, could require a mid-life refurbishment commencing around 2014. In addition, one reactor at Bruce A (Unit 4) could also require refurbishment within the time period of Bruce B refurbishment.

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[2] For convenience, also referred to in this document as the "Project".

Figure 2 shows that approximately 4,000 MW of generating capacity at the Bruce Power site will require refurbishment or replacement by the middle of the next decade in order to maintain the site output at 6,200 MW. The Project is designed to provide this electricity from a new 4,000 MW nuclear power station. An environmental assessment of the effects of the continued operation of the Bruce B station through approximately 2040 was completed in 2004 (Bruce Power, 2004).

2.5 Previous Environmental Assessments

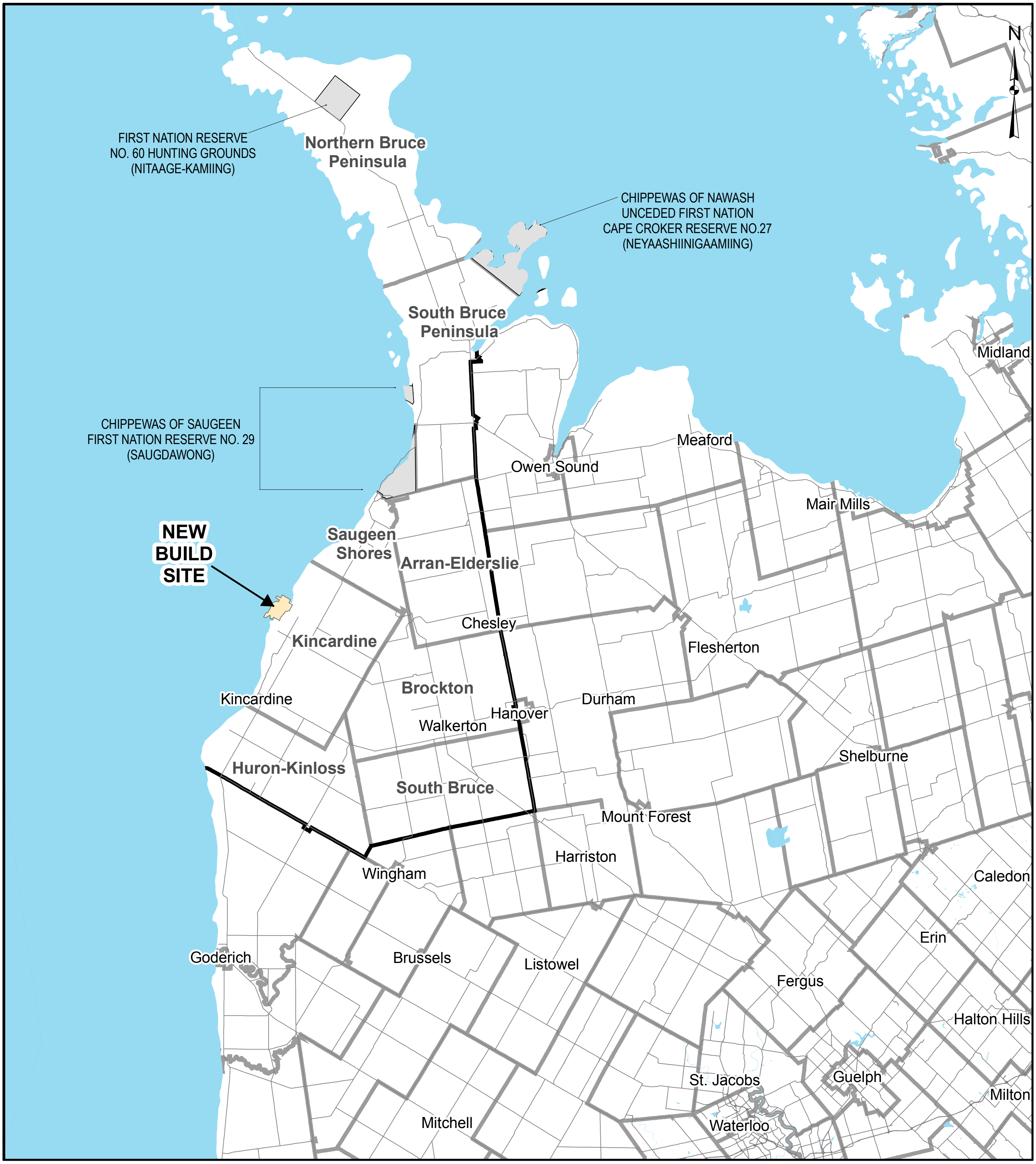
Over the past 30 years, numerous siting, construction and operational studies have been completed for projects at the Bruce Power site. Since becoming the operator of the site in 2001, Bruce Power has carried out a number of major EAs as described below.

- In 2002, Bruce Power conducted an EA of the Bruce A Units 3 & 4 Restart Project. This assessment evaluated the potential environmental effects of restarting Units 3 and 4 after temporary lay-up. The reactors were successfully restarted in 2003 and 2004, respectively.
- In 2004, Bruce Power conducted an EA for the use of "New Fuel", (i.e., Low Void Reactivity Fuel or LVRF) at Bruce B. The assessment found that the use of New Fuel in a CANDU plant such as Bruce B would not likely result in significant adverse effects. In 2006, a New Fuel test load of 24 bundles was initiated at Bruce B, Unit 7.
- In 2005, Bruce Power conducted an EA of the Bruce A Refurbishment for Life Extension and Continued Operation Project. This EA evaluated the potential environmental effects of the return of Units 1 and 2 of the Bruce A nuclear generating station to operational status with continued operating life through approximately 2040. The project also included consideration of refurbishment of Units 3 and 4 to enable them to produce power until approximately 2040, and the potential use of New Fuel in all four Bruce A units.

All three EAs concluded that the projects being assessed were not likely to result in significant adverse effects on the environment, taking into consideration the planned mitigation measures for each project. The EAs were approved by the CNSC following extensive public review and public hearings.

In addition to the Bruce Power EAs, a number of other EA studies have been conducted by Ontario Power Generation Inc. (OPG) (and/or its predecessor Ontario Hydro) as the previous operator of the site, and for waste management activities at the site that are still retained by OPG under the lease arrangements. These include an EA of the Western Waste Management Facility Refurbishment Waste Storage Project (OPG, 2005), Low Level Storage Buildings 9 to 11 (OPG, 2004) and Bruce Heavy Water Plan Decommissioning (OPG, 2002).

The EA of the Bruce Power New Build Project would draw extensively on the information and studies from these successfully completed previous studies and will consider the overall effects of all operating reactors and waste management facilities at the site as part of the cumulative effects



LEGEND

- Bruce Power
- Bruce County
- Municipal Boundaries
- First Nations' Lands

0 12.5 25 50

Kilometres

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD
bridging the generation gap

TITLE

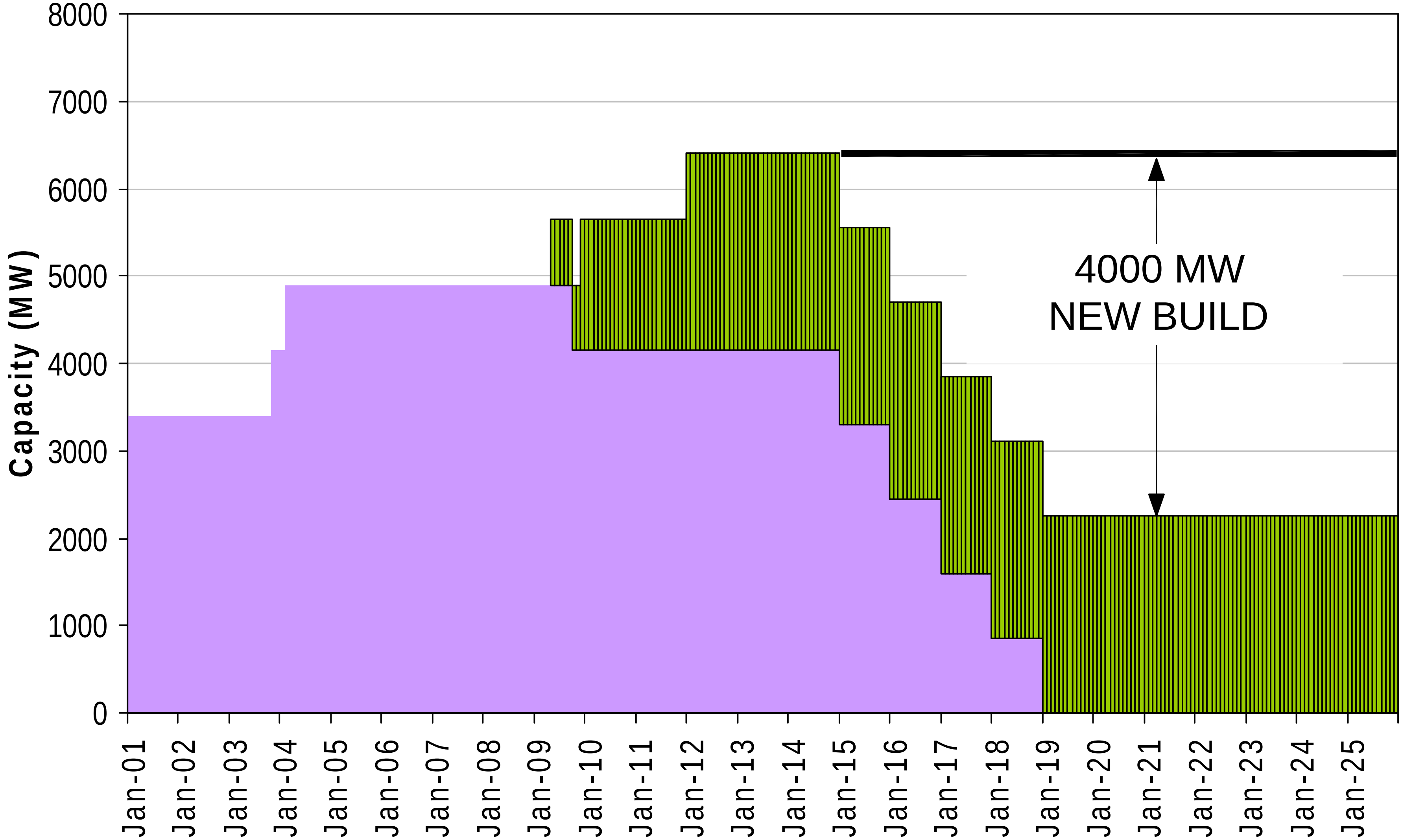
SITE LOCATION

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE 1:1,000,000	REV. 0
DESIGN	ASB	21 Sept. 2004	FIGURE 1	
GIS	KD	18 Jan. 2007		
CHECK	BT	18 Jan. 2007		
REVIEW	MM	18 Jan. 2007		

G:\Projects\2006\06-1112-041_BruceEA\GIS\MXDs\Draft\Project_Description\Fig1_Site_Location.mxd

PLOT DATE: December 20, 2006
FILENAME: T:\Projects\2006\06-1112-041 (BP, Kincardine)\-BB-5000\061112041BB02.dwg



Operating Capacity | Units 1,2 and 3 Capacity when Refurbished

Note: Bruce Power could also achieve the capacity shortfall by refurbishing Bruce B and Bruce A Unit 4.

PROJECT
BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

TITLE
OPERATING CAPACITY OF EXISTING BRUCE POWER REACTORS

Golder Associates
Mississauga, Ontario, Canada

PROJECT No. 06-1112-041 (5000)			FILE No. 061112041BB02.dwg
DESIGN	KD	2006/09/20	SCALE AS SHOWN REV. B
CAD	KD	2006/12/20	DRAWING No.
CHECK	MM	2006/12/20	**FIGURE 2**
REVIEW			

assessment. To ensure that all likely cumulative effects are considered, the EA would assess the effects of operating up to 12 reactors at the Bruce Power site (i.e., Bruce A, Bruce B, plus 4,000 MW new build).

2.6 Authorizations Required

2.6.1 Federal Authorizations

Under the *Nuclear Safety and Control Act* (NSCA), nuclear generating stations are described as Class I nuclear facilities, and the regulatory requirements for these facilities are found in the *Class I Nuclear Facilities Regulations*. The regulations require separate licenses for each of the five phases throughout the entire life-cycle of a nuclear power plant:

- A license to prepare a site;
- A license to construct;
- A license to operate;
- A license to decommission; and
- A license to abandon.

Bruce Power filed an initial application with the CNSC for a license to prepare a site for a new nuclear power station on August 17, 2006. The CNSC acknowledged receipt of the application on August 17, 2006. Bruce Power provided an initial Project Description to the CNSC on September 25, 2006. The CNSC provided a formal response to the initial Project Description on December 19, 2006 (CNSC, 2006b).

As noted in Section 5(1) of the CEAA, an EA under the CEAA is required when an FA issues a permit or licence, amends a licence or grants an approval or takes any other action for the purpose of enabling a project to be carried out in whole or in part. It is Bruce Power's understanding that under the CEAA, the Bruce Power New Build Project will follow the Comprehensive Study track. Bruce Power recognizes that the CNSC is responsible for determining the type, scope and schedule for an EA. For a Comprehensive Study, the Canadian Environmental Assessment Agency also has statutory responsibilities.

2.6.2 Other Federal EA Triggers

Federal Funding

Bruce Power is not aware of any federal funding relating to the Project.

Ownership of Land

The Project does not take place on federal crown lands. The Bruce Power site is owned by OPG. Bruce Power signed a lease agreement with OPG in 2001 which provides Bruce Power with the authority to operate the site as a nuclear powered generating station, and for ancillary or related uses thereto, which includes the operation of both Bruce A and Bruce B. The lease has an initial term of 18 years with an option to renew the lease for up to a further 25 years (i.e., through 2043). The Government of Ontario has indicated that any future nuclear reactors will continue to be publicly owned, similar to the current arrangement for Bruce A and Bruce B. Under the terms of the existing lease arrangement, upon construction of any improvement by Bruce Power on leased premises, which would include construction of any new nuclear generating station, title and ownership to the improvement would immediately transfer to OPG and the improvement would form part of the leased premises.

As part of its planning process over the next few years, Bruce Power will pursue an option for continuing the lease and operating the new nuclear power station for the lifetime of the reactors. Bruce Power will also demonstrate that it has authority to carry out future licensed activities related to the Project.

2.6.3 Provincial Authorizations

Bruce Power is not aware of any provincial EA requirement under the Ontario *Environmental Assessment Act*, which is applicable to the Project. The *Ontario Electricity Projects Regulation* under the Ontario *Environmental Assessment Act* excludes nuclear facilities. However, similar to other EAs that have been conducted on Bruce Power facilities, the Ontario Ministry of the Environment (OMOE) and Emergency Management Ontario may have an interest in participating in the technical review of any potential EA. In addition, other provincial ministries may be involved.

Compliance with provincial acts regarding air and water discharges/intakes is regulated through the requirements of Ontario's *Environmental Protection Act* and the *Ontario Water Resources Act*. The OMOE regulates the discharge of non-radioactive substances through Certificates of Approval under these acts and, in the case of liquid effluent releases, through regulations promulgated under the *Municipal Industrial Strategy for Abatement* (MISA). Appropriate provincial approvals will be sought as design details of the Project evolve.

2.6.4 Municipal Authorizations

As a federal undertaking, Bruce Power does not maintain municipal permits with respect to operation of the nuclear facilities at the Bruce Power site. Municipal codes and standards will be observed to the extent that they are applicable to the Project.

2.6.5 Project Description Distribution List

The following list indicates government agencies that may want to receive copies of this document once finalized with the CNSC:

- Environment Canada (EC);
- Natural Resources Canada (NRCan);
- Health Canada (HC);
- Fisheries and Oceans Canada (DFO);
- Indian and Northern Affairs Canada (INAC);
- Ontario Ministry of the Environment (OMOE);
- Ontario Ministry of Natural Resources (OMNR);
- Ontario Ministry of Community Safety and Correctional Services, specifically Emergency Management Ontario;
- Local, Regional and Municipal Governments; and
- Grey Bruce/Owen Sound Health Unit.

Bruce Power has had preliminary discussion of the Project with officials from the Ontario Ministry of Energy and the Ontario Ministry of Environment. In addition, as described in Section 7, a number of federal and provincial officials attended a workshop at the Bruce Power Visitors' Centre in October 2006.

Bruce Power has contacted both local First Nations and has provided both bands with copies of the initial Project Description. In addition, Bruce Power is currently in the process of developing a communications plan to guide on-going discussions with the Chippewas of Saugeen First Nation and Chippewas of Nawash Unceded First Nation (see Section 7).

2.7 Proponent and Contacts

2.7.1 Proponent

Bruce Power is the sole proponent for the Project. Bruce Power is a limited partnership among BPC Generation Infrastructure Trust (a trust established by OMERS Administration Corporation), Cameco Corporation, TransCanada Corporation, the Power Workers' Union and The Society of Energy Professionals with Bruce Power Inc. as the sole general partner. Bruce Power Inc. is the licensed operator of the Bruce A and Bruce B nuclear generating stations.

Bruce Power's operations at the site are carried out under a lease agreement with OPG, the site owner. As discussed in Section 2.6.2, the current lease has an initial term that expires in 2018 and provides that the term may be renewed for up to an additional 25 years. Use of the site by Bruce Power after 2043 would require discussion and agreement on amended lease terms between Bruce Power and OPG. The leased premises, including all buildings and structures on the leased premises, whether or not constructed by Bruce Power, would revert to OPG on termination of the lease.

The terms of the current lease permit Bruce Power to use the leased premises for the purpose of a nuclear power generating station and ancillary or related uses to nuclear power generation. As such, Bruce Power has authority under the current lease to proceed with any site preparation activities leading to the construction of a new nuclear power station including authority to carry out all necessary studies on leased lands to support an EA. Accordingly, Bruce Power is not aware of any impediment to proceeding with its long-term planning, including conducting EA studies for the Project.

2.7.2 Contact Persons for Additional Information

The contact information for the EA Project Manager for the Bruce Power New Build Project is as follows:

Frank Saunders
Vice-President Safety, Environment and Assessment
Bruce Power
P.O. Box 3000
Tiverton, Ontario
N0G 2T0
Telephone #: 519-361-5525
Facsimile #: 519-361-4559
Email: Frank.Saunders@brucepower.com

3.0 BRUCE POWER SITE OPERATIONAL HISTORY AND CURRENT STATUS

The 932 ha (2,300 acres) Bruce Power site is located on the east shore of Lake Huron, about midway between the towns of Kincardine and Port Elgin, at a longitude of approximately 81°30’ west and latitude 44°20’ north (Figure 1).

The site was originally owned and operated by Ontario Hydro (now OPG). In 2001, Bruce Power took over operation of the site from OPG, through a long-term lease arrangement. OPG retains portions of the site and operates a number of facilities within these OPG retained lands, most notably the Western Waste Management Facility (WWMF).

3.1 Bruce A and Bruce B Nuclear Generating Stations

Bruce A is located on the northeast corner of the Bruce Power site, while Bruce B is located on the southwest corner of the site (Figure 3). The Bruce A and Bruce B facilities are each licensed by the CNSC as a Class I Nuclear Facility under the NSCA.

The four Bruce A CANDU pressurized heavy water nuclear reactors[3] were brought into service by Ontario Hydro in 1977 (Units 1 and 2), 1978 (Unit 3) and 1979 (Unit 4). The four Bruce B CANDU pressurized heavy water nuclear reactors (Units 5 through 8) were similarly brought into service in 1984 (Unit 6), 1985 (Unit 5) 1986 (Unit 7) and 1987 (Unit 8).

In the late 1990’s, Ontario Hydro, made a business decision to temporarily lay-up the Bruce A Units. Unit 2 was taken out of service in October 1995; Unit 1 was taken out of service in December 1997; Unit 4 was taken out of service in January 1998; and Unit 3 was taken out of service in April 1998. Throughout this period, Bruce B remained in service.

As noted, Bruce Power assumed operation of Bruce A and Bruce B from OPG in 2001. Bruce Power subsequently restarted Bruce A Unit 4 in October 2003 and Bruce A Unit 3 in January 2004, after conducting an EA of station operations through 2016. At present, Bruce A Units 3 and 4 have a maximum net output of approximately 770 MW (i.e., when the lake is at its coldest temperatures). Bruce Power is currently in the process of conducting a mid-life refurbishment on Bruce A Units 1 and 2 and expects to return these two units to service commencing in 2009. Current operations at Bruce A are governed by the Nuclear Power Reactor Operating Licence PROL 15.01/2009, granted by the CNSC to Bruce Power.

The Bruce B reactors have operated since their respective commissioning dates with the exception of limited planned and unplanned outages. Lifetime capacity factor has met expectations (about 80%,

[3]Canada Deuterium Uranium (CANDU) pressurized heavy water reactors (PHWR) designed by Atomic Energy of Canada Limited and Ontario Hydro.

i.e., in accordance with original design targets [Van Adel, 2003]). In 1993, due to re-evaluation of safety margins with respect to certain low-probability scenarios, the Bruce B reactors were down rated from 860 MW nominal net output each to 785 MW each. As noted above, Bruce Power took over operation of this station in 2001. Most recently, Bruce Power has undertaken a project to replace natural uranium fuel with LVRF in the Bruce B reactors. This project, which is currently underway, will allow Bruce Power to improve some of the safety margins and operate the reactors closer to their design capacity. Operations at Bruce B are governed by the Nuclear Power Reactor Operating Licence PROL 16.00/2009, granted by the CNSC to Bruce Power.

3.2 Western Waste Management Facility

The WWMF is owned and operated by OPG and is located on OPG retained lands within the boundary of the overall Bruce Power site (Figure 3). Developed in stages since 1974 to accommodate wastes produced during reactor operation and maintenance, the waste management facility receives and manages shipments of low and intermediate level radioactive waste from the Bruce, Pickering and Darlington nuclear power stations. Beginning in 2003, used fuel from the Bruce Power stations has also been stored at the Used Fuel Dry Storage Facility, located adjacent to the WWMF.

OPG has gradually increased the processing and storage capacity within the WWMF on an "as needed" basis to accommodate wastes arising from normal operation and maintenance activities. The most recent of these upgrades included the WWMF Refurbishment Waste Storage Project. That project comprised provision of additional structures at the WWMF for the safe and secure storage of the waste materials resulting from refurbishment activities associated with continued operation of Ontario's reactors until a long-term waste management facility is commissioned (OPG, 2005).

3.3 Deep Geologic Repository

OPG is proposing a Deep Geologic Repository (DGR) on OPG retained lands adjacent to the WWMF (see Figure 3). The DGR would receive low and intermediate level radioactive waste currently in storage at the WWMF, as well as that produced from the continued operation of the Bruce, Pickering and Darlington nuclear power stations. The DGR will not accept used nuclear fuel.

It is anticipated that the first wastes would be emplaced in the DGR in approximately 2017. In the intervening period, waste will continue to be received, processed and managed at the WWMF.

The DGR project is currently undergoing an EA under the CEAA.

0 250 500 1,000

Metres

LEGEND

- Road Centreline
- Site Feature
- Shoreline
- Transmission Lines
- Buildings
- 914m Exclusion Zone
- Site Perimeter fence

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD bridging the generation gap

TITLE

EXISTING BRUCE POWER SITE LAYOUT

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE 1:25,000	REV. 0
DESIGN	ASB	21 Sept. 2004	**FIGURE 3**	
GIS	KD	18 Jan. 2007		
CHECK	BT	18 Jan. 2007		
REVIEW	MM	18 Jan. 2007		

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3.4 Douglas Point Reactor

The site of the Douglas Point reactor, owned by Atomic Energy of Canada Ltd. (AECL), is also located within the boundaries of the Bruce Power site (see Figure 3). The facility, which operated between 1966 and 1984, was the prototype commercial-scale CANDU nuclear power plant. With full operation commencing in 1968, the Douglas Point Generating Station supplied 220 MW to the Ontario grid over the next 16 years.

Eventually a decision was made to shut down Douglas Point rather than undertake the refurbishment of the pressure tubes that was required for continued operation. While the Douglas Point facility structures remain in place today, the reactor has been permanently shut down since 1984. Used fuel from the reactor is stored in dry storage modules at the facility.

3.5 Bruce Heavy Water Plant

The site of the former Bruce Heavy Water Plant is located on OPG retained lands within the Bruce Power site (see Figure 3). The Bruce Heavy Water Plant was in continuous operation from April 1973 until March 1998, producing reactor grade heavy water for use in OPG's and other CANDU reactors. Plant A was operated from 1973 to 1984. Plant B was operated from 1979 to 1997.

In 2003 the federal Minister of the Environment made a decision to allow the decommissioning project to proceed through the licensing process. Following a public hearing in February 2004, OPG was granted a ten year licence to carry out decommissioning of the facility. The decommissioning project is currently in its final stages.

4.0 PROJECT INFORMATION

4.1 Project Phases and Schedule

The Bruce Power New Build project would consist of four phases:

- Site preparation;
- Construction;
- Operation and maintenance; and
- Decommissioning.

Decommissioning would also be subject to a separate EA as part of the licensing process that would be undertaken during the period immediately preceding the shut down of the reactors. For the current Project EA, it is expected that the effects of decommissioning would be considered at a conceptual level reflecting that decommissioning would occur well into the future, and is estimated to be no sooner than 2075.

Figure 4 provides the proposed schedule for the Bruce Power New Build Project. This schedule also shows the current operating timeframe for the existing Bruce A and Bruce B reactors. Physical activities on the Project would commence with site preparation in 2009. Commissioning and first power delivery to the grid from the first new unit would occur in 2015. This schedule is typical of new nuclear power plant construction projects in other countries.

4.2 Principal Project Activities

Construction and operation of a new nuclear power station represents a major civil undertaking, involving site grading and preparation for plant foundations, major construction, including construction of concrete and steel buildings and structures, and installation of reactor and mechanical components fabricated off-site. Operation of the new nuclear power station represents an undertaking similar to the operation of Bruce A and Bruce B. The following sections briefly describe the major activities in each of the Project phases.

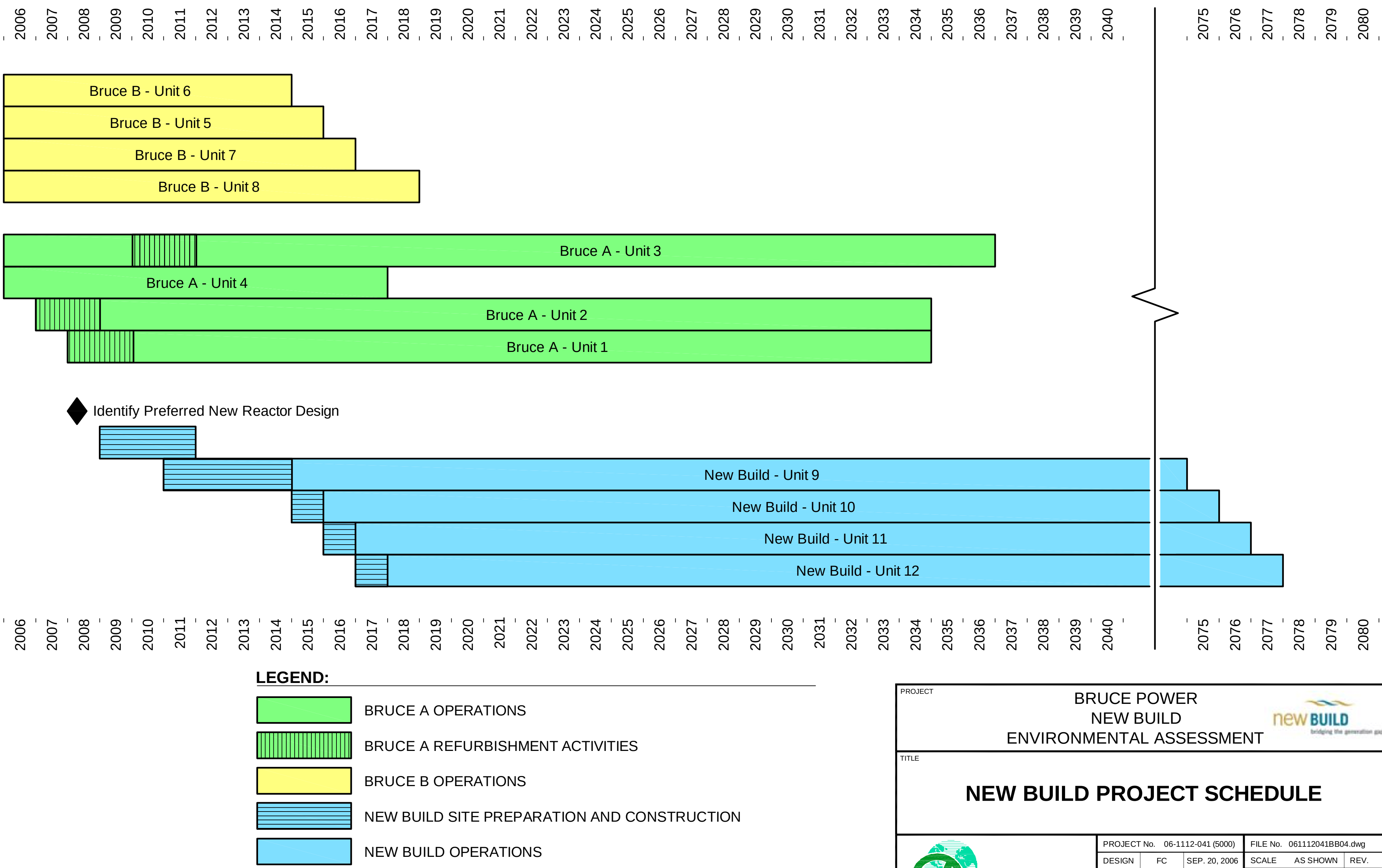
4.2.1 Site Preparation Phase

Prior to the commencement of any construction, a number of activities are necessary to prepare the site. Site preparation generally includes the following activities:

- Clearing – Clearing consists of the removal and disposal of vegetation such as trees, brush, shrubs and other foliage. Trees are felled, skidded and piled in the cut area, and, if salvageable, may be sold. Unsalvageable cuttings may be disposed of by chipping, piling or burning. Trees are normally cut so that sufficient stump remains to allow for grubbing (described below). The proposed site locations contain grassland and woodland as well as some cleared areas. To provide for the construction of various facilities, the existing tree cover and grass cover within the site area will be removed. It is Bruce Power's practice to replace any trees removed with plantings either on- or off-site.

- Grubbing – Grubbing is the removal and disposal of roots, stumps, embedded logs and debris. Small stumps may be removed by winching or using a bulldozer. Large stumps may be removed by blasting. Debris from grubbing are usually loaded onto trucks and are buried, burned or hauled to a disposal area.
- Stripping – Stripping involves the removal of topsoil and other organic materials, which may be accomplished using a bulldozer or scraper. If the removed material is suitable for re-use, it is stockpiled.
- Grading – Grading involves the removal and placement of soil material below the topsoil layer (the overburden), which may be accomplished using a bulldozer or scraper. If suitable for re-use, the excavated materials will be placed in areas requiring fill, spread by a bulldozer or grader, and compacted. If not suitable for use as fill (due to permeability, high moisture content, etc.), the material may be disposed of in a designated disposal area. Depending on the final grade selected for the powerhouse floor and the switchyard, the amount of excavation and fill could vary considerably. The majority of the materials removed during grading will be used for backfilling or shoreline reclamation.
- Drilling and Blasting – Drilling and blasting will be conducted to create sample/monitoring wells or additional geophysical borings.
- Excavating – Excavation is the removal of earth or rock materials. Prior to the removal of the rock, all overlaying earth or overburden is removed. Excavation to allow for the powerhouse foundation will occur into the bedrock, and may require dewatering through pumping. Rock crushing facilities may be required for the creation of aggregate. The majority of excavation materials will be used for backfilling or shoreline reclamation.
- Trenching – Trenching involves laying underground pipelines (e.g., sewer lines, drains, water lines, etc.). A bulldozer, scraper, trencher or grader may be used to excavate and shape the trench.
- Installing Temporary Construction Support Facilities – This includes the set up of warehouses, shop facilities, utilities, concrete mixing plants, docking and unloading facilities, and construction offices.
- Developing Construction Waste Management Facilities – Developing construction waste management facilities includes the creation of areas for the storage and management of construction waste on the Bruce Power site. Solid wastes generated in day-to-day construction at the site will be hauled to these facilities if they cannot be reclaimed.
- Implementation of Environmental Mitigation and Environmental Monitoring – All site preparation activities will be conducted in accordance with an environmental management

PLOT DATE: December 20, 2006
FILENAME: T:\Projects\2006\06-1112-041 (BP, Kincardine)\-BB-5000\061112041BB04.dwg



PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

TITLE

NEW BUILD PROJECT SCHEDULE

Golder Associates
Mississauga, Ontario, Canada

PROJECT No.	06-1112-041 (5000)		
DESIGN	FC	SEP. 20, 2006	
CAD	KD/FC	DEC. 20, 2006	
CHECK	MM	DEC. 20, 2006	
REVIEW			

FILE No. 061112041BB04.dwg
SCALE AS SHOWN REV. B
DRAWING No.

FIGURE 4

plan that incorporates mitigation of identified environmental effects and best practices. Environmental monitoring will be conducted to verify that implemented measures function as intended.

4.2.2 Construction Phase

Following site preparation, the construction phase will include the following activities:

- Land Reclamation – The proposed site nearest to Bruce A will require the reclamation of land (i.e., the extension of the shoreline into Lake Huron). This type of activity has been completed previously during the construction of Bruce B.
- Building Construction – Building construction includes the construction of reactor buildings, turbine hall, pumphouses, annex buildings, service buildings, water treatment plants, and administration buildings.
- Cooling Water System Construction – Cooling water system construction includes the construction of the intake and discharge tunnels, associated piping, and cooling towers as required. Dredging and dumping activities will occur during the tunnel construction.
- Switchyard Construction – Switchyard construction includes the construction of towers and transmission lines and the associated switchyard gear.
- Installation of Systems and Equipment – Installation of systems and equipment includes the installation of all plant internal components (e.g., reactor components, steam generators, steam supply piping, turbines, electrical power systems, fire protection system, water piping, sewage handling and treatment equipment, lighting, etc.).
- Construction of Site Services – Construction of site services includes the construction of roadways, parking lots, fencing, exterior lighting and security systems.
- Construction Waste Management – Construction waste will be managed at the on-site construction waste management facilities unless it can be re-used. Typical construction wastes generated from routine activities include:
    - Non-reusable forms from concrete operations
    - Material packaging such as crates and steel bands
    - Damaged scaffolding
    - Worker’s lunch wastes and empty beverage containers
    - Used tires from construction equipment and vehicles
    - Plastic sheeting used for product protection
    - Empty metal and plastic containers.
- Rehabilitation – Once construction activities are complete, the site area will be graded and sloped and returned to a vegetated state. Roads and parking areas will be paved.

- Implementation of Environmental Mitigation and Environmental Monitoring – All construction activities will be conducted in accordance with an environmental management plan that incorporates mitigation of identified environmental effects and best practices. Environmental monitoring will be conducted to verify that implemented measures function as intended.

Some of the larger reactor components may be shipped to the Project site by barge because of their size. If this is required, additional construction activities may include the construction of a docking facility to receive these large components.

4.2.3 Operation and Maintenance Phase

This phase consists of the 60-year timeframe over which the nuclear power station is expected to generate electricity.

The operations and maintenance phase will be preceded with a period of commissioning. Commissioning is anticipated to take up to six months per unit and will consist of the following general activities:

- Verification and qualification of systems;
- Pressurization tests of pressure vessels;
- Fuelling of reactor;
- Pressure testing of containment building;
- Approach to criticality;
- Approach to full power;
- Testing of the reactor core physics;
- Verification of control systems;
- Connection to the grid;
- Operational testing; and
- Full power operation.

Following commissioning, the operations and maintenance phase comprises the day-to-day running of the facility, and therefore activities in this phase include the operation of the following plant systems:

- Nuclear Steam Supply Systems;
- Turbine Generator and Feedwater Systems;
- Electrical Power Systems;

- Nuclear Safety Systems;
- Ancillary Systems;
- Systems for Maintaining Facility Security;
- Maintenance Program;
- Materials Handling Systems;
- Solid Waste Handling Systems; and
- Administration and Support Systems.

Operation and maintenance of the above systems can largely be categorized into the following activities:

- Operation of equipment for production of electricity;
- Verification, sampling, testing and maintenance during operation at power;
- Maintenance, repairs, cleaning, and decontamination during planned shutdowns and outages[4];
- Fuelling and refuelling of the reactor;
- Waste management and transfer to WWMF; and
- Environmental monitoring and radiation protection.

4.2.4 Decommissioning Phase

Decommissioning of a nuclear facility can be categorized into a number of stages and would be subject to future planning and an EA. In general, decommissioning activities can be described as follows:

- Plant Cleanout – Generally commenced following shutdown, used nuclear fuel is removed from the reactor and transferred to interim or long-term storage. Radioactive wastes accumulated during operation may be treated and stored/disposed of. The reactor and associated plant are then prepared for the next phase of dismantlement. Operations that follow consist of decontamination by plant wash-out using conventional or more specific reagents and enhanced when necessary by mechanical operations. Additional equipment items posing potential risks such as the spreading of radioactive and chemical contamination are dismantled and disposed of according to regulation.

[4] Depending on the reactor design selected for the Project, varying levels of maintenance will be required over the lifetime of the reactors. Specifically, the CANDU6E and the ACR-1000 would require mid-life replacement of the pressure tubes.

- Decontamination – Surface contamination of facilities or equipment is removed by washing, heating chemical or electrochemical action, mechanical cleaning, or other techniques.
- Dismantling – Equipment within the facility may be dismantled, and equipment within the building(s) on the non-radioactive side of the facility can be removed for possible re-use, and the building(s) demolished.
- Demolition and Site Clearance – When the final stage of dismantling is complete, all remaining buildings are demolished and radioactive wastes removed to storage or disposal facilities. The site is cleared and restored.
- De-licensing and Release of the Site to Alternative Use – Once the site's radiation levels are demonstrated to meet all regulatory requirements, the operating license is terminated and the site is then available for re-use.

4.3 Principal Buildings and Structures

The new build nuclear power station consists of four nuclear reactors and associated infrastructure. For planning purposes, the station would be constructed as two two-reactor modules. As described below, the principal buildings and structures are grouped into three primary areas: the power block, the cooling system and the switchyard.

4.3.1 Power Block

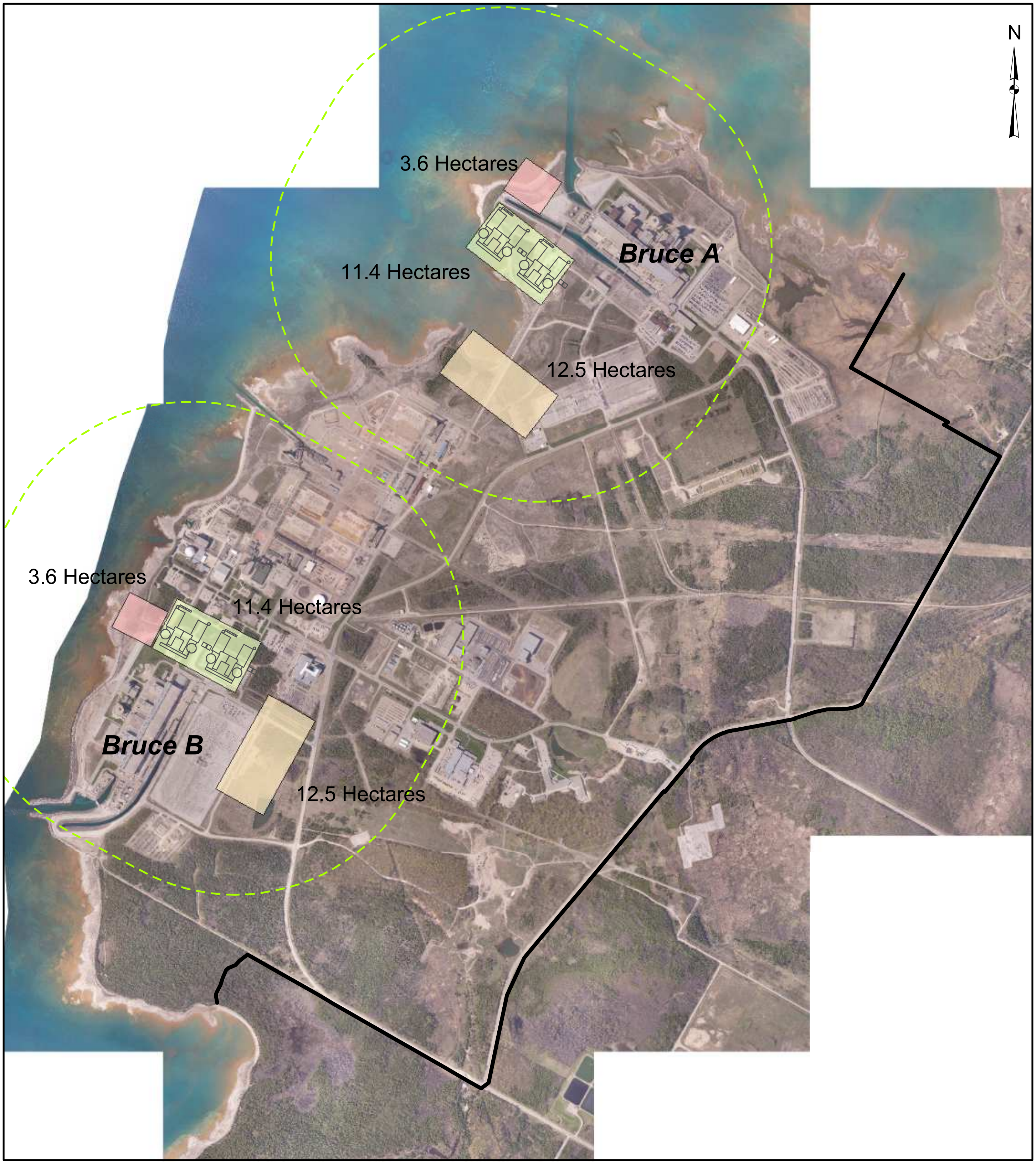
The power block consists of the buildings housing the nuclear reactors and all associated facilities and equipment. The area of the power block for a two-reactor module is approximately 250 m by 250 m. All four reactors would require an area of approximately 11 hectares (ha) as shown in Figure 5.

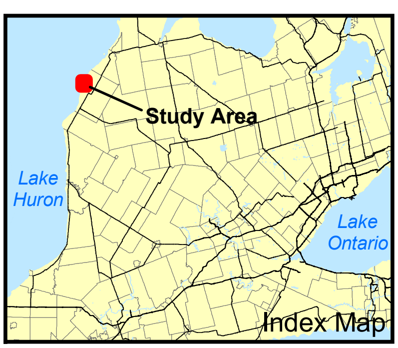
A typical schematic layout of the principle buildings and structures in a two-reactor module is shown in Figure 6. For each power block there will be two sets of the following structures:

- Reactor Building – containing the nuclear steam supply system;
- Turbine Building – holding the turbine and electrical generator;
- Annex and Auxiliary Buildings – holding laydown areas, purification systems, used fuel bay, heavy handling equipment, low and intermediate level waste handing facilities, and internal maintenance areas; and
- Other support facilities (e.g., standby generators, storage tanks, etc).

As shown in Figure 6, the forebay, which provides cooling water to the condensers, will be located immediately adjacent to each power block and will be shared by both reactor units.

Shared facilities between the two-reactor modules will include:





LEGEND

- Proposed Power Block
- Proposed Switch Yard
- Proposed Cooling Tower
- Proposed New Build Exclusion Zone
- Site Perimeter fence

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT
BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD bridging the generation gap

TITLE

POSSIBLE LOCATIONS OF COOLING TOWERS

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE	REV. 0
DESIGN	ASB	21 Sept. 2004		
GIS	KD	19 Jan. 2007		
CHECK	BT	19 Jan. 2007		
REVIEW	MM	19 Jan. 2007		

FIGURE: 5

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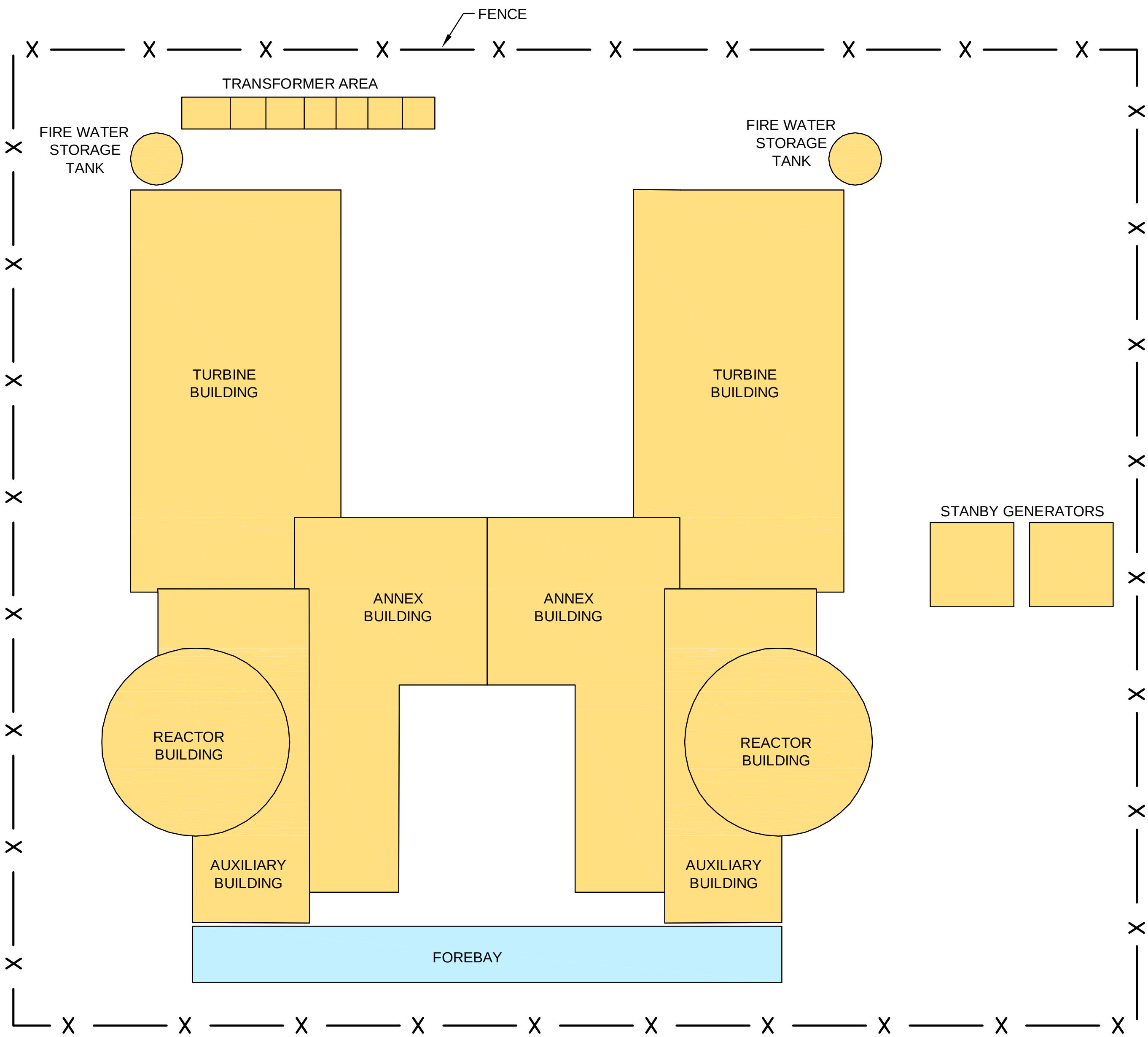


REFERENCE:

Plant Layout - U.S. Nuclear Reglatory Commision, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design (NUREG-1793)

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD bridging the generation gap

TITLE

GENERIC TWO-REACTOR LAYOUT

Golder Associates
Mississauga, Ontario, Canada

PROJECT No.		06-1112-041	FILE No. 061112041BB06.dwg	
DESIGN	KD	2006/09/15	SCALE AS SHOWN	REV. B
CAD	KD	2006/09/15	DRAWING No.	
CHECK	SL	2006/09/18	**FIGURE 6**	
REVIEW				

PLOT DATE: January 18, 2007
FILENAME: T:\Projects\2006\06-1112-041 (BP, Kincardine)\-BB-5000\061112041BB06.dwg

- Administrative buildings and offices;
- Laboratories; and
- Maintenance facilities and workshops.

4.3.2 Condenser Cooling Water System

In the operation of a nuclear generating station, water is heated to steam by nuclear fission in the reactor core. The steam is then used to power the turbines that generate electricity. The steam within the generating station is recycled but must first be condensed to a liquid state before it can be re-used. The excess heat that is removed from the steam must be released to the environment in some manner. This release of heat to the environment either can be dissipated to a body of water or to the atmosphere.

As indicated above, there are two practical options for achieving the necessary removal of heat from the reactor, specifically the use of mechanical draft cooling towers or the use of a once-through cooling system using lake water. As such, the selection of the condenser cooling water system may be considered as alternative means of carrying out the Project. Each of the cooling options is described in the following sections.

Mechanical Draft Cooling Towers

Wet cooling towers dissipate heat through evaporative losses to the atmosphere. The movement of air though these towers can be mechanically induced by fans. A mechanical draft tower requires the use of large fans which typically consume about three percent of the electricity generated by the station.

Figure 7: Typical Mechanical Draft Cooling Towers

A 2,000 MW two-reactor module would require three blocks of mechanical draft cooling towers. Figure 7 shows a nuclear power station with two blocks of towers. For the Project, each block would be divided into 15 towers each with a top mounted fan. Each block would be approximately 180 m long, 17 m wide, and 17 m high, including the fan stack. As shown in Figure 5, the total footprint for a cooling tower for four new units would be 3.6 hectares (ha). Figure 5 also identifies the possible locations of the cooling towers at "Area A" and "Area B" (refer to Section 4.5).

Once-Through Cooling System

A once-through cooling system comprises a cooling water intake system and a discharge system, which typically draw from and discharge to a large body of water. Subsurface systems are typically preferred from an environmental perspective and have better access to cold water. The following description refers to a subsurface system.

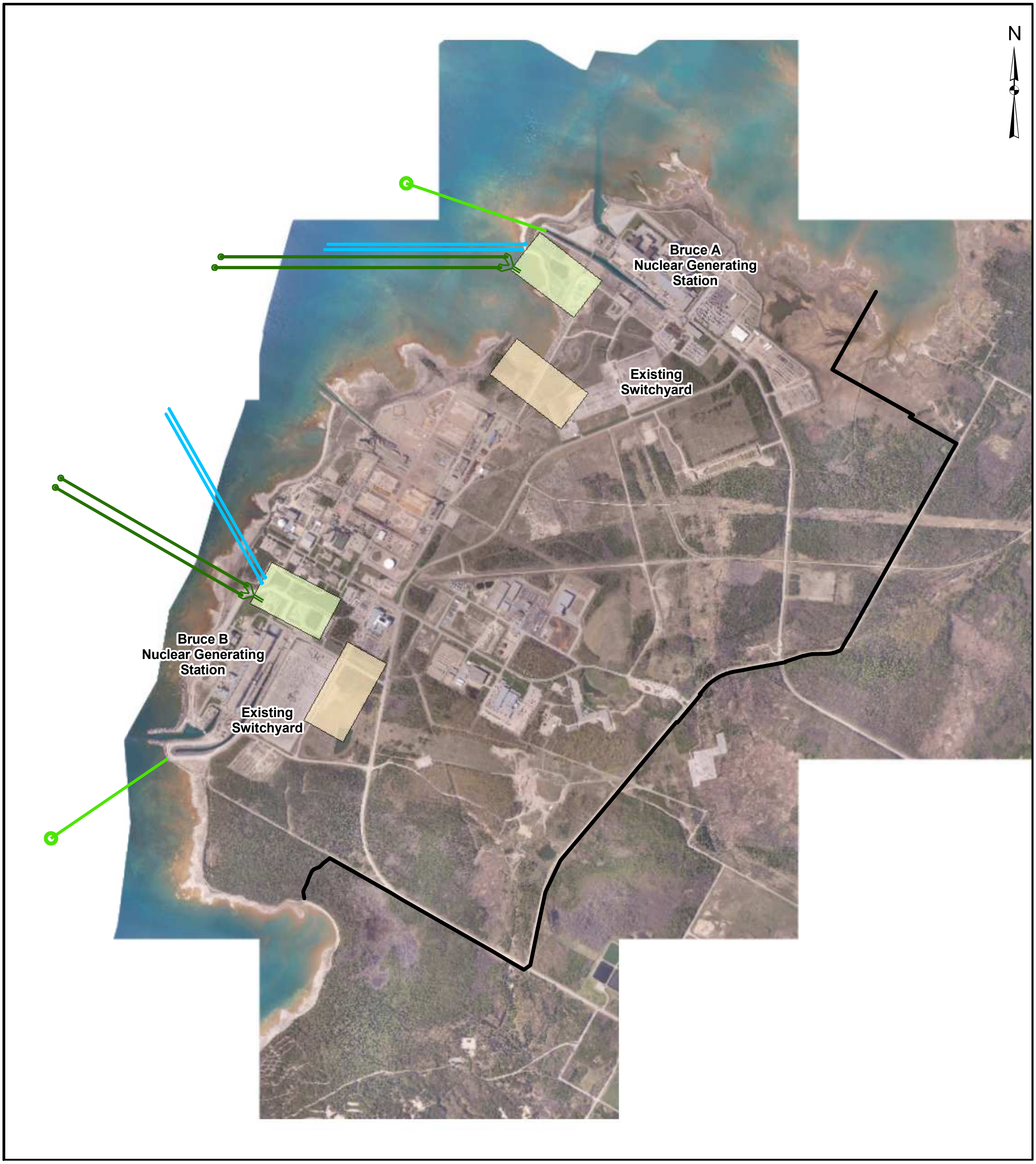
A submerged intake system has three main components: a submerged velocity cap, an intake conduit and an intake reservoir or forebay. A submerged discharge system has three main components: a discharge pond, a submerged discharge conduit and a submerged discharge diffuser. The primary design consideration for the cooling water systems is to align the tunnels to minimize their length, while satisfying hydraulic, environmental and geotechnical requirements.

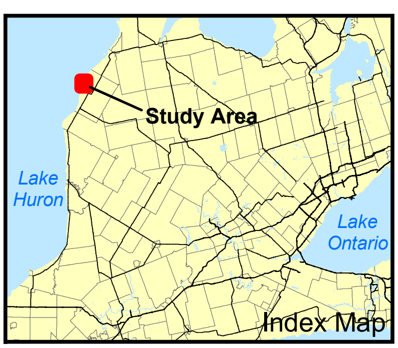
A 2,000 MW two-reactor module would require approximately 100 m^3/s flowing through the plant. This flow can be supplied by a concrete lined tunnel with an internal diameter of 7.5 m, resulting in a velocity of about 2.25 m/s. This velocity is high enough for the tunnel to be self-cleaning while keeping head losses down. The velocity cap for such an intake system would require a diameter of approximately 30 m and a height of 6 m resulting in flows of about 0.2 m/s at the outer edges of the cap. The flow into the velocity cap should be horizontal to allow most fish to avoid becoming entrained in the system.

Figure 8 shows a conceptual layout of the intake and discharge tunnels for the Project at two potential sites, Area A and Area B. The length of the intake tunnel for a power station located in Area A would be 1,600 m to ensure a water temperature in the 5°C to 10°C range in the summer. The length of the intake tunnel for a power station in Area B would be 1,200 m. The depth of the centreline of the tunnels would be 40 to 45 m below Lake water level.

The length of the discharge tunnel for a power station in Area A would be 1,100 m to ensure that the cooling water is discharged in at least 9 m of water. The length of the discharge tunnel for a power station in Area B would be 1,080 m. The depth of the centreline of the tunnels would be 40 to 45 m below Lake water level.

Cooling water would be discharged through a series of diffusers attached to the crown of the discharge tunnel, and the first diffuser would be located at the 9 m depth contour line. The velocity at





0 500 1,000 2,000

Metres

LEGEND

- Proposed Intake Tunnel
- Existing Intake Tunnel
- Discharge Tunnels
- Proposed Power Block
- Proposed Switch Yard
- Site Perimeter fence

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD bridging the generation gap

TITLE

CONCEPTUAL TUNNEL LAYOUT

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE 1:30,000	REV. 0
DESIGN	ASB	21 Sept. 2004	**FIGURE 8**	
GIS	KD	18 Jan. 2007		
CHECK	BT	18 Jan. 2007		
REVIEW	MM	18 Jan. 2007		

G:\Projects\2006\06-1112-041_BruceEA\GIS\MXDs\Draft\Project_Description\Fig8_Conc_Tunnel_Layout.mxd the outlet port of the diffusers is set at of 3 m/s. Larger velocities at the nozzles improve dilution but cause an exponential increase in head losses and associated pumping costs, and may impact the fish in the vicinity of the structure. The number of diffusers then becomes a trade off between size of diffuser (nozzle diameter) and spacing and the required length of tunnel to accommodate the diffusers. The spacing between the diffusers is a function of the thermal dispersion. A diffuser with a nozzle diameter of 2 m would require 12 diffusers at about 20 m centre to centre at an exit velocity of 3 m/s to accommodate the system flows.

Typically, the discharge tunnels are shorter than the intake tunnels and are located downstream from the intake tunnels. The distance between the intake cap and the closest diffuser is about 580 m at Area A, and 685 m at Area B. These distances are deemed sufficient to prevent re-circulation.

4.3.3 Switchyard and Electricity Transmission

Both the switchyard and the transmission corridor likely would be owned and operated by Hydro One. As part of the Project, a new switchyard may be required to transmit electricity from the power station to the provincial grid. Accordingly, the siting, construction and operation of the switchyard is considered part of the Project. However, no specific transmission upgrades would be required for new build. Any modifications to the existing transmission corridor would be subject to an environmental assessment following the Ontario Ministry of Environment's "Guide to Environmental Assessment Requirements for Electricity Projects" (OMOE, 2001).

The current plans for the switchyard and transmission corridor are summarized briefly below.

Switchyard

A switchyard will be built and dedicated to the new reactor units. The new switchyard will be common to all the new reactor units and will be designed to adequately perform the functional requirements for all modes of station operation, including startup, normal power generation and station shutdown. Generally, the switchyard will consist of buses, lines, circuit breakers and towers in close proximity to the new station. The main purpose of the switchyard is to distribute power generated from the new reactors to the transmission corridor that supplies power to the Ontario grid, or to supply the new plant with power from the grid. The specific design of the switchyard will depend upon the reactor design selected.

Transmission Corridor

Under existing conditions, there is a need for upgrades to the transmission corridor to accommodate the 6,200 MW capacity of the current eight reactors at the Bruce Power site. The province has announced a plan to carry out transmission system upgrades to meet the requirements for Bruce A refurbishment and continued operations. Accordingly, replacement of some of the existing capacity with new reactors as outlined in this Project Description would have the benefit of these upgrades.

4.4 Reactor Design

Several generations of nuclear reactors have been used in the nuclear power generation industry for more than half a century, namely Generation I, II and III reactors. Generation I reactors were developed in the 1950-60s. The majority of reactors in operation today are Generation II. Generation III reactors incorporate evolutionary improvements in design to the Generation II reactors such as improved fuel technology, passive safety systems and standardized design. Most proposed new developments for nuclear reactors will consider Generation III reactors. Several dozen Generation III reactors are currently planned or under construction around the world. While Generation IV reactors are currently being researched, it is expected that they will not be operational before 2020 at the earliest.

Generation III reactors are safer, more efficient and easier to build than earlier reactors. Standardized design for each type is intended to result in faster licensing and reduction in capital costs and construction time. Simplified, more rugged design has facilitated plant operation and lowered vulnerability to operational upsets. A higher capacity factor of 90% and a longer operating life of 60 years, are also distinct features of Generation III reactors. Other modifications include reduced probability of core melt accidents, minimal effect on the environment, higher burn-up to reduce fuel use and waste generation.

The most significant feature in Generation III reactors compared with earlier designs is the incorporation of “passive” or inherent safety features. These features require no active controls or operational intervention, in order to circumvent accidents in the event of malfunction. This is achieved by relying on convection, gravity, or resistance to high temperatures, and not on the functioning of engineered components such as pumps and valves typical of earlier generation reactors.

The Bruce Power New Build Project may use one of five reactor designs:

- ACR-1000;
- AP1000;
- EPR;
- SWR-1000; or
- ESBWR.

As noted previously, Bruce Power is also considering the use of the Enhanced CANDU 6 reactor. The Enhanced CANDU 6 has a smaller capacity (~740 MW) than the other reactors and has many of the features of a Generation III design.

A summary of the technical specifications for each of the reactor designs is provided in Table 1.

Table 1: Reactor Design Specifications

DATA	ACR-1000	AP1000	EPR	ESBWR	SWR-1000	Enhanced CANDU 6
Reactor Type	PHWR[a]	PWR[b]	PWR	BWR[c]	BWR	PHWR
Manufacturer	Atomic Energy of Canada Ltd.	Westinghouse (US Based)	Areva / Framatome (Europe Based)	General Electric (US Based)	Areva / Framatome (Europe Based)	Atomic Energy of Canada Ltd.
Net Electrical Output (MWe)	1085	1100	1600	1560	1254	740
Reactor Thermal Power (MWt)	3187	3400	4500	4500	3370	2064
Fuel Type	UO_2, MOX	UO_2; MOX	UO_2; UO_2-Gd_2O_3; MOX	UO_2	UO_2	UO_2, MOX
Fuel Enrichment (^{235}U%)	≤2.0	4.95	≤5	4.2	3.54	Natural Uranium or ≤1.2
Coolant	Light Water	Light Water	Light Water	Light Water	Light Water	Heavy Water
Moderator	Heavy Water	Light Water	Light Water	Light Water	Light Water	Heavy Water
Number of Fuel Assemblies/Channels	520 Channels	157 Assemblies	241 Assemblies	1132 Assemblies	664 Assemblies	≥380 Channels
Type of Fuel Assembly/Bundle	CANFLEX-ACR Bundle	17x17 Array	17x17 Array	GE 14 10x10 Array	ATRIUM 12x12 Array	CANFLEX Bundle
Active Fuel Length (m)	0.5/Bundle	4.3/Assembly	4.2/Assembly	3/Assembly	3/Assembly	0.5/Bundle
Number of Steam Generators	4	2	4	N/A	N/A	4
Design Life (Years)	60[d]	60	60	60	60	60[d]

Notes:

[a] Pressurized Heavy Water Reactor
[b] Pressurized Water Reactor
[c] Boiling Water Reactor
[d] Requires mid-life replacement of pressure tubes

As shown in Table 1, the net electrical output ranges from 1,000 MW to 1,600 MW for the five Generation III reactor designs and is approximately 740 MW for the smaller Enhanced CANDU 6. All the reactors use enriched uranium dioxide (UO_2) as fuel, with uranium-235 (^{235}U) enrichment concentrations ranging from 1% to 5%, although natural uranium fuel may also be used in the Enhanced CANDU 6 design. The ACR-1000 and Enhanced CANDU 6, similar to other CANDU reactors, contain fuel bundles within pressure tubes, use heavy water as a moderator and can be fuelled on-line. The ACR-1000 and the Enhanced CANDU 6 also require a mid-life replacement of the pressure tubes after approximately 30 years of operation.

Additional information on each of the reactors being considered for the Project is presented in Appendix A.

Bruce Power has not decided on a specific reactor design at this time. Accordingly, the EA will be "technology neutral" and will conduct an assessment of the likely effects of the Project by using typical bounding conditions to encompass all reactor designs. Accordingly, Bruce Power does not need to provide a detailed design of the reactor and the associated facilities but will identify sufficient bounding parameters and characteristics of the reactor and associated facilities so that an assessment can be made. Consequently, the EA will refer to generic plant parameters for the reactor and its associated facilities. This approach will allow Bruce Power to describe the potential environmental benefits of each reactor design while at the same time ensuring that the assessment of effects is conservative and does not add complexity to the EA.

This type of technology neutral assessment has been carried out by the US NRC for a similar range of reactor designs for the Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site (NRC, 2004).

For planning purposes, Bruce Power is considering 4,000 MW capacity from four new reactors. Based on the electrical output of the various reactor designs (refer to Table 1), a fewer number of reactors may be required and the new nuclear power station capacity maybe somewhat more or less than 4,000 MW.

Bruce Power expects to identify the preferred reactor design and capacity in parallel with the EA and will utilize information from the EA as part of its decision process. Accordingly, the identification of a preferred reactor design technology option may be considered alternative means of carrying out the Project. In addition to environmental considerations, selection of the reactor design by Bruce Power will include consideration of economic and social factors. These include considerations such as safety, capital and operating cost, Canadian content and jobs, operating lifetime and licensability. Bruce Power's guiding principle in the design selection process will be consistent with the CNSC's "Licensing Process for New Nuclear Power Plants in Canada" (2006a). Specifically:

> "When applying for a licence to operate a new nuclear power plant, it is the responsibility of the applicant to demonstrate to the CNSC that the proposed design of the new nuclear power plant conforms to regulatory requirements and, if constructed as designed, will provide for safe operation on the designated site over the proposed plant life."

4.5 Siting Options

Currently, Bruce Power has identified two potential locations for the Project. These siting options may be considered as alternative means of carrying out the Project. The currently identified siting options are shown on Figure 9, and are identified as "Area A" which is adjacent to Bruce A, and "Area B" that is adjacent to Bruce B. As shown in Figure 9, the 914 m exclusion zone associated with each of these sites is similar to the current exclusion zones for Bruce A and Bruce B and would not impact any new or additional areas outside of the Bruce Power site perimeter.

In addition to Area A and Area B there may be other locations on the Bruce Power site where the Project might be located. Internationally accepted siting criteria will be used in a site selection process as part of the EA studies. This approach to site selection will contribute to the identification of the preferred site, and will include consideration of the potential environmental effects of the identified alternative locations. For example, siting options in addition to Site A and Site B would be considered, if during the conduct of the EA studies, it is found that there are sufficient environmental concerns at either of these two site options. Any additional sites identified would be entirely within the existing perimeter of the Bruce Power site.

4.6 Manufacture and Transportation of Reactor Components to Site

One important development of Generation III reactor designs compared with earlier designs is the modular nature of many of the components. This allows major components of the reactors to be fabricated off-site under controlled conditions in a manufacturing facility. The fabricated components would be transported to the Bruce Power site where the reactor would be constructed. Transportation of the components to the Bruce Power site would occur on public highways using diesel tractors and flatbed trailers. Among other benefits, this pre-fabrication process has the advantage of requiring a smaller on-site construction workforce.

4.7 Use of Toxic and Hazardous Materials

Toxic and hazardous materials used in the Project include both radioactive and non-radioactive materials. These are identified below for each of the Project phases.

4.7.1 Radioactive Materials

Site Preparation and Construction Phases

No radioactive materials will be used during the construction phase other than sealed radioactive sources used in nuclear density gauges such as routinely employed on construction site during the geotechnical investigations and quality assurance. There will be no need to relocate any of the existing radioactive waste management facilities to accommodate the Project.

Operation and Maintenance Phase

Fuel for the reactor design options being considered by Bruce Power may consist of either natural uranium, or enriched uranium up to about 5 percent uranium-235 (see Table 1). The fuel would be fabricated in a commercial fuel fabrication facility, which would be licensed independently of the Project.

Fresh fuel will be received at the Bruce Power site in road transport vehicles. While the shipping container for fresh fuel will vary depending on reactor design option, the transportation packages will be designed and qualified to meet CNSC and International Atomic Energy Agency (IAEA) regulations for safe transport of radioactive materials.

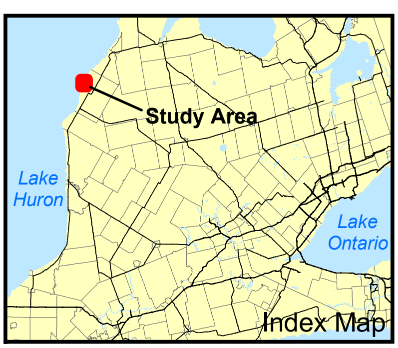
Similar to existing operations at the Bruce Power site, fresh fuel bundles will be received at the fresh fuel receiving area and stored in seismically and fire-qualified fresh fuel storage racks. Fresh fuel bundles will be appropriately stored in their protective transport crates until they are moved into the fresh fuel loading area. The specific fuelling practices vary depending on reactor design.

The inventory and transfer of all fuel (fresh and used) will be monitored by the IAEA to ensure compliance with Canada's obligations under the *Treaty on the Non-proliferation of Nuclear Weapons* (NPT).

4.7.2 Non-Radioactive Materials

Site Preparation and Construction Phases

Site preparation and construction activities will include use of liquid petroleum products such as fuels, oils, lubricants and solvents for operation and maintenance of construction equipment. Necessary maintenance of vehicles will be conducted on appropriate surfaces, using best management practices for handling accidental spills of maintenance materials. Site preparation and construction activities will generate construction debris and household miscellaneous wastes, which will be handled, stored, transported and disposed of in accordance with applicable provincial and local regulations.



LEGEND

- Proposed Power Block
- Proposed Switch Yard
- Proposed Cooling Tower
- Proposed New Build Exclusion Zone
- Site Perimeter fence

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD
bridging the generation gap

TITLE

SITING OPTIONS

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE 1:25,000	REV. 0
DESIGN	ASB	21 Sept. 2004	**FIGURE 9**	
GIS	KD	18 Jan. 2007		
CHECK	BT	18 Jan. 2007		
REVIEW	MM	18 Jan. 2007		

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On-site materials and equipment handling will be conducted in accordance with a Site Preparation and construction phase environmental management plan. Procedures will be established to ensure proper temporary storage, handling and disposal of any hazardous wastes, including procedures for record keeping and waste minimization, according to the OMOE Chemical Handling and Storage Guidelines and O. Reg. 347 of the *Environmental Protection Act* and consistent with Bruce Power's commitments to waste handling under ISO 14000. Bruce Power will prepare and submit the appropriate Waste Generation Reports for all wastes generated at the site during the site preparation and construction phases of the Project.

Operation and Maintenance Phase

Limited quantities of toxic and hazardous materials, which will be present at the station, will include liquid petroleum fuels, oils, lubricants and various chemical reagents (e.g., anti-oxidants for maintenance of various systems susceptible to oxidation). These materials will be stored and handled in accordance with applicable regulations and Bruce Power's own policies and practices. Bruce Power has programs in place to support the corporate objective of eliminating worker injuries and/or reportable releases. These programs include an ISO 14001 Environmental Management System. Hazardous wastes will be disposed in compliance with both federal and provincial requirements, frequently using the services of a licensed contractor. These will include expired chemicals, cleaners, paint waste, aerosol cans and electrical components.

Ozone depleting substances (ODS) will not be used in the operation of the new build nuclear power station (i.e., for coolers and chillers) consistent with the 2007 compliance deadline. Similarly, PCBs will not be used in the Project, as required by current regulations.

4.8 Waste Generation and Management

Wastes will be generated during the construction phase and during operations and maintenance. Wastes produced during construction will be non-radioactive typical of any large construction activity. Wastes generated during operations and maintenance of the nuclear power station include both radioactive and non-radioactive wastes. Radioactive wastes include low and intermediate radioactive wastes produced during routine operations and maintenance. Used fuel is also a radioactive material that will be managed as part of the Project. Non-radioactive wastes consist of items such as chemicals, lubricants and oils, and other industrial materials typical of any large industrial facility.

4.8.1 Site Preparation and Construction Waste

Site preparation and construction activities will generate non-hazardous and hazardous wastes. Non-hazardous solid wastes meeting landfill requirements will be disposed of in the existing licensed on-site landfill or transported to licensed facilities off-site. Hazardous wastes will be handled in accordance with regulations, and shipped off-site to licensed disposal facilities.

All contractors carrying out activities that involve handling of hazardous materials will be required to meet applicable regulations and current Bruce Power materials/waste management practices.

4.8.2 Operation and Maintenance Waste

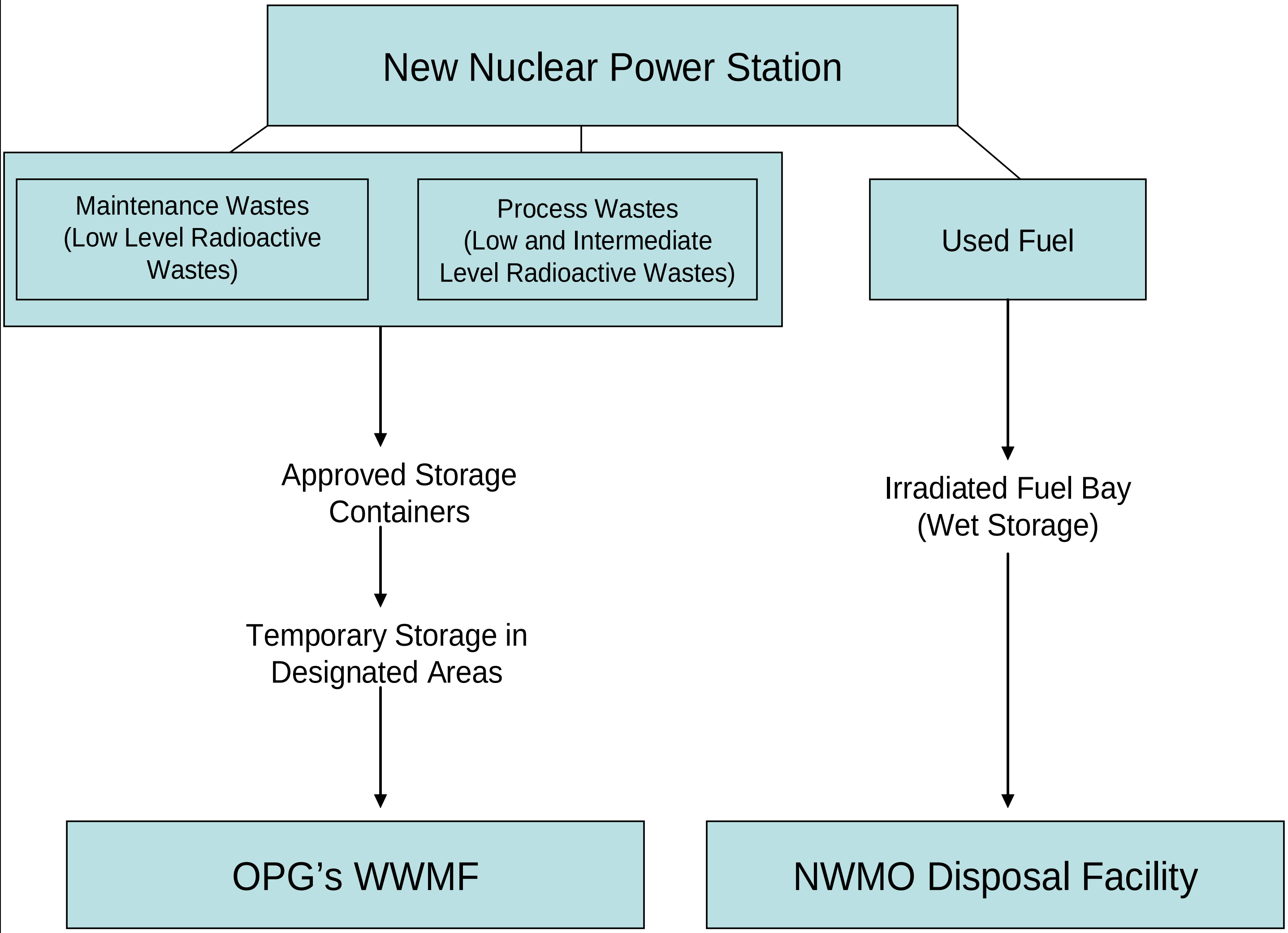
Wastes produced during the operations and maintenance phase can generally be separated into radioactive and non-radioactive wastes. Radioactive wastes comprise low and intermediate level wastes. Used fuel will also be managed for long-term storage and disposal. The overall management process for used fuel and low and intermediate level wastes is shown in Figure 10. Non-radioactive wastes consist of typical materials produced at large scale production facilities. Each of these types of waste is described briefly below.

Used Fuel

Used or irradiated fuel, which has been depleted by the fission process, having lost some of its reactivity, will be managed through ‘wet storage’. Wet storage will occur in irradiated fuel bays for at least 10 years. Based on this storage timeframe, the earliest time that used fuel would be transferred out of the bay is approximately 2030. The federal government has mandated the Nuclear Waste Management Organization (NWMO) with the responsibility for identifying and siting facilities for the long-term management of Canada’s used nuclear fuel. Depending upon the progress made by the NWMO in establishing a centralized storage facility, Bruce Power will make a decision to continue with wet storage at the Bruce Power site or transfer the used fuel to an independently licensed NWMO facility. Prior to the establishment of the NWMO facility, an environmental assessment will be required. Preliminary discussions with the NWMO have identified the need for that organization to consider the potential different fuel types and quantities that may result for the Generation III reactors under consideration.

If the Enhanced CANDU 6 design option is selected then it is expected that waste management would continue in the two-phase process which is currently implemented for the Bruce A and Bruce B reactors (i.e., stored in an used fuel bay for approximately 10 years, followed by dry storage at OPG facilities on the Bruce Power site).

Since all the light water cooled reactor designs being considered use enriched fuel, the total quantity of used fuel generated during operation will be less than the quantity generated by the existing reactors per 1,000 MW per year. The Enhanced CANDU 6 would generate similar quantity of used fuel as existing Bruce A and Bruce B reactors (per 1,000 MW per year).



PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ASSESSMENT

new BUILD bridging the generation gap

TITLE

MANAGEMENT OF WASTES FROM GENERATION III NUCLEAR POWER GENERATING FACILITIES

Golder Associates
Mississauga, Ontario, Canada

PROJECT No.	06-1112-041 (5000)		FILE No.	061112041BB10.dwg
DESIGN	KD	2006/09/15	SCALE	AS SHOWN REV. B
CAD	KD	2006/12/20	DRAWING No.	
CHECK	MM	2006/09/15	**FIGURE 10**	
REVIEW				

PLOT DATE: December 20, 2006
FILENAME: T:\Projects\2006\06-1112-041 (BP, Kincardine)\-BB-5000\061112041BB10.dwg

Low and Intermediate Level Wastes

With the exception of minor differences in containers and storage configurations, waste management systems are similar between the reactor design types being considered for the Project.

Low and intermediate wastes consist of process and maintenance wastes that originate from day-to-day reactor operations. Process wastes include purification wastes, comprised of ion exchange resins and filters from liquid streams in process systems; and bituminized wastes, comprised of the solidified effluent from reverse osmosis and filtration systems. Maintenance wastes are low-level wastes that result from daily activities, and include cleaning materials, protective clothing, and metal parts.

Similar to current practice at the operating Bruce Power reactors, process wastes such as spent resins will be kept in interim storage at the new power station before being processed and transported in shielding flasks to the WWMF for long-term management. It is expected that Bruce Power would continue to send low and intermediate level wastes to the WWMF as allowed by the current agreement between Bruce Power and OPG. The WWMF is currently licensed to receive wastes from Ontario's nuclear reactors. In addition, OPG is undertaking an environmental assessment of a Deep Geological Repository (DGR) which would be used for the long-term management of low and intermediate level wastes.

For all of the reactor designs, the estimated low and intermediate level wastes would be approximately 30 m^3 per 1,000 MW per year (i.e., or approximately 130 m^3 per year for the Project). This volume of waste is roughly the same volume of waste generated by existing Bruce A and Bruce B units.

Non-Radioactive Wastes

Toxic and hazardous materials, which are present at the station, include liquid petroleum fuels, oils, lubricants and various chemical reagents. These materials are stored and handled in accordance with applicable regulations and Bruce Power's own policies and practices. Bruce Power has programs in place to support the corporate objective of eliminating worker injuries and/or reportable releases. These programs include an ISO 14001 Environmental Management System. Hazardous wastes are disposed in compliance with both federal and provincial requirements, frequently using the services of a licensed contractor. These include expired chemicals, cleaners, paint waste, aerosol cans and electrical components.

Some non-radioactive waste may be disposed of either at OPG's independently licensed waste management facility on the Bruce Power site or at off-site provincially licensed facilities.

4.9 Alternative Means

Preceding sections have identified a number of alternative means of carrying out the Project. These include:

- Reactor design technology, including net electrical output, moderator, coolant, and fuel enrichment;
- Siting options within the Bruce Power site; and
- Condenser cooling water system, including air or water cooling.

As the conduct of the environmental assessment proceeds, other alternative means might be identified. For example, alternative layouts or technologies for the switchyard may be identified. For each of the alternative means it is expected that the environmental assessment will include a comparative evaluation of the alternative means, which will contribute to the selection of the preferred alternative. However, the selection of any of the alternative means for carrying out the Project will not be based solely on environmental factors above, but will also include consideration of social and financial factors that would be made outside of the EA.

4.10 Summary of Works and Activities

Table 2 provides a consolidated tabular summary of the physical works and activities that comprise the Bruce Power New Build Project. In addition, the table identifies the accessory works and activities that Bruce Power could rely upon in carrying out the Project. The information in Table 2 should be useful to the Responsible Authority(ies) in facilitating decisions on the scope of the Bruce Power New Build Project.

Table 2: Summary of Works and Activities

Work and Activity	Description
Site Preparation	The Project comprises all activities required to prepare the site for the construction of four new reactors at the siting options within the Bruce Power site. This includes the siting of the power block, cooling towers and switchyard. A description of these activities is provided in Section 4.2.1.
Construction	The Project comprises all activities related to the on-site construction of four new reactors. This includes the construction of the power block, cooling towers and switchyard. A description of these activities is provided in Section 4.2.2.
Operation & Maintenance	The Project comprises all activities related to the continued operation and maintenance of four new reactors for approximately 60 years. A description of the operation and maintenance activities is provided in Section 4.2.3.

Work and Activity	Description
Decommissioning	The Project comprises the decommissioning of the four reactors. It is recognized that decommissioning is the subject of a separate CNSC licence and would occur approximately 75 years into the future. A description of decommissioning activities is provided in Section 4.2.4.
Reactor Fuel	The Project comprises the receipt and storage of uranium fuel – either enriched or natural uranium – and its use in the new build reactors. The fuel would be manufactured at a commercial facility operating under separate and independent licences. A description of activities associated with reactor fuel is provided in Section 4.7.1.
LLW/ILW	The Project comprises the production, interim management at the reactor site, and transport of LLW and ILW to OPG's licensed Western Waste Management Facility (WWMF) for long-term management independent of the Project. The WWMF is currently licensed to receive LLW and ILW. In addition, OPG is currently conducting an environmental assessment for a deep geological repository (DGR) for the disposal of LLW and ILW produced by Ontario's nuclear reactors. A description of LLW and ILW is provided in Section 4.8.2.
Reactor Components	The Project includes the receipt and assembly of components that may be manufactured off-site at commercial facilities located some distance from the Bruce Power site. These manufacturing facilities would carry out activities under independent regulatory requirements, independent of the Project. A description of the activities associated with reactor components is provided in Section 4.6.
Non-radioactive Wastes	The Project comprises the production, interim storage, and transfer of non-radioactive wastes to licensed facilities, including both hazardous and non-hazardous wastes. On-site disposal of non-hazardous waste would occur at the provincially licensed waste management facility of the Bruce Power site or off-site licensed facilities. Hazardous wastes would be transferred to a licensed waste hauler for disposal at a licensed waste management facility. Other wastes may be recycled or disposed off-site following Ministry of Environment regulations. A description of conventional wastes is provided in Section 4.8.
Used Fuel	The Project comprises the underwater storage in water-filled pools at the reactor site of used fuel produced throughout the life of the reactors. The Federal government has mandated the Nuclear Waste Management Organization (NWMO) to identify and ultimately develop a long-term solution for used fuel produced in Canadian reactors. Any storage or disposal facility operated by the NWMO would be licensed by the CNSC, independently of the Project. A description of used fuel is provided in Section 4.8.2.
Transportation	The Project comprises the receipt on-site of materials transported to the reactor site on public roads. In addition, workers in all Project phases will use public roads in accessing the site. The Project is not envisaged to require any upgrades or improvements to the existing roadways. A description of materials transportation is provided in Section 4.6. Note that any effects from transportation relating to the Project would be limited to the local area.
Electricity Transmission	The Project comprises the generation of 4,000 MW of electricity for delivery to the Ontario Provincial power grid. Transmission facilities include an on-site switchyard which would be constructed as part of the Project and the existing transmission corridor which is currently being upgraded by Hydro One to ensure the transmission of 6,200 MW from the Bruce Power site. The transmission corridor upgrades, which are not part of the Project, would be the subject of a separate EA to be carried out under the Ontario *Environmental Assessment Act*. A description of electricity transmission is provided in Section 4.3.3.

5.0 EXISTING ENVIRONMENTAL CONDITIONS

5.1 Bio-physical Environment

5.1.1 Geology

The Bruce Power site is located on the eastern shore of Lake Huron, at a longitude of approximately 81˚30' west and latitude 44˚20' north, within the Municipality of Kincardine, Bruce County, Ontario.

Bruce A is situated on the shores of Lake Huron at the northern end of the Douglas Point Promontory, a feature of comparatively low relief rising approximately 5 m to 15 m above lake level. Bruce B is situated at the southern end of the Douglas Point Promontory. This promontory juts out into the lake 2.5 km to 3.0 km over a length of 5 km extending from Baie du Doré southward to Inverhuron Bay. The Project would be located on the Bruce Power site in the general vicinity of Bruce A and Bruce B.

Inland, the dominant physiographic feature for both Bruce A and Bruce B sites is the Algonquin Bluff, a ridge formed from shoreline erosion by post-glacial Lake Algonquin. The terrain above and inland from the Algonquin Bluff consists of comparatively flat clay plains with a network of streams that drain westward to Lake Huron.

There are no major rivers or lakes in the vicinity of the site other than Lake Huron. A former tributary of the Little Sauble River, named Stream C, drains into the southwest corner of the Baie du Doré to the north and the Little Sauble River empties into Inverhuron Bay to the south.

The Bruce Power site is underlain by limestone and dolostone formations of Lower Silurian age to the north and Middle Devonian age to the south. These formations are flat lying with a very gentle dip of approximately one-half percent towards the southwest. Bedrock locally crops out along the Lake Huron shoreline between Inverhuron Bay and Baie du Doré where it has been exposed by shoreline erosion. Bruce A lies either directly on bedrock or on engineered granular fill placed on the bedrock. Most of the site lies within 4 m of the lake level, except for the area on the north side of the reactor auxiliary bay where granular fill has been placed up to 7 m above the general site grade. The Bruce B facility was constructed at a foundation grade level excavated several meters below Lake Huron and from 1 m to 12 m into the bedrock. Overall, the regional bedrock geological setting is a very stable environment where structural features associated with faulting or folding of the rock sequence are rare.

The western Ontario region lies within the tectonically stable interior of the North American continent and is characterized by low rates of seismicity. The National Building Code (NBC) of Canada (2005) indicates that the Bruce Power site is located within a region that would have a median peak ground acceleration of 0.059 g, where g is the acceleration due to gravity. This median peak ground acceleration is the lowest value indicated on the Seismic Hazard Map of Canada.

The surficial deposits below the Algonquin Bluff and underlying the Bruce Power site include silty to clayey till of the Elma (Catfish Creek) sequence overlying the bedrock surface. This till sequence varies in thickness up to approximately 15 m and locally contains interbedded sequences of sand. Overall, the soil beneath the site consists of natural soil derived from glacial deposits as well as construction fill materials that are also derived from glacial deposits.

Groundwater flow within the surficial deposits and bedrock of the local area is directed north-westward toward Lake Huron, generally sub-parallel to the well-established surface drainage pattern. Groundwater discharges into the streams and within the swampy areas below the Algonquin Bluff. Above the Algonquin Bluff, groundwater gradients are downward from surface toward the bedrock. Below the bluff, adjacent to Lake Huron, the gradients are upward where groundwater in the bedrock, recharged over time from locations above the bluff, discharges into the lake.

Although there are local variations, groundwater movement within the vicinities of Bruce A and Bruce B is generally towards Lake Huron. The principal hydrostratigraphic units descending from ground surface are as follows:

- A laterally discontinuous foreshore sand deposit;
- A coarse grained matrix supported sand and gravel;
- A dense fine-grained, glacial till aquitard; and
- A semi-confined carbonate bedrock aquifer.

However, direction of groundwater flow beneath both the Bruce A and Bruce B Powerhouses is directly controlled by a system of foundation drains. The foundation drain sumps collectively discharge into the Condenser Cooling Water (CCW) discharge duct. The discharge rates are not affected by either the operational or lay-up status of the power plant. The sumps are gravity drains affected only by variations in the lake level and surrounding groundwater levels.

5.1.2 Hydrology

The Bruce Power site is located within the Stream C watershed, which is bounded by the Underwood Creek watershed at the north and the Little Sauble River watershed at the south. There is an extensive storm water infrastructure, including catchbasins, manholes, open ditches, culverts and outfalls to Lake Huron. There are a total of 16 outfalls, which discharge directly to the lake.

The near-shore currents in the local area are predominantly bi-directional and parallel to shore. The ratio of northeast current movement to southwest current movement is about two to one throughout the entire year. Lake currents agree reasonably well with the prevailing wind, particularly during fall and winter.

The average current speed is about 10 cm/s, with maximum recorded current speed of 50 cm/s. Mean current speed varies from month to month, with relatively stable and slow speeds in spring, highly variable speeds in summer (due to stratified conditions), increasingly high speeds in the fall, and significantly lower speeds during winter (due to sheltering effect of ice cover).

Under most prevailing current conditions, there is little circulation in Baie du Doré. The Baie appears to be more heavily influenced by wind and wave action than by broad circulation patterns in the lake.

Sediment transport is bi-directional along the shoreline, principally driven by wave-generated currents alongshore. However, imbalances between the bi-directional transport results in net transport to the south. The existence of only limited depositional zones suggests very little deposition of sand-sized and smaller materials occurs in the vicinity of the Bruce Power site, with the possible exception of a localized area at the head of Baie du Doré.

Lake Huron is a typical cold, deep oligotrophic lake, with low nutrient levels (relative to Lake Ontario and Lake Erie). Typical concentrations for nitrogen, phosphorus, dissolved solids, chlorophyll, calcium and silica, show little variation spatially and temporally. Results from sample collection and analysis conducted for the EA of the Restart of Units 3&4 were consistent with those previously reported for Lake Huron, falling within the provincial water quality guidelines.

All Bruce A and Bruce B effluent is directed to the existing CCW intake or discharge channels, with the exception of the domestic sewage (which goes to the Sewage Processing Plant) and portions of the yard drainage, which flow directly to Lake Huron. The various effluent streams at both Bruce A and Bruce B are monitored for chemical and radiological discharges to the environment. This monitoring is undertaken to ensure compliance with the MISA limits in accordance with the requirements of Ontario Regulation 215/95 and specific Certificates of Approval from the OMOE.

The towns of Port Elgin, Kincardine and Southampton are located on the shores of Lake Huron in the region of the Bruce Power site. These towns have municipal water supply plants (WSPs) which obtain water from Lake Huron, and water pollution control plants (WPCPs) which discharge treated wastewater to Lake Huron. MacGregor Point Provincial Park (13.5 km NE of Bruce A) is supplied from a water intake located 20 m into the lake at a depth of about 0.6 m. The Brucedale Conservation Area campsites (6 km NE of Bruce A) are supplied by a well (48 m deep and 30 m from the lakeshore). Inverhuron Park has recently switched its water supply from well water to supply from the Kincardine WSP.

Most of the rural population in the area obtains their water from private or communal wells. Communities within the vicinity of the Bruce Power site, such as the Village of Tiverton, the hamlet of Underwood, some residences of Scott Point, Woodland Court Trailer Park, and Lime Kiln Cottages are supplied by communal wells. Many inland cottages have water wells and septic tanks, but some lake front properties have direct intakes from the lake. Bruce A and Bruce B obtain their treated domestic water through withdrawals from the intake channel and treatment in the water treatment plant.

The near-shore ambient water temperature typically ranges from 0.2°C to 4.4°C in winter (December to April) with lows typically occurring in February. Water temperature ranges from 7°C to 20°C in spring, summer and fall (May to October) with peaks typically occurring in August. Ambient water temperature in the area is affected by upwelling and downwelling events primarily in summer. During these events, daily changes of about 10°C in ambient water temperature are common, with recorded extreme increases or decreases of more than 15°C over a few days.

The estimated areal extents of thermal plumes for existing reactors for both warm and cold water conditions have been described in previous studies. The shape of a thermal plume at any given time is highly variable and affected by a number of factors, including the prevailing currents and ambient water temperature. The maximum areal extent of the thermal plumes for existing conditions is approximately 4,400 ha based on the criterion of 2°C above the ambient, in consideration of both warm and cold water conditions. The area affected by the combined Bruce A and Bruce B plume at any given time is conservatively estimated to be in the range of 70 ha to 3,600 ha with an average plume size of 1,250 ha for eight units in operation.

5.1.3 Aquatic Biology

Each of the Bruce A and Bruce B stations utilize a CCW discharge channel to carry used CCW. The Bruce A CCW discharge channel is conveyed through an excavated channel that runs north from the site to the shoreline of Lake Huron. The Bruce B CCW channel is conveyed through an excavated channel that runs to the southwest from the site.

The majority of the near-shore zone of Lake Huron is characterized by rocky outcrops and as a result the aquatic habitat features are largely comprised of rocky substrates. As such biological diversity is limited. The deeper near-shore areas in the vicinity of the Bruce Power site also consist of primarily rocky substrate. Some of these areas potentially provide spawning habitat for regionally important fish species, such as lake and round whitefish, as well as habitat for deepwater sculpin.

Baie du Doré, located northeast of the Bruce Power site, is the first major embayment along the eastern shoreline of Lake Huron northward from Sarnia. The Baie is characterized by shallow depths and substrates comprised mainly of rock and bedrock outcrops. It is nearly completely transected by two rocky shoals that run in a northeast direction (i.e., parallel to the Lake Huron shoreline) and provide protected habitat at the head of the Baie. Substrates in the Baie are typically a mix of sand and gravel, interspersed among cobble and boulder, which alternate with bedrock outcrops. A number of small, localized wetlands occur at the head of the Baie and are connected to the Baie through small outflow channels.

The occurrence of aquatic vegetation throughout the area is sparse. A limited area of submergent aquatic vegetation occurs only in the discharge channel in the relatively protected barge dock area where suitable substrates exist. A few very small, localized patches of submergent vegetation have also been noted in Baie du Doré, where suitable conditions exist.

Benthic habitat diversity is low, as near-shore areas (less than 4 m) are typically characterized as severe and inhospitable. Benthic invertebrate habitats are primarily confined to rock and sand substrates with only a few localized areas of fine-grained organic sediment.

A similar lack of substrate diversity affects potential use of the area by fish populations. Much of the habitat consists of rocky areas interspersed with sandy substrates in protected areas. Adult and young-of-the-year fish species in the Great Lakes use a wide diversity of substrates, although gravel, sand and silt are the most preferred. These substrate types are often found within areas protected from wave and current action, such as occur at the head of Baie du Doré, where the highest numbers and diversity of fish were observed during 2001. Coarser substrates, such as those found in areas exposed to currents (i.e., discharge channels) or wind/wave action (i.e., exposed shoreline), are also important habitat features since they provide spawning, nursery and adult habitat for many fish species.

A review of shoreline attached algae (periphyton) from 1973 to 1981 found that differences in growth were observed relative to the various discharge points, with better algae growth in the discharge channels relative to unaffected areas along the near-shore. Biomass was also higher in Baie du Doré than in other areas along the near-shore and likely reflected warmer summer water temperatures in this area.

Plankton communities in the area have been characterized as highly variable both in biomass and species composition. Summaries of studies from 1975 to 1980 of the phytoplankton community noted that while phytoplankton were abundant near the Bruce Power site, diatoms dominated the community.

Summaries of zooplankton sampling for 1975 to 1980 have noted that the most common group was rotifers, though copepods and cladocerans were also noted as important members of the community. Baie du Doré is the most productive area for both zooplankton and phytoplankton.

Benthic community assessments found that benthic communities were limited by habitat characteristics to a number of primary groups: oligochaetes (Naididae); amphipods; chironomids; and ephemeroptera. Numerically, amphipods were the dominant group in the near-shore areas, while Naidids were the dominant group in the discharge channel (in association with Cladophora). Qualitative assessment of the near-shore benthic communities in 2001, conducted as part of the EA studies, indicated that a relatively diverse community of benthic organisms exists in the near-shore area, but that these were sparsely distributed within this area.

Between 1961 and 1993, 155 fish surveys were completed using several different gear types (gillnet, trap net, seine, windemere net, larval tows, electrofishing) and techniques (SCUBA and skin diving, impingement and entrainment sampling, creel surveys, surface visual surveys). A total of 85 species were recorded, the most common being the yellow perch, white sucker, smallmouth bass, alewife, rock bass, common carp and longnose sucker. In general, the composition of the fishes captured was a mixture of species preferring warmwater and coldwater habitats. The fish community in the area of the Bruce Power site is comprised of two major types: those that range broadly throughout the region (the Lake Huron fish community); and those that are confined to the local area for most or all of their life stages (the local fish community).

Species included in the Lake Huron fish community category are round whitefish, lake whitefish, lake trout and deepwater sculpin. These fish prefer cooler water temperatures and typically spawn at depths of 1-8 m, outside the shallow inshore littoral zone. The majority of these species make use of the near-shore areas only during spawning preferring offshore deeper waters, particularly during the warmer summer months.

The Lake Huron fish community uses the near-shore area only during specific periods. An example of this community is the lake whitefish, which typically spawn in shallow areas on gravel and rock substrates. Adult whitefish are benthically oriented and spend most of the summer and fall offshore in deeper, cooler water beyond the influence of the Bruce Power site (18 m to 60 m). Seasonal migrations into the near-shore zone are made in spring, possibly to take advantage of near-shore food resources, and again in November/December for spawning when inshore water temperature cools. Spawning is expected to occur at depths ranging from 1 m to 8 m. Loscombe Bank, located northwest of the Bruce A discharge, has been postulated as the most southern extent of spawning for both round and lake whitefish along the eastern shore of Lake Huron. A three year tag, release and recapture program for both round and lake whitefish is in its last year of tagging (2006) to determine the validity of the above assumption as a result of the Bruce A Units 3&4 restart EA follow-up program.

Deepwater sculpin inhabit deep offshore areas well beyond the influence of the Bruce Power site for almost their entire life cycle. The species' only potential interactions with either Bruce A or Bruce B occur when newly hatched larvae may migrate inshore becoming susceptible to entrainment during late winter/early spring.

Species included in the local fish community category are smallmouth bass, northern pike, spottail shiner and bowfin.

Baie du Doré provides the largest area of warmwater fish habitat in the vicinity of the Bruce Power site. The habitats of the Baie provide spawning, nursery and foraging areas for many species of fish including large predators (e.g., northern pike, smallmouth bass), lake resident smaller species (e.g., spottail shiner), wetland species (e.g., central mudminnow, banded killifish) and riverine species (e.g., common shiner).

The two most common inshore warmwater (i.e., local) species were yellow perch and smallmouth bass. Perch prefer water temperatures of approximately 20°C and migrate in and offshore according to seasonal temperature variations. They spawn in shallow water during spring and move offshore to depths generally less than 9 m during summer.

During various times of the year many fish species move between offshore and near-shore habitats to spawn, forage or enter tributaries. For example, emerald shiners spawn in the shallow littoral zone of lakes in spring and then move to deeper water during summer. The exposed coastline of Lake Huron periodically experiences rapid temperature fluctuations due to wind-driven currents such that the deeper offshore habitats become warmed enough to be exploited by warmwater fishes. When these conditions are present, warmwater fish often move out into the lake from their protected embayments and river mouths to forage.

Local First Nations consider the surrounding waters of Lake Huron part of their traditional territory. Their lands, water and resources are an essential part of their identity and culture, as well as their sustainable economy. The harvesting of fish from Lake Huron is an important source of food for both communities and the commercial fishery is important to their livelihood.

5.1.4 Atmospheric Environment

The Bruce Power site is located on the east shore of Lake Huron, and is subject to lake meteorological effects. The mean annual temperature measured at the Bruce Power site is 8.2°C. The mean daily temperatures fall below 0°C in December through March. The coldest month is January, with average mean daily temperatures of -3.4°C. The lowest recorded temperature for this period was -24.7°C, recorded in January of 1999. Summer temperatures average 19.0°C, or higher, and the highest temperature recorded was 31.2°C in June of 2001. Precipitation is quite consistent throughout the year. The average annual precipitation ranges from 944 mm to 1,154 mm.

The prevailing winds are generally from the westerly direction approximately 50% of the time. There is also a strong south-westerly component that occurs approximately 11% of the time. The average measured wind speed at the 10 m level of the on-site 50 m tower was 3.45 m/s for the years 1998 to 2000. No average wind speed was determined for 2001 to 2003. In 2003, calms (wind speed <1.5 m/s) were reported 17% of the time and low to moderate wind speeds (1.5 to 3 m/s and 3 to 5 m/s, respectively) had the highest frequencies at 33% and 32%, respectively.

Local and regional air quality is typical of the general air quality in south-western Ontario. Air quality impacts are dominated by the substances that combine to produce smog or acid rain: carbon monoxide; nitrogen oxides; volatile organic compounds; sulphur dioxide; and particulate matter. Existing off-site noise levels reflect a rural sound environment and are generally characterized by the sounds of nature (rustling leaves, waves on the shore of Lake Huron, insects and birds).

5.1.5 Terrestrial Biology

Bruce County contains a number of large forested areas and wetlands, providing core habitat for a variety of wildlife species. Approximately 37% of Bruce County is forested, with much of the north portion of the county under forest cover. Major river systems within the region include the Saugeen, Sauble, and Rankin. The Lake Huron shoreline, which runs along the west edge of the County, provides a natural habitat corridor that extends north to the Bruce Peninsula. The Niagara Escarpment runs along the east side of the Bruce Peninsula, which forms the north end of Bruce County. The natural environment in the vicinity of the Bruce Power site consists of a mosaic of immature to mature deciduous and coniferous forest, wetlands, open water, and old field.

The Douglas Point Swamp, which is located within the Bruce Power site, is a locally significant wetland that is dominated by eastern white cedar swamp communities. Stream C runs through the Bruce Power site before discharging to Lake Huron through Baie du Doré, a recognized provincially-significant wetland.

Other watercourses near the Bruce Power site include Tiverton Creek, Little Sauble River, Underwood Creek, and Mill Creek. Core natural areas in the area include: Inverhuron Provincial Park; Baie du Doré wetland; Scott Point wetland; and MacGregor Point Provincial Park. The Huron Fringe Deer Yard is another important natural feature. This deer yard runs along the Lake Huron shoreline from Inverhuron Provincial Park to MacGregor Point Provincial Park and provides significant winter habitat for white-tailed deer.

The Bruce Power site is large and much of it is forested with white cedar as the dominant tree species. A large white-tailed deer population is present on the site. Other wildlife species present on the site include groundhog, raccoon, beaver, porcupine, brown bat, coyote and a variety of breeding and migrant bird species, including wild turkeys.

A total of eleven amphibian species and seven reptile species have been identified within and immediately adjacent to the Bruce A exclusion zone. Northern spring peeper and American toad are reported to be the most commonly heard species during the amphibian breeding season. Other frequently encountered amphibians included northern leopard frog, green frog, gray treefrog, and wood frog. Eastern garter snake was the most commonly encountered reptile. Midland painted turtles were also observed relatively frequently.

Four amphibian species and three reptile species have been identified within the Bruce B site area, with a few additional species noted in areas adjacent to the site area. The leopard and green frog are the most commonly observed species. The three species of reptile observed were the midland painted turtle, the brown snake and the northern watersnake.

The greatest number and diversity of bird species are observed along the Lake Huron shoreline and in the Baie du Doré wetland. Species regularly observed in these areas included double-crested cormorant, ring-billed gull, herring gull, great blue heron, Canada goose and American black duck. Both of these areas provide protected embayments that may attract birds seeking refuge from wind and wave action that occurs at the mouth of the embayment. Less frequently observed species included red-breasted merganser, black-crowned night-heron, and spotted sandpiper.

The majority of significant, rare or endangered species recorded in the vicinity of both Bruce A and B are bird species. These include black-crowned night-heron, bufflehead, bald eagle, wild turkey, pectoral sandpiper, dunlin, great black-backed gull, Caspian tern and red-headed woodpecker. Most of these bird species are found within the Baie du Doré wetland.

Spotted turtle has been identified in the Baie du Doré wetland, although this species was not observed in the course of the field investigations carried out in recent years.

5.1.6 Radiation and Radioactivity

In terms of radioactivity, people living and working in the area are exposed to both natural and technically enhanced sources of radiation. Natural sources of radiation include ionizing radiation from cosmic rays, naturally occurring radionuclides in air, water and food and gamma radiation from radioactive materials in soil, rock and building materials. Technically enhanced sources of radiation are primarily from the operation of nuclear facilities (e.g., Bruce A, Bruce B and other CNSC licensed facilities).

The existing radiation environment is extensively described in the Radiological Environment Monitoring Program reports that are published by Bruce Power annually, and in the EAs recently completed for other facilities at the Bruce Power site.

5.2 Human Environment

5.2.1 Land Use

Land use in the area surrounding the Bruce Power site falls into two general classifications. Along the shoreline is a recreation area, while inland is primarily used for agriculture.

Title to Inverhuron Provincial Park, which is situated at the southern boundary of the Bruce Power site, was acquired by Ontario Hydro so that the Atomic Energy Control Board (the predecessor organization of the CNSC) siting guidelines for heavy water plants are satisfied (the heavy water plant at the Bruce Power site has since been closed and has largely been decommissioned). However, Inverhuron Provincial Park is leased to the MNR, which operate the southern portion as a day-use and overnight campsite.

Cottage development in the Bruce County has been growing at a rate of five per cent per year since 1968. In recent years, the number of cottages along the shoreline within 40 km of the Bruce Power site has grown to approximately 5,800. There are also three conservation areas, two provincial parks and numerous private parks that offer camping and trailer facilities. MacGregor Point Park, located approximately 13 km north of Bruce Power site is a day-use and overnight camping facility.

Agriculture is an important component of Bruce County with over 62% of the County's area dedicated to the agricultural industry. There are over 2,300 farms in the County, and it is ranked first in Ontario for total cattle production, and second in Ontario for total pork production. The County is ranked third in Ontario in sheep production, and is also the top producer of oats and the second largest producer of canola in Ontario. There is also a wide variety of supporting and processing industries related to the production of food.

One of the major industrial developments within Bruce County is the Bruce Energy Centre. This is an 800 acre serviced industrial park located immediately southeast of the Bruce Power site that was established in 1986.

The Bruce Power site is within the Municipality of Kincardine. The municipality includes the communities of Kincardine and Tiverton as well as several smaller residential areas. Bruce A and Bruce B are within 10 km of these residential centres. The local area is predominantly rural in nature, with isolated residences such as farm homes and country cottages. No residences occur within the Bruce A or Bruce B 914 m exclusion zones, which encompass the majority of the Douglas Point promontory west of Tie Road.

5.2.2 Aboriginal Communities

There are two First Nations communities in the area of the Bruce Power site: the Chippewas of Saugeen First Nation Reserve No. 29 and the Chippewas of Nawash Unceded First Nation located at the Cape Croker Reserve No. 27.

The Chippewas of Saugeen First Nation Reserve No. 29 is located adjacent to the town of Southampton on the shoreline of Lake Huron, between the mouths of the Saugeen and Sauble Rivers, approximately 30 km north of the Bruce Power site. The population on this reserve in 1998 was estimated by the Department of Indian & Northern Affairs at 617, with an additional 773 members living off-reserve, many within the traditional territory in the County.

The Chippewas of Nawash Unceded First Nation is centred at Cape Croker Reserve No. 27, located on the north side of Colpoys Bay and the east shore of the Bruce Peninsula north of the town of Wiarton. The population on this reserve in 1998 was estimated by the Department of Indian and Northern Affairs at 718 with an additional 1,246 members living off-reserve many within the traditional territory in the County.

As noted previously the First Nations consider the surrounding waters of Lake Huron part of their traditional territory. Their lands, water and resources are an essential part of their identity and culture, as well as their sustainable economy. The harvesting of fish from Lake Huron is an important source of food for both communities and the commercial fishery is important to their livelihood.

Métis people are recognised as a distinct group of Aboriginal peoples in the 1982 *Constitution Act*. There are a number of Métis people in the vicinity of the Bruce Power site who are part of the broad community and who are represented by the Saguingue Métis Council. The Council has shown a continuing interest in environmental studies relating to the operation of facilities on the Bruce Power site.

Bruce Power is working cooperatively with the First Nations to address two specific issues related to:

- The on-going care of the burial ground within the Bruce Power site; and
- Participation in an international lake-wide monitoring program of lake whitefish in Lake Huron. Lake whitefish is an important commercial and traditional fish species for the First Nations.

Two registered archaeological sites, Upper Mackenzie and Dickie Lake, are on record as having been located within the confines of the Bruce Power site. A third heritage area, the “Indian Burial Ground”, was identified by Ontario Hydro in the mid-1970s and demarcated by signposts in the early-1980s. A joint council meeting of the Chippewas of Saugeen and Chippewas of Nawash on March 10, 1998 resolved that the site previously known as Dickie Lake and the “Indian Burial Ground” be assigned an Ojibway name. The site is now referred to as Jiibegmegoong (Spirit Place). Both Chippewas of Saugeen and Chippewas of Nawash have requested and have received approval in the past to access the Bruce Power site to conduct either ceremonies or monitoring at the Jiibegmegoong burial ground.

5.2.3 Socio-economics

The economic base of Bruce County is diverse and includes agriculture, tourism and recreation, a service sector, manufacturing, light industry, fishing and some aggregate resource extraction. The County has a significant agricultural sector involving over 3750 farm operators (approximately 63% of farms are family owned and operated) and is ranked number one in cattle in Ontario, with approximately half of all of the County farms dedicated to beef cattle production. Tourism and recreation, hospitality services and the area’s heritage-oriented tourism attractions and associated crafts manufacturing/retailing are well established.

Saugeen Shores is the largest community in the County and Kincardine is the closest urban centre to the Bruce Power site. The Bruce Power site is within the municipality of Kincardine, which had a population of 11,255 in 2003. The municipality includes the communities of Kincardine and Tiverton as well as several smaller residential areas, including Inverhuron and Underwood. The Bruce Power site is approximately 4, 5 and 8 km from the closest of these residential centres, Scott Point, Inverhuron and Tiverton, respectively.

The overall population growth pattern for the County is stable. The towns of Kincardine, Walkerton, Port Elgin and Southampton (the lattermost two making up the majority of the population in Saugeen Shores) are the largest nearby communities with 2001 populations of 6,113 (2,542 households), 5,036 (1,951 households), 9,865 (2,651 households) and 3,151 (1,402 households), respectively. Tiverton, located approximately eight kilometres from the site, had a 2001 population of 743 (338 households). Inverhuron has a year-round population of approximately 200, plus approximately 250 seasonal cottagers.

The Bruce Power site is the single largest employer in the County, currently employing over 3,800 people. These full-time high paying jobs, along with both the Bruce A and B related expenditures and tax payments, represent a major factor in the local economy.

6.0 POTENTIALLY AFFECTED COMPONENTS OF THE ENVIRONMENT

One of the purposes of this document is to assist the CNSC and FAs in the early identification of potential environmental issues that should be considered in preparing the scope of the EA. Table 3 identifies the potential interactions between the Project and the environment, based on a preliminary analysis. The identification of potential interactions between the Project and the environment and a determination of expected change is based on the judgement of the technical specialists who prepared this report based on their experience with similar EAs at Bruce Power and other Ontario nuclear power stations.

Table 3: Potential Project-Environment Interactions

Environmental Component	Potential Interaction
ATMOSPHERIC ENVIRONMENT	
Air Quality	Dust and vehicle emissions may be generated during site preparation and construction. During operation and maintenance, the periodic discharge of steam generator chemicals (e.g., hydrazine) is a potential source of exposure to humans and non-human biota. No greenhouse gases or smog-producing substance releases are expected during operation and maintenance. Mechanical draft cooling towers have the potential to produce visible plumes of condensed water vapour and emissions of small droplets of water with low concentrations of suspended solids. These suspended solids emitted in the water droplets may be sufficiently small to be respirable (i.e., < 10 µm) and are a potential source of exposure to humans and non-human biota.
Noise	Site preparation and construction may result in changes to noise levels. Operations are expected to have similar to existing facilities if once-through cooling is selected. The use of mechanical draft cooling towers may result in changes to noise levels during operation compared with existing facilities.
HYDROLOGY, WATER QUALITY AND AQUATIC ENVIRONMENT	
Lake Circulation	Construction and operation of new cooling water intake and discharge tunnels may result in changes to lake circulation.
Lake Water Quality	The Project has the potential to affect lake water quality through release of substances in routine and stormwater discharges and during site preparation and construction (e.g., sediment from erosion, road salt, and steam generator chemicals).
Lake Water Temperature	Operation of the condenser cooling water system may result in localized changes to lake water temperature.
Aquatic Biota	Aquatic biota may be affected through the construction and operation of cooling water tunnels and changes to lake water circulation. lake water quality, and lake water temperature. These changes to lake water circulation and lake water quality may alter the ability of aquatic biota to continue to use their habitat, particularly during early life stages.
Aquatic Habitat	Site preparation and construction activities, and operation of cooling water tunnels may result in physical changes to aquatic habitat including lake water temperature.
Radiation Dose to Aquatic Biota	Radioactive releases to air and water may be potential sources of exposure to aquatic biota. Radiation doses are expected to be similar or lower than those experienced under existing conditions.
TERRESTRIAL ENVIRONMENT	
Vegetation Communities	Site preparation and construction activities may result in changes to vegetation communities (e.g., removal of vegetation during grubbing and clearing). As noted for the atmospheric environment, changes in air quality associated with dust, vehicle emissions, or periodic releases may lead to toxicological effects to vegetation.

Environmental Component	Potential Interaction
Wildlife Habitat and Natural Heritage Systems	Site preparation and construction activities may result in changes to wildlife habitat and/or natural heritage systems (e.g., removal of vegetation during grubbing and clearing). Changes in air and water quality or the level of disturbance (e.g., noise, lighting, and increased human presence) may also alter the suitability of wildlife habitat and/or natural heritage systems.
Wildlife Communities	Site preparation and construction activities may result in changes to vegetation communities (e.g., removal of vegetation during grubbing and clearing) and changes in noise levels, in turn, changing the ability of wildlife to continue to use the habitat. As noted for the atmospheric environment, changes in air quality associated with dust, vehicle emissions, or periodic releases may lead to toxicological effects to wildlife. Wildlife may also be directly affected by changes in rates of road-related mortality.
Radiation Dose to Terrestrial Biota	Radioactive releases to air and water may be potential sources of exposure to terrestrial biota. Radiation doses are expected to be similar or lower than those experienced under existing conditions.
GEOLOGY, HYDROGEOLOGY AND SEISMICITY	
Geology	Changes to overall geology are not expected as a result of construction and operation..
Hydrogeology	Site preparation and construction activities has the potential to result in localized changes to groundwater flow and direction (e.g., from surface sealing).
Seismicity	The plant will be designed to safely withstand earthquakes greater than any earthquake likely to occur at the Bruce Power site.
LAND USE AND RESOURCES	
Land Use	Site preparation and construction activities may cause localized changes to land use.
Transportation	Site preparation and construction activities as well as operation of the new power plant may cause changes in the number of transport and staff vehicles entering and exiting the site.
Landscape and Visual Setting	Site preparation and construction activities may cause localized changes to landscape and visual setting (e.g., with the construction of new buildings and/or mechanical draft cooling towers). Mechanical draft cooling towers may produce visible plumes of condensed water vapour.
HUMAN HEALTH	
Radiation Dose to Workers	The Project is a potential source of radiation exposure to workers. Radiation doses to workers will be similar to those experienced by current workers operating the Bruce A and Bruce B reactors.
Radiation Dose to General Public	Radioactive releases to air and water may be potential sources of exposure to members of the public. Radiation doses are expected to be similar or lower than those experienced under existing conditions.
Conventional Health of Workers	The Project is a potential source of chemical (non-radiological) exposure to workers. Workers may also be exposed to physical risks (e.g, cuts, bruises and falls) and noise levels that may affect their health.

Environmental Component	Potential Interaction
Conventional Health of General Public	Changes in air and water quality may result in potential chemical (non-radiological) exposures to members of the public. Demand for health services may potentially be affected by the Project and may, in turn, affect people's health and well-being.
SOCIO-ECONOMIC CONDITIONS	
Population and Economic Base	The meaning people attach to the presence of a nuclear facility and their community and the influence of normal station operations may potentially affect people's feelings of personal security and well-being.
Residents and Communities	The meaning people attach to the presence of a nuclear facility and their community and the influence of normal station operations may potentially affect people's feelings of person security and well-being.
Community Infrastructure	The Project could have potential effects on finances, employment and demand for services during all phases.
Community Services	
Municipal Finance and Administration	
PHYSICAL AND CULTURAL HERITAGE RESOURCES	
Physical Heritage Sites	The Project is not expected to result in any changes to physical or cultural heritage sites.
Cultural Heritage Sites	
ABORIGINAL INTERESTS	
Aboriginal Communities	The meaning that Aboriginal people attach to the constructions and presence of a nuclear facility and their community and the influence of normal station operations may potentially affect people's feelings of personal security and well being. Site preparation, construction and operation of the Project may affect employment and business opportunity. The construction of new cooling water intake and discharge tunnels may affect Treaty Rights/Land Claims.
Traditional and Current Land Use	
Cultural Heritage and Spiritual Sites and Activities	
Affects on Mother Earth and Future Generations	
Employment and Business Opportunities	
Treaty Rights/Land Claims	

7.0 COMMUNITY AND STAKEHOLDER CONSULTATION

7.1 Communications and Consultation Plans

Bruce Power is committed to providing members of the public and other interested stakeholders with opportunities to gain knowledge about the Project and to provide input to the EA studies on their interests and concerns. To ensure the necessary consultation throughout the conduct of the EA, Bruce Power has developed a Communications and Consultation Plan (Golder, 2006a). The Plan outlines how communications and consultation will be implemented and how consultation will be used to inform the EA process. The plan identifies communications and consultation with federal, provincial and local government agencies, communities in proximity to the Bruce Power site, Bruce Power employees, and the general public. The community outreach area, showing the geographic extent of the proposed activities, is illustrated on Figure 11.

Bruce Power also recognizes the importance of engaging in dialogue on the Project with Non-Governmental Organizations (NGOs). A NGO Consultation Plan has been prepared to guide discussions with NGOs throughout the EA (Golder, 2006b).

Bruce Power will also continue to engage the local First Nations governments and communities in information and communications on the Project. Based on experience and understanding of the communications environment in the Saugeen Ojibway Nation communities, discussion on finding the best methods for reaching specific target audiences will be required. There are cultural beliefs and ways of life that also must be considered. For example, in making decisions Anishnaabe people believe the impacts for seven generations must be considered and that the entire community must be involved, including youth and children. An initial meeting with the First Nations was held at the Bruce Power Visitors' Centre on December 15, 2006. Bruce Power and the First Nations are proceeding with the development of an agreement to guide First Nation participation throughout the EA.

Some of tools that are being considered and discussed to engage these communities include:

- Radio public service announcements;
- Radio interviews;
- Community feasts including presentations and discussions;
- Facilitated workshops;
- Presentations to Chiefs and Councils;
- Joint meetings/community events with Chippewas of Saugeen, Chippewas of Nawash Unceded First Nations and Saguingue Métis Council;
- Education tools for youth and children (e.g., age appropriate tools such as colouring books, puzzles, classroom visits etc.);

- Bus tours to the Bruce Power Visitors' Centre for open houses etc.;
- Personal/home visits to community members;
- Pamphlets/brochures;
- Flyers; and/or
- Inclusion in community events calendars.

Once agreed-to by the First Nations and Bruce Power, the agreement will form the basis for communications throughout the EA process.

7.2 Initial Communications and Consultation Activities

On August 17, 2006, Bruce Power announced its intention to proceed with long-term plans to evaluate options for continued electricity generation over the long-term, including refurbishment of existing reactors at the Bruce Power site or construction of a new nuclear power station at the Bruce Power site.

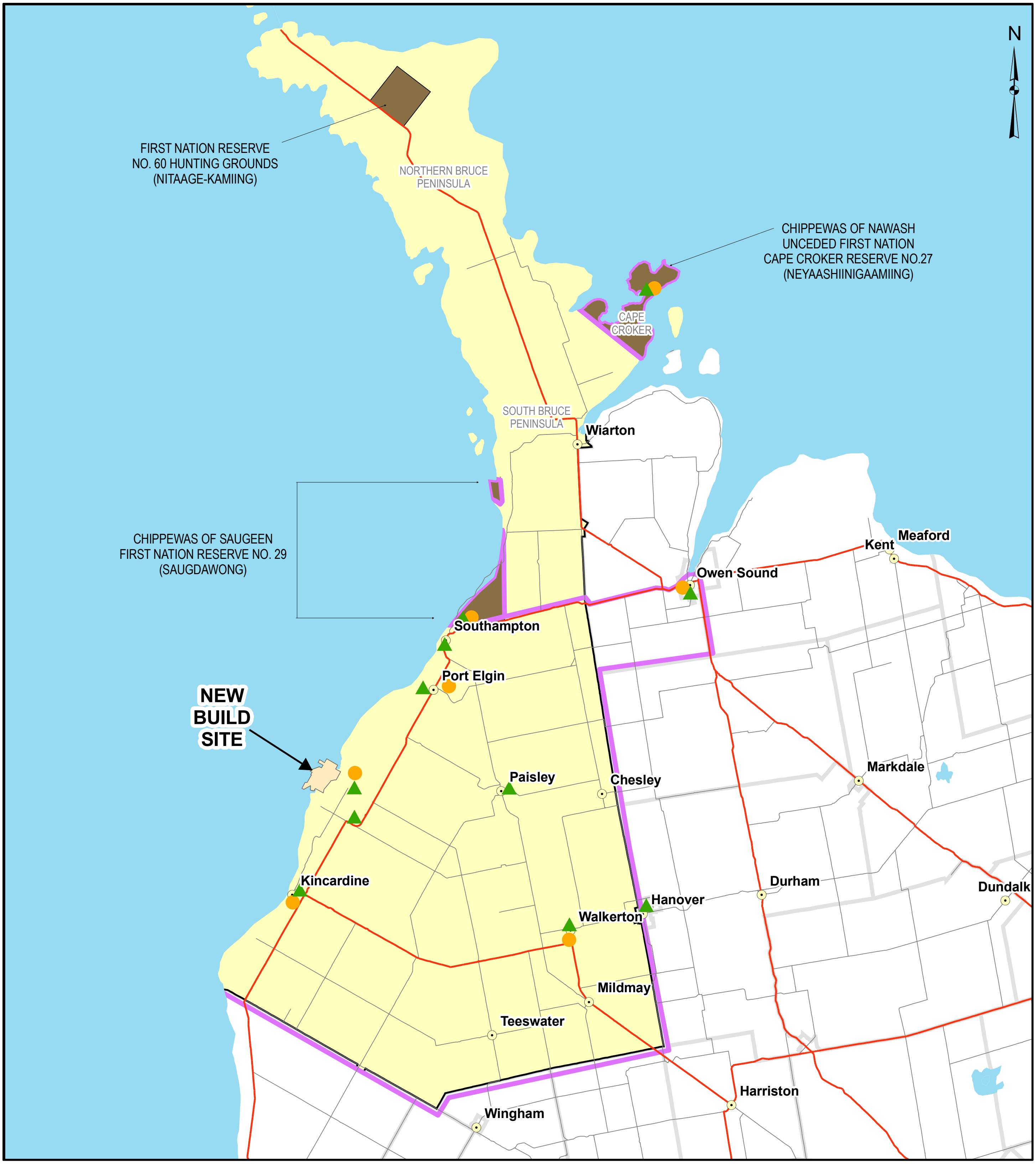
Shortly thereafter, mailing cards, newsletters, and newspaper and radio advertisements were used to inform the public about their long-term planning process and the EA being commenced, to invite them to the first round of Open Houses, and to provide them with ways of contacting Bruce Power. These Open Houses were extensively advertised in the outreach area (Bruce Power, 2006a).

Table 4 summarizes the dates and locations for the first round of Open Houses and also identifies the number of people who signed-in. Response to the Open Houses, which included an advertised presentation by Bruce Power's President and Chief Executive Officer, was modest and was typical of the level of interest seen in previous EAs. A report on the Open Houses has been prepared and a copy is provided on the CD accompanying this Project Description Report.

Table 4: Summary of Open House Events

Date	Location	Signed Attendance
August 30, 2006	Bruce Power Visitors' Centre, Tiverton, ON	54
September 14, 2006	Lakeshore Racquet Club, Port Elgin, ON	13
September 18, 2006	Owen Sound North Grey Union Public Library, Owen Sound, ON	11
September 19, 2006	Governor's Inn, Kincardine, ON	15
September 26, 2006	The Hartley House, Walkerton, ON	8

An initial Workshop on the likely EA process was held on Wednesday, October 25, 2006 at the Bruce Power Visitors' Centre. The Workshop provided an opportunity for community and government



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LEGEND

- Proposed Library and Community Repositories
- Proposed Open House Event
- Proposed Newsletter Distribution Area(Approximate)
- Bruce Power
- First Nations' Lands
- Bruce County
- Highway

REFERENCE

Site Layout and Base Data - Provided by Bruce Power.
Airphotos - Terra Remote Sensing, 2005, 25cm resolution.
Datum: NAD 83 Projection: UTM Zone 17N

PROJECT

BRUCE POWER
NEW BUILD
ENVIRONMENTAL ACTIVITIES

new BUILD bridging the generation gap

TITLE

OUTREACH AREA FOR COMMUNICATION ACTIVITIES

Golder Associates
Mississauga, Ontario

PROJECT No. 06-1112-041			SCALE 1:750,000	REV. 0
DESIGN	ASB	21 Sept. 2004	FIGURE 11	
GIS	KD	19 Jan. 2007		
CHECK	BT	19 Jan. 2007		
REVIEW	MM	19 Jan. 2007		

G:\Projects\2006\06-1112-041_BruceEA\GIS\MXDs\Draft\Project_Description\Fig11_Outreach_Area.mxd stakeholders to learn more about the EA and provide feedback early in the process. The Workshop was attended by members of community organizations, local media, municipal representatives, public health officials, and federal and provincial government representatives from Environment Canada, Indian and Northern Affairs Canada, Ontario Ministry of the Environment, and Ontario Ministry of Natural Resources. Feedback from Workshop participants indicated protection of the environment, human health and safety, radioactive waste management, and concerns about accidents as being the most important issues regarding the Project (Bruce Power, 2006b). A report on the Workshop has been prepared and a copy is provided on the CD accompanying this Project Description Report.

Materials generated for the Communications and Consultation Plan, such as newsletters, Open House reports, EA Guidelines and the Project Description will be made available throughout the EA at library repositories throughout the community outreach area. Questions, issues and comments provided to Bruce Power on the Project and/or the EA being conducted will be recorded in a stakeholder comment database. Responses to questions and comments and how issues were incorporated into the EA will be tracked and documented in the final EA Study Report prepared by Bruce Power.

8.0 REFERENCES

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