
CHAPTER 11

SOCIAL IMPACT ASSESSMENT

11.1 Introduction

Large development projects, especially petroleum exploration and production, often introduce changes in tradition, cultural resources and natural resource uses, as well as introduce ethnic and demographical migration and dispersion. These projects modify the social and cultural environments, and depending on development type and size, creates or enhances economic, health, education and other benefits that are valued by society.

Social impact assessments have been subject of debates over the last few years. Presently, they are not expected to be a complete sociological study nor a social cost/benefit analysis of a project. The assessment identifies, analyses, and evaluates those social impacts the proposed development may have on individuals, social groups, traditional users, and other social users of the area.

However, unanticipated negative social impacts can increase undesired benefits. In the long term, unanticipated negative social impacts can come in the form of increased need and access to social services such as education and health services, etc., during post construction phase and final development phase due to demographical population growth and migration.

The proposed BNE developmental Drilling and Pipe Installation Project will impact the social infrastructure. These impacts will include demographic migration, roads and transportation, and institutional capacities of local government and organization to meet these needs. Also for consideration are goods and services demand, housing and skilled labor, as required with any new large development project of this nature.

11.2 Background

The BNE **‘Spanish Lookout Field – Development Work Programme’** has been developed based on the MHA Reservoir Simulation Model Studies. Four prediction cases were run in order to understand the oil rates and recoveries that may be expected from various development strategies. Management has decided that Case 3 – “Depletion with 5 existing producers plus 4 additional production wells” as the best option based on economic evaluation. Four additional producer wells (the two proposed wells in the San Marcos Area as a possible extension of the SLO field) are proposed to be drilled and the reservoir will be depleted with a total of nine wells. The **“Field Gathering System”** was initiated in August 2006 and consists of a 10” SDR 7 Polypipe trunkline running along the spine of the field, from Mike Usher #1, through Mike Usher #2 to Mike Usher #5. A 10” isolation valve will be installed at each of the well sites. The proposed pipeline route although this is subject to minor changes to meet concerns within the Mennonite Community. There may also be changes to the high point vents.)

At each well site the trunk line will be brought above ground in 10” steel pipe into a manifold which will permit production from up to 5 wells to be individually flowed into the pipeline. The manifold will also include the facility to divert the production stream from each well through a three phase separator, where oil, water and gas rates can be measured, before the individual components will be co-mingled back into the trunk line. Production from any additional wells will be flowed through individual 4” SDR 7 Polypipe flow lines to the nearest trunk line well site with spare manifold capacity.

In order to **prevent rupturing of the pipes due to excess pressure**, all Polypipe lines are restricted to a 130 psi MAWP. All Polypipe pipelines will be protected from excess pressures by a 2” Rupture Pin Technology Rupture Pin Valve downstream of the wellhead choke and upstream of the Polypipe pipeline with the rupture pin set at 130 psig.

BNE will follow a **“Burial & Marking Policy”** of all Polypipe pipelines, irrespective of diameter; they will be buried in a 5.5ft deep trench. The pipe will then be covered with 12 inches of fill prior to laying the power distribution cable in the same trench. The trench will then be backfilled and surface conditions restored. (Note: this depth of burial exceeds that required in US DOT § 195.246 Transportation of Hazardous Liquids by Pipeline)

11.3 Socio-economic Environment

The Spanish Lookout (SLO) Community can be described as an agricultural, agro-industrial, industrial, commercial and trading center. Data for this section was obtained through the use of a survey instrument that was prepared and explained to the members of the Petroleum Committee; they filled the data on the form and the following table summarizes it.

Table 11.1 Summary of Economic Activity in Spanish Lookout

Industry	No of Farmers of Business Owners	Approximate value of Yearly Production	Comments
1. Poultry	176	\$28.35 M	Broilers, layers, turkeys
2. Hatchery	18	\$3.5 M	
3. Dairy	67	\$6.825 M	
4. Beef	256	\$2.5 M	\$4 M expanding annually
5. Grains	110	\$19.125M	Corn, RK, Vigna, sorghum
6. Animal feed	4	n.a (Private Business)	
7. Commerce and trading	59	Idem	
8. Timber Industry-Lumber	5	Idem	
9. Timber Industry-Board House Construct	4	Idem	
10. Pre-fab Metal	4	Idem	

Building			
11. Construction off SLO by SLO Businesses	various	\$4.0 M	
12. Transportation	n/a	Private Business	

n.a= not available

Those five productive activities alone and which are community owned add up to Bz. \$60.3 million. If we were to estimate the per capita GDP from these five activities alone, it is already Bz. \$30,105 based on the 2006 mid-year estimate of the SLO population of 2003 people.

11.3.1 Current Land Use and Traditional Resource Users

Except for the Aguacate Lagoon Reserve, all land in the SLO area is being used for agriculture, extensive pastures, quarrying, roads/infrastructure and dumpsites. The Community owns as a group approximately 30,000 acres in this region. This Mennonite Farming Community of SLO had begun to rent land annually over the last 10-12 years from other landowners in the Cayo District in order to meet their demands of grain production for human consumption and animal feed. The SLO Community has also been a pioneer in exporting RK Beans and Vigna beans to the Caricom Region and as such has been always looking for more and more better soils for these crops.

On the other hand, the immigrant community members of San Marcos use their lease parcels of land for subsistence agriculture, some small scale beef cattle production and have just begun to raise dairy cattle for their home use. The few who had mechanized their lands either sold them to the Mennonites of SLO or are renting the land for grain production to the same SLO community members. Unfortunately, of the 32 families residing in the village, two have property documents, six have Lease Fiats and the remaining 24 families do not even have an ordinary long term lease for which most have applied 3-5 years ago but without success.

In discussions with Mr. Owen Gentle, who is working for the sub-contractor ASG International (surveying, drilling, recording components), he has prepared a list of farmers whose parcels will be impacted by road and bridge construction and pipe installation. Even when only one well will be drilled in the Lima family parcel, the following farmers' parcels may be impacted and if so, BNE may need to consult with them with regards to the proposed development. The list is presented herein:

Table 11.2 List of San Marcos farmers to be impacted by roads, bridges and pipelines

With redesign of the road and pipeline from San Marcos, the following farmers (the Lima family) will be the only ones affected, namely: Mrs. Mercedes Lima, Mr. Cecilio Lima, Mr. Julio Lima and Mr. Gregorio Lima.

It should be noted that one of the direct benefits these farmers will receive from the development and production drilling, including pipeline installation, is the upgrading of their farm road to an

all weather 25ft-wide road that will be maintained by the developer during the drilling and production operations.

11.4 Socio-economic Issues

i. Regional Demographics/Population

The Cayo District is one of the largest districts in Belize. The following table presents a clearer picture. The highest percentage change in population between 2000 and mid-2006 has been in the urban in-migration.

Table 11.3 Demographics and Population of the Development Area

Region	1991	2000	Mid-year 2006	Percent Change
Cayo -Total	37,693	52,564	70,000	33.2%
- Urban	16,100	26,478	40,100	51.4 %
- Rural	21,593	26,086	29,900	14.6%
Spanish Lookout	1,506	1,786	2,003	12.2%
San Marcos	68	n/a	161*	

(CSO Mid-year estimate 2006, based annual population growth rate for Belize is 2.7%). *= As of January 31, 2007 reported by Chairman of Village Council.

ii. Employment

In discussions with three members of the Petroleum Committee, they emphatically and unanimously agreed that the Spanish Lookout Community has zero unemployment among the Mennonite residents themselves. The community employs approximately 200 men, women, girls and boys of their own and also an additional 800 employees from the surrounding villages. Wages in this community are better than the national minimum wage. The non-Mennonite workers commute daily to work and do not reside in SLO.

The BNE operation, as of the Fourth Quarter of 2006, was employing 142 workers and this figure peaked at 176 in the previous quarter. These workers come mainly from Bullet Tree Falls, Santa Familia, San Ignacio, Roaring Creek, Georgeville, Teakettle and Blackman Eddy. These workers have These workers are well compensated above the above the minimum wage even in non-supervisory positions they get paid overtime in accordance with the labour laws and have at least two weeks vacation per year. Additional benefits include free Group Life and health Insurance and a Christmas bonus. Transportation to and from work is supplied free of cost to the workers.

Of the 142 workers, there are 73 permanent employees of which the Corporate Office has 24 employed. The Petroleum Production operation employs 43 nationals and three expatriates.

In addition to this workers directly employed by BNE, there are other sub-contractors, such as ASG International who also employ more than 40 workers in the surveying, seismic and recording operations. This section currently employs seven persons from San Marcos Village and three more will soon be hired. This group of workers again is well compensated above the minimum wage. Most males from the village work out either at the SLO Community, Placencia and the Cayes in the tourism construction industry. Some of San Marcos female villagers work in SLO.

11.5 Social Infrastructure and Services

i. Education/Health Services

The SLO Community has two private primary schools for girls and boys (30 students on average) where both Mennonite and non-Mennonite children attend; each of the 30 students pays Bz. \$100/ month. These two schools have from infant to Standard Six grades.

There are 16 Community primary schools whose curriculum caters to the needs of the community. Currently there are no high schools or Junior Colleges. However, the private schools are planning to open a high school in SLO and are negotiating with the Ministry of Education to adopt the national curriculum.

San Marcos Village has one Roman Catholic Primary School with grades from Infant I to Standard Five since it was recently opened. Enrollment for 2006/2007 school year was at 57 students. The staff is comprised of one principal and two other teachers.

Table 11.4 Social Infrastructure of Villages near Project Site

Community	School	Fire Station	Police Station	Health Clinic	Church	Community Center
SLO	18	0	1	1	3*	1
San Marcos	1	0	0	0	1	1

* There are seven church buildings and three denominations

While San Marcos receives one monthly visit by the mobile health Clinic Service of the Ministry of Health, the SLO Community has a well established and daily functioning Health Clinic that is staffed by three nurses and 2 health assistants that cater to its residents and villagers from the neighboring villages. SLO also has a separate Dental Health Clinic catering to its residents and villagers nearby. In discussions with the Head Nurse at the SLO Community, she reports that there has been a slight increase in number of patients at the clinic, mainly from SLO, who have been treated for ailments resulting from the oil industry. BNE workers requiring the services of the health facility has been minimal or non-existent. Actual data was not available from the Clinic when the contact was made.

ii. Communication and Services

In the SLO Community, communication and related services are well established in the area with public and private telephones, two-way radios, fixed cellular phones, fax and email, and internet facilities. SLO has 24-hour electricity. No cable television is available because of their religious belief.

In San Marcos, few families have cell phones and private light plants for electricity to run their water pumps and television sets. San Marcos residents depend on rain water for human use since the well water is too heavy and of poor quality. They do not have potable water.

On the other hand, the SLO Community has 24-hour potable water that is sourced from the Belize Old River from various sites along the river. Currently they do not pay the GOB for the use of the river water is substantial due to the agro-industrial activity in the Community.

iii. Community Meetings

At a meeting held with the San Marcos Community in Late January 2007 with BNE's Communications Manager, the villagers had the following concerns:

- a. employment for villagers;
- b. assistance for the primary school;
- c. fixing of the road;
- d. increased traffic in front of school, especially when children playing during recess periods;
- e. supply of electricity to the village;
- f. medium or long term effects of flaring to villagers and
- g. villagers are not organized to negotiate with the Developer.

In response to these concerns, the Communications Manager reiterated that BNE is committed to work with communities where they have operations but at the time of the meeting the developer did not have any specifics on which projects they would invest their assistance. He also stated that the developer's Communications Plan is not ready yet.

At a separate meeting with five Village Leaders, including the two members of the San Marcos Petroleum Committee, the consultant was able to develop a list of the pros and cons of the drilling and pipe line installation activities as follows:

Table 11.5 Pros and Cons of the Drilling and Pipeline Installation Activities as seen by Village Leaders of San Marcos.

Pros	Cons
-Roads will be improved with two new bridges	-No terms of reference has been developed for the Village Petroleum Committee
-Village will be beautified	-Village has no high school graduates to take advantage of industry employment
-School may get computers	-If crude oil stored in tanks, flaring will be a health problem as is the case in SLO
-Electricity will come to the village -Agriculture Equipment for village may be acquired -Already 10 villagers employed	-24-hour drilling creates noise pollution for residents but most affected are the school children as was the experience when well No. 6 was being drilled. If pipes are used, then there won't be a problem.

At a consultation meeting with the Elders of SLO and the Chair of the SLO Petroleum Committee on the proposed development drilling and pipeline installation operation, they pointed out the following potential health impacts:

- a. Depression because of the unknown (many complaints and suspicions);
- b. Rainwater has dark particles;
- c. 50% of residents close to wells, say 100 ft away from flares, complain about having liver problems and have sought medical attention;
- d. The flu has been persistent; some people have it since August 2006 and still receiving treatment; and
- e. Some couples are complaining of reproductive problems.

As per Potential Human Safety issues for villagers, the SLO Leaders believe that BNE needs to establish a better and more effective consultation process. They also feel that BNE does not know exactly what and how human safety issues should be addressed and reduce their impact.

In discussing potential economic benefits to SLO, the leaders said that there are zero social benefits, few employment opportunities, some building contracts such as pipe line installation and trucking (only 4-5 SLO tankers of the 20 tankers are transporting crude oil to Big Creek). One main benefit to the Community is that BNE is paying for the use of the road system and also the maintenance of the system.

In discussions with the staff at BNE Corporate Headquarters, it is documented that the developer has invested in the SLO Community, since their work began in the area, approximately US \$3.5 M for road construction and the supply of goods and services by the many businesses operating there.

As per royalty to SLO, they understand that out of the GOB's 7.5%, the Community would be getting 5%; but so far no payments have been received. (Note: BNE is not responsible to pay them the 5% royalty it is the GOB)

iv. Security

Policy security is supplied through the SLO Police Station that is manned by one Constable who is supported, especially at night, by patrols of the Western Composite (BDF and Police Department) force based in San Ignacio.

v. Roads and Transportation

The project site and surroundings are linked by an internal the road system designed and maintained by the SLO Community. BNE is currently paying a fee to the Community for the use of this road access system. All major changes to the road due to pipe line installation (trench digging and bridges) will be rebuilt to previous state. Access to Belmopan and Belize City, is through a ferry and the Iguana Creek Bridge to the Western Highway. The nearest landing strip is at Central Farm and Belmopan City

Traffic to the region of the proposed development has increased over the last few years due to the increasing population growth of the area. The paved road through the Iguana Creek has increased the use of private vehicles to the area. Additionally, the road transport of the crude oil from SLO to Big Creek has also increased traffic to and from this project area.

11.6 Potential Human Health and Safety of the Proposed Development

The potential human health and safety issues of this proposed development are as follows:

Table 11.6 Potential Human Health and Safety Issues

Issues	Potential Impact	Actual Impact	Comments
Solution gas (also known as "associated gas")	Yes, if flared.	No, will be piped, separated and burnt to generate electricity.	- emissions of VOCs due to incomplete combustion and the combustion products such as oxides of nitrogen (NO _x) and carbon dioxide (CO ₂). -Emissions hydrogen of sulphide (H ₂ S) and oxides of sulphur (SO _x) are unlikely to occur as the sulphur component of the Spanish Lookout oil is negligible. - robust assessment monitoring should be carried out for nitrogen dioxide (NO ₂), sulphur dioxide (SO ₂), and the

			VOCs known as BTEX (Benzene, Toluene, Ethyl benzene and Xylenes). -The equipment used on site is modern and properly maintained such that exhaust gases have a minimal impact on the environment.
Concentration of particulate matter	Yes, if flared	No, will be done at turbine site away from villages	-Should be monitored formally once a month using the Ringelmann Smoke Scale.
Odor complaints	Yes, mainly for workers on site	Yes, for workers at oil production sites	-Kitagawa organic gas qualitative detector tubes should be used to provide an indication of the composition of the gas causing the odor nuisance.
Noise	During drilling operations	-Undertaken continuously 24 hours a day and noise might be a concern.	-The transportation of large equipment such as drilling rigs may cause temporary noise (and occasional vibration) but this is of a limited duration.
Vibration	No. All seismic activity from this development has been finalized in 2006.	The well drilling operation utilizes a rotary method of drilling and this minimizes the potential for vibration.	No longer a concern for this development.
Increased Traffic or transportation	Yes. By the oil production and transportation activities.	Especially for the school children of San Marcos	-BNE has assisted by installing a high fence between the school compound and the road to the production site. -There is the need for the company to discuss with the landowners the options for road use and pipeline installation and compensation in case of damages.
Toxic and Hazardous Materials	There will be a limited amount of inert and potentially hazardous and toxic materials stored, for use during	Directly impacting the workers in storage facilities and during drilling operations.	-Proper storage, handling and disposal of these materials should result in no impact during the project.

	the oil drilling operations.		
Explosives	Not considered to present an impact that needs mitigation.	None	-Used for seismic surveying and to be used for well perforation. - the storage and use of these explosives are, as they are currently stored in secure facilities controlled by the Belize Defense Force.
Radioactive Materials	Potential occasional use of very small radioactive sources in Down hole geophysical logging equipment (used in well exploration investigations)	None	-There is no expected impact

11.7 Potential Social Impacts from the Development and Mitigation Measures

The potential impact on social services, human services, and natural resources as a result of the development are briefly discussed. Mitigation measures for these impacts are recommended.

a. *Potential Impact on traditional resource users within the project area and zone of influence*

Traditional users of the area are mainly Mennonite farmers, small farmers from San Marcos and farm workers. There is no serious foreseen threat to users since the impact of the four proposed wells will not “take away” farm land nor make these lands less productive.

Mitigation Measures

The proposed development will not affect the use of the area for farming.

b. *Potential Impact on Labor and employment opportunities (present and projected)*

Creating employment is one of the activities that will result from the development. There will be a need for both skilled and unskilled labor, a large part of which would come from the region.

Mitigation Measures

Labor should be recruited from the area as much as possible. There exists a sizable pool of skilled and unskilled labor in this part of the country.

c. Potential impact on population (present and projected)

There may be a temporary increase in population by the workers during the day. Since they will be transported daily to and from the development site, there will not be immigration to the two SLO and San Marcos communities.

Mitigation Measures

Ensure that the residents of the project area be employed and avoid bringing workers from outside the district.

d. Potential impacts on Customs & Culture

Residents of the development may bring different lifestyle and cultural ideas which could clash with the culture of the local residents. The SLO community complains of seeing new “faces” every day and this creates a sense of “intruders to their normal way of life”.

Mitigation measures

The developer will be transferring the bulk of its operation to the Iguana Creek Facility, hence reducing the presence of its workers and that of its sub-contractors in the SLO community. However if the community so desires they may increase the number of Police Officers to increase the number of patrols.

e. Potential impact on displacement and resettlement (if any)

There will be neither displacement nor resettlement of local residents.

Mitigation measure

None.

f. Potential impact on provision of basic health care and hygienic facilities for all workers during construction and operation of the project

There will not be an increased pressure on existing health care and sanitary facilities for workers since the developer, through a Health Insurance Plan, sends its workers to the Belmopan or Belize City Hospitals.

Mitigation measures

By using the majority of local labor there will not be an increase on the need for health and sanitary services.

g. Potential impact on fire protection, Police/Security Services

There will be increased need for police presence around project area, need for private security of project area and need for fire control services.

Mitigation measures

The development may have its own internal security system in place. A fire management plan will also be instituted by BNE using the best equipment available. Coordination with the Police Office in SLO and San Ignacio will be developed.

Table 11.6 Potential Impacts and Comments

Activities and Conditions	Potential Impacts	Comments by Consultants	Residual Impacts Magnitude; Direction; Duration; Scope	Avoidability	Reversibility
Current and Proposed Land Use in Area	<ul style="list-style-type: none"> Location and size of development 	<ul style="list-style-type: none"> Adequate control development proposals take into consideration future development activities being undertaken in the immediate area 	low/ positive/medium/local	No	Yes, once oil field is exhausted
Post Construction Activities	<ul style="list-style-type: none"> Transportation of construction materials and equipment during all phases of development Operation of construction machinery 	<ul style="list-style-type: none"> All vehicles transporting construction materials should be covered, and equipment secured to allow for safe transportation to the site; this should be monitored by contractors/sub-contractors Respect speed limits Operators should be trained and involved in development plans Workers should be trained in the safety 	<p>High/positive/months/local</p> <p>Medium/positive/medium/local</p> <p>High/positives/med./local</p> <p>High/positives/medium/local</p>	No	Needs to be done as integral components of the oil industry.

	<ul style="list-style-type: none"> • Low population densities during construction and post construction 	<p>procedures; operation of machinery and use of safety gear used</p> <ul style="list-style-type: none"> • Adequate transportation, proper housing, and other basic facilities are available for workers. 	Low/positive/low/local	Yes, employ local people.	No. Population will grow at its normal rate; 2.7% is the annual national population growth rate.
Terrestrial Traffic	<ul style="list-style-type: none"> • Increase number of vehicles 	<ul style="list-style-type: none"> • Movement of workers, machinery/equipment and cargo, should be scheduled in advance 	High/negative/life of project/local and regional between Cayo & Stann Creek Districts	No.	No. The pipe line will reduce transportation from wells in communities
Population	<ul style="list-style-type: none"> • Pressure on existing resources and social infrastructure 	<ul style="list-style-type: none"> • Institutional capability and services strengthened • Workers be transported to an from the site during all phases of construction 	<p>Low/ little change/medium/local</p> <p>Low/little change/ project life/local</p>	No	No
Culture	<ul style="list-style-type: none"> • Pressure on existing institutions and 	<ul style="list-style-type: none"> • Locally strengthen existing institutions and social groups or 	Low/positive/medium/local	No	No

	<p>social groups</p> <ul style="list-style-type: none"> • Pressure on existing lifestyles 	<p>developing new ones</p> <ul style="list-style-type: none"> • Strengthen existing institutions, and regulatory systems 	<p>Low/positive/medium/local</p>		
Education/Health Services	<ul style="list-style-type: none"> • Increased pressure on health and sanitary facilities 	<ul style="list-style-type: none"> • Local education and health facilities should be strengthened • Locals should continue to have first access to all existing infrastructure facilities 	<p>Low/positive/project life/local</p> <p>Low/positive/project life/local</p>	No	No
Employment	<ul style="list-style-type: none"> • Skilled laborers from the region not employed during exploratory and oil production phase 	<ul style="list-style-type: none"> • Employment of individuals from the three communities encouraged which will strengthen local/regional skills and will include the potential for long-term employment • Laborers should also be paid as per skill requirement (s) • The Belize labor laws should also be observed • Crew be provided with restroom 	<p>High/positive/project life/local</p> <p>High/positive/project life/local</p> <p>High/positive/project life/local</p>	No	No

		facilities, adequate drinking water, basic health services, and safety equipment			
Noise Nuisances	<ul style="list-style-type: none"> Disturbance of machinery during post construction phase and other phases from construction machinery (light plant) 	<ul style="list-style-type: none"> All machinery and equipment used during all phases of construction should be maintained in proper running condition 	Medium/positive/project life/local	No	No

List of People Interviewed

Ms. Faye Smith, Exploration and Environment Manager, BNE
Mr. Felix Canul, Environment, Health and Safety Officer, BNE
Mr. Russ Gentry, ASG International
Ms. Erin Ryan, Human Resource Officer, BNE
Mr. Daniel Gutierrez, Marketing, Sales and Communications Manager, BNE
Mr. Eulysis Dawson, Driver, Field Production Section, SLO
Ms. Paula Dawson, Secretary, BNE Field Production Station, SLO
Ms. Tina Friesen, Principal, Private Primary School, SLO
Mr. Allen P. Reimer, SLO Community Representative
Mr. Abe K. Thiessen, SLO Community Representative
Mr. Henry Dueck, SLO Community Representative
Mrs. Matilda Friesen, Head, Health Clinic, SLO
Mrs. Ines Ramirez, San Marcos Resident
Mrs. Mercedes Lima, San Marcos Resident
Mr. Gregorio Lima, San Marcos Resident
Mr. Eusebio Catalan, San Marcos Resident
Mr. Francisco Maldonado, San Marcos Resident
Mr. Arnaldo Maldonado, Idem
Mr. Luis Diaz, Idem
Mr. Owen Gentle, Land Tenure Consultant
Mr. David Cabb, Principal, San Marcos R.C. School