Booyong
Forest Science

Forestry Impact Assessment for the PNG LNG Project

For

Coffey Natural Systems

November 2008

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SUMMARY

This study presents the findings of the Forestry Impact Assessment for the PNG Liquefied Natural Gas Project which has been undertaken for Coffey Natural Systems on behalf of Exxon Mobil. The study focuses on the proposed new areas of disturbance for route sectors between Juha and Hides in the Southern Highlands and Western Province respectively. Updates are also provided for route sectors between Nogoli and Omati River landfall which were reported on in 2005 for the PNG Gas Project.

The approach to this study involved a literature review, interviews and field survey. Field survey comprised a visit to an active portable sawmill operation in the Moro area, an aerial reconnaissance of the Juha to Hides area, and field verification of the forest types between Juha and Hides. Interviews were conducted with the Forest Industries Association (FIA), the international log monitoring organisation SGS (Société Générale de Surveillance), the Papua New Guinea Forest Authority (PNGFA), an industrial logging company, and PNG based Non Government Organisations. The literature review focused on significant PNG related forestry publications/reports published since the 2005 impact study.

Evidence suggests that based on the forestry impact of the existing oil export pipeline right-of-way the proposed PNG LNG pipeline between Hides and Juha will result in additional small scale forestry activities as a direct consequence of the timber needs of the project and associated companies. Some of the timber supplied may originate from illegal and unsustainable operations operating opportunistically unless assistance is provided to communicate technical advice on sustainable forest management and legal information pertaining to the operation of commercial forestry operations, and strict project controls are in place to check timber sources. The most severe impact of small scale forestry can result in long term forest degradation and, or permanent forest loss because of subsequent subsistence agriculture activities. However the scale of the forest loss/degradation associated with the oil export pipeline right-of-way is not clear. The project may also help facilitate medium scale logging in the proposed Nogoli logging concession if the project results in a significant upgrade in access roads to the Hides area. The project is unlikely to promote large scale logging in the Juha to Hides area in the short term because of the remoteness of the area, distance to markets and access constraints.

To mitigate the potential forestry impacts it is recommended that the project appoint a forestry professional at an early stage of the project to (a) liaise with both large scale and small scale loggers, (b) liaise with the provincial forestry officers based in Mendi, and (c) to develop an approved chain of custody for timber sourced for the project to ensure it originates from legal and sustainable operations. Moreover, access between Hides and Juha should be restricted to project staff and local landholders for the life of the project.

Without this commitment uncontrolled, unplanned and illegal logging as a consequence of the PNG LNG Project may occur, but not necessarily on a large scale.

1 INTRODUCTION

This study presents the findings of the Forestry Impact Assessment for the PNG Liquefied Natural Gas (LNG) Project (Figure 3-1) which has been undertaken for Coffey Natural Systems on behalf of Exxon Mobil. The study provides information for the EIS for the proposed additional upstream route sectors between Juha and Hides in the Southern Highlands and Western Province respectively (Figure 3-2). The potential forestry impact for the main route sectors between Nogoli and Omati River landfall were reported on in 2005 for the PNG Gas Project, which has since been superseded by the PNG LNG Project proposal. Updates to industrial logging activities for these route sectors are also provided.

1.1 THE PNG LNG PROJECT

The Papua New Guinea Liquefied Natural Gas (PNG LNG) Project involves the development of a number of gas fields and facilities in a series of development phases to produce liquefied natural gas (LNG) for export. The development will also produce condensate. The development of the Hides, Angore, and Juha gas fields and blowdown of the gas caps at the existing Kutubu, Agogo and Gobe oil fields will supply the gas resources. An extensive onshore and offshore pipeline network will enable transportation of the gas to a new LNG Plant near Port Moresby and stabilised condensate to the existing oil processing and storage, and offloading facilities at the Kutubu Central Processing Facility and Kumul Marine Terminal respectively. Small amounts of condensate are also produced at the LNG Facilities site.

Esso Highlands Limited (Esso), a Papua New Guinea subsidiary of the Exxon Mobil Corporation (ExxonMobil), is the operator of the PNG LNG Project. The PNG LNG Project will be developed in five phases over a period of 10 years to ensure reliability and consistent quality of supply of LNG for over the 30 year life of the project.

A list of the proposed developments is provided below, and in Figure 3-1.

Upstream Development Components:

- Hides gas field development:

— Seven wellpads with a total of eight new wells and re-completion of two existing wells.
— Hides gathering system including gas flowlines from new and re-completed Hides wells.
— Hides spineline and mono-ethylene glycol (MEG) Pipeline in the same right of way (ROW).
— Hides Gas Conditioning Plant.
— Hides–Kutubu Condensate Pipeline in the same ROW as the LNG Project Gas Pipeline.

- Juha gas field development:

— Three new wellpads with four new wells.
— Juha gathering system including gas flowlines from new Juha wells.
— Juha spinelines and MEG Pipeline in the same ROWs.
— Juha Production Facility.
— Juha–Hides pipelines right of way (ROW) containing three pipelines including Juha–Hides Rich Gas Pipeline, Juha–Hides Liquids Pipeline and Hides–Juha MEG Pipeline.

- Angore gas field development:

— Two new wellpads with two new wells.
— Angore gathering system including gas flowlines from new Angore wells.
— Angore spineline and Angore MEG Pipeline to Hides Gas Conditioning Plant, both in the same ROW.

- Gas from existing fields:

— Gas treatment at the Agogo Production Facility and a new Agogo Gas Pipeline from the Agogo Production Facility to LNG Project Gas Pipeline.
— Gas treatment at the Gobe Production Facility and a new Gobe Gas Pipeline from the Gobe Production Facility to LNG Project Gas Pipeline.
— Gas treatment at the Kutubu Central Processing Facility and a new Kutubu Gas Pipeline from the Kutubu Central Processing Facility to the LNG Project Gas Pipeline.

- South East Hedinia gas field development: one new wellpad and two new wells; new gathering system including gas flow lines from the South East Hedinia new wells to the Kutubu Central Processing Facility in the same ROW as the Kutubu Gas Pipeline.

- Kopi scraper station.
- LNG Project Gas Pipeline:

- Onshore: from Hides Gas Conditioning Plant to Omati River Landfall.
- Offshore: Omati River Landfall to Caution Bay Landfall.

LNG Facilities Development Components:

- Onshore LNG Plant including gas processing and liquefaction trains, storage tanks, flare system and utilities.
- Marine facilities including jetty, LNG and condensate export berths, materials offloading facility and tug moorage.

Supporting Facilities and Infrastructure:

In addition to the principal gas production, processing and transport, and LNG production and export facilities, the project will involve the following permanent infrastructure and facilities:

- New roads and upgrade of existing roads.
- New bridges and upgrade of existing bridges.
- Upgrade of two existing airfields (upstream at Komo and Tari).
- New helipads (multiple).
- New wharf and an upgrade of the existing Kopi roll-on, roll-off facility.
- Water supply systems and pipelines, wastewater and waste management facilities.
- Operations Camps (at Hides, Juha and Tari).

A series of temporary works and access roads will also be required during the construction phase, including:

- Construction camps (multiple).
- Material/pipe laydown areas.

1.2 STUDY OBJECTIVES AND SCOPE

Within the terms of engagement with Coffey Natural Systems, the scope of this study focuses on the new areas of disturbance between Hides and Juha (Figure 3-2) which includes route sectors in the Southern Highlands and Western Province. An update is also provided for the route from Kutubu to Omati River landfall.

The objectives of this study are to:

- Determine the interaction of the proposed project components with existing and planned forestry developments; and
- Evaluate whether the project is likely to result in promoting logging in the project area.

2 LIMITATIONS

The findings presented in this report are based on a combination of publicly available data, interviews with key persons, and limited field survey. The field survey was limited by time available for a rapid assessment and logistical constraints. Independent confirmation of the reliability, accuracy or completeness, mathematical accuracy and reasonableness of the above information has not been sought. Thus, it should not be construed that a due diligence type audit of forestry activities in the project area has been carried out.

3 APPROACH

The approach to this study involved a literature review, interviews and field survey. The field survey comprised a visit to an active portable sawmill operation in the Moro area, an aerial reconnaissance in the Juha to Hides area and a limited field assessment to verify the main forest types traversed by the ROW, or potentially accessible from the ROW. Interviews were conducted with the Forest Industries Association, an industrial logging company, the international log monitoring organisation SGS, the Papua New Guinea Forest Authority, and PNG based Non Government Organisations (Appendix A). The literature review targeted significant new reports and publications about forestry in PNG, produced since the 2005 impact study (Rogers 2005).

Figure 3-1 Project Overview – New and Existing

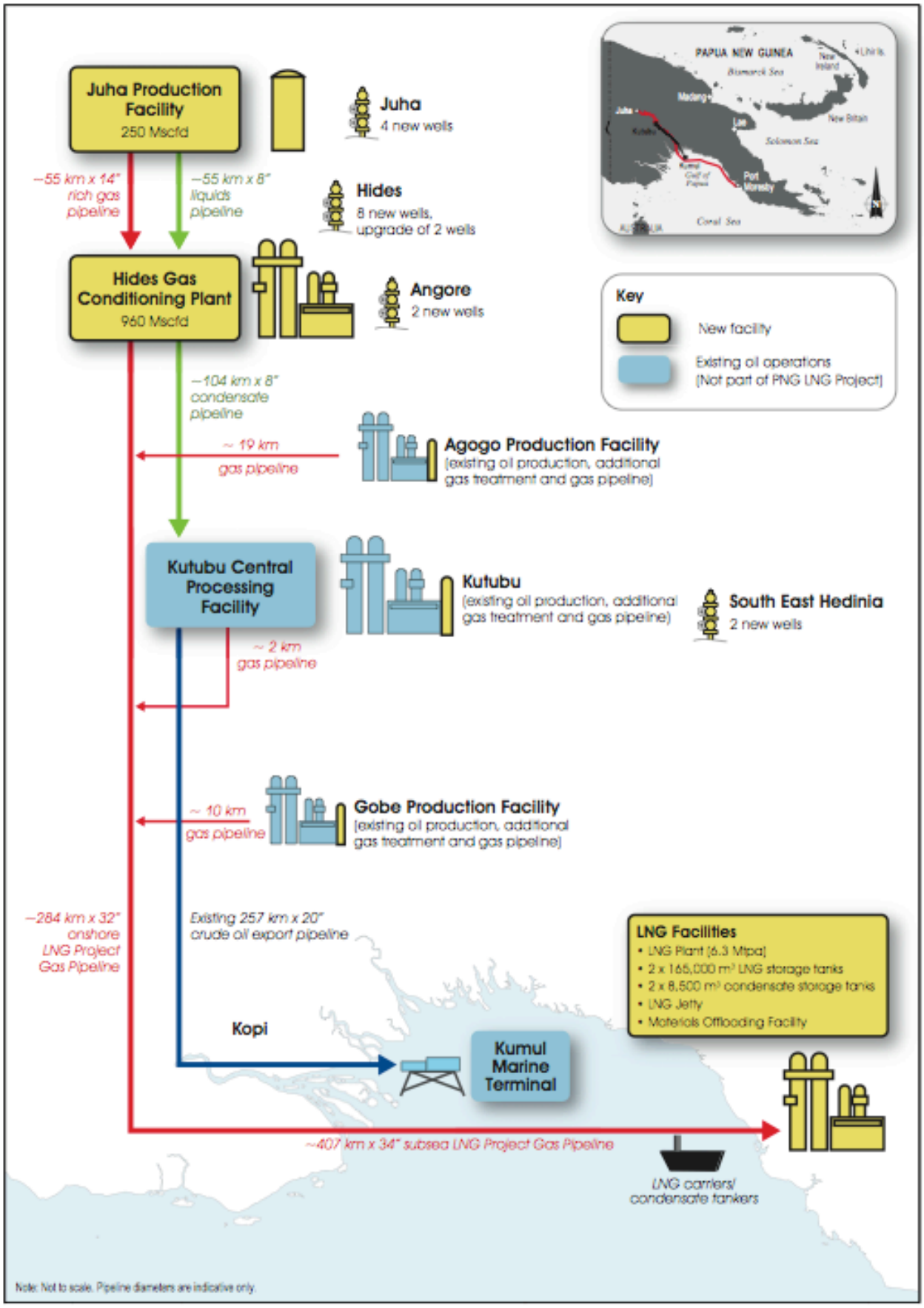
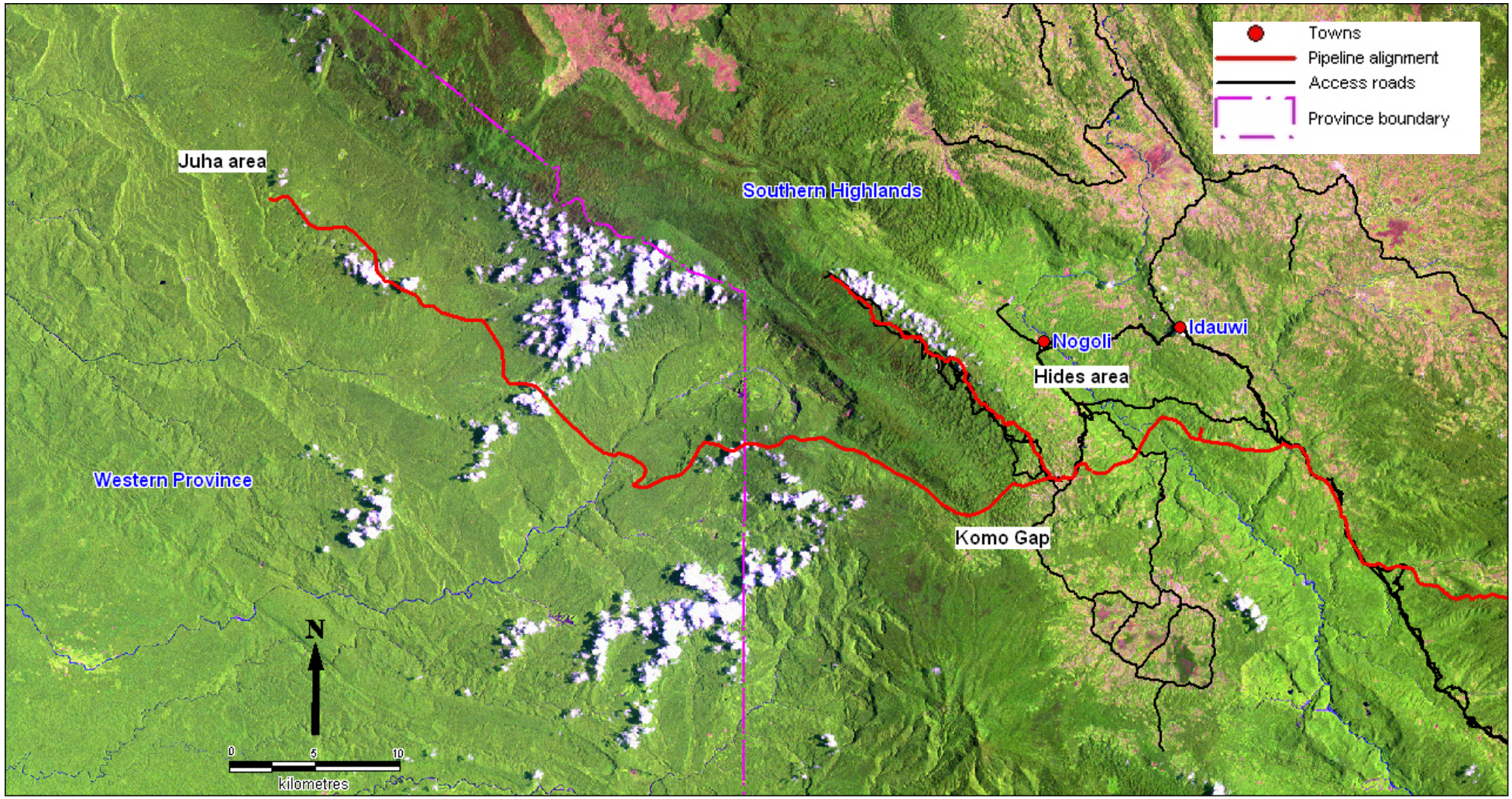


Figure 3-2 Satellite image of the proposed new area of disturbance from Juha to Hides



4 PREVIOUS STUDIES

In 2005 a comprehensive study was undertaken to determine the implications for forestry development (rainforest logging) of the PNG Gas Project infrastructure for route sectors between Hides and the Omati River landfall (Rogers 2005). The study was based on the existing oil export ROW between Moro and Omati River landfall and new route sectors between Moro and Hides. The study noted that the sectors between Moro and the Omati River traverse extensive areas of lowland forest, much of which is subject to existing and proposed logging concessions adjacent to the ROW.

The 2005 impact assessment study focused on the operational requirements for rainforest logging in the study area, and in particular on the extensive roading requirements necessary for logs to be transported to sites from which they can be loaded onto river barges or ships for export. Clearly, infrastructure that provides access to forests with commercial production potential can facilitate additional logging that otherwise would not occur. To determine the opportunity for additional forestry operations presented by both the existing and the proposed ROWs, the 2005 PNG Gas Project study examined the legal, resource base, technical, economic, and management regimes of the forest industry in the project area for both large and small scale logging operations.

The study concluded the following:

- National Forest Policy and Government intent combine to provide a favourable environment for continued industrial scale logging of lowland primary rainforests throughout PNG;
- The construction of the PNG Gas Project ROW has the potential to facilitate additional industrial logging (by reducing transport costs) if logging companies are granted access to the ROW;
- The PNG Gas Project would promote sporadic small scale logging to meet occasional orders related to the development of the project, including the sawn timber requirements of local companies associated with the project; and
- The installation of the PNG Gas Project sales gas pipeline south of Kopi may conflict with the use of this area by existing logging operations[1]. Log barge traffic in the Omati River may also be affected.

The performance of the industrial forestry industry in PNG has been reviewed since the completion of the 2005 forestry impact assessment. The International Tropical Timber Organisation (ITTO) published a report on the progress of Papua New Guinea towards meeting the ITTO's sustainable forest management objectives (ITTO 2007), and PriceWaterHouseCoopers (PWC) completed a review of the logging industry for the Forest Industries Association (PWC 2006). These and other recent reports are reviewed in the following sections.

5 FORESTS AND FORESTRY IN PNG

5.1 FOREST COVER

Papua New Guinea (PNG) has a total land area of 46,410,390 ha which includes extensive lowland and montane forest types, and some of the world's largest areas of relatively unmodified mangroves. The area of forest is reported at around 33 M ha (71%) (Shearman et al. 2008). This figure is based on detailed analysis of land cover maps derived from satellite imagery in 2002, therefore it does not reflect the current extent of forests. Since 2002 ongoing forest loss has occurred from a range of activities, including conversion to oil palm, industrial scale logging, mining and hydrocarbon development projects, and expansion of subsistence agricultural activities. Combined, these activities contribute to an annual deforestation and degradation rate of 1.71% (Shearman et al. 2008). The term deforestation refers to the loss of forest and replacement with another land type (e.g. agricultural use and grasslands). The term degradation refers to the conversion of primary (unmodified forest) to secondary (modified) forest, typically through logging or shifting cultivation practices. The majority of deforestation and forest degradation in the lowlands is attributed to logging, but is attributed to shifting cultivation in the highland forests (Shearman et al. 2008).

[1] Turama Forest Industries currently operate south of Kopi

Based on data from 2002 the remaining potential production forests accessible to logging primarily occur in the lowlands of the mainland (c. 18.5 M ha) and the islands (2.5 M ha), with a relatively small area of production forest occurring in the montane (highlands) zone (0.5 M ha) (Shearman et al. 2008).

Much of the accessible lowland forest has been progressively modified by industrial logging since the early 1980's when natural forest logging rapidly expanded to take advantage of favorable Government Forest Policy (Saulei 1997). Exploitation of PNG forests continues today and will be guided by the draft National Forest Plan (May 2006) which when finalised will replace the out of date 1996 National Forest Plan. The draft plan classifies the natural forest as:

- Production forest: 13.75 million ha;
- Reserve forest: 3.91 million ha;
- Salvage Forest: 546, 700 ha;
- Protection Forests: 3.24 million ha with afforestation potential; and
- Others remaining: 9.41 million ha.

This classification focuses on the timber production value of forests as it did in the previous 1996 National Forest Plan. However, this classification is regarded as inadequate since it does not satisfactorily capture emerging challenges with regards to ecosystem approaches to sustainable forest management (PWC 2006). Contemporary sustainable natural forest management focuses on balancing the production and service function of forests to meet economic, social and ecological imperatives. Moreover since there has been no recent National Forest Inventory as stipulated in the National Forest Policy (1991) the accuracy of the draft National Plan is uncertain.

5.2 TIMBER PRODUCTION

Timber harvesting in the *Production Forests* is the primary focus of the PNGFA. The natural forests are biologically diverse and heterogeneous comprising more than 2,000 tree species (Kula 1994), of which only about 200 currently have economic value (PNGFA 1996b). Of these 200 commercial species, a relatively small number have the highest market value, and are consequently targeted for logging and export. Market access determines the choice of species to be harvested. The only limiting factor is the size of the tree which must be of minimum diameter 50 cm DBH (diameter at breast height) to be legally felled.

In PNG, there is no national standard to demonstrate good harvesting and production practice by which compliance with the principles of sustainable forest management can be measured, for industrial logging. Even though various controls, such as the PNG Logging Code of Practice (PNGFA 1996a) are in place, in practice no satisfactory compliance monitoring regime has been implemented. Moreover there are multiple reports of non-compliance. Recent reports by reputable organizations suggest PNG is still a long way from being able to demonstrate sustainable forest management for timber production (PWC 2006; ITTO 2007). Of particular concern is that harvest levels remain at unsustainable levels, well above sustainable yield and therefore the country is at risk of running out of accessible timber resources if it maintains the current level of harvesting (ODI 2006).

5.3 FOREST GOVERNANCE AND LAW ENFORCEMENT

Forestry is regulated by the PNG Forest Authority which was established under section S.5 of the 1991 Forestry Act. Mandated by this Act, and operating through the National Forest Board, the National Forest Service and the Provincial Forest Management Committees, the PNGFA is empowered to manage the nation's forest resources through implementing the overall objectives of the National Forest Policy. The Forestry Act enables the PNGFA to negotiate Forest Management Agreements (FMAs) with resource owners and select developers (concessionaires), and negotiate conditions under which Timber Permits, Timber Authorities (TAs) and licenses may be granted. The 1991 Forestry Act also has social and environmental aspects, however these appear to be inadequately addressed or completely unaddressed by either the PNGFA or any other government agency (ITTO 2007).

Taken in isolation, the laws governing the PNG forestry sector are regarded as thorough, with the principal relevant legislation including (a) the Environment Act 2000, (b) the Forestry Act 1991, and

(c) the Forestry Regulations 1998. Yet notwithstanding the presence of meaningful laws and policies, concern is repeatedly raised about the capacity of PNG to monitor and enforce its own legislation. An example of this is the physical area of forest concession assigned to each of the government forest monitoring officers (up to 250,000 ha). The areas generally exceed the capacity of an individual to effectively monitor for compliance (ITTO 2007).

The ITTO also suggests that there is a major problem in PNG concerning the compliance of the government with its own laws. This has been noted in connection with the decision-making processes whereby forested areas are designated for logging purposes; the processes whereby agreements are negotiated with landowners; the management, monitoring and enforcement of agreements, and; the procedures through which existing agreements are extended. These issues are not new and have been reported on an almost annual basis over the last decade by a range of sources, including various NGOs, the World Bank and academic institutions such as the PNG National Research Institute (NRI).

It is apparent that the narrow focus of the PNGFA on the exploitation of forest resources for the primary financial benefit of the national government presents a conflict of interest which influences decisions made by the government at all levels. On occasion, the imperative to promote logging has influenced the National Forest Board to take decisions without regard to the procedures required by the Forestry Act 1991. Again, an example of this includes the extension of large scale logging concession permits without any consultation with landowners (PWC 2006).

5.4 MANAGEMENT FOR REDUCED CARBON EMISSIONS

As a consequence of increasing international concern over rising carbon emissions and associated climate change PNG's rainforests are being targeted for carbon emission reduction schemes based on reduced emissions from deforestation and degradation (REDD). The REDD mechanism forms an important part of the post 2012 United Nations (UN) climate agreement which must incorporate reduction targets, mechanisms, and incentives to avoid the worst impacts of climate change. The REDD mechanism aims to compensate countries/landholders for reducing carbon emissions from deforestation and forest degradation. The mechanism is dependant on establishing an approved baseline for deforestation rates so that countries/landholders can be compensated for avoided deforestation based on the baseline. The potential value of REDD schemes is recognised by the Government of PNG who have recently established an Office of Climate Change. Also, NGO's and financial institutions are currently working with landholders across PNG to sign up forests for the implementation of REDD post 2012 (Geoff Lipsett-Moore, Director Conservation Strategies, The Nature Conservancy, Brisbane, Pers. Com. December 5th 2008).

REDD mechanisms under the post 2012 climate agreement, must be measurable, reportable and verifiable (WWF 2008). The procedure to achieve this is currently being worked on by a range of organisations. Consequently REDD may become an important mechanism across PNG for reducing deforestation, particularly in areas subject to gradual degradation from shifting cultivation, new settlements and opportunistic small scale logging. However, the implications for industrial logging across PNG are less clear. REDD is unlikely to reduce industrial logging, at least in the short term until the financial benefits are more apparent.

6 OVERVIEW OF THE PNG LOGGING INDUSTRY

Papua New Guinea's logging industry continues to focus on the harvesting of large scale natural forest concessions for round log exports. There are about 30 forest concessions currently in production, operating over an area of 3.5 M ha across the country. These concessions are run by privately owned companies which dominate timber production. Additional logging is undertaken by small scale portable sawmill operations (Plate 6-1) which produce sawn timber for community needs (e.g., house building) and local companies. The small scale operations are usually operated by landholder companies and produce relatively small volumes of sawn timber.

Large scale commercial timber production is dominated by Malaysian owned or controlled multinational companies. Five companies together control over 80% of the market (PWC 2006). The largest company controls over 45% of log exports and has logging and processing operations in Western Province, Gulf Province, East and West New Britain, Milne Bay and Central Province. The next three largest companies control about 25% of exports. One of these operates in Western Province, while the other companies have no known concessions in the PNG LNG Project provinces (Gulf, Southern Highlands and Western).

6.1 MARKETS

The majority of timber is supplied to international export markets as round log exports. Log exports go to at least eleven countries in the Asia region, with more than 80% of logs exported to three countries: China/Hong Kong, Korea and Japan. China continues to be the main market for logs from PNG (about 64%) and it is also the world's fifth largest consumer of tropical logs (ITTO 2006). China's impact on PNG's logging industry has been reviewed by (Bun et al. 2004).

The major markets for processed and semi-finished products are Australia, New Zealand and various South Pacific countries. Veneer is predominantly exported to China and South Korea. Sawn timber and veneer is becoming an increasingly important export commodity for PNG.

6.2 FINANCIAL RETURNS

The financial returns for logging companies in PNG are not known. However the level of industry activity suggests that operations are profitable. PWC (2006) suggests logging is not economically viable based on the export prices in 2005 which were US$60/m^3, however prices have since risen to over US$70/m^3. Despite PWC's finding, the level of logging activity is high and logging companies actively seek and lobby for new concessions.

The Government is the primary beneficiary of the forest industry, receiving over $US30 M in cash revenues annually. These receipts partly pay for the PNG National Forest Service (NFS), the Department of Environment and Conservation (DEC) and the independent log export monitoring program undertaken by SGS. However, the Government's provision of infrastructure and social services to the communities whose forest has been logged is limited (PWC 2006).

6.3 OUTLOOK FOR FORESTRY

Currently the PNGFA is expected to contribute more towards the government's Medium Term Development Strategy (MTDS) by facilitating the development of ten new Forestry Projects. This would involve commitment of a further 2.1 million hectares of the remaining 2.4 million hectares of unallocated production forests. Much of this resource is in Western Province, but at least one of the 10 projects is in the Southern Highlands. This is the East Pangia project which is currently being negotiated with a developer (Loo Kanguep, Provincial Forest Officer, Mendi, Pers. Com. May 7th 2008).

Log prices are currently at a 10 year high due to increasing restrictions on the export of round logs from Asian countries. Export restrictions are likely to be increased over time resulting in higher log prices in the next few years. Unless there is a major reduction in the demand for logs from both China and Japan, the demand for PNG round log exports will continue. This will help maintain the momentum to develop the remaining unallocated areas of production forest.

Plate 6-1 Portable sawmill used by small scale forestry operations

7 RESOURCE CHARACTERISTICS FROM JUHA TO HIDES

The route from Juha to Hides (including Hides Ridge) traverses large areas of natural forest from the lowlands to the montane zone at 2500 m ASL along the Karius Range (Table 7-1). The forests are largely unmodified from the Komo Gap to Juha, contrasting with the forests from Nogoli to the Komo Gap where forests are heavily modified and cleared in places for settlements and food gardens.

Table 7-1 Forest resource characteristics from Juha to Hides

Forest Type	PNGRIS Code	FIM description	% of route Juha to Hides	% of route Hides Ridge
Medium crowned forest	Hm	Low altitude forest on uplands below 1000 m	52	-
Small crowned forest	L	Lower montane forest above 1000 m	21	-
Small crowned forest. Heavy disturbance	L 5	Lower montane forest above 1000 m	10	-
Small crowned forest with *Nothofagus.* Heavy disturbance	L 5	Lower montane forest above 1000 m	9	
Small crowned forest with *Nothofagus* and very small crowned forest with *Nothofagus*	LN/LsN	Lower montane forest above 1000 m	2	86
Medium crowned forest with *Araucaria* common	LAr	Lower montane forest above 1000 m	Not mapped	Not mapped
Other – non forest		-	6	14

Source: Forest Inventory Mapping (McAlpine and Quigley 1998)

Most of the forests types traversed by the Juha to Hides route (Figure 7-1, Plate 7-1, Plate 7-2), where intact, are a potential source of commercial timber. The forests comprise many commercial species, although access would be restricted by terrain and slope in some areas. There has been no prior logging along the route other than in the in the Tagiri River valley. This area was logged in the 1980s for klinkii pine (*Araucaria hunsteinii*). Typical premium quality export species (Log export groups 1 and 2) predicted to occur and observed along the route are listed in Table 7-2. Many other commercial species are also present that are used for domestic and export markets, including *Nothofagus* spp. (PNG Beech). Extensive stands of Klinkii pine (banned from export but able to be sold on the domestic market) are also present in places.

Table 7-2 Premium quality export species

Species	Commercial name	Log export group
Calophyllum sp.	Calophyllum	1
Canarium indicum	Red Canarium	1
Dillenia papuana	Dillenia	1
Homalium foetidum	Malas	1
Pometia pinnata	Taun	1
Terminalia sp.	Terminalia	1
Aglaia sp.	Aglaia	2
Anthocephalus chinensis	Labula	2

Figure 7-1 Forest types traversed by the Juha to Hides route and the Hides Ridge route

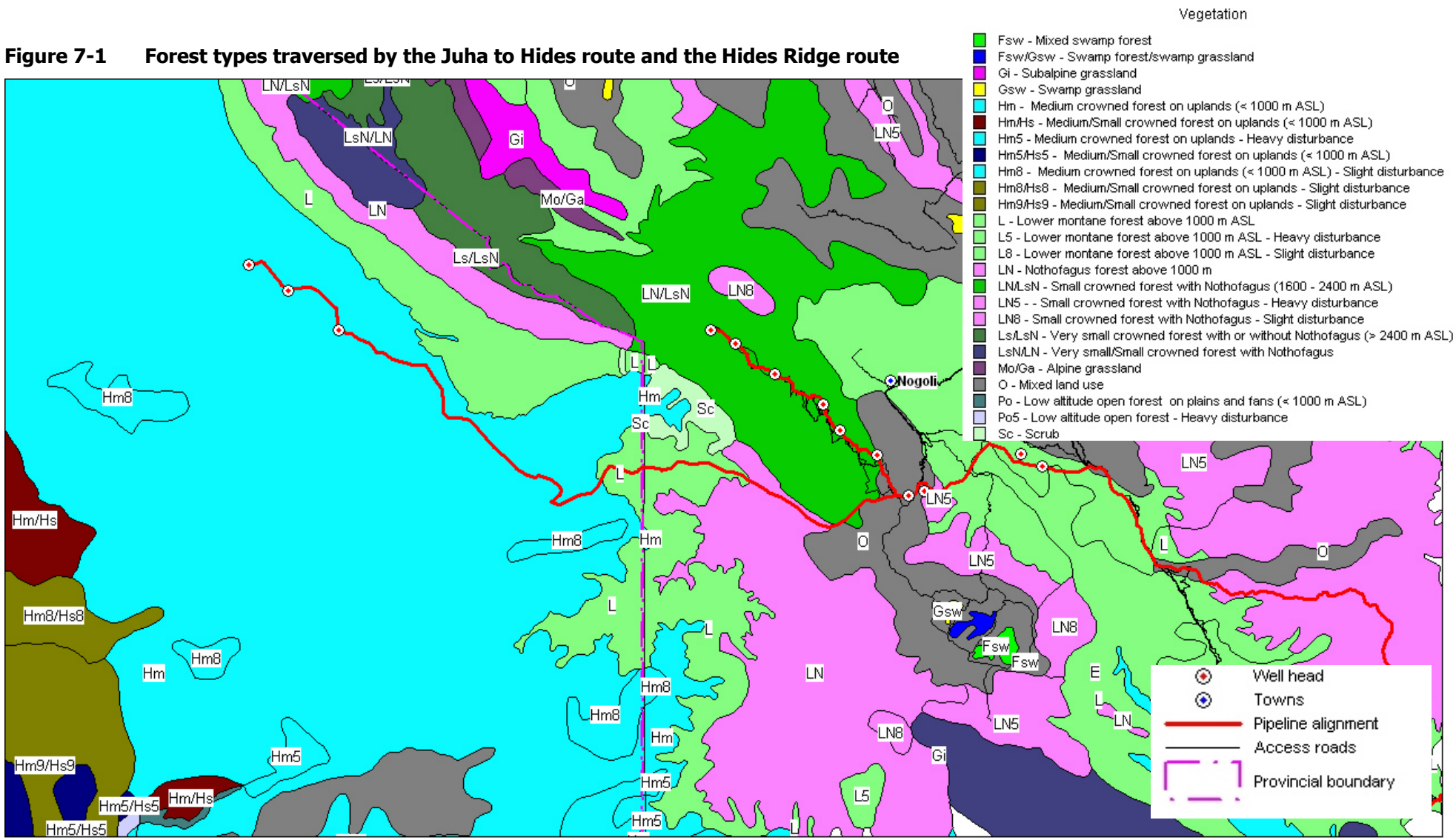


Plate 7-1 Forest traversed by the Juha - Hides route

Plate 7-2 Lowland forests in the Juha area

7.1 TERRAIN AND ACCESS

The proposed route traverses a range of terrain types (Plate 7-3) that includes steeply incised fast flowing river gorges, almost vertical escarpments, steep hilly terrain with karst land forms and swamp lands. More benign terrain is also traversed including gently rolling hills, karst plateaus and wide river valleys.

In places the terrain would present severe physical restrictions to industrial logging, restricting access to the resource and/or resulting in prohibitively high roading and bridge costs. Much of the resource would also be inoperable because of steep slopes. The logging code of practice generally prohibits the harvesting of trees on slopes steeper than 30^{o}. The presence of steep karst landforms, escarpments and river gorges would exclude logging in many places.

Currently the only possible way that loggers could access the area would be from the west of Juha where the Strickland River flows. If navigable the Strickland River could potentially be used to transport equipment and logs. However it is not known if the upper reaches of the river are navigable to logging barges.

Plate 7-3 Rugged terrain in the vicinity of the Juha - Hides route

8 FOREST MANAGEMENT IN THE PROJECT AREA

8.1 CHANGES SINCE 2005

No major changes in forest policy or management are known to have occurred in PNG since 2005. However, the country is in the process of updating its National Forest Plan and its Provincial Forest Plans, and a "Forest Carbon Partnership" policy is also being developed. The carbon policy is being developed in collaboration with the Government of Australia and aims to reduce greenhouse gas emissions from deforestation and forest degradation under the United Nations Framework Convention on Climate Change (UNFCC) and the Kyoto Protocol.

Of these developments, the updating of the Provincial Forest Plans by the PNGFA is potentially the most significant. The Provincial Forest Plans are five year strategic plans which identify existing concessions, new concessions and proposed concession areas. The implications of the updated plans are reviewed below.

8.2 SOUTHERN HIGHLANDS PROVINCE

Compared to Gulf province there are relatively few active forestry projects within the vicinity of the project area (Figure 8-1), other than small scale portable sawmill operations. There is only one large scale concession, East Pangia which is located to the east of the province away from the project area.

However, medium scale logging operations have previously occurred in the Hides area, which was logged in the early 1980s. The area was logged primarily to harvest the extensive Klinkii pine (*Araucaria hunsteinii*) resource in the Tagiri River Valley. Logging was conducted by the Beechwood Scheme which was active on Mt Giluwe in the Southern Highlands in the late 1970's (Isaac Hekele, Provincial Forest Officer, Mendi, pers. com. 5th June 2008). Some unlogged stands remain in the Hides area, while other logged stands demonstrate good regeneration and growth, and may have potential to be logged again in the future.

Although there are currently no large scale forestry concessions operating in the vicinity of the project, the north eastern slopes of the Karius Range, including the Tagiri River Valley, have been partly gazetted as a proposed forestry concession (Figure 8-2), through which the Juha to Hides route passes. This concession includes much of the klinkii pine resource that was logged in the 1980's. The Nogoli concession also borders the Hides Ridge route. The size (27,530 ha) and terrain would make it unsuitable for a large scale logging operation, but it would be suitable for small – medium sized logging operations (Isaac Hekele, Provincial Forest Officer, Mendi, pers. com. 5th June 2008).

8.3 WESTERN PROVINCE

The remoteness of the forest resources in Western Province and the lower mean timber volumes have constrained logging activities compared to some of the more accessible provinces. However, Western Province is increasingly being opened up for logging with several large concessions in operation, and substantial proposed concessions yet to be developed. Most of the current and proposed concessions are distant from the Juha to Hides route. The closest area identified in the Provincial Forest Plans that may be logged is the Ningerum concession, approximately 38 km away.

However, a proposal is being assessed by the Department of Environment and Conservation to develop a logging road from Kiunga to the Nomad area. The logging road is being promoted by the developer as a mechanism for initiating the Trans Papua Highway. The proposal includes several side roads which link remote settlements and facilitate access to substantial forest resources. One of the side roads appears to link up with the Hides – Juha route (Figure 8-3).

Some of the logging projects in Western Province have been controversial, such as the Kiunga to Aimbak logging road, and logging in the Wawoi Guavi area (Melick 2003). Most recently logging in the huge Kamulo Doso logging concession has been halted by an injunction application to the Supreme Court by the Eco-Forestry Forum. Logging was stopped because of the failure of the National Forest Authority to comply with the requirements of the Forestry Act (EFF 2007).

8.4 GULF PROVINCE

For Gulf Province the Provincial Forest Plans identify a change in status of the Hekiko Concession from a proposed concession to an active concession (Figure 8-1). This concession is adjacent to the proposed route between Kutubu and Omati River landfall and was a proposed concession in 2005.

Figure 8-1 Existing, proposed and disputed forestry concessions

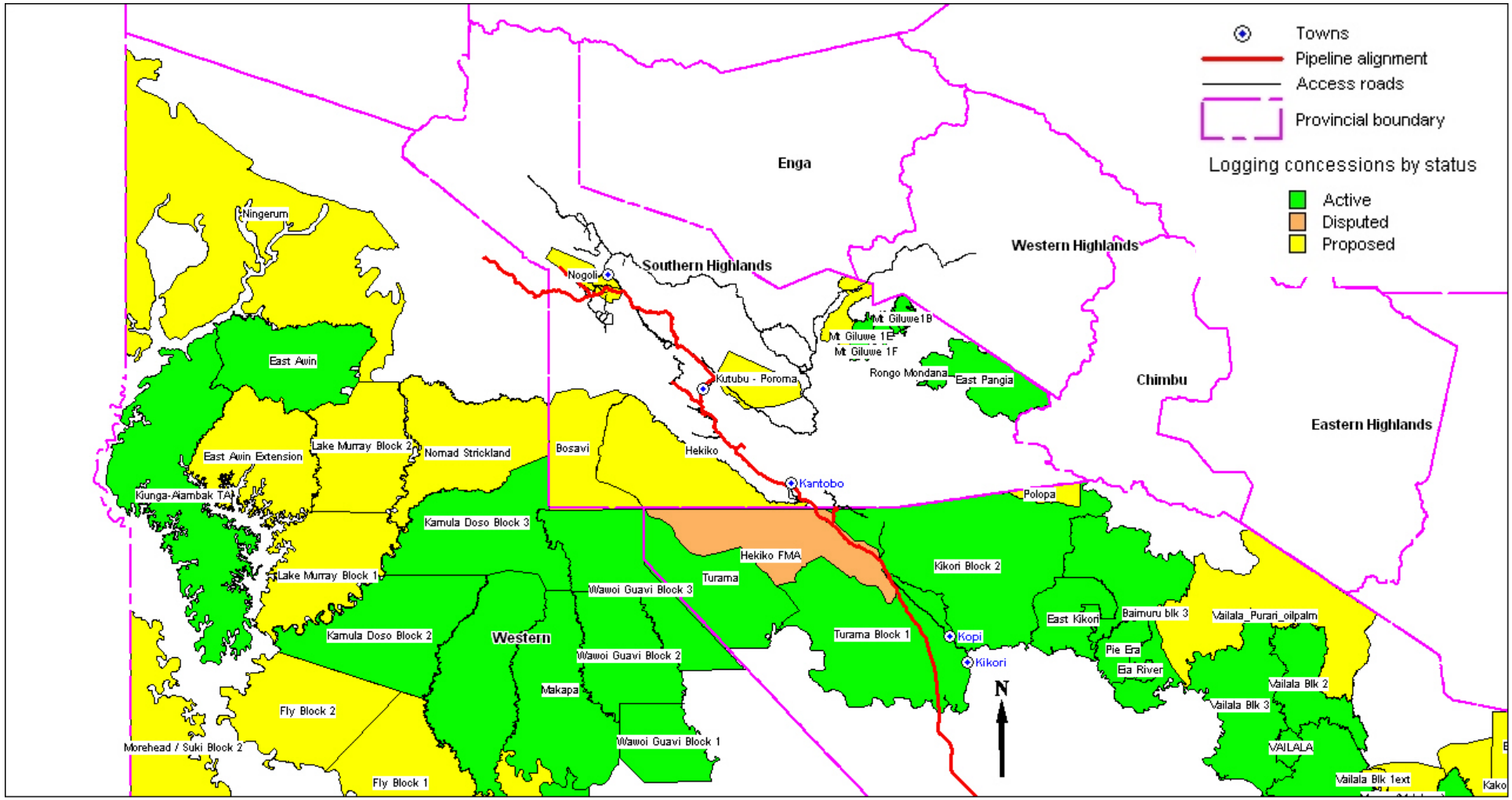


Figure 8-2 Nogoli Concession and the Juha to Hides route

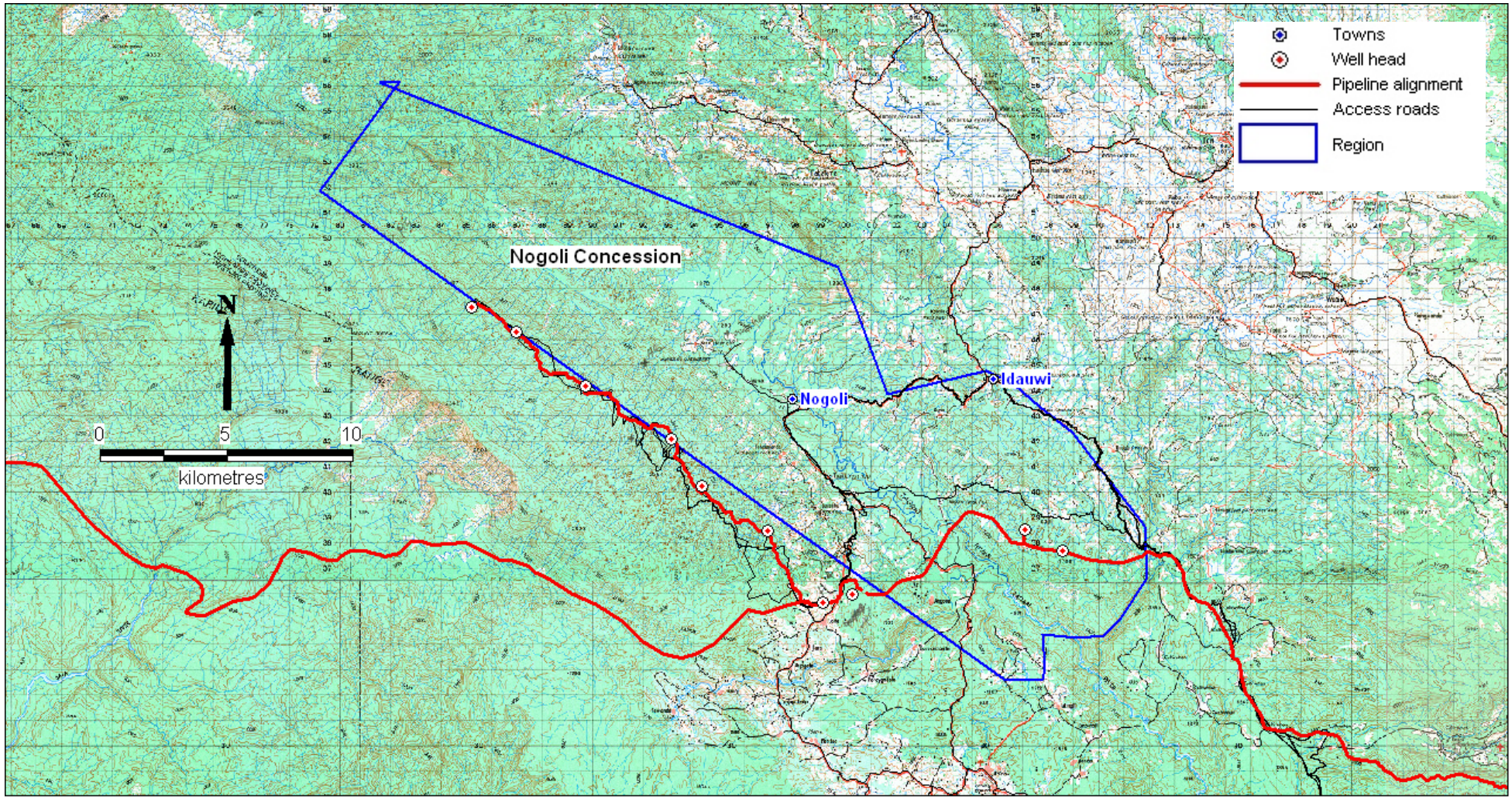
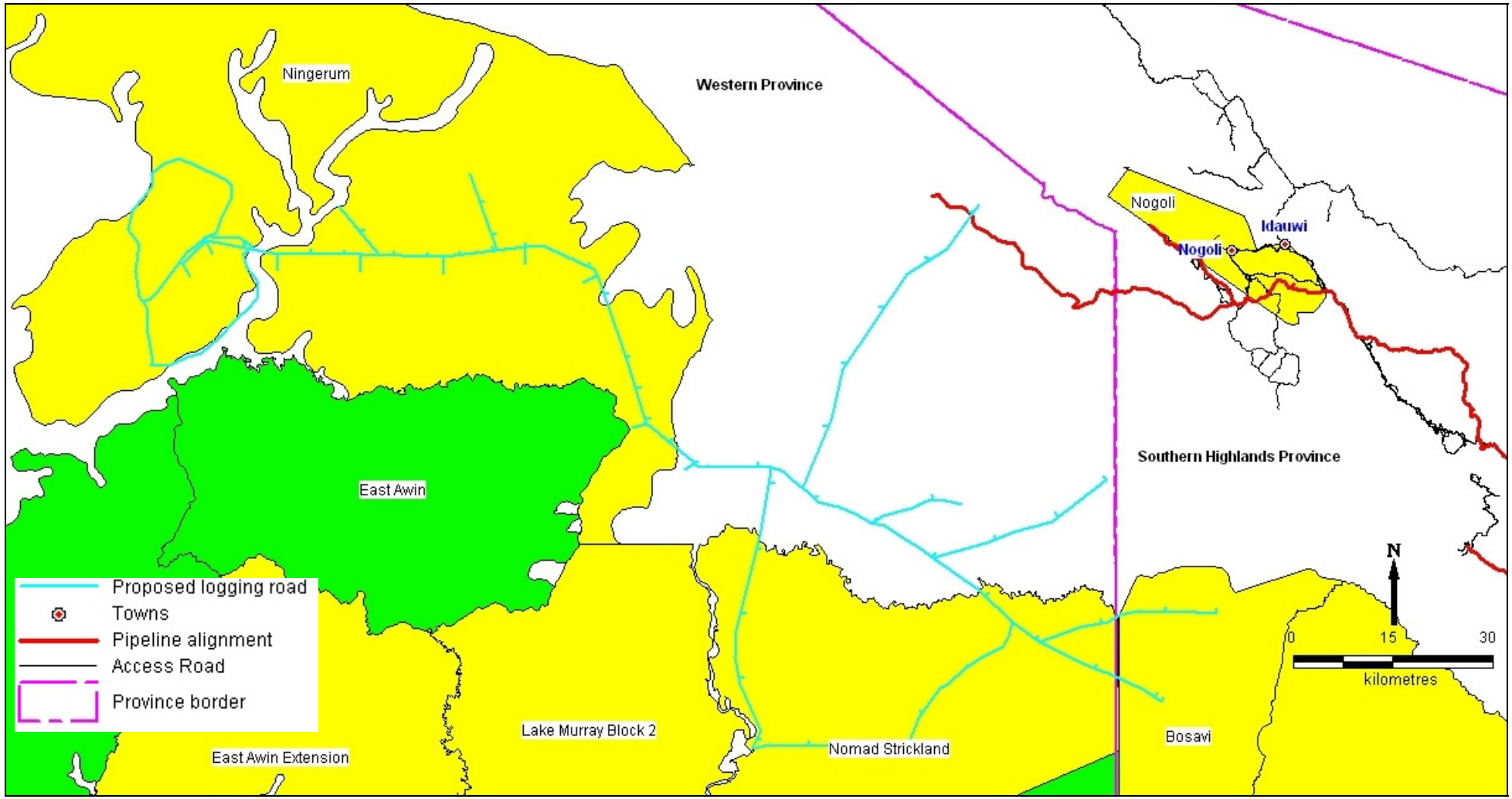


Figure 8-3 Proposed Trans Papua Logging Road, the Juha to Hides Route and Nearby Logging Concessions

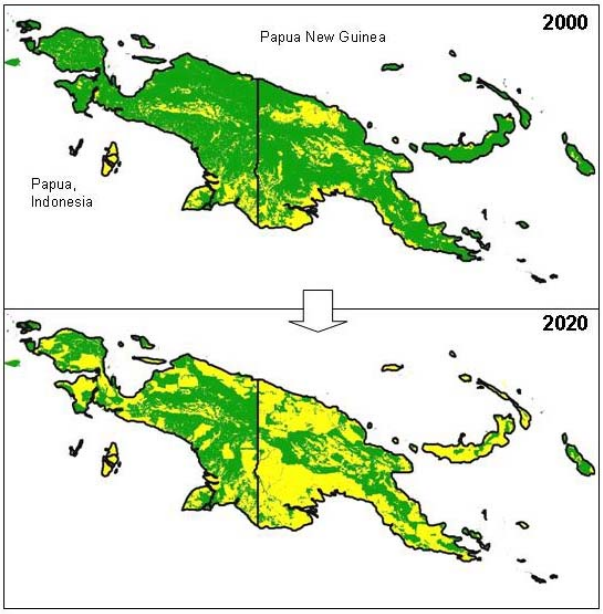


Turama Forest Industries (TFI) stated that they will be allocated the block as an extension to their existing Turama Block 1. However the PNGFA expressed some uncertainty over the concession's status and stated that the concession will either be allocated as an extension to TFI's Turama Block 1 or put up for competitive tender as a new Forest Management Area (FMA). Therefore, it appears likely that logging will occur in the Gulf portion of Hekiko in the near future. This may have implications for the route south of Kutubu, but has no implications for the route from Juha to Hides. Issues relating to logging concessions in Gulf Province route sectors were reviewed in 2005 for the PNG Gas Project (Rogers 2005) and are applicable to the Hekiko concession.

9 LONG TERM IMPACTS OF FORESTRY ACROSS PNG

In the long term, the future existence of PNG's natural forests is considered to be threatened by logging and associated large scale conversion of forest to oil palm, conversion for subsistence agriculture, and possible conversion to fast growing wood fibre plantations (Shearman et al. 2008). These three factors are linked, with logging pushing in new roads to allow access to previously inaccessible areas for more intensive land use. WWF suggest that PNG may loose more than 50 % of its forests by 2020 if the current trend in logging and forest conversion continues (WWF 2007).

As commercial stands of natural forest in the region are increasingly exhausted, particularly in Sumatra and Kalimantan, attention has increasingly shifted eastwards to New Guinea. For example large pulp mill operators in Central Sumatra view PNG's lowland natural forests as an opportunity for large scale conversion to fast growing pulp species, which may contribute further to the high rate of deforestations and degradation across PNG.



(Source: WWF 2007)

10 FORESTRY ACTIVITIES AND IMPLICATIONS FOR THE LNG PROJECT

There are several factors that need to be considered to determine the level of opportunity an access road from Juha to Hides may afford loggers. The potential opportunities will vary significantly between small and large scale operations and may change over time, particularly as the project proceeds. The following sections discuss this issue with consideration to the resource, economic, policy and governance aspects reviewed above.

10.1 SMALL SCALE LOGGING

Evidence from the Moro and Moran area indicates that roads associated with pipelines provide access to forest resources for small scale logging operations, provided that commercial stands of timber are within a relatively short distance of the road (1 – 2 km). These small scale operations provide sawn timber for specific orders for landholder companies associated with existing developments in the project area (Plate 10-1).

Typical operations involve a small team of individuals operating a portable sawmill (e.g., a Lucas Mill) which is carried unassembled into the forest and reassembled adjacent to the felled tree. The impact of such operations varies depending on the harvest intensity (trees harvested per hectare).

Plate 10-1 Illegally harvested timber for sale in the Moro area

Plate 10-2 Small scale logging impact

An operation visited in the Moro area was logging at a high intensity, removing all trees of commercial size. This operation would be regarded as unsustainable (Plate 10-2). The operation was also operating illegally since it is a requirement of the PNGFA that small scale logging operation work under an approved Timber Authority (TA) if timber is being processed for commercial sale. The operation had no TA.

Several portable sawmill operations have been operating adjacent to roads associated with servicing existing developments in the project area. The extent of the impact is unclear and requires imagery to fully assess. Typically the logged over areas are subsequently used for food gardens and or expansion of settlements depending on the terrain, resulting in permanent loss of forest.

In addition, the improved roads that the project may bring would increase the likelihood that small – medium scale logging would be viable for the proposed Nogoli concession (Isaak Hekele, Provincial Forest Officer, Mendi, pers com June 6th 2008). Options to mitigate this risk require further work.

10.2 LARGE SCALE LOGGING

In the short term, the Juha to Hides route is unlikely to facilitate immediate access to the kinds of large scale forestry concessions that characterise industrial forestry across PNG because:

- No large scale concessions are currently gazetted in the Juha to Hides area;
- There are no known navigable rivers close to the route that can be used to transport heavy equipment and logs by barge. (It is not known if the Strickland River to the west of Juha is navigable);
- Access to much of the potential resource is constrained by extremely rugged terrain; and
- No large domestic market exists locally, and the transport costs to truck logs by road to the nearest port would be prohibitive.

It is possible that concessions may be gazetted in the area within the life of the project, however transport costs will remain a potential constraint unless a significant domestic market develops within the vicinity. Moreover much of the rugged terrain will constrain logging. Despite this conclusion there is a potential project that may benefit from the proposed route. The proposed Trans Papua Highway Agro Road Project identifies a potential logging road route from Kiunga to Nomad, and also includes reference to a potential link road that joins up with the proposed LNG pipeline route in the Juha area. The proposed LNG route from Juha to Hides may provide opportunities to service logging operations if access was permitted.

10.3 IMPLICATIONS

The PNG LNG Project will require sawn timber for both construction and ongoing project work. It is likely, therefore, that the project will result in several small scale forestry operations to supply the sawn timber needs of both the project developer and the local landholders servicing the project.

Small scale operations typically operate in areas where there is road access, with harvesting limited to the distance that sawn timber can be manually carried from the forest to the access road. This generally restricts operations to operating within 1 – 2 km of the nearest road. However, unless controls are implemented to ensure timber is sourced from licensed operations, it is likely that some of the small scale forestry operations that develop will be unlicensed, producing sawn timber that is illegal.

At present the extent of the small scale logging is unclear. Analysis of aerial photography or satellite imagery should be undertaken to quantify the level of impact so that the baseline condition prior to project start up can be established.

11 CONCLUSIONS

The project will result in local demand for timber which is likely to be supplied by small scale portable sawmill operations. Some of the timber supplied may be from illegal and unsustainable operations operating opportunistically unless, (A), assistance is provided to communicate technical advice on sustainable forest management and legal information pertaining to the operation of commercial forestry operations, and (B), strict project controls are in place to check timber sources.

The project may promote the development of medium scale logging in the Nogoli concession in the Hides area because of improved roads associated with the project. The project is unlikely to promote

large scale logging in the short term because of the remoteness of the area, distance to markets, and access constraints to much of the forest resource.

12 RECOMMENDATIONS

The following recommendations are provided as options to mitigate/control potential forestry impacts:

- Appoint a forestry officer at an early stage of the project to liaise with both large scale and small scale loggers, and in particular to collaborate with local small scale portable sawmill operations to ensure that these operate legally and in accordance with the principles of sustainable forest management;
- Collaborate with PNG based forest certification officers to develop an approved chain of custody for timber sourced for the project, e.g., FPCD (Foundation for People and Community Development or FORCERT;
- Collaborate with the Provincial Forest Authority Officers in Mendi to ensure any locally sawn timber is produced from licensed sources;
- Provide logistical assistance to the Provincial forestry officers to ensure they can make regular field visits to the project area;
- Restrict access to the Juha to Hides route to project staff and local landholders;
- Develop a land use plan in collaboration with landholders to prevent uncontrolled small scale logging;
- Further assessment of the use of the REDD mechanism (reduced carbon emissions from deforestation and degradation) to minimise future forest degradation and deforestation along the ROW warrants consideration; and
- Review of the REDD mechanism as a means of limiting potential indirect forest degradation and deforestation along the ROW warrants consideration.

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APPENDIX A

LIST OF INTERVIEWEES

List of Interviewees – May - June 2008

Organisations	Interviewee	Position
PNG Forest Authority, Port Moresby	Fabian Niulai	Resource Allocations Officer
PNG Forest Authority, Port Moresby	George Gunga	Acting Manager, Projects
PNG Forest Authority, Port Moresby	Ripa Karo	Supervising Cartographer
National Forest Service, Mendi	Isaak Hekele*	Project Supervisor
National Forest Service, Mendi	Loo Kanguep**	Provincial Forest Officer
SGS PNG Ltd, Port Moresby	Bruce Telfer	General Manager, International Log Export Monitoring
PNG Forest Industries Association (FIA)	Bob Tate	Executive Officer
Turama Forest Industries, Port Moresby	Ron Wilson	Resource Manager
WWF, Port Moresby	David Melick	Transfly Ecoregion Coordinator
WWF, Moro	Olo Gideon	Acting Manager,
Oil Search, Moro	Robert Kiapranis	Environment Manager
Oil Search, Moro	Benjamin Sipsip	Environmental Officer

* Interviewed by correspondence, ** Interviewed by phone.