



Women's Group ay Mbelopa (near Hides)



Opportunistic Settlement along Pipeline near Angore



Pipeline Route near Homa Ridge

REPORT OF THE:

## INDEPENDENT ENVIRONMENTAL & SOCIAL CONSULTANT

## ENVIRONMENTAL & SOCIAL COMPLIANCE MONITORING

## PAPUA NEW GUINEA LNG PROJECT

Site Visit: November 2016

*Prepared for*

Export-Import Bank of the United States

Export Finance and Insurance Corporation

Japan Bank for International Cooperation

Società Italiana di Assicurazione dei Crediti all'Esportazione

Export-Import Bank of China

Nippon Export and Investment Insurance

Commercial Banks

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## *ACRONYMS*

<b>AGI</b>	Above-Ground Installation
<b>ANUE</b>	ANUedge–Australian National University Social development initiative
<b>BIMP</b>	Biodiversity Implementation and Monitoring Program
<b>BMP</b>	Biodiversity Monitoring Plan
<b>BOM</b>	Board of Management
<b>CBD</b>	Convention on Biological Diversity
<b>CDS</b>	Community Development Support
<b>CEPA</b>	Conservation and Environment Protection Authority
<b>CLIP</b>	Community Livelihood Improvement Program
<b>CHP</b>	Community Health Program
<b>CP</b>	Cathodic Protection
<b>CTA</b>	Common Terms Agreement
<b>CV</b>	Check valves
<b>DFAT</b>	Australian Department of Foreign Affairs and Trade
<b>DPE</b>	Department of Petroleum and Energy
<b>ECA</b>	Export Credit Agency
<b>EHS</b>	Environmental Health & Safety
<b>EMPNG</b>	ExxonMobil PNG Limited (formerly EHL – Esso Highlands Limited)
<b>EMP</b>	Environmental Management Plan
<b>EMS</b>	Environmental Management System
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>ESMP</b>	Environment and Social Management Plan
<b>ESMS</b>	Environmental and Social Management System
<b>GIS</b>	Geographic Information System
<b>GWIM</b>	Global Women in Management
<b>HGCP</b>	Hides Gas Conditioning Plant
<b>HWMF</b>	Hides Waste Management Facility
<b>I&amp;D</b>	Inclusion & Diversity
<b>IBR</b>	Institute of Biological Research
<b>IESC</b>	Independent Environmental and Social Consultant
<b>IFC</b>	International Finance Corporation
<b>iHDSS</b>	Integrated Health Demographic Surveillance System
<b>IMR</b>	Papua New Guinea Institute of Medical Research
<b>ISPM-15</b>	International Standard for Phytosanitary Measures No. 15
<b>IR</b>	Industrial Relations
<b>KP</b>	Kilometer Point
<b>KPI</b>	Key Performance Indicator
<b>L&amp;CA</b>	Land and Community Affairs
<b>LKRUMP</b>	Lower Kikori Resource Use Management Plan
<b>LNG</b>	Liquefied Natural Gas
<b>LTI</b>	Lost Time Incident
<b>MEG</b>	Monoethylene Glycol
<b>MLV</b>	Main Line Valves
<b>MOC</b>	Management of Change
<b>MOH</b>	Medicine and Occupational Health
<b>MOU</b>	Memorandum of Understanding
<b>MTA</b>	Million tons per annum
<b>NAQIA</b>	National Agriculture Quarantine and Inspection Authority
<b>NBSAP</b>	National Biodiversity Strategy and Action Plan
<b>NC</b>	Non-Conformance or Non-Compliance
<b>NGO</b>	Non-Governmental Organization
<b>NNL</b>	No net loss

<b>OIMS</b>	Operations Integrity Management System
<b>OSL</b>	Oil Search Limited
<b>Para.</b>	Paragraph
<b>P&amp;GA</b>	Public and Government Affairs
<b>PMA</b>	Program Monitoring Activity
<b>PNG LNG</b>	Papua New Guinea Liquefied Natural Gas Project
<b>PPP</b>	Public – Private Partnership
<b>PS</b>	Performance Standard
<b>Q</b>	Quarter
<b>RAP</b>	Resettlement Action Plan
<b>RoW</b>	Right-of-Way
<b>SME</b>	Small to Medium-Sized Enterprise
<b>TOR</b>	Terms of Reference
<b>TRIR</b>	Total Recordable Incident Rate
<b>TWM</b>	Total Waste Management
<b>U-PNG</b>	University of PNG
<b>VMP</b>	Vehicle Monitoring Plan
<b>WCS</b>	Wildlife Conservation Society
<b>WMA</b>	Wildlife Management Area
<b>WMZ</b>	Weed Management Zone
<b>WWTP</b>	Wastewater Treatment Plant
<b>YTD</b>	Year to Date

## ***EXECUTIVE SUMMARY AND CONCLUSIONS***

This report represents the sixteenth post-financial close field visit to Papua New Guinea (PNG) made by D'Appolonia S.p.A. of Genoa, Italy serving in the role of the Independent Environmental and Social Consultant (IESC) for the Papua New Guinea Liquefied Natural Gas (PNG LNG) Project with ExxonMobil PNG Limited (EMPNG) as the Operator on behalf of Export Credit Agencies (ECAs) and commercial banks providing Project financing (Lenders). The purpose of this visit has been to monitor conformance with Project environmental and social commitments made for the Production phase of this development. This visit was conducted from November 7 – 17, 2016 in PNG. IESC visits during the Production phase of the PNG LNG Project are taken annually and the last visit was in October 2015.

Gas is obtained from the Hides Field, processed at the Hides Gas Conditioning Plant (HGCP) and sent to the LNG Plant about twenty kilometers northwest of Port Moresby on the coast of the Gulf of Papua. There, the gas is liquefied and the resulting LNG product (design capacity of 6.9 million tons per annum - MTA) is loaded onto ocean going tankers and shipped to gas markets overseas. As of the time of this field visit over 17 million tons of LNG have been produced and 246 tankers of LNG shipped from the jetty at the LNG Plant and annual production was about 15% above the design capacity.

### ***Environmental and Social Management System (ESMS)***

Production continues to be responsible for all aspects of operations. Drilling is complete and the only construction is the F1 Surface Facilities Project that involves the design, and construction of Wellpad F Surface Facilities (including the equipment, MEG line, power and control cables) to allow production from the F1 well and also including construction of a flowline from Wellpad E. The next major construction project will be installing the flowlines from Angore to the HGCP.

The Production ESMP has been revised and is currently in a Revision 1 (R1) stage. The changes were reviewed by the IESC in 2016 and our comments and recommendations have been incorporated within R1 to an acceptable degree. One of the key points of our review was that the Production ESMP is not suitable for construction, other than at a small scale, and we recommended that an Addendum to the Construction ESMP be developed to cover the construction of the Angore Flowlines. This is the approach undertaken by EMPNG. This construction requires IESC review of an ESMP for the flowline construction at least three months before start of construction, an action completed shortly after this field visit.

### ***Government Acquisition of Project Infrastructure***

The Kaiam Bridge over the Kikori River has not yet been turned over to the Government, but the Kopi Bypass Road has been turned over. EMPNG has assigned the turnover of the Kaiam Bridge to be a Class 2 Management of Change (MOC) on the basis that it is a bridge is on an existing public road that will be replaced if it is not turned over, so EMPNG is not in a strong position to refuse. At this stage, EMPNG is planning to handover the Kaiam Bridge when the Government completes the construction of the road between Erave and Sameberigi, progress of which continues to be stalled. The turnover of the Project controlled Gobe to Kantobo road with the turnover of the OSL controlled road from Kantobo to Moro (Kutubu) is a potentially greater impact than the turnover of the Kaiam Bridge and is designated by the PNG Department of Transport in their National Transport Strategy as their first priority for development by 2020. The question as to whether or not Project and OSL controlled roads are going to be turned over to the Government is not if, but when. Negotiations have yet to start with the PNG Government, but IESC has recommended that EMPNG and Lenders have discussions on this topic before entering negotiations with the PNG Government.

### ***Pollution Prevention***

The basic observation with respect to pollution prevention is that EMPNG works within their Environmental Management System (EMS). This System has reached a stage of maturity, whereby most of the requirements for pollution prevention in terms of waste and wastewater management, noise, air emissions, and erosion and sediment control are managed as part of routine operations. Problems have occurred, but the System is in place to identify when problems occur and to develop solutions to the problems.

EMPNG's response to problems can be exemplified with some examples:

- A single air emission exceedance from April 2016 stack emissions testing was found at the LNG Plant general waste incinerator for the dioxin/furan criterion (average 0.89 ng/m<sup>3</sup> compared to the

limit of 0.41 ng/m<sup>3</sup>). Rigorous performance testing was then undertaken in Q2 to assess the relationship between the type and volume of waste materials incinerated and the resulting impact on emission concentrations. Lessons learned from the compliance and performance testing were applied in a revision of the incinerator waste loading and operating guidelines in Q3, with follow-up compliance testing conducted in October 2016. Results are pending, but the main point is that there is a solid process to correct a problem once it is encountered.

- Another example is the work that was undertaken after the identification of amines in the retention pond at the LNG Plant in August 2016. Amines are a major component of a solvent (UCARSOL) used to remove carbon dioxide as part of gas processing at the LNG Plant. Low levels of amines had been entering the retention pond, but the problem was compounded after a concentrated amine solution was added to the pond due to human error. Managing this large body of contaminated water required undertaking a complicated risk assessment such that risk-based concentrations for different ecological species could be calculated. It was then necessary to determine a means to discharge the pond below the risk-based concentrations. The final solution required significant engineering ingenuity, but a solution was found and was being implemented at the time of the visit. The problem of the amines is cited as an example of how an environmental management system is supposed to work. On many projects the attitude might have been to simply make a discharge on the basis that ecological damage would be minimal. EMPNG worked to solve the problem and discharge following acceptable standards.
- Noise monitoring surrounding Project facilities has shown that noise is not an issue, except at the Hides Waste Management Facility at Kopeanda, where the large incinerator is the source of noise. This noise has been taken into account with a new noise model, which confirms that the buffer zone is adequately designed, but there are people living inside the buffer zone, where noise levels are above criteria. In this case, EMPNG is working with the Department of Petroleum and Energy (DPE) to address the issue of noise with those nearby households.
- Long-term issues of wastewater treatment continue to be addressed. The problematic wastewater treatment plant at Moro has been replaced with good results. The plant at Hides has also been replaced with good results and the LNG Plant facility continues to operate well. Again, this is how an EMS is supposed to work. Problems are addressed until they are managed, even if it takes a long time to find the appropriate solutions.

The remaining topics that fall under the category of pollution prevention continue to be well managed.

### ***Erosion and Sediment Control***

Erosion and sediment control continue at a level that minimizes environmental impact. The program is based on surveillance including community reporting and maintenance. Problem areas at Komo, Hides and the wellpads and access roads continue to be focus areas, but conditions continue to improve. Areas where drainage ditches at Komo were damaged due to public removal of geosynthetic liner material and vandalism, the ditches are now being lined with concrete. Drainage at the HGCP continues to be upgraded. Pipeline RoW work falls in the realm of maintenance. Essentially, there are no issues to report.

### ***Ecological Management and Biodiversity***

The revised Biodiversity Strategy and Biodiversity Implementation and Monitoring Program have been finalized and agreed with the IESC; they will be made publicly available via [www.pnglng.com](http://www.pnglng.com) shortly. The biodiversity offset technical rationale within the strategy has been strengthened, and IESC commends EMPNG on these efforts over the last two years. Much progress has been made in various offset component activities since our last visit, with the public Conservation Meetings showcasing local community conservation projects especially worthy of note. Dialogue in two of the three protected area offset components is progressing (Lower Kikori and Lake Kutubu), with identification of a suitable higher elevation protected area in Hela Province still proving challenging.

The monitoring program undertaken in 2015 has produced several reports summarizing results and analyses. Remote sensing has identified areas that were disturbed both during and since construction, some related to EMPNG and some not attributable, as well as locations of forest loss and settlement infill. Condition surveys on sites avoided or near to project infrastructure have shown generally that sites have not been further degraded and some are indicating an improvement in ecological health; EMPNG should survey sites until a stage where their ecological health can be confirmed, and shown to be maintained.

Biodiversity surveys undertaken by a team of external experts at pre-selected transect locations have gathered data on a variety of taxa. Interesting findings from these first surveys have indicated species new to science and range extension information, and confirm the areas support many rare, conservation-listed, restricted range and hunting-sensitive species. Over time, these surveys will help to indicate whether and how species distribution (edge effects), diversity and abundance might be influenced by project impacts. Learnings from the first full monitoring campaign are being fed back into revised protocols and survey methodologies.

Recommendations focus on: development over time of site-specific offset rationale and delivery plans for each offset protected area, to provide reference and assurance for ongoing offset program delivery; include a remote sensing repeatable focus on key areas most at risk from disturbance; some adjustments to rules that define whether disturbance may be attributable to the project; that condition surveys of focal habitats be maintained for a timeframe whereby ecological health can be better determined; to consider whether drones could add monitoring value; that learnings from early condition surveys be fed into Angore planning; and to consider the inclusion of butterflies in future biodiversity survey as indicators of ecological change.

### ***Induced Access***

EMPNG is working with communities around the Angore wellpads to resolve vehicular access events. At Benaria (near MLV-1) the Government has completed the installation of the public bridge, and EMPNG advises that use of EMPNG bridge/road infrastructure will be curtailed by the end of 2016. The EMPNG road linking Kopi shorebase to Kopi Scraper Station has now been handed over to the Government. EMPNG reports there have been no observed signs of logging adjacent to the RoW and no bypassing of project gates or padlock tampering. Unauthorized vehicle tracks on the RoW were reported to and observed by IESC and EMPNG is liaising with the community to ensure access restrictions are respected. Also vehicle tracks were observed at the pipeline landfall at the LNG Plant.

Vehicle data gathered by monitors at open EMPNG gates indicate an increase in the use of the Southern Highway (essentially Kopi to Moro) by private vehicles on business and/or for trading purposes. There has been an increase in the proportion of vehicles passing through the Gobe gate and then continuing on the road up to OSL Ridge Camp and beyond. This is evidenced by findings from an EMPNG socio-economic assessment of increased trade occurring between the Highlands and Gulf Province, with a number of Highlanders clearing land in the Kikori and Gobe areas.

The Government has formally requested ownership of the Kikori River Bridge near Kaiam and EMPNG is undertaking an environmental and social risk assessment in relation to a potential request for the Kantobo to Gobe EMPNG road portion of the Southern Highway.

Recommendations focus on: with regard to the potential handover of the Kantobo to Gobe EMPNG road, we have made some high level recommendations on mitigation topics that EMPNG should consider, in anticipation of more detailed future risk assessment discussions with Lenders; and that market surveys be undertaken in Gulf Province to better understand the types and quantities of trade in fauna/flora species and/or wildlife parts, as evidenced by increased trade in cultural items for ceremonial wear from the coast to the Highlands.

### ***Reinstatement and Regeneration***

Natural regeneration of reinstated areas continues to progress, with slope stability and elevation being the primary factors in determining success. Increased vegetation diversity and bird observations were noted during the visit to Hides Ridge. RoW revegetation generally appeared good from our overflight between Hides Ridge and MLV-3 near Paua. Mangrove roots and stands are becoming more established at the LNG Plant, as evidenced by photo points established a year ago, although vehicle tracks were observed at the pipeline landfall in the salt pan area, which may hamper natural regeneration if unchecked (EMPNG are liaising with communities to avoid further vehicular access).

The first regeneration monitoring surveys were undertaken in 2015, surveying over 150 plots to ascertain regeneration success when compared with established benchmark succession areas. The external expert team found that regeneration of vegetation is progressing in the majority of different vegetation groups affected by project construction. They noted that a number of RoW survey plots have already reached tree canopy cover typical of early succession, and that vegetation recovery typically declines with altitude.

Recommendations focus on: ensuring exact locations are used for static photo points so that effective comparison between different photo events is more feasible.

### ***Invasive Species and Quarantine Management***

EMPNG has undertaken a thorough review of their weed audit and management processes. Permanent monitoring sites have been devised for each Weed Management Zone (WMZ), although these should be in addition to the usual regular weed audits as performed by external experts observing the areas around the EMPNG RoW, facilities and other infrastructure. EMPNG reports that a number of specific changes have been adopted in how weed audit data is used, and that there is now a higher level of confidence in data held. Weed abundance data within each WMZ has now become a focus for assessing risk and control management. Although we recognize the efforts taken in the recent review, we feel there are further improvements that can still be made in how the data is presented to management/IESC, to better communicate what weeds pose the most significant risk in each WMZ (and between WMZs), how EMPNG is controlling those risks, and how well the risk is being managed so as to contain and eradicate weeds within WMZs to avoid range expansion. We are asking for clarification on a number of queries.

EMPNG reports that clan caretaking agreements are contributing significantly to reduced weed abundance along the RoW. Community awareness and training is ongoing. Cane toad presence at several EMPNG sites has necessitated an increased focus on raising awareness, eliminating standing water on site, and toads being caught and disposed of safely if found on site.

Import shipment volumes have declined significantly since the end of construction. However, the need for further fumigation once the shipments have arrived within PNG and inspected by NAQIA is still proving a challenge. Import volumes are expected to increase again shortly as the Angore gathering system is installed.

Recommendations focus on: providing more clarity when communicating the key risks, challenges and successes in relation to avoiding increase in weed abundance, diversity and distribution; to consider representing map-based/time-based information on the spread of key P1 weed species between WMZ's to better highlight the risks they pose and management strategies; the importance of Contractors involved in import shipments adhering to EMPNG quarantine needs and contractual requirements.

### ***Resettlement***

Land access, resettlement, and livelihood restoration, under the Public and Government Affairs (P&GA) group, continues to be well organized and effectively managed. The Project achieved a positive outcome for the original resettlement and responded positively to changes recommended by the IESC and the internal evaluation and external audit, and the close out actions have been substantially met, with one exception that is dependent on a 3<sup>rd</sup> party and is likely to be closed soon and will be reported to the IESC.

In terms of resettlement that will be caused by the Angore Tie-In, a RAP identifying minimal displacement (6 households affected and only one physically displaced) and proposing appropriate mitigation measures was accepted by the IESC in July. Given the small number of affected households, the Project will assess the outcomes for all households. A large number of speculative and a few trespasser structures have been built in the area. Eviction procedures will not be brought against the trespassers as the area is a very volatile one.

Project engineers recently discovered a potential landslip above the planned pipeline RoW. As the slope is sufficiently unstable to slip at any time, the Project will acquire the land and people have already relocated. The Project indicates that its activities will not affect the stability of the slope or otherwise contribute to a landslip, and the IESC has requested results of the technical assessment of this issue. The Project is also acquiring a small amount of land nearby occupied only by uninhabited speculative structures as a safeguard. The Project will develop and submit to the IESC at the end of January 2017 an addendum to the Angore RAP Addendum that defines the mitigation measures.

### ***Information Management***

The IESC notes that the Project's adoption of the IsoMetrix system will greatly assist in planning, reporting, and sharing data across the project.

### ***Community Impacts Management***

The Project continues to see a decrease in security incidents, but serious community protests have occurred. The most serious event occurred in August when Hela province landowners asked the Project to voluntarily shut down the wellpads and when the pads were not shut down, blocked access to the conditioning plant and armed “non-locals” took over two wellpads and looted other facilities. The cause appears to be that landowners were protesting the Government’s failure to meet its Benefit Sharing Commitments. Government met with community leaders and signed an MOU to meet commitments within 14 days, but this has not yet occurred. Going forward, armed police patrol the road on an increased basis and facilities are being upgraded to allow the wellpads to be manned 24/7 in the event of security issues.

The IESC stresses that the best approach under these circumstances is a combination of continuous engagement and good intelligence, rather than donations. Communities should be made aware, to the extent feasible, of the Project’s effort to facilitate the Government to meet commitments. Any direct assistance measures should be done in the context of the goals and plans of the CDS program.

### ***Community Development Support***

The CDS is bringing positive impacts to and growing enthusiasm from communities. The program has made notable progress in, for example, staff expansion covering Upstream and the LNG Plant, producing a *Project Planning and Implementation Desk Instruction*, developing Logical Frameworks for each CDS component, improving contract management and expediting turnaround on purchase orders and payments, incorporating safety standards in contractor work, quarterly planning workshops with key stakeholders, and building strong partnerships with Government, local SME consultant groups, the Hides Special Purpose Authority and Lancos.

The CLIP (*agricultural livelihood*) program has expanded to 17 groups, many of which have added male members. Internal evaluation shows progress toward the goals of improved subsistence food and cash crop production, village poultry production, and advancing the livelihood status of women through life skills and entrepreneurship development. External evaluation is scheduled for early 2017. The IESC Social Expert visited the Mbelopa Women’s Group and found that the group has made enormous progress since the 2015 visit when the area was plagued by drought, and this progress has greatly increased enthusiasm and activity level. It is very encouraging and a tribute to the program training and the women, that women have retained their newly earned status even with the large number of male members.

Highlights of *business development* include addition of an ANUE manager with agri-business experience, assessment of women’s groups in the Upstream communities as a basis for a longer term strategy, and contributions of the Global Women in Management (GWIM) Program networking on women’s empowerment including working with women in community organizations developing small income generating ventures.

In terms of *education*, CDS completed follow up activities to address declining enthusiasm for the School Board of Management (BOM) training in schools near the LNG Plant (noted by the IESC in its 2015 report). The IESC visited one of the schools where a significant improvement on School Board performance, as well as on students and community members, was observed and reported by the persons consulted. Particularly notable is the development of a Board of Management Training Manual that has been endorsed by the Central Provincial Government and the National Education Department and will be used to train and assess school boards in the coming 5-year Provincial Education Plan period. In addition, a needs assessment and plan for Upstream (Hides, Komo and Angore) school BOM is in progress.

The initial phase of the *health* component focuses on provision of various kinds of infrastructure and in-kind support to health facilities in the LNG Plant area and Upstream Project facilities area, as well as health awareness programs. The IESC visited the upgraded Para Clinic in the Upstream area done through collaboration among the Project, the Hides Special Purpose Authority, and a local Lanco. The new facility and the provision of an ambulance is a major improvement.

Projects directly addressing *law and justice* have not yet been developed as many of the other CDS components address underlying causes of community inability to self-regulate and manage law and justice. Longer term interventions will be based on various assessments that will help to identify conflict triggers on which to focus, as well as a baseline law and justice study for the Upstream areas planned for 2017. At present, EMPNG through its Security Department and the Australian DFAT is providing advisory support to the Hela Provincial Government.

Domestic violence, mainly with women and children as victims, is a most serious problem, particularly as it undermines social and economic stability in the Upstream areas. The IESC proposes that the Project consider an awareness and advocacy strategy that draws on selected male PNG staff as champions against domestic violence inside the Project and, depending on the results of the “inside Project”, supports a similar awareness campaign in Project area villages.

### ***Stakeholder Engagement and Consultation***

The Project continues to engage widely with communities, conducting during 2016 to date engagements with 11,394 communities across the Project affected areas reaching out to a total of 257 communities (93,189 attendees) of which 6,179 engagements occurred in the LNG Plant area, 5,203 in the Upstream area, and 12 engagements with communities near the PNG main office in POM (PNG Haus).

The takeover and opening of Project built roads by the Government has been addressed in various sections of this report. The IESC understands that the Project is not in a position to provide regulation of in-migration, but can help minimize adverse impacts by engaging with affected communities to raise awareness of positive and negative impacts, their responsibilities in helping to manage impacts, and providing advice on activities that should be avoided. The Project can also help by engaging with Government to urge regulations on and monitoring of in-migration and by supporting collection of iHDSS data for those areas.

### ***Community Grievance Management***

Community *grievances* continued to decline from the previous year to 33 in 2016 to date. *Issues and comments* in 2016 to date total 2,866. The *target* rate of 75% grievances closed within 30 days has not been achieved because most grievances are more complex than those filed during the construction period, thus require a longer period for investigation and closure. The IESC concludes that the grievance management process is effective and recommends that reporting show, in addition to the overall closure rate, closure rates for categories of grievances (grievances that can be resolved quickly in the field; grievances that can be resolved within 30 days; and grievances requiring longer than 30 days to investigate and/or require external inputs). Reports should also contain information on meeting targets for responding to and initiating investigation of grievances.

### ***Benefit Sharing***

Judiciary involvement remains a challenge (see the IESC 2015 Report for more information). The Project’s strategy remains to mitigate near-term risk, support resolution of underlying issues, and capture lessons for potential future projects. The Project also continues its advocacy with the DPE and other key Government stakeholders toward a positive resolution to the issue.

### ***National Content***

The National Content program for Project workforce is on target to achieve its goal of replacement of most expatriate workers with PNG nationals. Of the current 2,522 total workforce, 81% (2,046) are from PNG and 19% (476) are expatriates. Of the PNG employees, 33% are from Project areas, 40% from the Project regions, and 27% from outside Project areas. In terms of PNG gender breakdown, 81% are male and 19% are female. Intake IV of the training began in August and is a 15 month program to develop junior technicians for Ops, Inst, & Mechanics. In terms of outcomes to date, an increase in competency of trainees who completed Intakes I and II Technician training has been observed.

The IESC requested some additional changes be made to National Content work force reports. These have been communicated to National Content management.

The Project continues to purchase as much as possible from local suppliers and to support local suppliers and contractors in implementation of the Production ESMP. The Project uses the services of nine landowner companies (Lancos) and about 120 PNG non-Lanco businesses. Since the beginning of the Production phase, just over PGK 1 billion (USD 320 million) has been spent on PNG services, of which PGK 449 million (USD 142 million) was paid to Lancos. The Project’s total expenditure on third party services in the first half of 2016 was PGK165 million (USD 52 million), of which PGK 82.5 million was for Lanco services.

### ***Labor and Working Conditions***

In terms of grievances, no hours were lost due to industrial action. Payroll queries have generally decreased and any issues are addressed through workshops with emphasis on self-help by providing information on where to find the applicable policies and to whom to speak to get information. Harassment complaints remain low and many were judged not warranting investigation. The Project has several initiatives to help eliminate grievance causes including adding PNG citizens to the Cultural Awareness training, establishing an Inclusion & Diversity (I&D) framework, support to the EM Social Club, and developing support to address domestic violence.

In terms of gender, a good effort has been made to recruit PNG females. Of the total PNG workforce of 2,522, 397 are females. Female training represents about 26% of training hours. The lower proportion of females results primarily from the types of work, much of which is not suitable to PNG females. The Project responded to the IESC's recommendation that the female counselor make more frequent visits to LNG Plant and HGCP sites and that these visits be scheduled and announced to employees. The issues discussed with the Counselor by female staff are all personal and largely concern domestic violence and the impact of excessive Wontak obligations.

Project Management is exploring possible reduction of counselor visits. The IESC agrees that visit reduction may be appropriate, but urges the Project to continue female counselor visits to HGCP.

### ***Workforce Accommodation***

The IESC reiterates the positive observations made in previous IESC reports and notes that improvements continue, most in response to requests from camp committees and residents. As a result of these improvements and the many informal mechanisms for making and responding to issues and requests, camp related grievances are minimal and easily resolved.

### ***Community Health***

The Production Community Health Program (CHP) has worked with the PNG Institute of Medical Research (IMR) in a Public-Private Partnership (PPP) over the past seven years in a relationship that has produced sustained health benefits and health sector improvements in PNG with numerous accomplishments. This program now deserves and is receiving a comprehensive scientific review of the data gathered.

At this stage of the PNG LNG Project, the iHDSS data have effectively served their purpose to evaluate the impact of the Project on local communities and the community health program needs to take a different direction. Nevertheless, IESC supports that iHDSS data be gathered where the Government plans to open up roads currently under Project control. The ongoing partnership with Baylor College of Medicine and Texas Children's Hospital focusing on education and training of students, physicians and nurses, as well as the ongoing direct community health programs, are important components of EMPNG's community development program, but the community health program can be expected to have a smaller role for the PPP with the IMR.

### ***Occupational Health and Safety***

EMPNG Production safety performance through Q3 2016 continues to be excellent. The last Lost Time Incident took place in July 2013 – a period covering 14.5 million man-hours. The four recordable injuries for Q1 through Q3 2016 were all minor. The occupational health program is founded on monitoring ambient conditions and making sure that workers have appropriate protection, as would be expected for a project of this size, and is a best practice program. This program is being expanded with what EMPNG refers to as a Focused Risk Reduction initiative to minimize the reliance on personal protective equipment. The medical staff is now entirely nationalized and fully managing the occupational health program, except at the HGCP where doctors and rescue paramedic staff are still expats. The only other area where expat services are still used is with respect to vector surveillance by Mosquito Zone. Vector-borne disease is still a major concern with a slow increase in dengue since 2012.

### ***Cultural Heritage***

EMPNG continues to monitor cultural heritage sites identified during the Construction phase as part of PMA-2 surveys of those focal habitats and significant ecological features adjacent to and in the vicinity of the pipeline RoW, facilities and other infrastructure. About half of the sites monitored in 2016 will be discontinued from monitoring, as they are not accessible, functional or could no longer be located. As part

of undertaking the environmental evaluation of the 1.3 km Angoreflowline, a new archaeological survey was undertaken. Cultural sites were identified, but none were of high significance. An additional activity being undertaken is working with the Australian High Commission to improve the capacity of the National Museum and Art Gallery (NMAG) to fulfill their mandate.

## 1 INTRODUCTION

D'Appolonia S.p.A. (D'Appolonia), located in Genoa, Italy, was appointed as the post-financial close Independent Environmental and Social Consultant (IESC)<sup>1</sup> for the Papua New Guinea Liquefied Natural Gas Project (PNG LNG or the "Project") being developed by ExxonMobil PNG (EMPNG), the designated Operator and also representing a consortium of co-venturers including Oil Search Limited (OSL), Santos Ltd, JX Nippon Oil & Gas Exploration Corporation and PNG State and landowners as represented by Mineral Resources Development Company (MRDC) and Petromin PNG Holdings Limited. D'Appolonia's role as the IESC is to support the Export Credit Agencies (ECAs) providing Project financing, including the Export-Import Bank of the United States (USEXIM); Japan Bank for International Cooperation (JBIC); Export Finance and Insurance Corporation (EFIC) of Australia; ServiziAssicurativi del Commercio Estero (SACE) from Italy; Export-Import Bank of China (CEXIM); and Nippon Export and Investment Insurance (NEXI), as well as a group of commercial banks, collectively referred to as the Lenders or Lender Group.

The overall role of D'Appolonia as the IESC within the PNG LNG Project is to evaluate compliance with commitments made by EMPNG within their Environmental and Social Management System (ESMS) including health and safety. The benchmark for the ESMS is now the Production Environmental and Social Management Plan (ESMP) and associated commitments made within the ExxonMobil Operations Integrity Management System (OIMS) and the documents associated with biodiversity management.

The IESC Terms of Reference (TOR) requirements refer to an evaluation of Project "compliance", whereas the reporting requirements of the TOR state that the reporting will include a "list of non-conformance findings". Within this report the terms "compliance" and "conformance" are considered to be equivalent. In general, issues to be resolved are identified as non-conformances, but one of the requirements of the IESC is to identify any "material non-conformances" within the context of the CTA. The IESC believes that a "material non-conformance" within the context of the CTA would need to be a Lender decision, but for the purposes of this report a potential "material non-conformance" would be a Level III non-conformance or repeated Level II non-conformances as defined in the Section 2 Issues Table. It is emphasized that a Level III non-conformance is not necessarily equivalent to a "material non-conformance" and that extensive discussions among EMPNG, Lenders and the IESC would need to take place before any "material non-conformance" is identified.

IESC's review has included the environmental and social (E&S) and health and safety (H&S) management activities of EMPNG. Emphasis has been placed on evaluating conformance based on written information provided by EMPNG and observations made in the field including discussions with EMPNG personnel. Most of the findings identified in this report have been based on field observations and interactions with the individuals actually responsible for the field implementation of the ESMP, as well as meetings with stakeholders.

An activity that does not fall under the category of "monitoring" yet is within the scope of the CTA is a requirement for the IESC to certify certain non-Project operations (section 14.2(m)(iii) of CTA). Since the last field visit in October 2015 there have been several certifications that relate to this requirement of the CTA:

- Sharing the Komo airfield with third-party users;
- Providing PNG DATACO Limited access to space in the Project's Fiber Optic Local Equipment Room ("FOLER") and Tower Local Equipment Room ("LER") at the HGCP to extend communication networks from Port Moresby to the HGCP Tower on behalf of third parties;
- Enabling Barrick (Niugini) Limited to maintain certain equipment on the telecommunications tower owned by the Project and located at Hides and providing access to space on the telecommunications tower and the surrounding area outside of the tower fenced area; and
- Allowing Mobil Oil New Guinea Limited ("MONG") to utilize certain Project resources to minimize the duplication of such resources and conduct their operations in an efficient manner.

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<sup>1</sup> IESC Team members in the field: William J. Johnson (Field Team Lead - Earth Scientist/EHS Management System Specialist), Kerry Connor (Social Development Specialist), Louise Johnson (Biodiversity and Natural Resource Management Specialist)). IESC Team members not in the field: Giovanni De Franchi (Project Manager and Team Lead).

None of these actions had the potential to adversely impact the PNG LNG Project.

## **1.1 PRODUCTION OPERATIONS OVERVIEW**

Production continues stable operations reflected by the steady increase in Plant production, about 15% above the design capacity of 6.9 MTA. As of the end of October, 6.4 million tons of LNG had been produced in 2016 with record production in September. This has occurred in spite of setbacks due to an LNG Plant blackout in May 2016 caused by the loss of generators (failure of central controller during startup of the emergency generator) and a shutdown at the HGCP in August due to civil unrest. The overall increase in production is attributed to debottlenecking, control system tuning and high reliability across the wells, HGCP, associated gas fields and the LNG Plant. At the time of the IESC field visit, 246 LNG cargos had been shipped from the LNG Plant jetty representing the export of more than 17million tons of LNG. EMPNG's second custom-built LNG vessel, Kumul, began loading in May 2016.

Since June 2015 EMPNG has been supplying reliable power to the PNG Government from generators at the LNG Plant that produce about 25 MW of power. EMPNG has been engaged to facilitate the construction and operation of a PNG Government owned 50MW Gas-fired power generation plant in the vicinity of the LNG Plant. EMPNG will supply 6-20 MMscfd of gas to the plant over a 20-year period. The tendering process for plant construction is underway and funding is in place. A construction schedule will be established after contract award.

Drilling is complete and fully demobilized. Ongoing work relates to tying in the production wells to the HGCP. Work that started in June 2016 and is projected to be complete by May 2017 is a project to design, procure and install Wellpad F Surface Facilities (including the equipment, MEG line, power and control cables) to allow production from the F1 well. A larger project is to design, procure, and construct the pipelines from Angore Wellpad to the HGCP with surface facilities at Angore and tie-ins at HGCP for full wet stream flow, remotely operated from HGCP. This project includes a 14" three-phase wet gas pipeline with a 2" monoethylene glycol (MEG) line. The Angore surface facilities will include glycol injection, power and hydraulic control systems, a pig launcher, and an accumulator system to manage well pressure. New HGCP surface facilities will include a new pig receiver station, tie-ins to the flare header, a MEG system, and a slug catcher. The two Angore producer wells are currently drilled and completed, but need to be perforated prior to start-up. The FEED for this project is scheduled to start in January 2017.

The Komo Airfield Camp is in the process of being dismantled. The beginning of the demolition was associated with community violence, as some community members apparently felt that they were owed compensation by the Defense Forces that had occupied the camp. Demolition was still underway by a local Lanco at the time of the field visit with no associated civil unrest.

The Project workforce is currently slightly more than about 2,100 with Papua New Guineans making up about 80 percent of the Project workforce.

## **1.2 SOURCES OF INFORMATION**

The main sources of information used to prepare this sixteenth IESC trip report are primarily those provided by EMPNG, but D'Appolonia also obtained information by means of interviews with local stakeholders during the field visit in PNG as well as EMPNG employees. The information provided by EMPNG has included presentations made to the IESC and additional documents consistent with the trip schedule provided in Appendix A.

## **1.3 REPORT ORGANIZATION**

Subsequent sections of this report are organized as follows:

- Section 2.0 – Issues Table;
- Section 3.0 – Environmental and Social Management;
- Section 4.0 – Environment;
- Section 5.0 – Biodiversity and Ecological Management;
- Section 6.0 – Social;
- Section 7.0 – Labor and Human Resources; and
- Section 8.0 – Health and Safety.
- Section 9.0 – Cultural Heritage

The basic findings of the review are presented in the form of observations, comments and recommendations that are generally described according to topics within each section. Significant findings are summarized in the Issues Table provided in Section 2.0.

## 2 ISSUES TABLE

This Chapter tabulates a summary of the non-conformances raised in this report, consistent with our TOR as discussed in Section 1.0. The Table has been structured to provide a color-coding for strict non-conformances raised during each site visit, as well as IESC observations for situations that if left unattended could result in a non-conformance. Non-conformance is referenced with respect to Project commitments as included in applicable Project documents and with respect to on-going compliance with Applicable Lender Environmental and Social Standards. As noted in Section 1.0 of this report, “Applicable Lender Environmental and Social Standards” means the environmental and social standards applied by the Loan Facility Lenders to the Project in the form attached to Schedule H-1 (Environmental and Social – Applicable Lender Environmental and Social Standards) of the CTA. The nomenclature of the color-coded categorizations are assigned based on non-conformance levels similar to the non-conformance levels defined in the ESMP, somewhat revised to reflect the point of view of the IESC and to address that certain non-conformances need to be framed in the context of the Applicable Lender Environmental and Social Standards. The following descriptions are provided:

- **High:** Level III critical non-conformance, typically including observed damage to or a reasonable expectation of impending damage or irreversible impact to an identified resource or community and/or a major breach to a commitment as defined in Project documents or the Applicable Lender Environmental and Social Standards. A Level III non-conformance can also be based on repeated Level II non-conformances or intentional disregard of specific prohibitions or Project standards. In some cases, Level III non-conformances or repeated Level III non-conformances may, but not necessarily, represent a material non-compliance with the CTA. This would be decided on a case-by-case basis;
- **Medium:** Level II non-conformance representing a situation that has not yet resulted in clearly identified damage or irreversible impact to a sensitive or important resource or community, but requires expeditious corrective action and site-specific attention to prevent such effects. A Level II non-conformance can also represent a significant breach of a commitment, or a risk of a significant breach if not expeditiously addressed, requiring corrective action as defined in Project documents or Applicable Lender Environmental and Social Standards. A Level II non-conformance can also be based on repeated Level I non-conformances;
- **Low:** Level I non-conformance not consistent with stated commitments as defined in Project documents, but not believed to represent an immediate threat or impact to an identified important resource or community. A Level I non-conformance can also represent a minor breach of a commitment requiring corrective action as defined in Applicable Lender Environmental and Social Standards;
- **IESC Observation:** A potential non-conformance situation that could eventually become inconsistent with stated commitments as defined in Project documents or the Applicable Lender Environmental and Social Standards.

	Site Visit	Closing Date	Description	Non-Conformance	Reference	Status	Comments / Report Reference
<b>Environmental Issues – Biodiversity and Ecological Management</b>							
M15.12	Oct '15		<p>The accidental introduction of alien species into new areas can be a significant threat to biodiversity, since some species can become invasive, spreading rapidly and out-competing native species. This is especially important in areas of widespread disturbance where weeds can become quickly established.</p> <p>The containment of priority 1 weed species, especially those known to be highly invasive with the capacity to establish and persist in a variety of habitats, is paramount.</p> <p>Weed audits have indicated a number of P1 weeds expanding their ranges, moving through several Weed Management Zones through the Upstream area.</p> <p>A recent review of weed data collection and analysis has occurred since our 2015 visit. EMPNG are working to improve how weed information is collated and analysed, but data presented to IESC during both 2015 and 2016 visits has been flagged as incorrect following each visit.</p>	IESC Observation	IFC Performance Standard 6, Biodiversity Strategy and EMP Section 15	Open	<p>We recognize the efforts taken in the recent review of weed management processes, and note that EMPNG now has a higher level of confidence in the data it holds on presence/absence of weeds in various Weed Management Zones (WMZ). EMPNG has developed a permanent monitoring site approach to allow for weed abundance and range extension data to be tracked through time.</p> <p>However there is still opacity in information presented to the IESC on what weeds pose the most significant risk in each WMZ (and between WMZs), how EMPNG controls the greatest risks posed, and how successful they are being at managing that risk to contain and eradicate within WMZs to avoid range expansion. In addition, if only permanent monitoring sites are used, and the previous walk-through audit approach by BioTropica is no longer used, we believe EMPNG is at risk of being unaware of new weed threats previously captured by external expert walk-through audits.</p> <p>At the moment, we are told the weed audit identifies a weed, and a contractor is sent out to control it. We do not get an impression of how this program is being managed strategically, and it has been difficult for IESC to analyse data when elements of it are found to be wrong. Hence we retain this observation until such time that we are able to have more confidence in how well the information gathered through audit is being used to manage risks from the spread of weeds. (Report reference Section 5.6.2.1)</p>

<sup>2</sup> In order to better track project progress and accomplishments, the issues identified during each site visit are identified by a letter (M) and number (e.g. M1) that identifies the site visit (e.g.: M1 for the first visit, M2 for the second visit, etc.) followed by a digit that identifies the specific issue found (e.g. M15.1 refers to issue 1 found in visit 15).

### **3 ENVIRONMENTAL AND SOCIAL MANAGEMENT**

#### **3.1 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM**

The cornerstone to the Environmental and Social Management System (ESMS) for the PNG LNG Project is the Environmental and Social Management Plan (ESMP) for Production, which, along with the Biodiversity Strategy and associated documents, define EMPNG's environmental and social commitments. Drilling is complete and the only construction is the F1 Surface Facilities Project that involves the design, and construction of Wellpad F Surface Facilities (including the equipment, MEG line, power and control cables) to allow production from the F1 well and also including construction of a flowline from Wellpad E. The next major construction project will be installing the flowlines from Angore to the HGCP.

The Production ESMP has been revised and is currently in a Revision 1 (R1) stage. The changes were reviewed by the IESC in 2016 and our comments and recommendations have been incorporated within R1 to an acceptable degree. One of the key points of our review was that the Production ESMP is not suitable for construction, other than at a small scale, and we recommended that an Addendum to the Construction ESMP be developed to cover the construction of the Angore Flowlines. This is the approach undertaken by EMPNG and the Angore ESMP includes:

- environmental aspects assessment;
- social aspects assessment – gap analysis between Production SMPs and social aspects associated with construction and commissioning of Angore Gathering System; and
- both construction and commissioning phases.

The overall format of the Angore ESMP is similar to the Production EMPs.

IESC review of the Angore ESMP for the flowline construction was required to be undertaken at least three months before start of construction, an action completed shortly after this field visit.

While EMPNG retains responsibility for all ESMP obligations, several are executed via third-party contractors. As noted in the last IESC report, the rollout of ESMP requirements to contractors started slowly, but this is no longer considered to be an issue as a process is in place for contractors to be reviewed and ranked in terms of their performance, allowing for EMPNG to focus their effort to improve contractor performance.

Organizationally, the divisions dedicated to managing environmental labor and community issues have basically stayed the same as previously reported from the IESC visit in October 2015.

#### **3.2 MANAGEMENT OF CHANGE**

At the time of the field visit in October 2015, one of the pending changes was to the Production ESMP. As noted in Section 3.1, these actions are now complete and approved by the IESC. Since the October 2015 IESC field visit, there have been no new MOCs of significant environmental or social impact, except for the pending MOC related to the Government requests to acquire Project infrastructure.

The Kaiam Bridge over the Kikori River has not yet been turned over to the Government, but the Kopi Bypass Road has been turned over. EMPNG has assigned the turnover of the Kaiam Bridge to be a Class 2 Management of Change (MOC) on the basis that it is a bridge on an existing public road that will be replaced if it is not turned over, so EMPNG is not in a strong position to refuse. EMPNG will not turn over the bridge until road construction to Samberigi is complete and that activity continues to be stalled.

The turnover of the Project-controlled Gobe to Kantobo road with the turnover of the OSL controlled road from Kantobo to Moro (Kutubu) represents the potential for significant impact to what is otherwise critical habitat and Project control of this road is an EIS commitment reflected in the Common Terms Agreement. The entire stretch of road from Kikori to Moro (Kutubu) is designated by the PNG Department of Transport in their National Transport Strategy as the Petroleum Resource Area Economic Corridor (PRAEC) and is

their first priority designated for development by 2020. Transport infrastructure associated with this corridor includes the road running parallel with the pipeline route from Kutubu to Kikori. The question as to whether or not Project and OSL controlled roads are going to be turned over to the Government is not if, but when.

EMPNG has undertaken a study entitled “The Socio Economic Impact Assessment of Kantobo to Kikori Access Road” that concludes that turning over the Project road has potential socio-economic advantages and disadvantages, but will have an overall socio-economic benefit. Environmental risks are not addressed in detail, but it is clear that there are more environmental risks than benefits. Additional details of the potential consequences of opening up the Gobe to Kantobo road are discussed in Section 5.4.2. Negotiations have yet to start with the PNG Government, but IESC has recommended that EMPNG and Lenders have discussions on this topic before entering negotiations with the PNG Government.

IESC considers that the opening of the Project-controlled Gobe to Kantobo Road to be potentially a more serious impact than the handover of the Kaiam bridge over the Kikori River. The MOC associated with this action must be considered a Class I MOC.

### **3.3 INCIDENTS**

Since the last IESC field visit there has been one serious incident in August where community members around Hides requested that the HGCP be shut down. Hired “non-locals” entered Wellpads with guns. Wellpad B was shut-in and looted; Wellpad F was looted with equipment damaged. A Government contingent met with community leaders for several days and signed an MOU with commitments to be met within 14 days; these commitments are still yet to be fulfilled. Consistent with previous civil unrest, the protests are not against EMPNG, but related to Government benefits. The continued lack of Government response likely means that adverse community interactions are likely to continue.

In a separate incident, Komo Camp was taken over and vandalized by local community members for about a week. Curtain Brothers had started demolition of the camp, which had been occupied by PNG Defense force personnel, but community members clearly believed they were owed compensation by the Defense Force, which was not going to happen if the Camp was going to be removed. They also felt that the demolition debris consisted by EMPNG to be “waste” was valuable to them and something that should have been offered to them. The situation was resolved by having a local Lanco, HGDC, take over demolition with local clans involved.

In terms of environmental incidents, there have been no significant spills and the only Corporate Reportable incidents were minor, related to small oil and chemical spills to ground, and water quality discharges. A single exceedance of the flaring target took place at the LNG Plant in May related to a reliability incident as described in Section 1.1. The total flaring volume at the LNG plant in May was 768.7 MSCF when the normal flaring amount is typically less than 50 MSCF. The most common cause of spills is equipment failure, mainly from excavator hydraulic hoses in the Upstream area along the wellpads.

### **3.4 EMERGENCY RESPONSE**

The emergency response system is fully in place in terms of plans and procedures, equipment and personnel. Unless there is a major emergency where the capabilities of the system are tested, this is not a topic that will be included in future IESC reports.

## **4 POLLUTION PREVENTION**

### **4.1 WASTE AND WASTEWATER MANAGEMENT**

#### **4.1.1 Project Strategy**

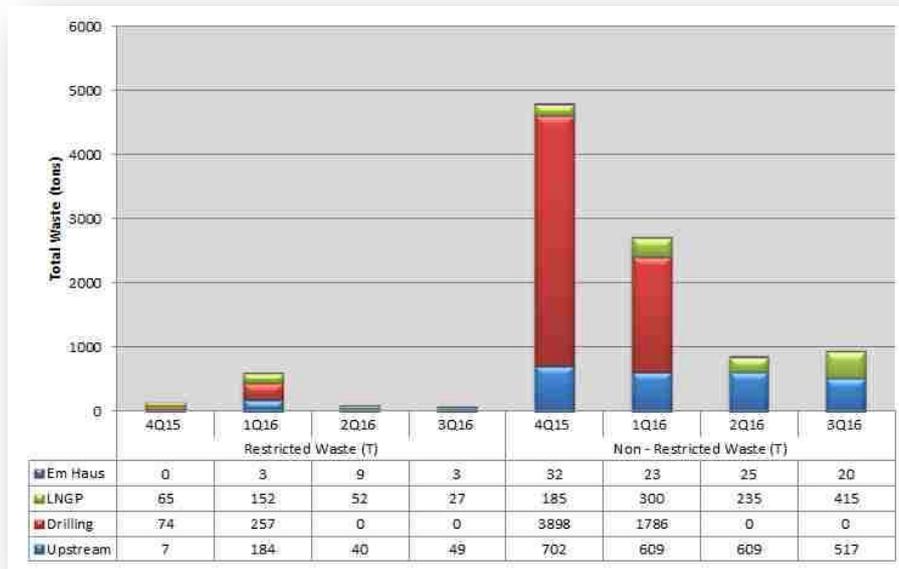
EMPNG's objectives are to apply the waste management hierarchy (wastes will be preferentially and sequentially avoided, reduced, reused, recycled or recovered) and to dispose all wastes at EMPNG facilities and approved third party facilities only. EMPNG's objectives are also to avoid significant impacts associated with the release of pollutants to surface water and groundwater and meet applicable discharge criteria. These applicable discharge requirements are those tabulated in Chapter 9 of the Upstream and LNG Plant EMPs.

#### **4.1.2 Observations**

##### **4.1.2.1 Waste Management**

Waste continues to be well managed. The main change is that drilling waste no longer represents a significant waste stream and the spikes in waste generation in Q4 2015 and Q1 2016 from the demobilization of drilling is complete. The second landfill cell at the Hides Waste Management Facility (HWMF) is still being filled and it is expected that the Q4 amounts of waste will reflect the demolition of the Komo Camp. The industrial incinerator at the HWMF continues to operate with no major issue and has become the permanent incinerator for production waste. The general incinerator at the LNG Plant has been found to have some emissions problems and is currently used for the disposal of only non-restricted waste. The sludge incinerator at the LNG Plant operated intermittently to manage chemical waste is currently non-operational due to technical issues.

41 tons of spent molecular sieve waste from the LNG Plant dehydration units were sent to the on-site landfill after laboratory test results confirmed that the waste did not contain hazardous substances. Special waste management problems at Hides were the disposal waste associated with the drilling demobilization. Specifically, surplus chemicals were returned to suppliers in Lae and 200 tons of drilling mud were sent to an approved third-party facility for disposal in Australia. Surplus materials were also transferred to the Operations team for re-use. A new excavator at the HWMF has been acquired with a cutting mechanism that can shred used tires for use as landfill base material.



**Figure 4.1: Project Waste Profile (Q4 2015 through Q3 2016)**

EMPNG is currently evaluating the possibility of using the Baruni landfill, the municipal landfill serving Port Moresby. In its current condition, the Baruni landfill is an open, burning dump operated by the National District Capital Commission (NCDC) through their Waste Division. The Japanese International Cooperation Agency (JICA) has initiated the upgrading of Baruni landfill in POM at the cost of PGK2.5 million through technical support. The upgrading of the facility will cost PGK10 million (PGK1 million from NCDC and PGK9 million from PNG National Government). The Conservation and Environment Protection Authority (CEPA) has approved the project. EMPNG conducted an audit of a new upgraded landfill cell at the Baruni landfill recently constructed with NCDC and Japanese Government cooperation to evaluate if it is suitable for the disposal of non-restricted waste from LNG Plant camp demolition and the Power Project. A decision is still pending.

EMPNG is in the process of reviewing their overall waste disposal practices to develop a long-term strategy. In addition to the use of the Baruni landfill, this involves a re-assessment of the use of third-party waste oil disposal at Niugini Table Birds and Ramu Sugar Farm in Lae and evaluating the use of OSL's new industrial incinerator at Ridge Camp. EMPNG is continuing to work with Total Waste Management (TWM) to ensure that their waste oil processing unit meets EMPNG requirements.

#### 4.1.2.2 Wastewater Management

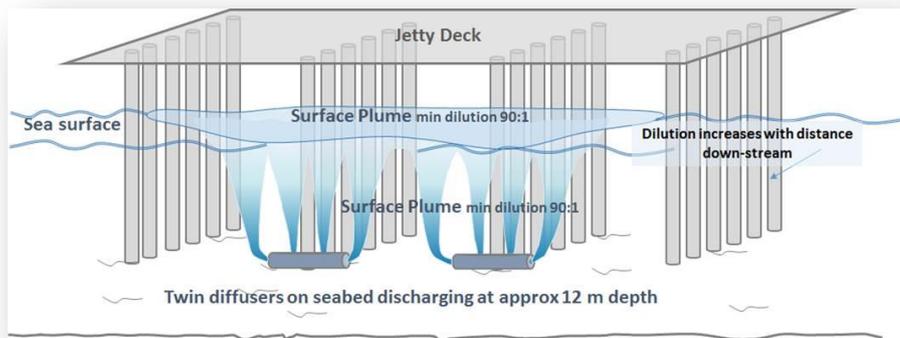
Long-term issues of wastewater treatment continue to be addressed. The problematic wastewater treatment plant at Moro was replaced in May with generally good results. The plant at Hides has also been replaced with good results and the LNG Plant facility continues to operate well. All of the WWTPs associated with Drilling were decommissioned by the end of 2015. EMPNG, with support of its main waste services provider TWM, has achieved formal certification of all of its Operators as Certificate II and III Water/Wastewater Treatment Plant Operators. The biggest challenge for wastewater management over the past year has been discharges from the retention ponds.

In the Hides area, discharges from the HGCP have all been compliant, including samples from Akara Creek that was impacted by the failure of the soil stockpile in 2010, but potassium concentrations from the HWMF have continued to be elevated. As these concentrations do not adversely impact the Tagari River, a higher end-of-the-pipe limit for potassium has been verbally accepted by CEPA, with written approval expected soon. Potassium is not a parameter where the IFC EHS Guidelines establish discharge standards as it is a common constituent from agricultural runoff.

Water discharges from the discovery of amines in the LNG Plant retention pond have proved the most challenging to manage. Amines in the retention pond at the LNG Plant were discovered in August 2016 and the immediate reaction was to immediately stop any additional discharge from the pond. This required the diversion of stormwater and desalinization brine water such that the pond would not quickly overflow.

Amines are a major component of a solvent (UCARSOL) used to remove carbon dioxide as part of gas processing at the LNG Plant. Low levels of amines had been entering the retention pond, but the problem was compounded after a concentrated amine solution was added to the pond due to human error. Managing this large body of contaminated water required undertaking a complicated risk assessment such that risk-based concentrations for different ecological species could be calculated. This required the services of an expert toxicologist hired to evaluate ecosystem protection guidelines for pond water release and ExxonMobil Biomedical Scientists Inc. (EMBSI) to evaluate the toxicologist's determinations and the laboratory procedures used to obtain results on amine concentrations. It was then necessary to determine a means to discharge the pond below the risk-based concentrations. This required the services of an expert engineer to develop diffuser options to release pond water from Marine Jetty, as the release requirements at the coastline were stricter than at sea and erosion would also have been a potential issue. The use of two diffusers to release retention pond water to deep ocean water off the Marine Jetty was determined to be the final solution with the least amount of ecological impact.

The solution of discharging the retention pond water with two diffusers (Figure 4.2) was being implemented at the time of the visit. The problem of the amines is cited as an example of how an environmental management system is supposed to work. On many projects the attitude might have been to simply make a discharge on the basis that ecological damage would be minimal. EMPNG worked to solve the problem and discharge following acceptable standards.



**Figure 4.2: Concept of Two Diffusers to Discharge Retention Pond Water at the LNG Plant**

### **4.1.3 Recommendation**

1. Do not be in a rush to use the Baruni landfill for waste disposal. Until the facility as a whole operates with at least a “not bad” practice, it remains a reputational risk to have association with an open dump, even if a portion of it has an engineered cell.

## **4.2 HAZARDOUS MATERIALS MANAGEMENT AND SPILL PREVENTION**

### **4.2.1 Project Strategy**

EMPNG’s objectives are to prevent spills of hydrocarbons and chemicals and to respond effectively to spills should they occur. EMPNG also has standards for materials management where objectives objectives are to avoid significant impacts associated with the procurement and use of raw materials and to use materials that are less hazardous or otherwise preferable from an environmental perspective, where practical.

### **4.2.2 Observations**

Spill prevention continues to be effective. There was only one reportable spills (>1 barrel) over the past year and this fell into the “Level 0” category of being a minor spill. Spill records continue to be properly maintained and spill response training continues to take place across the Project. Overall, from what was observed in the field, hazardous materials continue to be well managed throughout the Project. Spill kits and fire extinguishers were found to be available and properly located throughout the sites and hazardous material drums and containers were observed to be appropriately labeled.

## **4.3 AIR QUALITY AND NOISE**

### **4.3.1 Project Strategy**

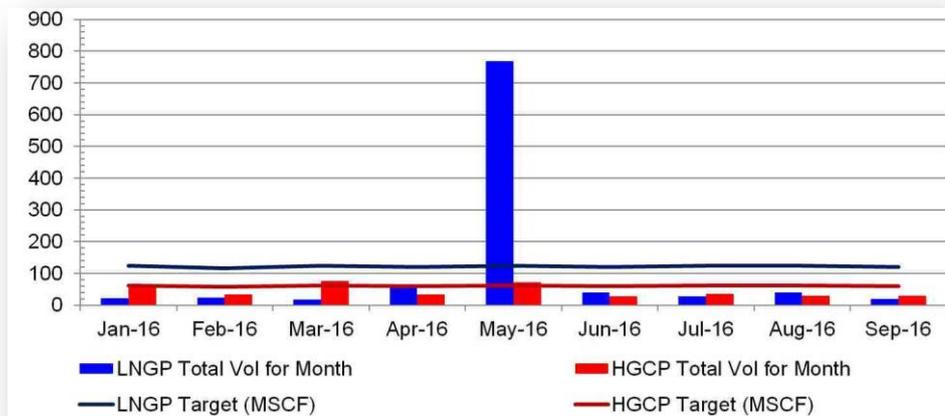
EMPNG’s objectives are to avoid significant impacts associated with the release of pollutants to air and meet applicable emissions and air quality criteria. Requirements for noise control are those identified in the IFC General EHS Guidelines.

### **4.3.2 Observations**

Stack testing was completed in April 2016 at the LNG Plant, HGCP and the HWMF. All emission were found to be below criteria, except at the LNG Plant general waste incinerator for the dioxin/furan criterion (average 0.89 ng/m<sup>3</sup> compared to the limit of 0.41 ng/m<sup>3</sup>). Rigorous performance testing was then undertaken in Q2 to assess the relationship between the type and volume of waste materials incinerated and the resulting impact on emission concentrations. Lessons learned from the compliance and performance testing were applied in a revision of the incinerator waste loading and operating guidelines in Q3, with follow-up compliance testing conducted in October 2016. Results are pending.

LNG Plant stack testing will continue semiannually for the general waste incinerator, process area incinerator, regeneration furnaces, and hot oil heater until four sets of data are established. HGCP has completed all base stack testing and is now only required to test annually. Testing for all sites is planned for March-April 2017.

The only significant deviation from normal operations took place in May 2016 at the LNG plant, which as described in Section 1.1 experienced a blackout caused by the loss of generators (failure of central controller during startup of the emergency generator). The total flaring volume at the LNG plant in May was 768.7 MSCF when the normal flaring amount is typically less than 50 MSCF (Figure 4.3).



**Figure 4.3: Flare Volumes through September 2016**

Noise monitoring surrounding Project facilities have shown that noise is not an issue, except at the HWMF at Kopeanda, where the large incinerator has required design and management measures to maintain emissions within acceptable limits at the plant boundary. These noise emissions have been taken into account with a new noise model, which confirms that the buffer zone is adequately designed, but there are people living inside the buffer zone, where noise levels are above criteria. In this case, EMPNG is working with the Department of Petroleum and Energy (DPE) to address the issue of people moving into buffer zones associated with Project facilities with those nearby households.

#### 4.4 EROSION AND SEDIMENT CONTROL

##### 4.4.1 Project Strategy

EMPNG's objectives are to control significant erosion and prevent sedimentation of surface waters.

##### 4.4.2 Observations

Erosion and sediment control has for the most part reached the stage where the program is one of surveillance and maintenance. The main area where there have been legacy problems with erosion and sediment control is at the Komo airfield. The geosyntheticcliner material used for the drainage channels was removed by the public in Q2 2016, which has required new improvements to be made. Work has started to install concrete drains (less susceptible to public removal and damage). Eastern side drains were completed in Q3 2016 (see Figure 4.4); the western side is estimated to be completed in Q4.

At the HGCP a small landslip near the administration buildings needed to be repaired (the same area where landslips had occurred during the Construction phase) and this was repaired. Drainage improvements continue to be made along the periphery road around the HGCP where problems have occurred in the past.

Wellpad G was observed during the field visit to be in a stable condition. Erosion and sediment control procedures have now focused on the construction ongoing at Wellpad E. Improvements to the Spine line road drainage also took place near Hides Quarry 3.

Erosion and sediment control activities along the Pipeline RoW are constantly ongoing as part of routine maintenance. The number of work crews has increased from two to three. The major works completed in 2016 have included retaining walls at KP41 and KP58.

A notable milestone in terms of erosion and sediment control is that after the 2010 soil embankment failure into Akara Creek in 2010, the freshwater ecological monitoring shows an accelerated rate of recovery for organisms and Akara Creek is now designated as “recovered.”



**Figure 4.4: Replacing Geofabric Ditch Liners at Komo with Concrete**

#### **4.4.3 Recommendations**

None at this time.

## 5 BIODIVERSITY AND ECOLOGICAL MANAGEMENT

### 5.1 INTRODUCTION

This section provides a record of IESC Observations and Recommendations associated with EMPNG's ecological management (both terrestrial and aquatic) including: the ecological monitoring of areas potentially impacted by the project to ensure the Biodiversity Strategy is being adequately implemented; the planning and implementation of the biodiversity offset program (to address residual impacts remaining after impact avoidance and mitigation); the reinstatement and regeneration of areas cleared by the Project, including the Right-of-Way (RoW), camps, quarries, etc.; the management of issues related to invasive species, pests and plant pathogens (including quarantine management of imports); and the avoidance of project-related induced access resulting from the construction/retention of roads and RoW corridor.

The whole Upstream Project area is deemed to be Critical Habitat, in accordance with IFC Performance Standard 6 (2006)<sup>3</sup>. EMPNG's overall strategy for biodiversity and ecological management is described in the Biodiversity Strategy and Production-phase EMPs, along with other associated documents.

Records from the EIA baseline studies and the Pre-Construction Surveys (see previous IESC reports for background) serve to establish the ecological conditions prior to ground clearance or infrastructure development. These records include information on the presence of weeds, and the locations of focal habitats and ecological sensitivities such as (but not restricted to): pinnacles that contain bat colonies; potential Bulmer's fruit bat (*Aprotelesbulmerae*) colonies; bird-of-paradise and bowerbird display grounds and trees; large individual trees (>1m diameter breast height); areas of Pandanus swamp forest; swamps in sinkholes less than 50 m deep on Hides Ridge; and *Nothofagus* (beech) forest that will require special hygiene measures (due to risk of dieback as caused by pathogens such as *Phytophthoracinnamomi*). These detailed records have been compiled into a Register of Focal Habitats and Significant Ecological Features. This Register is being supplemented by information related to post-construction and current ecological conditions through monitoring studies and surveys.

### 5.2 BIODIVERSITY STRATEGY INCLUDING OFFSETS

#### 5.2.1 Project Strategy

EMPNG's objective is to avoid impacts to specific features of ecological importance. The Biodiversity Strategy was developed to guide the long-term management of terrestrial and freshwater biodiversity within the Upstream area. The Strategy provides an overview of EMPNG's overall approach to mitigating impacts on biodiversity in alignment with the standard avoid, reduce, remedy, and offset mitigation hierarchy. The goal of the Strategy is to retain the biodiversity values of the Upstream Project Area on a regional scale for the long term. In order to achieve the overall goal, the following objectives were defined, and now refined in 2016:

- To maintain the intactness of the Upstream Area as a whole;
- To conserve priority ecosystems;
- To protect focal habitats; and
- To identify, measure and offset significant residual impacts.

In order to achieve these objectives, avoidance, mitigation and monitoring of biodiversity values take place at three levels:

- (i) The large scale, which is the entire Upstream Project Area;
- (ii) The medium scale, which is represented by particularly valuable areas referred to as 'priority ecosystems'; and

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<sup>3</sup> IFC Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management (2006)

- (iii) The small local-scale, which are sensitive habitats referred to as ‘focal habitats’ and significant ecological features.

To address residual impacts on critical habitat, and in accordance with the Biodiversity Strategy, EMPNG has developed a Biodiversity Offset Program.

### 5.2.2 Observations

Following an extensive review of the Biodiversity Strategy and Biodiversity Implementation and Monitoring Program (BIMP) by EMPNG, the IESC has approved the documents (Strategy Rev.3 and BIMP Rev.1, both dated 28-Oct-2016) and we are advised they will be available on [www.pnglng.com](http://www.pnglng.com) by the end of 1Q2017. Although the Biodiversity Strategy no longer includes the level of ecological detail contained within the first published version, the document now provides a strategic summary of risk management measures, implementation and monitoring relevant for the EMPNG operational phase, plus provides information on the Project’s Offset Program including the technical rationale.

We note that the first objective listed above has been rephrased from ‘ecological intactness’ to simply ‘intactness’. After the IESC sought clarification, EMPNG has confirmed their updated interpretation of ‘intactness’ includes ecological as well as social, cultural, physical etc. so is a broader interpretation to allow for the inclusion of other aspects beyond just ecological. The IESC concurs with this slight change in emphasis.

The Biodiversity Strategy is relevant for all ongoing construction and production activities. Any impacts related to Phase II construction linking Angore to the HGCP will also be managed via an addendum to the Construction ESMP and a standalone EMP specifically for the Angore Gathering System, currently under review (see earlier sections).

#### *Offset Framework & Technical Rationale*

To compensate for the PNG LNG project’s residual impacts, and to comply with IFC Performance Standard 6 No Net Loss (NNL) requirements, EMPNG has further refined their biodiversity offset framework and rationale since our last visit. As will be presented within the forthcoming Biodiversity Strategy, the Offset Program is based on guiding principles derived from earlier stakeholder consultation, and a social and technical rationale related to area-based conservation, representativeness, calculating habitat debt and gain to achieve NNL, and demonstrating additionality. Implementation of the Offset Program components and progress towards NNL will be assessed regularly via several program monitoring activities (PMAs) but specifically by PMA-4 (see 5.3).

The IESC commends EMPNG on their biodiversity offset rationale efforts specifically over the last two years – this has resulted in having a more robust offset framework as the foundation for their offset program, and more capable of helping them demonstrate progress towards NNL. This technical rationale can now form the basis for documenting the rationale for each offset site, and the specific characteristics for managing delivery of conservation gain at each (see Recommendation).

#### *Offset Program Design and Early Implementation*

Activities associated with each offset program component will shortly be available in the forthcoming BIMP publication. During this IESC visit, EMPNG has provided an update on the ongoing design and implementation of each component:

- Offset Component 1: Kikori-wide landscape scale. This component provides support to CEPA in meeting its international Convention on Biological Diversity (CBD) commitments via production of a ‘Protected Area Plan’ for a Kikori-wide river basin, that in subsequent offset planning phases can be taken forward for implementation:
  - o Update: Wildlife Conservation Society (WCS) is now making good progress, leading the consolidation and analysis of spatial data towards a single GIS database. Ecological models (MaxEnt and Marxan) have been developed to assess areas where conservation efforts could

successfully protect the most biological/ecological 'value'. Analyses based on beta-diversity, landform and major flora types, along with species distribution modelling, will help determine priority areas most likely to benefit from strategic protection within the Kikori basin landscape. Consultation with an external expert group has been ongoing, and improved models will be shared with key technical stakeholders early in 2017. These are early but vital stages.

- Offset Component 2: Support to CEPA to achieve 'actions for improvement' of the National Biodiversity Strategy and Action Plan (NBSAP). EMPNG is supporting the re-establishment of the bi-annual Conservation Forum, the development of quarterly newsletters (Biodiversity Digest) and provide for biology conferences:
  - Update: the first two biannual Conservation Meetings were held during 2016 in collaboration with CEPA and Mama Graun, with a strong emphasis on sharing learnings from local community conservation efforts from all over PNG. The meetings attracted a diverse range of attendees including representatives not only from individual community conservation initiatives and conservation NGO's, but also various PNG government agencies and authorities, international development partners, academia and the mining and oil & gas sectors. The meetings also provided the opportunity to discuss the forthcoming Protected Areas Bill and consultations on a future Biodiversity Offset Policy. EMPNG reports that feedback from the first two meetings has been very positive, with the meetings providing an opportunity for sharing of information and learning, and recognition of the value of local community conservation efforts. Two issues of the Biodiversity Digest have been published during 2016
- Offset Component 3: Enhancing conservation capacity. EMPNG's support is focused on developing and institutionalizing Post-Graduate and Diploma courses at University-PNG (U-PNG), providing scholarships, and establishing a framework for placements and mentorships with field-based conservation NGOs:
  - Update: there has been positive progress made during 2016 with a renewed collaboration between U-PNG and Mama Graun ensuring that new course programs have now been given University Senate approval, and institutionalized into the mainstream academic program. The first fund disbursement has now been awarded, and a second anticipated during 2017 when two Masters level scholarships are to be offered.
- Offset Component 4: Support for existing protected areas. Enhancement of the Lake Kutubu WMA (Wildlife Management Area) is the primary focus for achieving this component. EMPNG supports an on-site Coordinator role to work with the WMA Committee; initial priorities are to build capacity with the aim to develop and implement a protected area management plan, and ultimately ensure conservation gain within EMPNG's medium elevation zone.
- Update:
  - Lead Partner the Institute of Biological Resources (IBR) have delivered a series of courses to the Lake Kutubu WMA Committee in conjunction with the on-site Coordinator, to build capacity relating to visioning (and strategic planning), determining roles and responsibilities within the Committee, and analyze ecosystem services important to the community. The number of attendees has increased with each session, and feedback has been positive. The Committee is starting to prioritize their WMA activities and have erected local WMA sign boards, organized a local 'Clean-a-Thon' and manned a promotional booth at the Kundu and Digaso Festival.
  - EMPNG is aware of the dependency-avoidance challenges potentially inherent in early-stage support of community conservation initiatives (especially at an internationally recognized Ramsar site, with little alternative access to resources), and the on-site Coordinator role is proving invaluable in providing ongoing day-to-day support and guidance. The IESC hope to engage with members of the Committee again during our next trip.

- As highlighted previously, the presence of tilapia in Lake Kutubu may have significant consequences on EMPNG's ability to achieve the necessary conservation outcomes within the WMA offset component. One of the primary reasons for a WMA being established at Lake Kutubu was the unique lacustrine ecosystem and endemic fish population. EMPNG's position remains that the endemic fish species will be included in conservation measures if that is the wish of the WMA committee. The IESC believe it is still in EMPNG's interest to better understand the implications of tilapia on the ongoing health of the lake ecosystem so as to be able to fulfill the goal of strengthening the WMA (see recommendation in previous reports).
- Offset Component 5: Establishing new protected areas.
  1. At the Lower Elevation Zone (0-600m), EMPNG's intention is to establish a Lower Kikori Resource Use Management Plan (LKRUMP), so as to offset residual impacts on biodiversity values affected in this zone. The intention is that the creation of a new community-based, legally-designated protected area will build on the existing Aird Hills WMA as a nucleus for conservation. To achieve this, EMPNG plans to work with the former Barging Route Waterways Committee members and the Aird Hills WMA Committee.
    - Update: two boat trips have occurred since our last visit, specifically to reengage with communities previously liaised with during pipeline construction. The visits enabled dialogue to commence on EMPNG's offset program and the potential for resource management and conservation in the area. During these trips, community profiles were built and SWOT analyses undertaken at Goare, Omati, Ero, Kopi, Waira and Bisi villages, and at Wau Creek where EMPNG already supports a local Piku Conservation program. In addition, resource mapping has commenced at several of these villages. A number of community priorities have already been identified including the need for health and education programs, plus invasive species awareness – for example the community have stated that tilapia and other invasive fish are impacting their fish-catch diversity.
    - An on-site Coordinator resource, similar to that contracted at Lake Kutubu WMA, has been engaged to work in the delta area and is due to start shortly. There is synergy to continue work with the Piku research project at Wau Creek, and there are learnings to share between the local teams and community conservation efforts already established in the area. In the near term, additional boat trips will be undertaken to further engage with these and other villages in the area, and establish how the logistical challenges being identified may be overcome. EMPNG plans to deliver a boat to the area to support this local work and that of the Aird Hills WMA.
  2. Representative offset locations in the Upper Elevation Zone (montane >1200m) are still being explored. EMPNG's current focus is to engage with Hela Government to identify and discuss potential candidate offset locations in the province.
    - Update: EMPNG reports that due to the current political situation in Hela Province, no further conversations have been possible with Hela Government representatives or communities to establish their conservation priorities in the area. There is the risk that momentum from previous meetings may be lost, and is hopefully just a temporary setback to finding opportunities for conservation gain at this upper elevation zone (where the largest proportion of habitat debt occurred during EMPNG construction).

Overall, Lead Partner resourcing constraints as highlighted in several of our previous reports are being resolved, and the resulting progress seen in each of the offset program components during this trip is testament to enhanced resource support and management of external relationships by the EMPNG Biodiversity team.

### 5.2.3 Recommendations

1. Building on the Biodiversity Strategy offset rationale, we recommend EMPNG start to consider development of site specific offset rationale and delivery plans (i.e. one at Lake

Kutubu WMA, one at Lower Kikori), to document the basis for each offset program site, including: the need for area-based conservation and protection, and social context; the conservation objectives and desired conservation outcomes; describe how the offset will be representative of the debt incurred; how conservation gain is anticipated, so that a path towards NNL is demonstrated; the case for additionality at the offset site; and include a site-specific assessment of risks and uncertainties that will need to be fully understood and managed for that offset site to achieve the desired conservation outcomes. We recognize that finalizing these plans could take several years, depending on the maturity of planning at each offset site, but that their development and future reference would provide assurance for ongoing offset program delivery.

### **5.3 BIODIVERSITY IMPLEMENTATION AND MONITORING PROGRAM**

#### **5.3.1 Project Strategy**

To ensure effective implementation of the Biodiversity Strategy, the Biodiversity Implementation and Monitoring Program (BIMP) will assess on the ground performance against the following five Key Performance Indicators (KPIs):

- Intactness of forest;
- Trends in species diversity and abundance;
- Conditions of focal habitats;
- Occurrence of invasive species/pathogens; and
- Offset gains.

Four Programmed Monitoring Activities (PMAs) are used to collect information for analysis against these KPIs:

- PMA-1: remote sensing of broad-scale land cover, designed to monitor forest loss, land use change and degradation in the entire Upstream Area as caused by project-related direct and indirect impacts. Landsat data was acquired for 2009, 2011, 2013 and 2015 periods for the entire Upstream Area (UA), and higher resolution RapidEye data was acquired for 2011, 2013 and 2015 periods for a linear infrastructure (LI) corridor containing the PNG LNG RoW, facilities and all other infrastructure within the Upstream area;
- PMA-2: condition surveys of those focal habitats and significant ecological features adjacent to and in the vicinity of the pipeline RoW, facilities and other infrastructure;
- PMA-3: specialized biodiversity surveys, designed to collect and analyze flora, fauna and ecosystem data both in/around areas affected by the project and in protected areas enhanced and/or established through the offset program; and
- PMA-4: to assess the efficacy of the various components of the biodiversity offset program, and to ensure the program is on track to deliver NNL.

In addition, three Environmental Management Plan (EMP) Protocols are used to inform the KPIs. IESC observations on their implementation are provided in subsequent sections of this report:

- Access Control: the protocol formalizes the monitoring of vehicle access to and along PNG LNG project roads and infrastructure to prevent potentially damaging third party activities resulting from access;
- Invasive Species and Plant Pathogens: the protocol formalizes monitoring of the occurrence and distribution of invasive species, pests and plant pathogens, and provides guidance on remedial actions; and
- Regeneration Monitoring: the protocol formalizes the collection and analysis of information relating to the regeneration of temporary work areas disturbed during construction, and evaluated against established benchmarks.

EMPNG will evaluate monitoring results gathered via the various PMAs and EMP protocols, and depending on the significance of the findings, implement adaptive actions through management response.

### 5.3.2 Observations:

As a result of EMPNG's first extensive monitoring campaign across the Upstream area conducted in 2015, PMA outputs have now been compiled and analyzed. EMPNG will be publishing information on survey results via their website, but our observations in summary include:

- PMA-1 Remote sensing updates:
  - Recalibration of data to correct previous misclassifications and areas obscured by cloud has occurred, and is likely to continue as subsequent data sets are collated and compared;
  - Most recently, 2015 remote sensing imagery was acquired, processed and the assessment report now complete. There have been delays to ground-truthing the results of the processed forest cover change analysis through in-field observations, and EMPNG recognizes the need to shorten the period between data collation and ground-truthing for the 2017 cycle.
  - At a general level across the Upstream Area (UA), the report concludes the overall area of mapped undisturbed land cover and water bodies has remained relatively static across the 2009-2015 assessment period. However, mapped disturbance was highest during the latest 2015 survey, with a notable increase in disturbed vegetated land cover and logging when compared to previous assessments (note: these increases were deemed to be not attributable to PNG LNG). Levels of undisturbed wetland land cover do not change greatly between assessment periods. It should be stated that trends across the UA are based on Landsat data using a minimum mapping area of 1.4 hectares, so small cover changes are not picked up with these data.
  - At the Linear Infrastructure (LI) more detailed level, mapped disturbance was most easily seen in areas concentrated around already populated areas, e.g. the Highlands Highway to the north-east of the LI corridor area. Within the corridor, the majority of forest loss is occurring immediately adjacent to pre-existing disturbance, in part where PNG LNG is operating, but overall in areas where settlement is relatively dense and reflects general anthropogenic expansion in the area. From visual inspection, the main evidence of clearing in both 2013 and 2015 survey campaigns occurred along the Hides Spine and in the Angore region. Furthermore, development was evident near the oil & gas operations of other companies (i.e. deemed not attributable to PNG LNG) but comprising a relatively large portion of overall disturbance in 2015. Land cover around Homa did not change significantly during this period, although potential settlement infill was observed around Komo (especially to the north), and both north and south of the HGCP. Disturbance was also evident around Kopi in the south-east where ongoing logging activity was evident (historical logging area), around Kantobo where land clearing was attributable to building and local gardens, and towards the Kikori River crossing north-west of Kaiam around PNG LNG bridge infrastructure (note: none of this activity was deemed to be attributable to PNG LNG operations).
  - With regard to land use changes attributable to PNG LNG:
    - The 2015 output report presents 'rules' related to the distance from infrastructure that determine whether land cover change is attributable to PNG LNG i.e. within 60m from fenced facilities, within 30m either side of built RoW, within 15m either side of PNG LNG roads (see Recommendation).
    - EMPNG reports that during the period 2013-2015, 624km<sup>2</sup> of forest cover was recorded as lost across the whole UA, 131km<sup>2</sup> within the LI corridor, and < 1km<sup>2</sup> of this forest cover loss has been attributed to project related activities. Field verification will be undertaken to validate these metrics, and numbers may be amended accordingly. This is the first time the PNG LNG-attributable number has been calculated via this process, and in our opinion

it appears low – we suggest a brief comparison to baseline and earlier years to provide additional context.

- With regard to Priority Ecosystems: potential forest lost on Hides Ridge between 2013-2015 was approx. 32km<sup>2</sup>, with less than 0.5km<sup>2</sup> being in close proximity to PNG LNG activities; potential forest loss across the Homa region was around 0.5km<sup>2</sup> and appears mostly in close proximity to project related activities so is due to be ground-truthed; potential forest loss within the Lake Kutubu area was 4.7km<sup>2</sup>, of which 0.2km<sup>2</sup> was in close proximity to project activities.
- o The ‘Intactness of forest’ KPI listed above is measured by the performance indicator ‘No evidence of broad-scale forest loss or degradation attributable to PNG LNG’. Performance Indicator data has to deliver the necessary information required to assess whether forest loss or degradation impact has occurred, so that a timely management response can be taken. Currently, ‘broad-scale’ is not defined, and therefore it is not clear what might trigger a management response. EMPNG state this is necessarily a subjective process. We understand this, and that instances of observed forest loss will be investigated, but would caution against the potential for inconsistent interpretation over time (see Recommendation).
- o EMPNG intends to adjust the scope of the LI area for the 2017 cycle, to exclude the public Highlands Highway ‘ring road,’ as well as to adjust the UA scope area to lessen the buffer area around Mount Bosavi (originally a backup to Lake Kutubu offset site option), the north-east (public ring road and Mendi used in construction) and south west (including parts of Kikori Delta and Darai Plateau).
- PMA-2 Condition surveys of focal habitats and significant ecological features, update:
  - o Focal habitats prioritized for ongoing review following the Initial Post-Construction Biodiversity Assessment (see previous reports for details) were surveyed during Nov-Dec 2015 and Jul-Sep 2016, including caves/pinnacles, swamps, dolines/sinkhole swamps, streams/creeks, dieback sites and noted habitats, e.g. megapode mounds. Of the 60 sites selected for inspection in 2015, 19 were unable to be assessed due to safety or inaccessibility, and seven noted to be removed from the list of sites requiring survey. Of the 34 sites selected for inspection in 2016, 8 again were unable to be inspected, and one site removed from list of sites. As areas along the RoW are naturally regenerating, vegetation growth is making access to some sites more difficult for the purposes of assessing their condition. In some ways this is encouraging, as it suggests enhanced access has not attracted communities to use these areas not necessarily used previously; on the other hand, not all detrimental impacts relate to the physical presence of people, for example, the presence of cane toads, rats, edge effects, etc. so might still warrant some sort of observation.
  - o Selected results: EMPNG reports that generally the ecological health of impacted focal habitats has improved post-construction. Some caves were found to have been fully impacted by construction activities, and therefore removed from future monitoring lists (see next bullet). Otherwise only minor impacts were recorded in caves, typically showing use by local communities. Dolines previously impacted during construction were noted to still be partially impacted by felled trees. One swamp, located near the Kopi Scraper Station, was found to be now completely impacted by government commissioned road construction. The Focal Habitats and Significant Ecological Features Register has been updated following the 2015 and 2016 monitoring campaigns.
  - o The IESC note that a larger number of sites than we had anticipated have been removed from the list of sites for continued monitoring. We would caution against removing sites from the list of those to be surveyed too hastily, without being able to confidently assert that the focal habitat is fully functioning. For example, a sinkhole swamp on the 2015 survey list was unable to be properly surveyed due to safety/security concerns, and its ecological viability was not able to be confirmed, yet the recommendation was to discontinue monitoring. Similarly, two

streams noted as dry during the 2015 extended drought period were suspected to still be ecologically functioning but this could not be confirmed; however they were withdrawn from the list of future survey sites (see Recommendation).

- The scope of PMA-2 has now been reduced from that used last year, in that previously PMA-2 was also intended to collect data related to: presence of priority invasive species and plant pathogens; reinstatement and erosion control works; control of access to new Project roads and infrastructure; and community encroachment at a local scale. On the ground monitoring visits were to be complemented by aerial surveys, and also by species specialists involved in PMA-3 surveys. EMPNG reports these aspects are now covered through EMP Protocols and other monitoring means following an ongoing refinement of all PMAs and Protocols. However, with the loss of PMA-3 providing external habitat/species expertise in helping to assess condition of focal habitats, IESC has received assurance from EMPNG that were a significant change in condition to be observed, expert advice would be sought where necessary to help assess the continued ecological viability of a PMA-2 site.
- PMA-3 Biodiversity survey updates:
  - A program of rapid assessment-style terrestrial biodiversity surveys were undertaken by a team of external species experts during Jun-Jul 2015 and the report collating all findings has now been completed. This has analyzed the first records of what will be a valuable body of work, providing the opportunity to gather in detail data on fauna and flora species diversity and abundance at specific locations across the Upstream area. Being undertaken every 2 years initially, the work will help to ascertain the ongoing health of habitats and species to ensure any potential negative impacts associated with the presence of the project are identified and managed. The PMA is designed to detect changes in species distribution (edge effects), diversity and abundance over time; however trend analysis will only be possible once several different survey campaigns have been run. It will ultimately evaluate the success of key elements of the Biodiversity Strategy.
  - During this campaign, two Biodiversity Assessment Areas (BAAs) were chosen to represent different eco-regions and altitudes: six transect sites were surveyed on Hides Ridge (BAA-1) and five transect sites in the vicinity of Ridge Camp near Moro (BAA-2). The external expert Team Leader (who had been involved in Pre-Construction surveys), proposed the BAA survey locations where ecological values might best indicate the presence of any project impacts, and EMPNG fed in information on logistical constraints. Taxa specialists focused on vegetation, volant/non-volant mammals, birds and frogs, using a variety of methods including plant plots, bioacoustics, live-trapping (and release), and visual including both camera traps and transect walks, depending on species (see Recommendation). Both camera traps and acoustic recordings proved highly successful at gathering data.
  - Information on the survey findings will be published on EMPNG's website, and multiple papers in scientific journals are planned.
    - In summary, the 2015 surveys indicate that both assessment areas retain high biodiversity values for taxa surveyed, with predictable variances observed between each area due to different elevation zones.
    - Numerous undescribed species of plants, frogs, marsupials, rodents and bats were observed. Plant and frog species new to science were discovered, and a new bat species detected acoustically.
    - Edge effects (both positive and negative) were recorded in relation to various species, but each taxon specialist specified it was too early to conclude whether observations were statistically significant. Examples of initial edge effect findings from the Survey Report include:

- For vegetation, there was no overall correlation between plant diversity and distance of plots from the ROW. They found little evidence of impact of ROW on adjacent vegetation. However, epiphytes and bryophytes were significantly more diverse and abundant respectively closer to the edge of the forest edge than further into the forest (both groups thrive in the drier, lighter conditions typical of edge).
- Using automated sound recordings, the surveyors were able to demonstrate that three birds-of-paradise species resident on Hides Ridge were all significantly less likely to vocalise at positions next to the ROW than in forest 170m from linear clearings. The causes of this apparent partial avoidance of the forest edges are presently unknown.
- Amphibians (including frogs) are excellent indicators of environmental conditions due to their thin, permeable skin and, for many species, exposure to the aquatic environment during their embryonic and larval life stages. These factors make them especially vulnerable to even subtle changes in both aquatic and terrestrial environments. Species diversity and composition differed significantly between the two different BAAs, with 10 frog species found in BAA-1, 29 species in BAA-2 and only two species (5.4%) shared between them. These results indicate that, to date, establishment of the ROW clearings in BAA-1 on the Hides spine-line and in BAA-2 on the Agogo Range near Moro have had no detectable impacts on local frog populations, and that the biodiversity values of frogs in these areas remain intact. No evidence for shifts in species diversity or composition with increasing distance from the ROW were observed in either BAA.
- Both BAAs continue to support many rare, conservation-listed, restricted range and hunting-sensitive species, reiterating the value of the mitigation measures that EMPNG applied prior to and during construction, and amplifying the importance for ongoing measures to ensure those values are retained during Production.
- Valuable range extension information was gained for several species.
- o Learnings from the 2015 surveys will be implemented for the 2017 campaign, such as use of control sites, additional camera traps, mitochondrial DNA, etc., and the Protocol has been revised accordingly. Additional transect locations will be added to the suite of sites surveyed in 2017, including near Lake Kutubu and in the Lower Kikori and reconnaissance trips are already planned.
- PMA-4 Offset efficacy updates:
  - o The IESC has provided feedback on the PMA-4 protocol, which has been much revised from an earlier version. A useful spotlight tool has been developed to monitor progress of PMA-4 work activities. EMPNG plans to contract an external consultant to undertake the spotlight assessment of all offset components during the first half of 2017, including protected area effectiveness for components 4 and 5. Therefore there are no results to report yet for PMA-4.

Following the 2015 PMA monitoring campaigns, EMPNG brought representatives of all PMA survey contractors together for a workshop where findings and learnings were shared captured. All learnings have been compiled and incorporated into the latest set of PMA Protocols for implementation in 2017. The IESC has also provided feedback, including for PMA-4 the need to procedurally define the methodology for calculating gain at offset sites, and a general point on linking significance of findings from each PMA back to the ecological indicator within the overall Production EMP's. In our previous reports, we noted the importance of using monitoring results to effectively inform adaptive management; although improvements have been made on this aspect in the revised BIMP, we have flagged that the levels of significance against which outputs from PMA surveys will be compared still appear quite subjective, and will review their use as part of future IESC visits.

During this visit an update was provided on the preliminary results of monitoring freshwater ecology undertaken by external consultants (Coffey Environments/Waterbug Company). Preliminary results show an accelerated rate of recovery for organisms in the Akara Creek next to the HGCP with the conclusion that Akara Creek has recovered from the November 2010 mudflow. As described in greater detail in the IESC

March 2011 field visit, on November 13, 2010 a mudslide originating at the HGCP spoil dump site blocked water behind the Komo road. This water overtopped the mudflow on November 14 and this allowed the mud to flow to the Tagari River along the path of the Akara Creek, a distance of 4.65 km. Fish in the Akara Creek were killed in the turbid water and mud, necessitating that downstream villagers be provided fresh water. The recovery of Akara Creek represents a milestone from what was a disastrous situation for the stream ecology six years ago.

Preliminary results for remaining rivers and creeks in Upstream area are:

- Timalia River downstream from HGCP – stable;
- Ariago Creek downstream from the Komo airfield– improved but impacted; and
- Wakuba River downstream of Komo airfield – stable.

Freshwater ecology monitoring will continue in 2017.

### 5.3.3 Recommendations

1. We recommend EMPNG produce repeatable/comparable maps derived from PMA-1 change detection data of a series of locations deemed to be at potential higher risk of impacts from enhanced access over time. Use these to visually represent changes through time specifically at those locations, for example, a 10x10km (?) grid covering the area around Angorewellpads and access roads, or Hides Ridge, or Heartbreak Hill, etc. Similarly, change detection maps shown in Figs 9-12 of the 2015 PMA-1 output report could form the basis for extracted highly zoomed in snapshots of RoW intersections with public roads such as MLV-1/Benaria, and compared side by side with 2009/2011/2013 versions.
2. Regarding PMA-1, we would suggest consideration that changes in land use cover at greater distances from PNG LNG RoW, Facilities and other infrastructure be used. For instance, only counting land use changes within 30m from the edge of the pipeline RoW would deem land cleared beyond 30m as not attributable to the project, even though access to the area has now been enhanced by the presence of the RoW.
3. EMPNG's interpretation of 'broad-scale forest loss or degradation' in the PMA-1 Performance Indicator should be defined and captured with the PMA-1 Protocol.
4. With regard to PMA-2 and ongoing survey of sites avoided during construction, we recommend that the monitoring of focal habitats is not curtailed too early. It would be wise to develop criteria that can be used to indicate when the condition of a site means that it no longer warrants surveying. This will ensure there is consistency in application, an auditable trail and a justification as to why a site previously close to impacted areas is considered unimpacted.
5. With regard to field monitoring aspects of PMA-2, we encourage EMPNG to consider whether the use of unmanned aerial vehicles/drones would add value in helping to determine change of condition at sites not accessibly by foot, and potentially with weed assessments and/or enhanced access.
6. Learnings from challenges experienced in PMA-2 surveys performed to date should be fed into the Pre-Construction survey approach for any new disturbances e.g. Angore and the future Juha development. That is, to gather as baseline the type of information that will then inform the future assessment in change of condition post-impact (whether good or bad).
7. The IESC believe that EMPNG should consider the inclusion of butterflies as additional taxa for future PMA-3 surveys due to their value as indicators of ecological change, and recommend this be further discussed with the PMA-3 Team Leader.

## **5.4 INDUCED ACCESS**

### **5.4.1 Project Strategy**

EMPNG's objective is to control vehicle access to Project roads and infrastructure, to prevent potentially damaging third party activities through enhanced access.

EMPNG has retained a number of RoW construction access tracks/roads for permanent use during the Production-phase, so as to allow emergency access, maintenance and delivery of fuel to above ground installations (AGIs), such as main line valves (MLV), check valves (CV) and cathodic protection stations (CP). Background on the justification for access and methods of access control is provided in the EMP (an updated Table 17-1 will be included in a future EMP revision) and in previous IESC reports, along with IESC's opinion on the status and effectiveness of each vehicle access control.

EMPNG's strategy is that access will generally be allowed only to EMPNG vehicles. Access by third party vehicles serving operational needs may be sanctioned subject to prior approval from EMPNG. Access by landowner vehicles may be sanctioned subject to approval from EMPNG. In both cases, access will be authorized only by designated EMPNG personnel. Vehicles will be inspected as deemed appropriate. A Vehicle Monitoring Plan (VMP) describes the process to be followed for vehicles seeking authorization to use EMPNG roads, and data is being gathered on type of vehicles passing through points where Access Monitors are located.

CEPA's Environmental Permit states that EMPNG is "required to establish and maintain systems to ensure project infrastructure and road systems are not used in any way to provide support of logging activity or any other uncontrolled access. Prevention of access should continue until such time as natural vegetation regrowth prevents their use."

### **5.4.2 Observations**

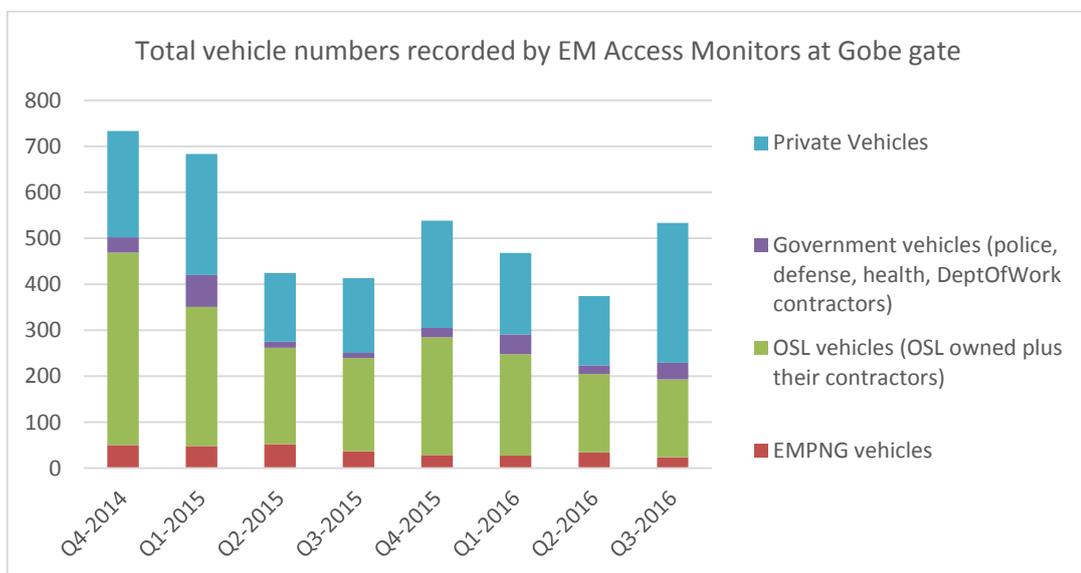
With regard to ongoing control and monitoring of vehicular access on EMPNG roads, there are a small number of differences between the controls stated in the published Upstream EMP to prevent potentially damaging third party activities, and the control mechanisms actually in use. EMPNG reports there has been no change to control mechanisms used since our last visit; however there have been a few situation updates. These are listed in the current status table below.

**Table 5.1: Status of Access Controls/Monitors**

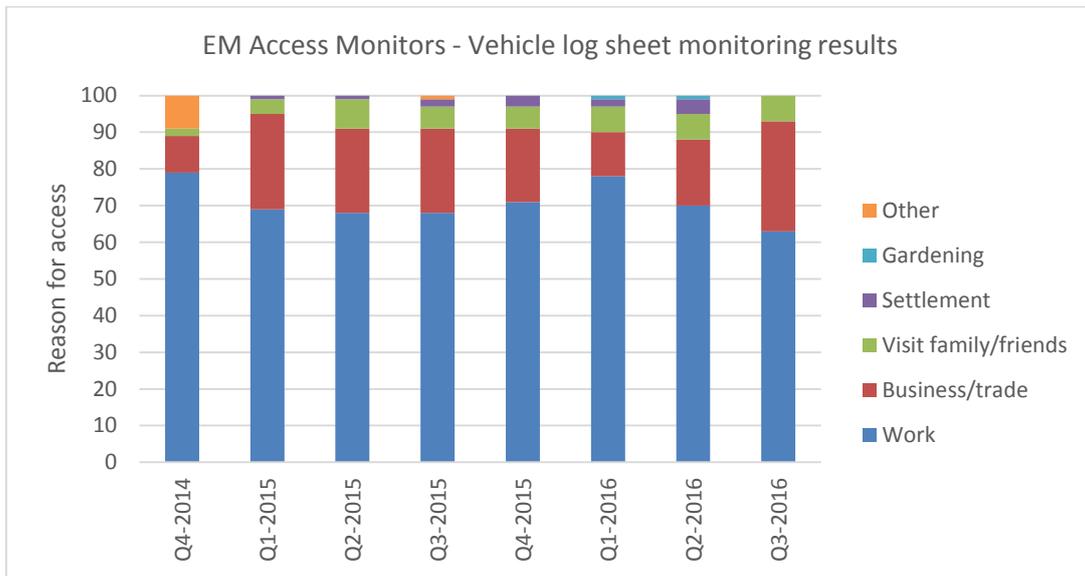
Access reason	Access location	Current Vehicle Access Control/Monitor Status
Producing wells	Hides Ridge	As per EMP. Manned station at vehicle wash at base of wellpad access road. All vehicle access is logged.
AGI (Above ground installation)	CV-1	As per EMP. Unmanned boom-gate between Angore WP-B and the RoW is installed and locked.
Producing wells (future)	Angorewellpad access road	Different from EMP. Boom-gate installed but open, & not permanently manned. <b>Update:</b> In an attempt to control access onto the wellpad access roads, EMPNG is currently working with community on how the gate will be managed.
AGI	MLV-1 Benaria	Different from EMP. No boom-gate is currently installed. Vehicle Access Monitor at Benaria village, not at project bridge/infrastructure. EMPNG previously advise that a locked boom-gate would be installed once the government has completed the installation of a permanent bridge to link Benaria Station to the public road. Until that time EMPNG is allowing Benaria Village clans to use the temporary construction bridge and small section of RoW access track running past MLV-1. <b>Update:</b> the government has completed the installation of the public bridge. EMPNG reports that installation of the lockable boom gate and removal of the temporary construction bridge is scheduled to be completed by end of the year. They report that access along the RoW track up Benaria Ridge is being prevented by reinstatement measures.
AGI / Road	MLV-2 &Homa-Benaria Ridge access road	As per EMP. Boom gates (two) installed and locked, one at MLV-2 and one at the intersection of the tax-credit public road and MLV-2 Homa Ridge access road.
AGI	MLV-3	As per EMP. Boom-gate installed and locked.
AGI	MLV-4	As per EMP. Boom-gate installed and locked.
AGI	CV-2, Moro	As per EMP. No EMPNG control. Rely on OSL road controls at Moro.
AGI	Agogo tie-in	Not in EMP. Boom-gate installed and locked.
AGI	Kutubu MLV (gas pipeline)	As per EMP. Boom gate installed and locked.
AGI / Road / Bridge / Road	<b>Southern Highway</b>  <b>Moro to Kantobo</b> OSL road, access to CP-1 (KP153).  <b>Kantobo to Gobe</b> EMPNG road (incl. Heartbreak Hill &Mubi Bridge).	Access to the EMPNG constructed road linking Kantobo to Gobe, and includes the Mubi Bridge (see paragraphs below).  Access from the north:  Different from EMP: The EMP states a locked unmanned boom-gate to be at KP164 near Kantobo – EMPNG reports that due to community requests for access, this gate is not currently in place. Instead EMPNG rely on OSL road controls at Moro (KP95) and Manu (KP115).  Access from the south:  As per the EMP. Access Monitors record vehicles using the road, at the re-instated Chevron/OSL boom gate at Gobe.
AGI	Gobe MLV	Boom gate installed and locked.
AGI	CP-2	Boom gate installed and locked.
Road/bridge	Kopi shore base to Kopi scraper station	Different from EMP. The EMP states locked boom gates at each end of the EMPNG road linking two old logging tracks. <b>Update:</b> This road has now been handed over to the government following requests in 2015.
AGI	KP232	As per EMP. Boom gate installed and locked.
Road/bridge	Kikori River Bridge	Boom gate installed and manned with Access Monitor (records vehicles using road).

EMPNG reports that there have been no observed signs of logging adjacent to the RoW, and no bypassing or destruction of access control equipment, e.g. gates or padlocks on gates. Unauthorized vehicle tracks have recently been detected on the RoW near the Tari-Komo public road/RoW intersection at KP-18. Track marks on the RoW were observed in this vicinity by the IESC during our RoW flyover for this trip. Public and Government Affairs (P&GA) teams have visited the area to reinforce with community representatives that driving on the RoW is prohibited and breaks a condition of the RoW Clan Caretaking Agreement. In addition, the IESC observed vehicle track marks at the pipeline landfall at the LNG Plant. This access was reported to EMPNG shortly after the incursion, and community engagement has been ongoing to prevent its reoccurrence.

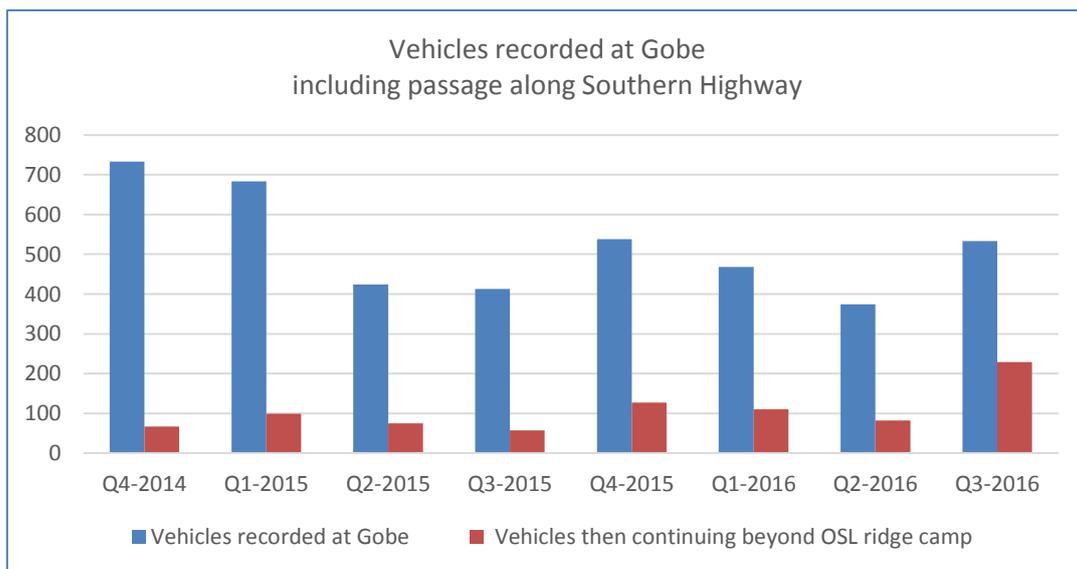
EMPNG continues to gather vehicle data from road users passing through the manned gates at Gobe and Kopi, plus at Benaria Station. As more data is collected, the information gathered is providing a useful record of vehicles using EMPNG roads. Updated IESC charts of vehicles recorded by Access Monitors at the Gobe gate on the Southern Logistics route are shown below, presenting data on ownership of vehicles, a breakdown of the purpose for their journey, and thirdly an indication of the number of vehicles who then go on to traverse the full Southern Highway (i.e. also recorded at OSL Ridge camp).



**Figure 5.1: Road Users by Purpose-Type**



**Figure 5.2: Breakdown of Purpose to Journey**



**Figure 5.3: Indication of Vehicles using Southern Highway for through Passage**

Total vehicle numbers recorded by Access Monitors have been relatively consistent over the last year. However, as can be seen in the above graphs, there has been an increase in the number of private vehicles recorded during this last quarter (Figure 5.1), and a higher proportion conducting business and/or for trading purposes (Figure 5.2). For the same quarter, there has also been an increase in the number of vehicles traversing the full Southern Highway (Figure 5.3) – for Q3 2016, 43% of the number of vehicles recorded at Gobe ended up travelling beyond OSL Ridge Camp. This is an indication of increased trade between the Highlands and Gulf Provinces.

As highlighted in our last report, risk assessments are being undertaken in relation to the potential for formal requests from the PNG Government for the transfer of ownership of various EMPNG road/bridge infrastructure. In anticipation of the potential request from the government for the EMPNG Kantobo-Gobe road, a socio-economic assessment has been undertaken by EMPNG Community Affairs and P&GA. This has provided a situational assessment of positive and negative impacts observed to date in relation to controlled public use of the EMPNG Kantobo-Gobe road. The study has also assessed potential impacts following handover of the EMPNG road to the government, which will be associated with enhanced linkages between the Highlands and Gulf Provinces. Increased and easier trade, as indicated by the vehicle data above, is noted as the primary positive impact, as the road has become the main trade link between the Highlands and the coast – traders bring down vegetables from the Highlands, and return home with betelnut, sago and fish. On the negative side, an influx of Highlanders into the Kikori and Gobe areas has been observed, with land clearance noted as well as increased trade in cultural items from the coast to the Highlands for ceremonial wear (including animal skins and cassowary/bird of paradise feathers) (see Recommendation).

Regarding formal requests from the PNG Government for the transfer of ownership of various EMPNG road/bridge infrastructure, a request was made late 2015 for the Kaiam/Kikori River Bridge. Negotiations are ongoing and handover has not yet occurred. As anticipated in our last report, the old logging road linking Kopi to the Scraper Station (upgraded and managed by EMPNG since RoW construction) has now been formally handed over to the Government.

As the Upstream part of the PNG LNG Project is sited in critical habitat, the IESC maintains that EMPNG must be able to demonstrate they meet the requirements of no measurable impacts on the ability of the critical habitat to support the established population of species or the functions of the habitat (as per IFC Performance Standard 6, Para. 9). As identified in the EIS, induced access when taken in combination with invasive species, forest fragmentation and edge effects from the RoW and road, has the potential to negatively affect the unique biodiversity values of the forest. With regard to Company infrastructure in the lowlands, the Gobe to Kikori area is a weed management quarantine zone within EMPNG's invasive species philosophy, reflecting the importance of the area as a buffer to prevent the spread of Priority-1 weeds from the Kikori area up beyond Gobe. The IESC continues to believe that unrestricted access to areas opened up by project infrastructure (most notably the EMPNG road between Kantobo to Gobe) would represent a potentially significant risk to the Project in relation to avoiding induced access, land-use change, the spread of weeds, pests and pathogens, and could threaten ecological integrity.

The turnover of the Project controlled Gobe to Kantobo road with the turnover of the OSL controlled road from Kantobo to Moro (Kutubu) is a potentially greater impact than the turnover of the Kaiam Bridge and is designated by the PNG Department of Transport in their National Transport Strategy as their first priority designated for development by 2020. The question as to whether or not Project and OSL controlled roads are going to be turned over to the Government is not if, but when. Negotiations have yet to start with the PNG Government, but IESC has recommended that EMPNG and Lenders have discussions on this topic before entering negotiations with the PNG Government. To allow for upholding commitments previously made to Lenders, EMPNG should ensure as part of its negotiations with Government that:

- The transfer of infrastructure and responsibility for environmental and social mitigation occurs in a manner consistent with IFC Performance Standards;
- Every effort is made to retain controls on vehicular access to prevent ecological damage through third party access to areas;
- Robust invasive species management be maintained in the areas between Kikori River Bridge to Mubi River, and between Mubi River to Moro, so that effective zone management can continue in the prevention (detection and eradication) of the spread of invasive species and plant pathogens;

- Opportunities be sought to build on the work being undertaken in EMPNG’s biodiversity offset program component 1 (Protected Area Planning for the Kikori River Basin) and determine potential candidates for protection in the vicinity of the Southern Highway, so as to continue assisting CEPA achieve its intention of World Heritage status for the Kikori River Basin.

As discussions continue with the PNG government on the transfer of certain EMPNG infrastructure, this will continue to be a key area for IESC and Lender focus in the future.

### **5.4.3 Recommendations**

1. EMPNG should ensure as part of its negotiations with the PNG government regarding transfer of ownership of roads/infrastructure, that every effort is made to retain controls on vehicular access to prevent any ecological damage through third party access to areas, and therefore allow the company to uphold their commitments made to Lenders with regard to invasive species, induced access and ecological management. Potential risks need to be fully understood and effective mitigation options discussed.
2. Building on the recent Southern Highlands and Gulf Province enhanced access socio-economic assessment, IESC recommends that market surveys are continued to help better understand the types and quantities of trade in fauna/flora species or wildlife parts, in conjunction with Community Affairs and P&GA.

## **5.5 REINSTATEMENT AND REGENERATION**

### **5.5.1 Project Strategy**

EMPNG’s objectives are to establish stable landform conditions at temporary work areas disturbed during construction, and create ground conditions conducive to natural regeneration so as to achieve vegetation succession according to established benchmarks.

The Regeneration Monitoring Program, currently undertaken every two years, uses fixed and random sampling and a benchmarking scoring system to evaluate the progression of plant community succession within the Upstream area. This is detailed in Appendix 3 of the Upstream EMP available at [www.pnglng.com](http://www.pnglng.com), and supplements EMPNG’s regular in-house assessment of regenerating areas to check for evidence of encroachment.

### **5.5.2 Observations**

#### **5.5.2.1 Reinstatement**

Visual observations during our short visit to the Highlands and to the LNG Plant indicate that reinstatement continues to progress.

On the Hides Ridge, roadside areas covered in side-cast materials appear stable, blackening of bare limestone is evident (a precursor to the establishment of soils so that early stage vegetation can take hold), and vegetation coverage and diversity is increasing. More birdlife was heard and seen up on the Ridge than during any previous trip during/post-construction. For our monitoring purposes, EMPNG has noted static photo points for ongoing visual comparison of natural revegetation. At the top of a slope near Wellpad-C, we were disappointed to observe that a very large tree that had been recorded during pre-construction surveys, and preserved throughout construction and early production, has now been felled; we were advised this was due to security concerns with regard to enabling access to wellpads in the event of community unrest events. Considering the size of the tree, the root system had likely helped stabilize the top of the slope on which it perched.

Due to time constraints, we were not able to observe ongoing erosion control work at Komo, but from the plane we could observe continued natural regeneration where the substrate is stable.

From the air, the RoW regeneration generally looks good. Where soil erosion issues do occur, EMPNG applies an engineering team to resolve the situation (see Section 4.4 for further details). Where vehicular access issues occur, as observed near KP-18 (and detailed in Section 5.4.2 above), EMPNG engages with the community to try to deter further incursions.

At LNG Plant, from visual observations at the RoW landfall, spreading mangrove root systems are now more evident, and numerous mangrove stands although still isolated are becoming established, even in the more dynamic lower littoral area. EMPNG is now implementing their static photo point locations so as to record more systematically how well regeneration is occurring. Upon reviewing a selection of the images, the value of using repeatable imagery in demonstrating progress over time periods is obvious, although care must be taken to ensure the same positions are used for each photo event (see Recommendation).

#### 5.5.2.2 Regeneration

The first of the Regeneration Monitoring campaigns was completed in 2015 by New Guinea Binatang Research Centre, and the output report now complete. By utilizing forest regeneration benchmark plots and analyzing their stand structure and species composition, specialists are able to study and compare with temporary work areas cleared during construction and ascertain their regenerating success.

The team surveyed 151 plots with >20,000 individual trees from 245 different genera and 12 forest types. Parameters focused on:

- forest regeneration (seedlings, saplings, and small trees);
- vegetation structure (and height);
- representation of 12 life form groups; and the
- composition of vegetation resolved to the genus level.

Summary findings include:

- the regeneration of the vegetation is progressing in all Broad Management Vegetation Groups (BMVG) survey plots across the Upstream area, apart from one (Nothofagus up on Hides Ridge), yet especially well in another (small/medium crowned forest around Heartbreak Hill and Aiiio/Moro);
- the RoW vegetation is most closely aligned to early successional benchmark plots, but not yet equivalent in terms of composition and regeneration rate, comprising primarily grasses, sedge and ground ferns;
- a small number of the most advanced plots along the RoW have already reached tree canopy cover typical of early succession vegetation;
- the best indicators of disturbance were found to be low total canopy cover along with the high ground cover comprising ground ferns, grasses, sedges and weeds (opportunistic encroaching);
- the rate of vegetation recovery declines with altitude, particularly above 1000m above sea level; and
- the presence of invasive species also decreases with altitude.

Monitoring will continue for the foreseeable future, so as to track the progression from early succession towards later succession composition and structure, and hence forest recovery. The next surveys are planned for early 2017, with the scope expanded to gather further information on the presence of weeds.

#### 5.5.3 **Recommendation**

1. On reviewing the static photo points from the LNG Plant RoW landfall, care should be taken to exactly locate the point from which photos should be taken. Comparing a number of photos (e.g. B-1, C-3, etc.) between Mar and Sep 2016 suggests the exact positions used for photos has changed, meaning that some of the individual plants in the foreground you would typically

use for comparison are not actually comparable between photo events. To be of most use, the static photo positions should be more clearly marked for ongoing use.

## 5.6 INVASIVE SPECIES, PESTS AND PLANT PATHOGENS

### 5.6.1 Project Strategy

EMPNG's objectives are to prevent priority invasive species, pests and plant pathogens from entering or becoming established at (or in the vicinity of) their facilities and infrastructure, and ensure containment of existing priority invasive species, pests and plant pathogens already present. Supporting the Upstream and LNG Plant EMP's are a Weed Identification Manual, an Invasive Species Monitoring Protocol (currently finalized at Rev.0), and a Register of Invasive Species, Pests and Pathogens. This Register is used to track any changes in invasive species type, abundance and distribution, and is updated through regular external specialist audits, internal monitoring and general reporting from staff and communities.

The project footprint is split into separate Weed Management Zones (WMZs), each delineating broad ecological units, with separate objectives and monitoring priorities. EMPNG's approach to weed management utilizes the identification and prioritization of weeds with each WMZ. Priority-1 (P1) weeds are defined as species that rapidly colonize disturbed areas and displace and/or invade native vegetation; the Project aims to control and monitor all P1 weeds and exclude them from all work areas through active control. Priority-2 (P2) weeds are defined as species that may rapidly colonize disturbed areas and displace native vegetation, but rarely invade natural habitats; P2 species are monitored, but only controlled where a species shows signs of increasing invasiveness or is growing alongside P1 weeds.

EMPNG seeks to manage the threat of spread of *Phytophthoracinnamomi* by preventing the spread or introduction of Type A2 into unaffected areas, in particular ecologically sensitive areas susceptible to senescence.

With regard to quarantine implications of imports into PNG, EMPNG has developed and adopted quarantine requirements which aim to prevent the importation and spread of foreign invasive species, pests, pathogens or disease; quarantine requirements are contained within a Quarantine Procedure.

### 5.6.2 Observations

#### 5.6.2.1 Invasive Species

BioTropica continues to audit and advise EMPNG on weed management across the Upstream and LNG Plant areas. The implementation of audit recommendations is tracked and shared with the IESC.

EMPNG's biodiversity team has undertaken a thorough review of their weed management process in conjunction with BioTropica in response to our previous Observation (see last report Issues Table). Our key message has been to prevent weeds extending beyond their WMZ's into neighboring zones, and to use abundance and diversity data within each WMZ to help prevent any extension to the range of outbreaks (see Recommendation). The objectives of the review were to: better understand weed abundance and diversity from weed audit surveys; to better understand field survey methodology used by external experts; to improve weed management process such that audit information supports weed control; and to improve weed control monitoring.

As a result of the review several actions have been put in place. Firstly, EMPNG has established a number of permanent monitoring sites within each WMZ as they propose this will provide realistic and representative WMZ data on abundance and range extensions (see Recommendation). Secondly, databases of weed records that compile survey findings from preconstruction, construction and production phases have been combined to ensure more accurate assessment and reporting of 'new finds' amongst presence/absence data. Finally, terms used in audit reports, for example 'abundance', have been discussed and aligned between auditor and EMPNG to improve consistency in use and interpretation in relation to weed control. Abundance data within each WMZ has now become a focus for assessing risk and control management, and is reported as a matrix for each WMZ. Although these matrices then need to be compared

back against recent audit findings, they in theory should allow for easier identification of risks and targets for weed control. IESC approve of the fact that the Review has highlighted some discrepancies in data management, definitions and the interpretation of audit findings. However we still feel there are improvements that can be made in how the data is presented in such a way as to inform management (and IESC) of the threats and strategies for management within each targeted area (see Recommendation and Observation).

By going through the Recommendations Tracker ourselves, we have determined that several weeds noted in previous reports remain an issue for weed management and control: Anglestem Willow Primrose (*Ludwigialeptocarpa*), Spiked Pepper (*Piper aduncum*), and Highland Trefoil (*Desmodiumsequax*). This latter weed has recently had its threat status changed from a P2 to a P1 weed as it is being found in new areas each audit, and increasing in numbers within existing areas. PCS data indicates its presence from Lake Kutubu to Hides Ridge. Most records for it have previously been at higher elevations (1200-1800m) but earlier in 2016 it was noted in the Mubi-Lake Kutubu (WMZ4) zone (i.e. at lower elevation), and on Hides Ridge at 2270m (i.e. at higher elevations). In addition, it appears to be increasing in population in the areas where it is found.

EMPNG reports that RoW Clan Care-Taking Agreements continue to be in place, and that efforts related to invasive species awareness raising has contributed significantly to reduced weed abundance. Mosquito Zone continues to undertake control of weeds on EMPNG's behalf, and a tracking system now contains information on priority weeds in priority areas to direct weed control events. Community awareness and training is ongoing, with four villages in the Lower Kikori Delta also trained through use of posters and dialogue.

Pest management work has increased since our last visit with a recent focus on cane toads. Cane toads (*Bufo marinus*) are an introduced species to PNG, and have typically been used by communities for the control of poisonous snakes. They have poisonous glands on their skin and can prove lethal to animals and dangerous to humans. A rising number of sightings on EMPNG facilities (e.g. Kopeanda waste management facility and Moro sites) during 2015/16 has meant that individuals are now being caught and disposed. Measures are being taken to avoid attracting the toads onto site by eliminating standing water, using awareness materials at toolbox talks and community meetings, and shared with the Lake Kutubu WMA committee.

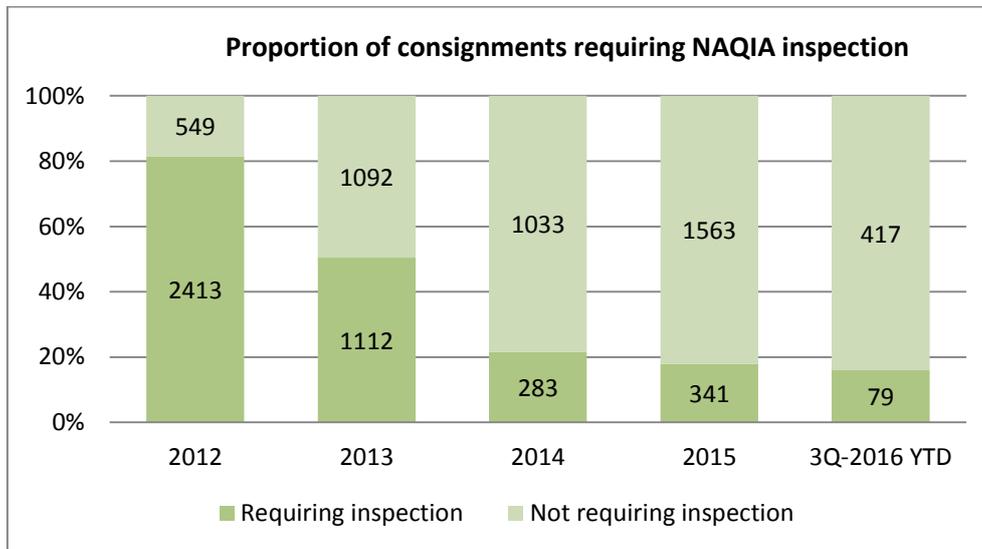
#### 5.6.2.2 Quarantine

Overall import shipment volumes have declined significantly since construction.

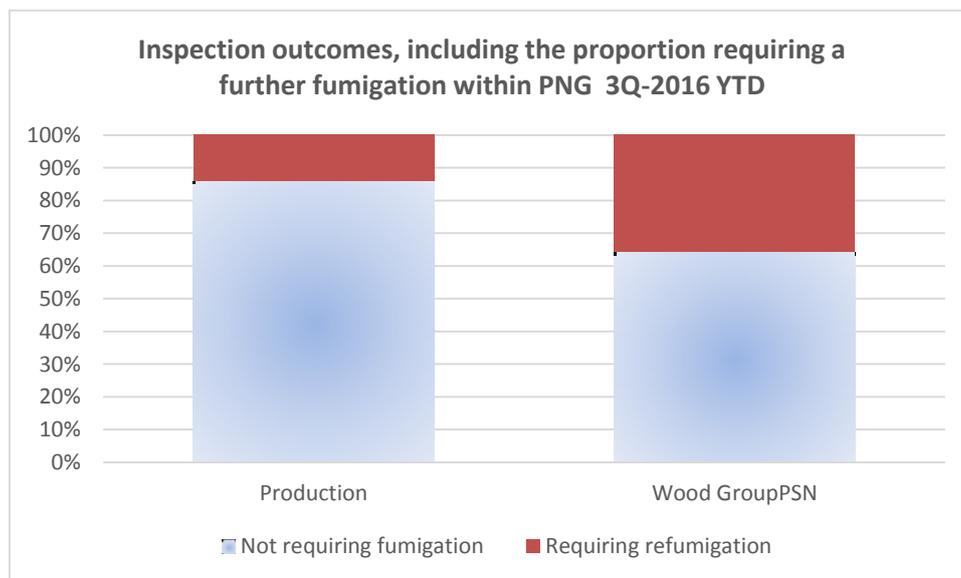
EMPNG Production and Wood Group PSN quarantine management performance data for 2016 YTD are included in the following two IESC graphs, presenting information on:

- top graph (see Figure 5.4): the proportion of consignments requiring a NAQIA inspection on arrival into PNG (showing numbers of consignments within the graph bars), and
- bottom graph (see Figure 5.5) the proportion of those inspections that result in the need for fumigation of that consignment i.e. the inspection outcome.

Note: inspections are typically triggered by inadequate/incomplete documentation accompanying the consignment, or the source of the consignment is a country that NAQIA deems to be higher risk. Thus the likelihood of inspection is not always within the control of EMPNG or their Contractors. However, fumigations are typically triggered by a suspicious item (e.g. insect) found during the NAQIA inspection, and hence are usually preventable by good housekeeping and management at the packing source of the consignment.



**Figure 5.4: Proportion of Consignments Requiring Inspection by NAQIA**



**Figure 5.5: Inspection Outcomes, Indicating the Need for Further Fumigation following Inspection**

Key points on performance in relation to inspections and fumigation include:

- Production:
  - o EMPNG air-freight shipments are down from 89% of total shipments in 2015 to 74% as of 3Q 2016, or equivalent to 5% of total tonnage; and
  - o Re-fumigation rates are higher than previously due to the proportion of LCL (less than a full container load) shipments, which are packed by a freight consolidator. EMPNG's freight forwarder has requested the consolidator to fumigate all containers used.

– Wood Group PSN:

- 55% air-freight and 45% ship-freight by volume; and
- Increased fumigation levels are currently taking place, and EMPNG is reiterating to WGPSN the requirement to use only ISPM-15 compliant pallets and wood bracing to assure compliance.

Ongoing dialogue with freight consolidators/forwarders/importers to reduce the need for refumigation events is only being partially effective (see Recommendation).

### 5.6.3 Recommendations

1. EMPNG could present their key messages from WMZ data to IESC with more clarity so as to better communicate the key risks from current abundance, diversity and distribution in each WMZ, key messages on how these risks are being managed, and how successfully they are being managed over time.
2. IESC strongly recommends that EMPNG continues with their external expertise weed audit approach (in addition to the use of new permanent ongoing plot surveys), to ensure that weed presence outside of the permanent sites are assessed by external experts and corrective actions targeted accordingly.
3. The spread of P1 weeds was one of the key ecological impacts identified in the EIS. A useful way to present information on the spread of key problem weeds between WMZs over time would be to visually represent for a number of key P1weeds (that have shown range expansion characteristics) a geospatial time sequence for each weed as it has expanded its range.
4. With the anticipated increased importation of equipment required for the Angore flowline construction, we recommend the importance of prioritized messaging around compliance with EMPNG quarantine requirements, and contractual adherence.

## **6 SOCIAL**

### **6.1 INTRODUCTION**

#### **6.1.1 Scope of Social Review for this Site Visit**

The IESC consulted with a variety of people and groups during its November 2016 visit. This visit focused primarily on the Community Development Support (CDS) program's progress and planning and the outcome evaluation of the initial agricultural component, the final close out of the Project's resettlement requirements, and resettlement associated with the Angore pipeline extension. Other aspects of social performance are also reviewed and reported on in this section. Section 7 presents the results of the labor review.

Social activities during this visit included the following:

- presentations by relevant project departments;
- discussions with the resettlement and CDS teams;
- discussions with National Content and Grievance Management teams on reporting practices;
- Visit to Mbelopa women's agricultural group (also visited in 2015);
- Flyover of Angore extension area to view affected households and speculator/trespasser structures;
- Visit to the upgraded Para clinic near HGCP; and
- Visit to Papa village (LNG Plant area) for discussion with the Headmaster and Senior Teacher (also a School Board member) regarding the CDS School Board Management Program.

#### **6.1.2 Waiver**

The IESC social review is substantially based on documents and data provided by the Project and interviews conducted with project staff, project affected people, and other stakeholders. It is not within the remit of the IESC to verify or substantiate the statements made by interviewees and, unless otherwise indicated, the IESC has taken no steps to verify or substantiate such statements. Accordingly, the IESC makes no representation as to the substance of any reported 'perceptions' or 'beliefs' of interviewees and notes that hearsay evidence should not be treated as proof of any specific statement or concern expressed.

### **6.2 LAND ACCESS, RESETTLEMENT, AND LIVELIHOOD RESTORATION - STRUCTURE**

#### **6.2.1 Project Strategy**

The Land Access, Resettlement and Livelihood Restoration Management Plan – Production applies to any new land access required during the Production phase and for managing the commitments for land that was obtained in the construction phase. This Plan supersedes the Resettlement Policy Framework developed for construction phase land acquisition. Livelihood restoration obligations for displacement that occurred during the construction phase, as well as evaluation of resettlement and livelihood restoration outcomes and the independent external audit of the resettlement and livelihood program, are also covered by this Plan and will be concluded in the Production phase.

The Plan defines the principles and approach to be used for management of the inter-linked activities related to accessing land, resettlement, and livelihood restoration. The content of the Plan is consistent with IFC Performance Standard 5 (Land Acquisition and Involuntary Displacement).

#### **6.2.2 Observations**

Remaining functions for land access, resettlement, and Livelihood Restoration remain under the Public and Government Affairs (P&GA) group. The Strategy and implementation of remaining tasks continues to be well organized and effectively managed and implemented.

### 6.2.3 Recommendations

None arising from this review.

## 6.3 MANAGEMENT OF DISPLACEMENT IMPACTS

### 6.3.1 Observations

#### 6.3.1.1 Closing Out Original Resettlement Obligations

The IESC notes that the Project achieved a positive resettlement outcome, particularly noteworthy in the context of the Highland economic, social and cultural context and its constraints. The Project responded positively to changes in processes and structure recommended by the IESC or revealed by the Project's internal evaluation process. The skills and, perhaps most importantly, the confidence acquired by the resettlement and community liaison staff during the resettlement and outcome evaluation processes is additionally noteworthy.

All resettlement close out recommendations contained in the last IESC report have been substantially met, with one exception (see asterisk in Table 6.1) as follows:

**Table 6.1: Follow-Up to IESC Recommendations**

IESC Recommendation	Project Response
Complete water access assessments of the 12 displaced households by end of June and provide any necessary remedial actions by end of July 2015.	Assessment completed and agreed community shelter completed
Complete assessment of community water issues (Komo and HGCP) and deliver any necessary remediation measures by end 2015. Assure that the CDS program considers water provision as a potential component	Assessment completed. Series of community tanks provided to churches that share water with local community members. Company provided materials and labor.
Report on the 10 households identified as needing supplementary agricultural assistance	All additional LR work completed for 7 households. One household refused additional support and 2 have been removed from list due to direct physical threats made to LR team (full security incident reported)
Report to IESC on status of legal process of the two Vulnerable People households and potential for Project to provide any additional assistance in the near future.	No change to status - will report on any change in status.
One case involving a compensation dispute between two (non-Project) parties has reportedly been settled out of court.	The Project will report internally and to the IESC once it has received confirmation of closure
Submit the final draft Resettlement Closeout Report to the IESC for review within one month of finalization of the Resettlement Completion Audit Report	Completed

#### 6.3.1.2 Angore Resettlement

The IESC reviewed and accepted the RAP addendum for the AngoreTie-In Project in July. Based on this RAP Addendum, resettlement impact is minimal affecting only six households. Only one of these households will be physically displaced and indicates it can relocate very near to its current dwelling site.

Of the other five households, one will lose a fence and four will experience minimal economic displacement and all have additional gardens elsewhere. Resettlement Agreements have been concluded with four of the six households and the other two household Agreements are under negotiation.

The one household that is both physically and economically displaced will lose a small bush type dwelling and one garden (out of the 10 gardens it currently has). The head of household insists on cash compensation. The IESC agrees that cash compensation is acceptable in this case, as long as the Head of Household agrees to sign a notice that he understands he will not receive any additional compensation in the event his standard of living declines because he uses the compensation for other purposes. The IESC further recommends that this agreement be made verbally and the verbal agreement and signing of the written agreement be video taped.

In terms of livelihood restoration, two of the economically displaced households have requested livelihood restoration assistance and they will be entitled to participate in the Community Development Support program's agricultural program. The IESC recommends that the other two households be asked once again if they wish to participate in the agricultural program and, if not, that they provide signed agreements to that effect. Additionally, the Project is liaising with its extension construction contractors on employment opportunities for people in the affected areas and will engage with communities on the recruitment process. The Project expects to have all resettlement activities, including livelihood restoration completed and assessed in 2018. Given the small number of affected households the assessment should be done for all affected households.

News of the extension led to a large number of speculative and a few trespasser structures in the area. From the fly over of the area by the IESC Social Specialist, the structures are many, obviously very new, and arranged in a way that supports their speculative nature. These structures will not be affected by the Project, but the persons who constructed them nonetheless have demanded compensation. The Project will not pay compensation to trespassers, but since the area is a very volatile one, does not want to create unrest by asking the Police to remove them. The Project is proposing instead a "Safety/Security Clean Up" program that provides funds to clans with land that is impacted by the pipeline, and distribution of the funds to individual clan members will be decided by the clans themselves. [Note that this strategy has not yet been communicated to the clans]. This strategy is acceptable to the IESC as long as formal agreements with the clans are concluded. The IESC also notes that the Project would be wise to agree with the clans on a general process for decisions on distribution to individual clan members in order to avoid subsequent claims that distribution was unfair.

Subsequent to the IESC visit, Project engineers discovered a potential landslip above the planned pipeline RoW. Investigation indicates that the slope is sufficiently unstable to slip at any time thereby causing serious damage to downslope persons and their assets. The Project has verbally informed the IESC that its activities (such as pipeline work) will not affect the stability of the slope or otherwise contribute to a landslip, and the IESC has requested results of the technical assessment on which the Project's opinion is based.

Given the gravity of landslip consequences, the Project will acquire this land and people in the affected area have relocated. The Project will compensate and otherwise assist affected households based on the census of asset losses that is on-going. The Project is also acquiring a small amount of land nearby as a safeguard. This land is unoccupied except for several uninhabited speculative structures. The persons who built these structures will be compensated following the speculative structure compensation strategy. The Project will produce an addendum to the Angore RAP addendum covering these displacements.

#### 6.3.1.3 Angore ESMP

The Angore ESMP Appendix 2 (Social risks, impacts and mitigations, p.31) gives the social aspect category as "Speculators and forced eviction" and the mitigation as "Keep current a management process for forced evictions . . .". The IESC notes that a distinction needs to be made between speculators and trespassers and that forced eviction legally applies only to trespassers. Speculators are those who may

legally build structures, either because they are recognized users of the land or because they are allowed to build on the land by the recognized land user. Trespassers are those who build without any claim to usership or permission from the recognized user. Speculators do not have to be compensated for losses, but they cannot be evicted, except by the recognized owner/user.

#### 6.3.1.4 Information Management

The IESC notes that the introduction of a new information system (Isometrix) is a valuable tool for management of all Project information. Its usefulness for planning, reporting, evaluating outcomes, and retaining information for the social programs (land access, resettlement, CDS, labor related, stakeholder engagement, etc.) is already evident.

#### 6.3.2 **Recommendations**

1. Closing out original resettlement: Report to the IESC on closure of the compensation dispute between the two parties as soon as the Project has received confirmation of the agreement.
2. Angore household receiving cash compensation: Conclude a signed agreement with the head of household agreeing that he understands the Project will pay no additional compensation in the event his standard of living declines because he uses the compensation for other purposes. The IESC further recommends that this agreement also be made verbally and the verbal agreement and signing of the written agreement be videotaped.
3. The IESC recommends that the two Angore households who declined livelihood restoration be asked once again if they wish to participate in the program and, if not, that they provide signed agreements to that effect.
4. Outcome evaluation should be done for all Angore affected households.
5. Agreements in principle should be concluded with the clans affected by the Angore Tie-In Project that receive funds for distribution to clan members. The Project is advised to agree with the clans on the general process for distribution of funds to clan members.
6. Provide the IESC with the results of the technical assessment on the Angore potential landslip.
7. Submit draft Addendum to the Angore RAP Addendum covering the new land acquisition to the IESC by the end of January 2017.
8. Angore ESMP clarification (p. 31): change wording of the risk category from “Speculators and forced eviction” to “Trespassers and forced eviction.”

### 6.4 **COMMUNITY IMPACTS MANAGEMENT AND SECURITY**

#### 6.4.1 **Project Strategy**

Project commitments to community impacts management during Production are contained in the Community Health, Safety and Security Management Plan – Production that addresses health, safety and security from a community perspective. See Section 8.2 in this report for IESC comments on Community Health.

The objectives of this Plan are to:

- avoid or limit risks to and impacts on the health, safety and security of the community during the production phase from both routine and non-routine circumstances through implementing targeted prevention programs to reduce risks, along with the implementation of an effective monitoring and evaluation program;
- ensure that safeguarding of personnel and property is conducted in an appropriate manner that avoids or limits risks to the community’s safety and security; and

- maintain a monitoring and evaluation program that is community-based, participatory, and transparent and covers all phases of production and decommissioning.
- Elements of the Production Community Development Support Management Plan also apply as it relates to community development support activities undertaken to mitigate the impacts or potential risks generated by Company activities with the objective to avoid or reduce the risk of adverse social impacts on Papua New Guinean communities during production.

#### **6.4.2 Observations**

The Project continues to see a decrease in security incidents, but serious community protests have occurred. Failure of the Government to meet its commitments under the Benefit Sharing Agreement (including payment of royalties) provoked Hela province landowners to attack the Project in the hope of getting Government's attention. The most serious of these events occurred in August when landowners asked the Project to shut down wellpads and when pads were not shut down, blocked access to the conditioning plant and sent "mercenaries" to take over two wellpads and looted other facilities damaging some equipment. In response, the Government met with community leaders for several days and signed an MOU to meet its commitments within 14 days, but commitments have not yet been met.

Another event occurred at the Komo Airfield Camp after the Project turned the camp over to the Government Defense Force and a contractor began to salvage the camp. Community members protested being left out of the salvage effort by over-running the camp for about a week. In response, a local Lanco was assigned to demolish the camp and all local clans were involved.

Going forward, armed police patrol the road on an increased basis and facilities are being upgraded to allow the wellpads to be manned 24/7 in the event of security issues. These police have all undergone training in the Voluntary Principles on Human Rights and the grievance mechanism is available should any human rights issues arise.

The IESC appreciates that community protests are likely to continue until Government commitments are met. It also understands the impulse to respond with additional benefits to communities. It is important, however, to keep in mind that the payment of royalties and meeting of other commitments by the Government are the central motivators for these actions, thus the community will continue to protest as long as these commitments are not met. Moreover, trying to "buy off" communities usually backfires.

The best approach is a combination of engagement and good intelligence. Communities should be made aware, to the extent feasible, of the Project's effort to facilitate the Government in meeting its commitments. Any direct assistance measures for communities should be done in the context of the goals and plans of the existing CDS program.

In terms of safety, the Project engages frequently with communities on key safety issues. The safety emphasis at this stage is on pipeline and roadway safety, particularly in the Upstream Project areas.

#### **6.4.3 Recommendations**

1. Make communities aware, to the extent feasible, of the Project's effort to facilitate the Government in meeting its commitments.
2. Any additional community assistance should be done in the context of the goals and plans of the existing CDS.

### **6.5 COMMUNITY DEVELOPMENT SUPPORT PROGRAM**

#### **6.5.1 Project Strategy**

Project commitments related to community development support are described in the Community Development Support Management Plan – Production. This Plan covers all community development support activities undertaken by the Project. This includes activities undertaken by the Land and Community Affairs team (L&CA) during construction, currently under Public and Government Affairs

(P&GA) and the Medicine and Occupational Health team (MOH), as well as to other functions undertaking relevant community support initiatives.

The objectives of EMPNG community development support activities are to:

- promote development of conditions that strengthen communities' ability to benefit from the Project's presence;
- avoid or reduce the risk of adverse social impacts on PNG communities;
- provide opportunities for sustainable development benefits in a culturally appropriate manner; and
- ensure that the development process fosters full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples, thus meeting both local regulatory and IFC *Performance Standard 7: Indigenous Peoples (2006)* requirements.

## 6.5.2 Observations

### 6.5.2.1 Strategy and Planning

The CDS overall is bringing positive impacts to and growing enthusiasm from the communities. The Program has made notable progress in:

- expanding staff in both Upstream and LNG Plant villages (analyst for both locations);
- updating community profiles (in progress);
- strengthening community participation and support;
- producing a *Project Planning and Implementation Desk Instruction*;
- developing Logical Frameworks for each CDS component;
- improving contract management and expediting turnaround on purchase orders and payments to contractors and incorporating safety standards in contractor work;
- holding quarterly planning workshops with key stakeholders;
- planning for the next phase of the CDS program (to be finalized in Q1 2017);
- sustaining internal alignment with relevant Project and Government sections/departments;
- building useful partnerships with a variety of external groups; and
- adopting Isometrix to manage data.

The CDS has strong partnerships with the PNG Government, particularly with the National Department of Education and the Central Provincial Government. Other partnerships at the national level have been developed through the Contributions program in the Project area, for example, with the Olympic Committee, Advancing PNG Women Leaders (APNG-WLN), and Buk BlongBilongPikinini. Existing partnerships with SMEs have been strengthened, for example with EsmieSinapa Development Consultancy and Services (ESDCS), ManTech Consultancy, Evangelical Church of PNG (ECPNG), and APNG WLN. The Project is also working with the Hides Special Purpose Authority and Landowner Companies (Lancos) for counterpart funding of certain projects, for example, the Para Clinic renovations. CDS planning continues to promote partnerships with other entities such as donors, businesses, Governments, and NGOs.

### 6.5.2.2 Program Status

#### ***Livelihood Support: Agriculture - Community Livelihood Improvement Project (CLIP)***

An external evaluation of the agricultural program is scheduled to be done in early 2017. The period for tendering proposals for the evaluation is now closed. The Project and the IESC are reviewing the TORs.

During the past year, CLIP expanded to 17 groups, some of which have added male members. Of the 17 groups, three have become inactive, largely as a result of lack of security due to clashes between the clans

in their areas. Overall observations revealed by a recent assessment performed by ANUE (the implementing entity) indicate that progress has been made toward the program goals of improved subsistence food and cash crop production, village poultry production, and advancing the livelihood status of women through life skills and entrepreneurship development. General achievements include:

- Increase in the number of groups distributing planting materials and seeds to other members;
- Adoption of improved land management techniques;
- Good crop management practices (mixed cropping);
- Development of policies for distribution of poultry offspring;
- Improved household nutrition, health literacy and hygiene;
- Earning income (baked items or sale of surplus produce);
- Three groups IPA registered (Mbelopa, Nogoli and Pongoli); and
- Progress toward group self-sustainability through main group creation of sub-groups.

The ANUE internal assessment measures participants' progression from their baseline status within and toward higher categories of achievement. The categories are (in order of progression):

- No change;
- Developing;
- Intermediate;
- Advanced;
- Leading practice.

Measurement results indicate that of the 11 groups included (groups that started the program later not included):

- Four groups progressed to the next step— three groups from Developing to Intermediate and one group from Limited to Developing; and
- Seven groups progressed incrementally within the Developing category.

It is notable that most groups want to expand as quickly as possible into sales of products and development of small businesses around agriculture, however, this is currently hindered by lack of markets in which to sell goods. PNG LNG is working on the market issue and at present a market very near the HGCP is scheduled for construction and will be managed by the Alliance Group. Additionally, discussion regarding provision of food items to the HGCP food service is underway.

The IESC Social Expert visited the Mbelopa Women's Group and found that the group has made enormous progress since the 2015 IESC visit when the area was plagued by drought. Group members indicated last year that they were enthusiastic because they anticipated the program would bring many improvements. The progress they have made in the last year has greatly increased their enthusiasm and activity level, as well as has increased membership including a relatively large number of males. The group is using good cropping techniques (including flat beds), producing enough food to provide varied and nutritional meals and some surplus for sale (duck eggs, vegetables, and flour they mill themselves from cassava, sweet potato, and nuts they grow). Members are also passing on learnings and forming smaller groups of persons who were not involved in the formal program. The financial management aspect of the training has had an equally important impact on the women by making them aware of the importance of spending earnings wisely on items like school fees, health care, and re-investment in livelihoods, rather than on items like wantok (family/community) obligations such as funerals or giving money to males for alcohol or gambling.

The men who have joined do the physical labor needed for farming and animal husbandry. It is important to note that males traditionally have not done this kind of work, particularly in the Huli areas. The IESC held group and separate discussions with the male and female group members. The men indicated they were

motivated to join once they saw how well the women were doing and the potential to earn more cash if the group could produce more crops and animals. Additionally, the males recognized that their group may be recognized by the Project as eligible for more training and assistance (such as marketing) if they achieve outstanding results from the current program. The IESC discussion with the female members focused on the pros and cons of having male participants. It is very encouraging that the women have not lost their newly earned status as important contributing members of their households and the group as a result of male participation. Retention of female status is evidenced by the fact that the men do not interfere in women's financial plans or expenditure of the cash women earn on sustainable items such as health care, school fees, and reinvestment.

### ***Livelihood Support-Business***

Highlights of the business development component include the following:

- ANUE has added a manager with agri-business experience to its team as a back-to-back with the agricultural expert. The CLIP is moving toward organizing member groups and members to sell products.
- EMPNG engaged Advancing PNG Women Leaders Network (APNG-WLN) to carry out an assessment of women's groups in the Upstream Project Area communities. The findings of this assessment will be used to draw up a longer term engagement strategy with relevant stakeholders.
- The Global Women in Management (GWIM) Program, sponsored by the ExxonMobil Foundation, is creating opportunities for alumnae women to network on women's empowerment (including business development). ExxonMobil has been sending participants to the GWIM Leadership and Management Training program for 10 years. GWIM also provides resources for various development initiatives aimed at improving opportunities for women in leadership roles. Half the women sent by EMPNG are from Project Area communities and work in community organizations developing small income generating ventures or health or education activities.

### ***Education***

The 2016 CDS education component consists of the following activities:

#### ***Plant site area***

- School Board of Management (BOM) Capacity Building;
- Early Childhood Teacher Training;
- Construction of Teacher's Houses;
- Water tank guttering/downpipes;
- School supplies; and
- Preschool classrooms.

#### ***Upstream***

- Kikori Secondary & Kapote Elementary Water tank;
- Supply of desks to schools;
- Homa-Paua School maintenance;
- Building materials for new classroom – Benaria Primary;
- School BOM & Improvement Needs Assessment – Hela;
- Empowering students through Basketball;
- Donation of water tank to Dauli Teachers College; and
- Koroba Secondary water pump replacement.

The last IESC report recommended that follow up activities be undertaken to address the declining enthusiasm for the School Board program. The Project responded with a number of activities including:

- Completion of Board of Education (BOM) Training for Porebada, Papa, Lealea and Boera;
- Completion of the Board of Management Training Manual that was endorsed and launched;
- Completion of the Upstream School BoM needs assessment and going forward plan based on assessment (in progress);
- Review of the funding agreement between Central Province government and EMPNG (on-going);
- Plan for School BoM Training M&E to be completed in 2017; and
- Construction of four new head teacher houses in the Plant site villages funded by Project (Papa, Lea Lea, Boera, and Porebada). Teachers have moved into the houses.

EMPNG engaged EsmieSinapa Development Consultancy and Services(ESDCS) in 2015 to conduct a School Board of Management Training Program with Plant Site Primary Schools. In addition to the training of school board members, a School Board of Management Training Manual was prepared in collaboration with communities and has been endorsed by the Central Provincial Government and the National Education Department. The Central Provincial Education Board and the National Education Department will use the manual to train and assess School Boards in the coming Provincial Education Plan period (5 Years). EMPNG and the Central Provincial Government will be signing a Funding Agreement that will enable the Central Provincial Government to engage EsmieSinapa to continue the work and expand the training to other schools in Hiri District. Evaluation of the BOM program will be conducted in 2017.

The IESC visited the head teacher and senior teacher at the Papa Primary School, one of the LNG Plant neighboring villages. Both head teacher and senior teacher were very enthusiastic about the results of the training, preparation of the Manual, and other Project support in the four villages. They noted a significant impact on School Board performance, as well as on students and community members. Communications and leadership practices in School Board meetings have greatly improved, leading to civil and productive behavior in meetings thus facilitating agreement. This constructive behavior is being emulated by other community groups such as churches, sports teams, and students and teachers. During the visit, a number of students and community members expressed their satisfaction with the changes that have occurred as a result of the program.

ESDCS began working *Upstream* in 2016 starting with a consultative needs assessment of 10 targeted schools in Hides, Komo and Angore areas in Hela Province. The assessment engaged with a wide range of stakeholders including the Hela Education Division; Catholic, SDA and ECPNG Church Education Services; the Board of Management Members; and teachers and community leaders, all of whom participated in interviews and focus groups discussions. The initial report contains a large number of detailed recommendations resulting from the assessment. CDS is reviewing these recommendations as the basis of agreement on the key next steps and the timing of their implementation. Additionally, CDS continues assessment of the performance and capacity of ESDC to determine if it needs any additional support to provide similar services in other parts of PNG.

## Health

Table 6.2. explains the general context of health facilities in the Plant site and Upstream areas.

**Table 6.2: General Context of Health Facilities**

Plant Site	Upstream
<ul style="list-style-type: none"> <li>• 4 health institutions (3 owned by government, 1 church-owned) mainly resourced with community health workers.</li> <li>• All operational but facilities basic and need renovation or upgrade.</li> <li>• No steady/consistent supply of clean water.</li> <li>• Nearest public hospital is in Port Moresby</li> <li>• Limited diagnostic capacities</li> <li>• These clinics mostly treat malaria, general health care, but lately drug resistant TB cases evident.</li> <li>• Lack proper community waste management.</li> </ul>	<ul style="list-style-type: none"> <li>• At 17 health institutions (most government owned and few by church). Nearly all them a nurse or community health worker.</li> <li>• Due to geographical constraint, most do not have steady supply of clean water or electricity.</li> <li>• Nearest public hospitals for most communities @ 100 km or more away.</li> <li>• Access to public hospitals mainly by public transport and often unreliable due to road conditions and remote locations of villages.</li> <li>• Limited diagnostic capacities.</li> <li>• Most cases are general health care and maternal health care and tribal wounds</li> <li>• Drug resistant TB also becoming evident</li> </ul>

Current and planned CDS health projects include the following:

### LNG Plant Site Projects

- Water source (bore) improvement for Papa sub health Center;
- Institutional strengthening through in kind support;
- Papa Clinic Infrastructure support – currently at proposal stage (seeking funding approval for infrastructure maintenance and extension to the existing wards and staff quarters, provision of ambulance, genset and V-scan);
- Support PNG Cancer Foundation in the cancer awareness and screening at Papa and Lea Lea Villages;
- Donation of household items including beds, chairs, etc. to the three clinics at Papa and Lea Lea villages; and
- Support Rotarians Against Malaria.

### Upstream Projects

- Awareness on TB prevention;
- Solar power project (3 institutions);
- Water facility improvement (4 institutions);
- Support TB Awareness programs at schools and Kikori hospital; and
- Institutional strengthening through in kind support:
  - Pua sub-health Center – solar power installation to new facility;
  - Inu sub-health Center – Solar power installation to the maternity ward;
  - Para sub-health Center – Construction of new clinic building, a staff house and new ambulance;

- Nipa Rural Hospital – donation and instillation of 220,000L water tank to new facility;
- Pimaga Rural Hospital – Donation of water tank (80,000L capacity);
- Hela Provincial Division of Health – survey currently conducted to identify sources of water people use and the common waterborne diseases associated; and
- Project Cure medical supplies through Tribal Foundation to Angau, Tari Hospital, Daru and Mendi Hospital.

The IESC visited the Para Clinic upgraded in a collaboration between the Project, the Hides Special Purpose Authority, and the Lanco HGDC (for earthworks). Based on observations and discussions with staff and with CDS, the IESC notes a big improvement over previous facilities and care, particularly important in terms of the facility itself, reasonable staffing, the ambulance service, and the maternity clinic and post-natal care. Staff indicated that additional nursing care is needed. The clinic is part of the PNG health care system, thus can apply for additional staff once it upgrades to Level 3.

### ***Law and Justice***

The goal of the Law and Justice component of the CDS program is to improve safety in the communities around the Project sites through supporting community capacity to self-regulate and manage law and justice. Law and justice conditions vary considerably between the Upstream and PNG plant site communities, as is shown in the table below.

**Table 6.3: Law and Justice Conditions**

LNG Plant Site	Upstream
<ul style="list-style-type: none"> <li>• Law and Order issues are minor and mostly result from alcohol consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Tribal fighting very common and seen as normal behavior</li> <li>• Limited police presence in key areas such as Hides and Komo.</li> <li>• Rundown facilities for existing police stations.</li> <li>• Limited to no community policing or village court systems.</li> </ul>

Projects directly addressing law and justice have not yet been developed as many of the other CDS components address underlying causes of community inability to self-regulate and manage law and justice, for example, the education Board of Management (BOM) program that gives people the skills and status to manage conflicts and the livelihood enhancement programs that give people economic status and the ability to educate their children. At present, EMPNG through its Security Department and Australian DFAT is jointly providing advisory support to the Hela Provincial government. Longer term direct interventions will be based on various assessments including the BOM and Livelihood program needs assessments that will help to identify conflict triggers on which to focus, as well as a baseline law and justice study for the Upstream areas that is planned for 2017.

Domestic Violence, mainly with women and children as victims, is one of the most serious problems, particularly as it undermines social and economic stability in the Upstream areas. The CDS program includes an objective of promoting “advocacy and awareness around domestic violence”. The IESC proposes that the Project consider an awareness and advocacy strategy that draws on selected male PNG staff as champions against domestic violence inside the Project and, depending on the results of the “inside Project”, supports a similar awareness campaign in Project area villages using champions perhaps chosen from among the school BOM program male participants.

The Project has and will continue to implement commendable efforts to address domestic violence. These efforts focus mainly on assisting females to learn conflict resolution behaviors and to manage the results of violence against them. Domestic violence research has recognized that the female approach, while necessary, does little to address the cause of violence against women which, in the PNG context, is that this behavior is viewed as traditional and “normal” for males. Results of research have shown that men need to be helped to “assume responsibility for preventing men’s violence against women” and to be involved as partners in solving the problem, rather than simply being blamed for it. Considerable research also has shown that reducing violence against women is best achieved by using male facilitators in all male groups<sup>4</sup> and the approach must be culturally appropriate and comfortable for participants.

The Project has done a commendable job recruiting and training PNG staff and PNG staff have equally commendably met the challenge and through their own efforts have gained status, respect and good communication skills. These can be leveraged to address the serious problem of domestic violence. CDS and HR staff (including the counselors) are in the best position to devise a specific approach, thus the following comments are the IESC’s suggestions for consideration:

- Organize a voluntary team of PNG male staff to engage male PNG staff on the issue of violence against women and children. These should be persons who are highly respected and have good communication skills.
- Select a high level staff member as the group’s Champion. CDS and HR are probably best suited to propose a champion. The champion could be a PNG staff member or, if this would in anyway cause friction, a high level expatriate could act as the Champion, with a PNG male staff member as the leader of the actual effort.
- Development of the team’s activities should be based on engagement with a selection of the PNG workforce to determine the best modes (e.g., focus group discussions, various suitable events, etc.), frequency of engagements, and the content of messages.
- Once the staff program is going, the Project could consider whether it wants to roll out a similar program in the affected communities, perhaps using the trained School Board members and headmasters as leaders.

### 6.5.3 Recommendations

1. The IESC would like to be given at or just prior to its 2017 visit flowcharts showing status of implementation against the planned implementation for each CDS component.
2. The IESC would like to understand more about the objectively verifiable sub-indicators that will be used to *measure* component overall indicators. Some of the component level outcome indicators are not in themselves measureable. As an example, one of the education component indicators is – “Education systems operate in a timely, proactive and coordinated manner.” The IESC would like to see the lists of the objectively verifiable and measureable indicators that will be used to determine whether timeliness, proactivity, and coordination have been achieved.
3. During the 2017 IESC visit, the IESC would like to have a discussion with at least one highlands education “group” participating in the CDS program.

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<sup>4</sup> “Working with Men to Prevent Violence Against Women: An Overview,” Alan D. Berkowitz and with contributions from David Matthews, *The National Online Resource Center on Violence Against Women*, 2004.

## **6.6 STAKEHOLDER ENGAGEMENT AND CONSULTATION**

### **6.6.1 Project Strategy**

The Project commitments with respect to stakeholder engagement are contained in the Stakeholder Engagement Management Plan – Production. This Plan describes the processes and actions applicable during production. The overall objective for stakeholder engagement during Production remains to keep all stakeholders informed with respect to their specific interests, engage people in decisions that directly affect them, and maintain stakeholder confidence and trust in the Project and its activities through open, informative, inclusive and timely communications. A *Village Liaison Officer Strategy* for the Production Phase supports implementation of the Management Plan and the Land and Community Affairs Plan.

### **6.6.2 Observations**

The Project continues to engage widely with communities. During 2016 to date, the Project conducted engagements with 11,394 communities across the Project affected areas reaching out to a total of 257 communities (93,189 attendees) of which 6,179 engagements occurred in the LNGP area, 5,203 in the Upstream area, and 12 engagements with communities near the PNG main office in POM (PNG Haus).

The main issues covered during engagements are:

- *Upstream communities*: Pipeline RoW caretaking activities; land access and agreement on change of clan agents; employment - clan agents and VLO opportunities; CDS/SCI asset donation to schools, health centers, scholarships; pipeline safety awareness; road safety awareness; and Project involvement in community activities.
- *LNG Plant site*: CDS/SCI-Agricultural livelihood programs, asset donation to schools, dynamite fishing/mangrove/navigational aid awareness, road safety awareness, Government related-royalties and benefit sharing agreements, and Project involvement in community activities.
- *PNG Head Office Building*: employment, community alignment regarding resettlement, and environmental issues like drain issues.

The IESC is aware that the takeover and opening of Project built roads by the Government has also been a topic of engagement. The introduction of new people and activities is not in itself a negative outcome, but can lead to negative consequences if unregulated. The Project is not in a position to provide the necessary regulation, but it can contribute to minimizing adverse impacts. The IESC's Social Expert and others have found through research and experience that helping people to understand and anticipate the consequences of events like in-migration is the best way to help them manage the impacts, both positive and negative.

The IESC recommends that the Project consider the following contributions:

- Undertake a series of engagement events with people in the Project affected areas where most in-migration is likely to occur. This engagement program would be much like the engagement done for the Construction phase In-Migration Management Plan - making people aware of the positive and negative impacts likely to occur, their responsibilities in helping to manage impacts, and providing advice on activities in which they should not involve themselves.
- Engage with Government at appropriate levels to urge regulations on and monitoring of in-migration to these areas.
- Provide support to collection and analysis of iHDSS data in the Project areas most likely to experience in-migration similar to the data collected to monitor the effects of in-migration during the Project construction phase.

### **6.6.3 Recommendations**

1. Engage with communities in the likely affected areas to make people aware of the positive and negative impacts likely to occur, their responsibilities in helping to manage impacts, and providing advice on activities in which they should not involve themselves.

2. Engage with Government at appropriate levels to urge regulations on and monitoring of in-migration to these areas.
3. Provide support to collection and analysis of iHDSS data in the Project areas most likely to experience in-migration similar to the data collected to monitor the effects of in-migration during the Project construction phase.

## 6.7 COMMUNITY GRIEVANCE MANAGEMENT

### 6.7.1 Project Strategy

The Project's grievance mechanism for management of project related individual and community grievances is described in Section 6 of the Stakeholder Engagement Plan.

### 6.7.2 Observations

Community *grievances*, formal complaints against the Project, continued to decline from the previous year to 33 in 2016 to date. The most common grievance topics related to ongoing land rental/deprivation payments and pipeline RoW clan-caretaking activities, ecological grievances from villages surrounding HGCP and along the Pipeline RoW, and labor and working conditions related grievances raised by causal workers along Pipeline RoW.

*Issues and comments* in 2016 to date total 2,866 with the most frequent relating to Strategic Community Investment activities, employment, requests for business development opportunities, land access and agreements, Pipeline RoW Caretaking activities (CAA/CCA), requests for change of clan agents, community health and safety awareness programs and engagements (such as the Board of Management (BOM) training program), and Navigational Aids thefts.

The *target* rate of 75% of grievances closed within 30 days was not achieved during this period. This target was set for construction when the majority of grievances required a fairly short resolution period. At this stage of Production, grievances are far fewer, but of a complexity that requires a longer period for investigation and implementation of closure actions. Nonetheless, 37 out of the 40 grievances (seven carried over from the last period) were closed during this period. Moreover, none of the grievances are sufficiently significant to merit Lender notification. Thus, the IESC concludes that the grievance management process is effective.

The IESC recommended and the Project has agreed that grievance reporting be changed slightly to more clearly represent the effectiveness of grievance resolution rates. The details of these changes are given in the Recommendations section below.

### 6.7.3 Recommendations

1. Changes recommended for Grievance reports:
  - Give the overall closure rate, *as well as* the closure rates for the following three grievance categories:
    - Category 1: Grievances that can be resolved quickly in the field (within 48 hours);
    - Category 2: Grievances that can be resolved within 30 days; and
    - Category 3: Grievances that will require longer than 30 days to investigate and/or require external inputs for either investigation, definition or resolution, or implementation of an agreed resolution.
  - Clear statement on cause of any non-achievement of overall KPI (concise reason for each case).

- Addition of information on the status of meeting process targets for the time to respond to reception of grievances and to initiate. These targets should be set and are typical respond within three days and initiative investigation within five days.

## **6.8 STATE CLAN BENEFITS INTERFACE -UPDATE**

### **6.8.1 Project Strategy**

The PNG Government is responsible and accountable for determination and payment of landowner beneficiary royalty and equity dividends. EMPNG's goal is to influence and support the Government to help it pay landowner State Cash benefits in accordance to the laws of PNG. Its main challenge in this effort is to help ensure safe, accurate, timely and effective delivery of cash benefits without having any actual control over the process.

### **6.8.2 Observations on Status**

Involvement of the judiciary remains a challenge as the injunction imposed by a Judge against payment until a mediation process is done to replace the clan vetting results as the basis for royalty payment for some or all areas. The Project's strategy remains to mitigate near-term risk, support resolution of underlying issues, and capture lessons for potential future projects. The Project also continues its advocacy with the DPE and other key Government stakeholders toward a positive resolution to the issue.

## **7 LABOR AND HUMAN RESOURCES**

### **7.1 INTRODUCTION**

The IESC consulted with a variety of people and groups during its October 2016 visit. Activities included the following:

- Presentations from labor related Project staff;
- Tour of the LNG plant accommodation and discussion with camp management;
- Visit to the HGCP accommodation and discussion with camp management; and
- Discussion with the counselors for the Workplace Assistance Program.

### **7.2 LABOR AND WORKING CONDITIONS**

#### **7.2.1 Project Strategy**

Project labor commitments are defined in the Labor and Working Conditions Management Plan – Production (the “Plan”). The Plan describes the requirements and expectations in terms of compliance, reporting, roles, supervision and training with respect to labor and working conditions, including camp accommodation. It covers all production activities for Upstream Facilities, the Pipelines and the LNG Plant. This Plan is expected to be adopted and applicable to EMPNG contractors, recognizing that EMPNG’s effectiveness in managing third parties will vary in accordance with the leverage EMPNG is able to exercise. To the extent that EMPNG can exert influence over its supply chain, the principles in this Plan will also apply.

The objectives of the Plan are to:

- promote fair and equitable labor practices for the fair treatment, non-discrimination and equal opportunity of workers;
- establish, manage and promote a healthy management-worker relationship;
- protect workers’ rights including migrant and third party workers; and
- promote healthy, safe, secure and comfortable accommodation that does not impact negatively on the communities in the surrounding area.

#### **7.2.2 Observations**

The information received on compliance of policies, procedures, guidelines, and reporting formats covering labor and working conditions to the obligations of IFC PS2, international labor standards, and PNG labor law adequately demonstrates compliance of the Project and its main contractors. Specific labor and working condition features are presented below.

##### **7.2.2.1 Labor Grievance Management**

The labor grievance management process is part of the Project’s Procedures & Open Door Communication Policy. Nearly all grievances and issues are initially addressed by immediate supervisors. In the event that an employee is dissatisfied by a response from an immediate supervisor, the employee is entitled to further review by the applicable level of management.

Overall no hours were lost due to industrial action. Payroll queries have generally decreased with most queries occurring when new programs are introduced, such as changes in housing and medical programs. These issues are addressed with workshops explaining the changes. The Project also emphasizes self-help by providing information on where to find the applicable policies and to whom to speak to get information without having to file a query.

The number of harassment complaints remains low and many were judged not warranting investigation. Of those warranting investigation, one case required disciplinary action and two cases at LNG Plant were raised by a third party contractor. No particular trend in types of harassment is shown.

The Project has several initiatives to assist in eliminating grievance causes including adding PNG citizens to the Cultural Awareness training to help them understand expatriate culture, establishing an Inclusion & Diversity (I&D) framework, continuing support to the EM Social Club to promote staff cohesiveness, and developing the Company position on and support to address domestic violence.

#### 7.2.2.2 Gender Issues

The Project has made a good effort to recruit and train PNG females. Of the total PNG workforce of 2,406, 397 are females. Training of female staff represents about 26% of training hours. The lower proportion of females results primarily from the types of work performed, much of which is not suitable or attractive to PNG females. The contractors with more suitable jobs, such as accommodation management, have a proportionately higher representation of female employees.

The Project has responded to the IESC's recommendation that the female counselor make more frequent and regular visits to the LNG plant and HGCP sites and that these visits be scheduled and announced to employees. The female (local) counselor now visits operational sites (HGCP/LNG Plant) monthly and alternates with the male counselor in fortnightly visits to the permanent office complex in POM. Visits are announced through a variety of easily accessible notices including News Blast and private appointments can be made. In addition to appointments, the counselors employ a "walk the floor" strategy that stimulates informal conversation that often leads to a deeper discussion of concerns. Additional counselors are being sought, but finding skilled PNG female counselors is difficult.

The issues discussed with the Counselor by female staff are all personal, rather than work related. Violence against women and children and the impact of excessive Wantok obligations are the most frequent issue mentioned. This information has contributed to various aspects of the CDS program (see also the CDS Law and Justice section (6.5.2.2) for IESC comments).

PNG male staff concerns are largely work related, such as excessive work load and work/life balance, manager support, occupational health, operational demands, personal performance review, vocational discontent, and organizational climate. These concerns are reviewed and changes are made if deemed constructive.

The IESC observes that the counselors are providing a valuable service to both staff, particularly Upstream PNG female staff, and the Project as a whole. The Project notes that its Management is exploring possible reduction of the frequency of counselor visits, given the maturation of the workforce and stability of issues raised. The IESC agrees that reduction of visits may be appropriate for EM Haus and LNG Plant, but urges the Project to continue the services of the female counselor at HGCP.

#### 7.2.2.3 Workforce Engagement

Engagement with the workforce continues at all PNG facilities.

### **7.2.3 Recommendations**

1. Provide the IESC with the total number of workforce grievances and the number of grievances in the sub-categories harassment, irregularities, and payroll.
2. The IESC agrees that reduction of counselor visits may be appropriate for the Permanent Office Complex in POM and LNG Plant, but urges the Project continue the services of the female counselor at HGCP.
3. Consider organizing a voluntary team of PNG male staff to engage male PNG staff on the issue of violence against women and children. Additional suggestions are given above.

## **7.3 PROCUREMENT AND SUPPLIERS**

### **7.3.1 Project Strategy**

Project commitments for procurement and supplier management are contained in the Procurement and Supplier Management Plan. The objectives of this Plan are the same as they were for construction:

- maximize procurement from local suppliers and economic benefit for local businesses;
- improve capacity and skills of local business to capture business opportunities associated with the Project, both locally and nationally; and
- ensure that EMPNG environmental and social standards and commitments are adequately communicated by the contractor to its subcontractors and suppliers and included in their contractual arrangements (as outlined in Table 4.1 of the Plan – *Risks and Impact Mitigation*).

The Procurement Manager is responsible for implementation of this Plan and owns this Plan from an OIMS functional perspective. Contract Owners and Administrators and Site Managers are responsible for contractor management in relation to this Plan on a day-to-day basis. Contract administrators monitor the actual compliance to the conditions of each contract.

### **7.3.2 Observations**

The Project continues to purchase as much as is possible from local suppliers and to support local suppliers and contractors in implementation of the Production ESMP. An ESMP training session for contractors was held on 27 May 2016.

The Project uses the services of nine landowner companies (Lancos) and about 120 PNG non-Lanco businesses. Since the beginning of the Production phase, just over PGK 1 billion (USD 320 million) has been spent on PNG services, of which PGK 449 million (USD 142 million) was paid to Lancos. The Project's total spend on third party services in the first half of 2016 was PGK165 million (USD 52 million), of which PGK 82.5 million was for Lanco services. Lancos provide services such as labor hire, maintenance, transport, fuel distribution, container freighting and supply of vegetables to the mess. Other PNG businesses provide services such as security, freight and logistics, Project personnel transport, food supply, maintenance supplies, customs clearance, surveying, medical services, and construction material testing.

### **7.3.3 Recommendations**

None arising from this review.

## **7.4 NATIONAL CONTENT**

### **7.4.1 Project Strategy**

The main objective of the Project's National Content strategy is to replace expatriate staff with PNG citizens through both targeted recruitment and training and development. In addition, national content requirements set out in a National Content Exhibit are contained in agreements with key contractors. The exhibit states that contractors shall "develop and implement a Local and National Content Plan in accordance with the requirements in this Exhibit." The Exhibit requires maximization of employment of PNG citizens in all job categories and sourcing of all PNG works will be in accordance with the requirements of this Exhibit and relevant law. First priority is to be given to local persons (proximate to Company locations), second priority to regional citizens, and third priority to persons elsewhere in PNG. It also specifies that contractors should give preference to local Lancos for provision of employees

## 7.4.2 Observations

### 7.4.2.1 National Workforce Statistics

The National Content program for Project workforce is on target to achieve its goal of replacement of most expatriate workers with PNG nationals. Of the current 2,522 total workforce, 81% (2,046) are from PNG and 19% (476) are expatriates. Statistics of the 2,522 PNG workforce broken down by characteristics are given in the table below.

**Table 7.1: Workforce Statistics**

Gender	Origins*	Type of Job
Male = 1,649 (81%)	P1= 673 (33%)	Management=141 (7%)
Female = 397 (19%)	P2 =820 (40%)	Office= 202 (10%)
	P3 =553 (27%)	Field=1703 (83%)

\*Local=Priority Area 1 (P1)-PNG citizens of local original (proximate to Company operations)

Regional= Priority Area 2 (P2)-PNG citizens of regional origin (So. Highlands, Hela, Western, Gulf, Central Provinces and POM area)

National=Priority Area 3 (P3)-PNG citizen from elsewhere in PNG

### 7.4.2.2. Training

The status of implementation of the third intake for training of PNG technical staff is:

- Advanced Skills Training completed for all of Operations;
- Maintenance training finished on October 10<sup>th</sup>;
- Assisted OJT training plan and modified Advanced Skills Training plan will permit most to be promoted to tech I level in the first quarter of 2017; and
- Move to Employee status start of January 2017.

Intake IV, begun in August, is a 15 month program to develop junior technicians for Ops, Inst, & Mechanic at Kumul Petroleum Academy. Focus is on oil and gas fundamentals, Safe Live Processing Plant training on behavioral development in safety program & approach to work. The Safe Live Processing Plant will be installed January.

In terms of general highlights of the training, an increase in the competency of trainees who were part of the Intakes I and II Technician II training has been observed. The Training Roadmaps review was completed. Advanced troubleshooting training for maintenance (skill guides) has been developed. A maintenance training and support contract is being developed (Competency Training) and a multi-skilled role has been devised for pipeline technician and a licensed electrician for this role is being recruited.

### 7.4.2.3 Reporting

The National Content reporting to the IESC requires some additional changes. These have been communicated to National Content management.

## 7.4.3 Recommendations

1. National content data presented to the IESC needs some additional changes and additions. These have been communicated to the Project.

## 7.5 WORKFORCE ACCOMMODATION

### 7.5.1 Observations

Based on presentations and visits to the LNG plant camp and the HGCP camp, the IESC reiterates the positive observations made in previous IESC reports and notes that improvements continue to be made,

most in response to requests from camp committees and residents. As a result of these improvements and the many informal mechanisms for making and responding to issues and requests, camp related grievances continue to be minimal and easily resolved.

Highlights of changes include:

*HGDC*

- New meeting / conferencing room with appropriate audio-visual equipment;
- Refurbished Dining Room;
- Community built haus-win for outdoor meetings; and
- Development and promotion of local Hela staff into lead positions.

*LNG Plant*

- Management of the “Green Zone” formalized with appointment of coordinator;
- Female accommodation refurbished;
- Additional permanent use facilities being refurbished;
- An attractive “bus stop waiting area” has been provided; and
- Various aesthetic improvements.

*MORO Camp*

- Minor upgrade and amenity improvements, taking ongoing use by the Project into consideration.

**7.5.2 Recommendations**

None arising from this review.

## **8 HEALTH AND SAFETY**

The PNG LNG Project has a well-developed program to manage both occupational health and safety of workers, as well as a community health and safety program. The success of both programs has been based on the understanding that community and occupational health and safety are linked and interdependent on one another.

### **8.1 OCCUPATIONAL HEALTH AND SAFETY**

#### **8.1.1 Project Strategy**

Occupational health and safety is managed independently of the Production ESMP within the ExxonMobil Operations Integrity Management System (OIMS), which is summarized within the ESMP such that the linkages between OIMS and environmental and social management are well defined. The ultimate goal of managing personnel safety is to achieve an incident-free workplace where “Nobody Gets Hurt”. Specific, measurable objectives that contribute to this goal are:

- reduce at-risk behavior (both on and off-the-job) and manage hazards associated with the work environment to significantly reduce Occupational Integrity (OI) risks; and
- hazard identification and correction programs are comprehensive and widely used across the Unit.

OIMS also provides the structure for identifying and managing health exposures with the following goals:

- protect the health of personnel on company premises and the public in proximity to our operations from adverse health effects that may result from our operations; and
- protect the personnel on company premises from environmental and health hazards prevailing in the environment.

The concept of protecting company personnel from health hazards prevailing in the environment is recognition that there needs to be a linkage between occupational and community health programs.

#### **8.1.2 Observations**

##### **8.1.2.1 Worker Safety**

EMPNG Production safety performance through Q3 2016 continues to be excellent. The last Lost Time Incident took place in July 2013 – a period covering 14.5 million man-hours. The four recordable injuries for Q1 through Q3 2016 were all minor:

- Worker cut shoulder on razor wire during fence disposal;
- Worker aggravated lower back while carrying out maintenance work;
- Contractor sprained right ankle while exiting bus; and
- Driver sustaining laceration to hand requiring stitches when he lost control of truck while descending hill.

In 2016 the average monthly Total Recordable Incident Rate (TRIR) through Q3 is 0.14, well below industry norms. The number of Observations and Interventions (O&Is) is about 5,000 per Quarter, about half of what was reported in the last IESC report, but it is emphasized that these number reflect a change in emphasis towards the quality of reporting, rather than quantity. The Near Miss incidents reported have also remained at a more or less constant level over the past year, but they are also about half of what was previously recorded. In this case the difference reflects the demobilization of drilling. Both the leading and lagging indicators demonstrate that the EMPNG worker safety program is functional and effective.

### 8.1.2.2 Worker Health

The occupational health program is founded on monitoring ambient conditions and making sure that workers have appropriate protection, as would be expected for a project of this size, and is a best practice program. This program covers both occupational health, which is closely aligned with public health services, and industrial hygiene. The program is being expanded with what EMPNG refers to as a Focused Risk Reduction initiative to minimize the reliance on personal protective equipment.

Focal points of the program in 2016 have been the following:

- Clinical services, pathology (lab) and medical emergency response maintained at the highest level across all camp clinics;
- Food and potable water safety programs, hygiene/sanitation practices, vector surveillance and control programs meeting EMPNG and industry standards;
- Implementation of an electronic record management system that includes IH data and medical records;
- Infectious disease outbreak management program in place with strong focus on prevention, early identification and containment of an infectious disease; and
- Ongoing medical screening and onboarding process at all sites.

The medical staff is now entirely nationalized at the LNG Plant Clinic and fully managing the occupational health program. The only area where expat services are still used is at HGCP where doctors and paramedic staff are still expats, and also with respect to vector surveillance by Mosquito Zone. Vector-borne disease is still a major concern with a slow increase in dengue since 2012.

### 8.1.3 **Recommendations**

The H&S program continues to be implemented is a “best practice” system. We do not offer any recommendations arising from the present review.

## 8.2 **COMMUNITY HEALTH**

### 8.2.1 **Observations**

The Production Community Health Program (CHP) has worked with the PNG Institute of Medical Research (IMR) in a Public-Private Partnership (PPP) over the past seven years in a relationship that has produced sustained health benefits and health sector improvements in PNG with numerous accomplishments:

- The National Infectious Disease Diagnostic & Research Lab is complete with 2,882 samples analyzed;
- Over 80,000 Papua New Guineans participated in the Integrated Health and Demographic Survey System (iHDSS) with 14,418 patients assisted in community clinics by IMR health team;
- Over 6,540 women participated in the Women’s Health iHDSS in the second half of 2015; and
- Approximately 6,540 children under five were represented in the Child Health iHDSS in the first half of 2016 with the final report still pending

EMPNG has initiated a comprehensive scientific review of the data gathered with this program.

At this stage of the PNG LNG Project, the iHDSS data have effectively served their purpose to evaluate the impact of the Project on local communities and the community health program needs to take a different direction. Nevertheless, IESC supports that iHDSS data be gathered where the Government plans to open up roads currently under Project control. The ongoing partnership with Baylor College of Medicine and Texas Children’s Hospital focusing on education and training of students, physicians and nurses, as well as the ongoing direct community health programs, are important components of EMPNG’s community

development program, but the community health program can be expected to have a smaller role for the PPP with the IMR.

### **8.2.2 Recommendations**

None arising from this review.

## **9 CULTURAL HERITAGE**

### **9.1 PROJECT STRATEGY**

Production has adopted Cultural Heritage (CH) Program from Construction:

- Cultural Heritage Management Protocol;
- Cultural Heritage Investigation and Salvage Protocol; and
- Chance Finds Protocol.

EMPNG's objectives are to avoid impacts to cultural heritage sites, including archaeological and oral tradition sites and to manage cultural heritage sites in consultation with landowners.

### **9.2 OBSERVATIONS**

EMPNG continues to monitor cultural heritage sites identified during the Construction phase as part of PMA-2 surveys of those focal habitats and significant ecological features adjacent to and in the vicinity of the pipeline RoW, facilities and other infrastructure. 41 of these previously identified sites were visited in 2016 and none were found to have been vandalized or otherwise adversely impacted. Several, however, were found to no longer be accessible, functional or could no longer be located and on this basis approximately 20 will be discontinued from monitoring.

As part of undertaking the environmental evaluation of the 1.3 km Angoreflowline, a new archaeological survey was undertaken. This survey identified two burial sites, one former ancestral village location, five former ceremonial sites and four former sacred sites. No sites of high significance were identified and the next stage of activity will be to follow the Chance Finds Protocol once construction starts. A survey of the power project site next to the LNG Plant site is scheduled for completion by the end of 2016.

One of the issues with cultural heritage management in Papua New Guinea is the capacity of the National Museum and Art Gallery (NMAG) to adequately curate all of the material contained within the museum and also to be able to manage archaeological permits that are also their mandate. A Master Plan for the NMAG has been prepared as part of aid through the Australian High Commission and EMPNG is working to contribute to the capacity building aspects of this aid. EMPNG has opened a dialogue with Museum Victoria to understand basic museum challenges and in particular the operation of a museum in the South Pacific context.

### **9.3 RECOMMENDATION**

1. None at this time.

**APPENDIX A**  
**IESC 16<sup>TH</sup> MONITORING VISIT – TRIP SUMMARY**

## **TRIP SUMMARY**

### ***November 6:***

IESC Environmental Team member specializing in biodiversity, L. Johnson, arrives in Port Moresby.

### ***November 7:***

Biodiversity Workshop in POM

### ***November 8:***

Biodiversity Workshop in POM; IESC environmental and social team members W. Johnson and K. Connor arrive in POM.

### ***November 9:***

IESC Environmental and Social Team - Port Moresby – updates on current activities presented by EMPNG. Overnight in POM.

### ***November 10:***

IESC Environmental Team - Port Moresby – Environmental team reviews updates on environmental topics; social team member visits Papa village (LNG Plant area) for discussion with the Headmaster and Senior Teacher (also a School Board member) regarding the CDS School Board Management Program. Overnight in POM.

### ***November 11:***

IESC Environmental and Social Team - Port Moresby – updates on current activities presented by EMPNG. Overnight in POM.

### ***November 12:***

IESC Environmental Team visits LNG Plant; social team member has discussions with the resettlement and CDS teams. Overnight in POM.

### ***November 13:***

Free day

### ***November 14:***

IESC Environmental and Social Team flies to Komo (after delay due to road blockages) and then flies from Komo to Hides; IESC Environmental – helicopter flyover of pipeline and Hides Ridge; Social Team member tours visited the upgraded Para Clinic in the Upstream area done through collaboration between the Project, the Hides Special Purpose Authority, and a local Lanco; overnight in Hides.

### ***November 15:***

IESC Environmental Team visits SpineLine and Hides Waste Management Facility; Social Team member does flyover of Angore extension area to view affected households and speculator/trespasser structures and visits Mbelopa women's agricultural group. IESC Environmental and Social Team flies to POM.

### ***November 16:***

Miscellaneous communication with EMPNG staff by entire team and preparation for Closeout meeting at EMPNG offices in POM.

### ***November 17:***

Closeout meeting in morning; IESC team departure.