Papua New Guinea LNG Project

Independent Environmental and Social Consultant

IESC - PNG LNG Desktop Monitoring - Final Report

Doc. No. P0022407-1-H1 Rev. 1 - 7th June 2021

Rev.	Description	Prepared by	Controlled by	Approved by	Date
1	Final Issue	B. Johnson K. Connor L. Johnson A. Gagliardo L. Meozzi	B. Grosso	E. Napoli	7th June 2021
1	Second Issue	B. Johnson K. Connor L. Johnson A. Gagliardo L. Meozzi	B. Grosso	E. Napoli	10th May 2021
0	First Issue	B. Johnson K. Connor L. Johnson A. Gagliardo L. Meozzi	B. Grosso	E. Napoli	8th April 2021

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ABBREVIATIONS AND ACRONYMS

AA	Assessment Area
ADR	Alternative Dispute Resolution
AGI	Above-Ground Installation
AKAR1	Akara Creek site
ANUE	ANUedge–Australian National University Social development initiative
Bbl	Barrel
BCFW	Business Coalition for Women
BIMP	Biodiversity Implementation and Monitoring Program
BRC	(New Guinea) Binatang Research Centre
BS	Biodiversity Strategy
CBD	Convention on Biological Diversity
CDS	Community Development Support
CEPA	Conservation and Environment Protection Authority
CEXIM	Export-Import Bank of China
CP	Cathodic Protection
CTA	Common Terms Agreement
CV	Check valves
CVP	Clan vetting process
E&S	Environmental and Social
EC	Enterprise Centre
ECA	Export Credit Agency
ECCP	Enhancing Conservation Capacity Program
ECI	Environmental Compliance Incident
EHS	Environmental Health & Safety
EIS	Environmental Impact Statement
EM	ExxonMobil
EMP	Environmental Management Plan
EMPNG	ExxonMobil PNG Limited (formerly EHL – Esso Highlands Limited)
EPR	Emergency Preparedness and Response
ESC	Erosion and Sediment Control
ESG	Emergency Support Group
ESMP	Environment and Social Management Plan
ESMS	Environmental and Social Management System
ESRP	Erosion, Sediment, Reinstatement Plan
FST	Facility Specific Training
GBIF	Global Biodiversity Information Facility
H&S	Health and Safety
HGCP	Hides Gas Conditioning Plant
HGDC	Hides Gas Development Company
HWMF	Hides Waste Management Facility
IESC	Independent Environmental and Social Consultant
IFC	International Finance Corporation
IMT	Incident Management Team
ISOS	International SOS
JBIC	Japan Bank for International Cooperation
Km	Kilometer
KOM4	Ariago Creek site
KP	Kilometer Point

KPA	Kumul Petroleum Academy
KPI	Key Performance Indicator
L&CA	Land and Community Affairs
LI	Linear Infrastructure
LKRUMP	Lower Kikori Resource Use Management Plan
LLG	Local Level Government
LNG	Liquefied Natural Gas
LOBID	Landowner Beneficiaries Identification
LTI	Lost Time Incident
M&E	Monitoring and Evaluation
MD	Ministerial Determinations
MLV	Main Line Valves
MOC	Management of Change
MOH	Medicine and Occupational Health
MOU	Memorandum of Understanding
MTA	Million tons per annum
NAQIA	National Agriculture Quarantine and Inspection Authority
NBSAP	National Biodiversity Strategy and Action Plan
NC	Non-Conformance or Non-Compliance
NCCC	National Content Coordination
NEXI	Nippon Export and Investment Insurance
NGO	Non-Governmental Organization
NMAG	National Museum & Art Gallery
NNL	No Net Loss
O&M	Operation and Maintenance
OIMS	Operations Integrity Management System
OSL	Oil Search Limited
P&A	Plugging and Abandonment
P&GA	Public and Government Affairs
P1, P2, etc.	Priority 1 weed, Priority 2 weed, etc.
PCS	Pre-Construction Survey
PDL	Petroleum Development License
PMA	Program Monitoring Activity
PNG LNG	Papua New Guinea Liquefied Natural Gas Project
PS	Performance Standard
Q	Quarter
RAP	Resettlement Action Plan
RoW	Right-of-Way
SACE	Servizi Assicurativi del Commercio Estero
SCICC	Strategic Community Investment Coordination Committee
SHE	Safety, Health and Environment
STP	Sewage Treatment Plant
TCH	Texas Children Hospital
TOR	Terms of Reference
TRIR	Total Recordable Incident Rate
TRM	Turf Reinforced Matting
TSS	Total suspended solids
TWM	Total Waste Management
UA	Upstream Area
U-PNG	University of PNG

USEXIM	Export-Import Bank of the United States
VMP	Vehicle Monitoring Plan
WAKU1	Wakuba River site
WCS	Wildlife Conservation Society
WMA	Wildlife Management Area
WMZ	Weed Management Zone
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

This report represents the 20th post-financial close review of the Papua New Guinea Liquefied Natural Gas (PNG LNG) Project with ExxonMobil PNG Limited (EMPNG) as the Operator made by Rina Consulting S.p.A. (formerly D'Appolonia S.p.A.) of Genoa, Italy serving in the role of the Independent Environmental and Social Consultant (IESC) on behalf of Export Credit Agencies (ECAs) and Commercial Banks providing Project financing (Lenders). The purpose of this review has been to evaluate conformance with Project environmental and social commitments made for the Production phase of this development. This report has been conducted as a desktop review based on information provided by EMPNG without undertaking a field visit as various international restrictions imposed by the Papua New Guinean Ministry for Immigration and Border Security and uncertainties related to the outbreak of the Coronavirus (COVID-19) prevented the IESC from visiting the Project. The review was therefore based on the documentation provided to the IESC by an agreed cut-off date and presentations undertaken on the basis of conference calls during the weeks of February 15th and February 22nd, 2021. As such, this IESC review is not as comprehensive as presented in past reports as it was not possible to make field observations as is the normal approach to monitoring.

The Project continues to make excellent recovery from the M = 7.5 February 2018 earthquake, however the biggest news is that in spite of COVID-19, 2020 was the best year since the start of Operations with respect to production, safety, reliability, and flaring. The wells originally drilled at Angore Wellpads A and B have been permanently plugged with no work interruptions and construction of new Angore Wellpad C is expected to start in 2021 after being delayed by the pandemic.

Environmental and Social Management System

The Environmental and Social Management System (ESMS) is a mature and active System. As such, it continues to evolve and be revised. Over the past year an important influence on project activities has been the COVID-19 pandemic, which necessitated the development of work procedures under what EMPNG has designated as "Island Mode" Protocols. Over the past year, EMPNG has also made some organizational changes. As Angore Field activities started up in 2020, the position of Angore Project Manager reporting to the General Manager has been added. Another change is that the Land and Community Affairs group now reports to the Operations Manager, who in turn reports to the Production Manager, and the National Content staff now report directly to the Production Manager rather than being under the Public and Government Affairs Group that reports to the General Manager. Within the Safety, Health and Environment (SHE) Organization the main change has been increasing National Content, which has gone from 70% PNG Nationals in March 2020 to 86% PNG Nationals in January 2021. EMPNG has not undertaken any Management of Change process requiring Lender notification over the past year.

Pollution Prevention

Environmental management is a subject best reviewed from field observations but based on information provided by EMPNG there are no major problems to report, and past problems continue to be eliminated.

Waste and Water Management

EMPNG continues to work towards improving their pollution prevention systems, and recovery from the February 2018 earthquake is nearly complete. Upstream waste quantities over the past year have decreased due to the postponement of work at Angore caused by the pandemic and the earthquake recovery effort ending. The new incinerator at Kopeanda is still pending commissioning and may never be commissioned, but the landfill still has good airspace (estimated 24 additional years of capacity) and waste is being safely managed. The Oil Search Limited (OSL) Waste Management Synergy effort expected to be reinstated after delays caused by the earthquake, was again delayed due to the pandemic, but was started in Q4 2020. Waste management at the LNG plant is reaching the limit of what can be undertaken internally at the LNG Plant as the landfill is 95.5% full, with only 258 m^3 airspace remaining. Fortunately, EMPNG has continued to support Total Waste Management (TWM) in their development of an integrated third-party waste management facility. This has allowed EMPNG to take their LNG Plant incinerator offline and use the TWM incinerator at Roku since the beginning of Q3 2020. EMPNG plans to continue work with TWM Roku in 2021 to develop their landfill and industrial wastewater treatment plant facilities.

A Level 1 Non-conformance (NC) was assigned to wastewater treatment in the 2017 IESC report. In 2018, the situation was not fully resolved, but much improved over 2017 and the Level 1 NC was reduced to an Observation. 2019 performance was better than 2017, but the gains made in 2018 did not continue through 2019. In 2020 the overall situation is much improved from 2019 with measurements for the most part better than 2018.

Groundwater monitoring around the Hides Gas Conditioning Plant (HGCP) shows no evidence of groundwater contamination. Conversely, at the Hides Waste Management Facility (HWMF), evidence of infiltration of leachate from the facility has been recorded since 2014. Monitoring events in July and November 2020 continue to show anomalous barium, iron, COD, calcium, magnesium, sodium, nitrogen and ammonia, and total coliforms in wells either downgradient or side gradient from the HWMF, showing the situation is continuing. Two new downgradient wells are being planned for 2021. IESC recognizes that impact to the nearby Tagari River is probably negligible and there are no users of groundwater in the neighborhood of the HWMF.

A problem at the LNG Plant retention pond previously reported by IESC is the presence of amines in water that was coming off the Regenerator Gas Knockout Drum and entering the retention pond. This situation has been resolved and amines have not been detected in discharge water for more than a year and a half. On this basis EMPNG solicited permission from Conservation and Environment Protection Authority (CEPA) to discontinue the monitoring and this permission was obtained in a letter dated January 18, 2021.

The groundwater monitoring network surrounding the landfill has some anomalous measurements of barium, selenium, manganese, and iron, but they do not define an obvious plume in the groundwater where westward flow towards Caution Bay would be expected. As there are also a few anomalous measurements of these same parameters elsewhere across the LNG Plant site, there are no obvious conclusions to be reached. EMPNG plans to have the groundwater monitoring network reviewed by a specialist to evaluate the effectiveness of the monitoring network and undertake data verification.

Hazardous Materials Management and Spill Prevention

The verification of hazardous materials management practice is something that requires field observation, which could not be undertaken for this review, but this is not an issue that the IESC has ever identified during the Production phase of the PNG LNG project. Spills continue to be consistently recorded and their causes investigated, and procedures developed to minimize future spills. The number of spills in 2020 was similar to 2019, although spill volume was greater. None of these spills had significant environmental consequence.

Air Quality and Noise

The past year has seen the best flaring performance since the start of production, better than 2019, with flare reductions observed both at the LNG Plant and at Hides. Reduced stack emissions testing going from annual to every three years, previously receiving IESC approval, has been approved by the Conservation and Environment Protection Authority (CEPA) and plans are underway to undertake in Q1 2021 stack testing at the three non-conformant sources from 2018 testing (three Train 2 compressors), as well as the Roku incinerator used to incinerate LNG Plant waste. Noise monitoring was undertaken in 2020 with new equipment across the site to evaluate conformance with standards with no problems to report, and at Moro X baseline noise monitoring has been completed with conformance monitoring planned for the first half of 2021.

Erosion and Sediment Control

The earthquake caused some serious problems with respect to slope failures in the Upstream area, including at the Komo airfield and along the pipeline route. Much of the work to fully recover from the earthquake is complete within the facilities, but there is still more to do. Some of the worst problems were associated with the Komo Airfield, which over the course of 2020 was the focus of the installation of a permanent drainage system expected to be completed by Q3 2021. Pipeline repairs relate mainly to issues of erosion and sediment control and 5 of 29 repair sites have been completed. The completion of the Moro Camp expansion will facilitate access to the pipeline right-of-way and outside the fence work is expected to start out of Moro Q1 2021.

Ecological Management and Biodiversity

Satellite imagery from 2019 has been analyzed by EMPNG's new contractor. Results indicate the loss of 130 km2 of forest cover across the whole Upstream assessment area since 2017, although approx. 115 km2 was due to the earthquake disturbance. Further analysis (desktop, flyover, fieldwork) was done on 33 locations to assess whether the forest loss could be attributable to the Project. EMPNG has concluded that no notable trends in broadscale forest degradation have been observed that are attributable to the Project. The IESC recommends the Project look again at how the distinction is made whether an observed loss of forest is attributable to the Project when this is done by the local community. Local landowners have the right to use their land of course, but if this is in direct proximity to the pipeline RoW, and the presence of the RoW has enhanced access to those areas now cleared, in the IESC opinion these would likely be deemed to indirect impacts associated with the Project.

Results from the rapid biodiversity monitoring surveys from 2019 at Hides Ridge and Agogo Ridge were presented. Species new to science continue to be observed. Headline conclusion is that both areas continue to retain high biodiversity values for all surveyed taxa (frogs, birds, mammals and bats). The primary edge effect noted during this survey was that bat diversity was significantly greater in open areas than in forest interior. Factors most likely to threaten biodiversity values in both areas surveyed relate to enhanced access due to the pipeline RoW and associated roads. Threats noted include increased hunting pressure and feral dog predation (as captured via camera traps), and the potential spread of exotic rodent species. In one area, an eightfold increase in hunting was detected, along with a twofold reduction in two IUCN Vulnerable species susceptible to hunting – the Eastern Long-beaked Echidna and the Pademelon. The field scientists recommend specialist hunting/harvesting studies be done to better understand of the ramifications of enhanced access and associated human habitation – EMPNG intend to undertake a structured survey to better understand the situation.

The biodiversity offset program has been somewhat affected by the COVID-19 pandemic, although good progress is being made in the Lower Kikori low-elevation offset. The Project facilitated a Community Leaders meeting to discuss and expand the program, and ten communities are now ready to establish Conservation Deeds (one

pathway that can be used to have an area of land formally considered and subsequently designated as a protected area). EMPNG is also now making early progress in initial community consultation on the establishment of a legally designated Special Protection Area at Gigira (Hides Ridge), a priority ecosystem for conservation, within which the EMPNG producing wells are located. Although some progress is indicated, the non-conformance remains open until the IESC/Lenders are provided with a clear, targeted program of work and some momentum in early implementation is clear. The IESC recommends the development of Biodiversity Offset Management Plans for each elevation zone, to document site-specific planning, timescales, key stakeholder engagements, etc. Additional funding partners are actively being sought to co-sponsor offset components related to conservation community networking and conservation capacity building, prior to the Project stepping back from these activities in a few years. The IESC hopes additional partners can be found so there is no loss of momentum in these enabling activities vital for conservation in PNG.

With regard to the Project's presence in already existing protected areas, the Lake Kutubu Wildlife Management Area (WMA), the IESC queries whether it would have been advantageous to include freshwater ecology in the 2017 biodiversity surveys undertaken specifically to help identify key biodiversity values in the area – PS6 requires the client to implement additional programs to promote and enhance the conservation aims of the area. The Project has worked with the WMA Committee from an offset perspective, but as Lake Kutubu is a Ramsar site of international importance, renowned for the unique assemblages of endemic fish, the IESC believes not surveying the aquatic ecology is a gap in contributing towards the WMA's conservation aims.

Recommendations focus on: monitoring downstream of the HGCP ponds for any escape of invasive fish from Project facilities; posting updated PMA3 reports on the website; consideration of landowner land use change through enhanced access should be Project-attributable; investigate *Nothofagus* dieback on Hides Ridge; more systematic provision of information on offset program progress; development of Biodiversity Offset Management Plans.

Induced Access

There are few changes to access controls since our last report. At Angore, the open boom gate is now manned; forest loss has been noted in this area, and the previous gate had been removed by the community. At Benaria Station, the community continues to use the Project's construction bridge and part of the RoW as the government constructed bridge is no longer useable.

EMPNG's upgraded approach to collation and categorization of Project road use has had some technical glitches. The previous system has been retained so vehicle data could be presented: on the Project's 'Southern Highway', COVID-19 has meant less EMPNG, OSL and government vehicles on the road, although private vehicles maintained their use of the road in numbers fairly comparable to previous years; data indicates just under 300 private vehicles regularly pass through the Project's manned gates annually during 2020, 2019 and 2018.

At the LNG Plant, the use of large, heavy concrete blocks on the track to the mangroves at the pipeline landfall RoW appears to have reduced the mangrove harvesting noted previously. Enhanced security and surveillance has accompanied ongoing dialogue with the community on the importance of not extracting mangrove wood.

Reinstatement and Regeneration

Komo reinstatement noted above has necessitated an increase in seeding to help stabilize soils and revegetate newly reconstructed areas following the earthquake disturbance in 2018. Hydroseeding is the proposed application approach, and seed import permits for Couch Grass and Carpet Grass imports have been provided.

The results from the 2019 regeneration monitoring studies were presented. A total of 63 plots were assessed, across 12 vegetation types, plus 6 transects for each forest type. The headline conclusion is that the recovering RoW vegetation is regenerating as expected on the succession path towards forest restoration, apart from two areas of note: high grass cover at low/mid elevations, and the 204 km of accidentally cleared primary/regenerating land along the pipeline RoW in 2018. These accidentally cleared areas are noted as a critical area for attention, and the Project confirms these will continue to be monitored separately in addition to the 2-yearly regeneration studies.

Invasive Species and Quarantine Management

The new contractor with the remit for weed inspection and control is now in place. International SOS (ISOS) is a health and medical services organization, but the Project advises the previous contractor staff to have been retained and now re-hired by ISOS. Lenders will recall previous IESC reviews trying to gain an understanding of the distribution, abundance and spread of weeds, what the ecological risks might arise from weeds observed in areas where they weren't seen previously, locations where weed control is particularly challenging, updates on priority areas for P1 high priority weeds control, etc. This information is still not being presented. EMPNG has provided an updated weed register with no analysis of weed control data.

As reported a number of times in previous IESC reports, access to key priority areas by the weed inspection and control contractors has been hampered by logistical (e.g. availability of cars) and security challenges. More recently

the 2018 earthquake and now COVID-19 has further restricted the ability of the contractors to inspect areas for invasive vegetation and control the spread of weeds. The consequence of restricted weed inspection and control across the Upstream footprint means there are large expanses of the Project's footprint, including priority ecosystem areas such as the Homa Benaria Ridge, where regular systematic weed inspection and control has not occurred for several years. This is therefore noted as a Level 1 Non-conformance in the Issues Table as the IESC is required to flag the issue to Lenders. The current situation is not consistent with stated commitments in the EMP and it is unclear whether the situation represents an immediate threat or impact to priority ecosystem areas.

Resettlement

The Land & Community Affairs (L&CA) organization now reports directly to the Operations Manager. This change was made to facilitate responses to day-to-day operations that drive land and community affairs issues and most benefit from L&CA mitigations.

The Project has fulfilled and documented its responsibilities for the one household displaced for pipeline repairs. The IESC concludes that the Project has no additional responsibility for this household. Displacement required by Angore Wellpad C and Hides Spineline Exclusion zone cause only minimal economic losses. The IESC has accepted the Resettlement Action Plan (RAP) addenda for both and delivery of compensation and other assistance is near completion.

Community Impacts Management

Tribal conflicts in the Upstream areas continue to be relatively calm, with sporadic fighting continuing to occur, particularly in Hela province. The Project's Community Development Support (CDS) Law and Justice component and other entities continue to support programs focused particularly on youths with the aim of reducing conflict over the longer term. The Project is cooperating with the United Nations *PNG Highlands Joint Programme Converging Toward Peace & Development* for Hela and Southern Highlands provinces. The three-year Programme is administered by a Multi-Partner Trust Fund, consisting of the Government of PNG, the European Union, USAID, FAO, UNICEF, UNDP, and the UN Peacebuilding Fund.

The IESC requests that in future it receives more detailed information on the Project area, Highland community security situation and conflict between clans and communities.

Community Development Support

Individual CDS activities are described in the relevant subsections of Section 6.3 of this report. In terms of strategic activities, the Project has made major progress toward developing a comprehensive approach to CDS, recommended by the IESC, that assures that all contributions to PNG communities. Whether implemented by CDS, another Project Unit or the Project as a whole, are those that contribute to the CDS overarching goal of "promoting development of conditions conducive to enhancing economic self-reliance of individuals whilst also mitigating potential impacts." The IESC also recommended in its 2019 Report that a steering committee be created to facilitate development of this comprehensive approach.

The Project has made significant progress toward a coordinated program that contributes to the Project as a whole meeting its overarching goal of "promoting development of conditions conducive to enhancing economic self-reliance of individuals while also mitigating potential project impacts", as recommended in the IESC 2019 report. Accomplishments include:

- ✓ CDS and National Content now report directly to the Production Manager;
- ✓ Cross-functional committees established and active:
  - Strategic Community Investment Coordination Committee (SCICC) - alignment on community investment activities across business unit,
  - Asset Teams (Upstream and plant site) composed of the relevant department heads - provide oversight on community issues and engagement and CDS program execution; and
  - National Content Coordination Committee (NCCC) – provide overall oversight and review of National Content programs.

Efforts are underway to develop a standard progress and outcome Monitoring and Evaluation (M&E) format for use by each of the CDS contributing components, as recommended by the IESC. A key outcome of the CDS and National Content Refresh and Management of Change (MOC) process is the development of metrics and an M&E Framework (that is in progress).

In terms of the core CDS program, activities were reprioritized in March 2020 to focus on helping Project Area COVID-19 response by providing support to the Hela Provincial Health Authority in their COVID-19 awareness roll out, key health facilities in Hela project area (donation and food support), and Provincial level engagements with Provincial Administration and Governor.

At the time the 2020 IESC review was completed, core CDS had begun the process of re-assessing all its programs beginning with the livelihood strategy. The assessment is on hold due to COVID-19 restrictions.

National Content

A National Content (NC) team was formed under the Production Manager to elevate NC, accelerate implementation of the updated NC strategy and to place National Content into the Project's larger effort toward benefiting communities and Country.

PNG Nationals now compose 91% of the Project's workforce, even though the actual number of Nationals is 2,539 compared to 3,964 at the end of 2019 due to demobilization of project workforce in response to COVID-19 impacts. The current proportion of PNG Nationals is the highest since the Production Project began. Of the 91%, 46% come from Project Impact Areas. In terms of gender, females account for 20% of the PNG workforce, 25% of whom are in the field (the highest percentage in EM projects worldwide) and females in management roles rose to 24%.

In terms of EM Competency Enhancement, 86,000 training hours were delivered in 2020 which is consistent with prior years despite COVID-19 constraints. Training, with an enhanced focus on leadership and supervisory skills, is being accomplished via supervisor network and employee development forums, the mentoring program and staffing and development processes. The Project also worked with its Suppliers to nationalize/eliminate expatriate roles.

A number of virtual efforts to assist in professional development are made available, including a Supervisor Network, Employee Development Forums, the Mentoring Program, and the Toastmasters Program. Financial Planning Training is offered for staff with a 1-on-1 personal financial coaching basis. LCM annual awards were granted to staff practicing outstanding core value behavior.

The Operations Support – Training team is partnering with Kumul Petroleum Academy (KPA) for continuous improvement of course materials and training support. The 17 trainees (5 female and 12 male) from Intake 6 will be joining EMPNG in June 2021. Intake 7 recruitment began on 8th January 2021 with a target of up to 22 trainees. The Junior Technician program at KPA will begin in April 2021. The Operations Support – Training team is also updating the Facility Specific Training (FST) instructor lead training material and converting induction packages to eLearning modules.

In terms of Local Procurement and Supplier Development, in-country spending has increased by >50% and the number of businesses engaged has doubled since first Production. EMPNG has spent over PGK 4.6b in-country during Production to date with almost PGK 2.9b with Papua New Guinean businesses and PGK1.4b spent with Lancos. In 2020, more than PGK 817 million was spent by EMPNG in-country, of this over PGK 308 million with Lancos. To date EMPNG has invested over PGK 27 million in PNG business development through the IBBM Enterprise Centre (EC).

Stakeholder Engagement and Consultation

The number of community members participating in engagements during 2020 decreased from recent years due to COVID-19. Comments and issues, however, are still being communicated to the Project via letters and e-mail.

Community Grievance Management

Issues

Issues raised in 2020 decreased to 513 compared to 791 in 2019. The decrease is attributed to improved stability in the Highland areas, as well as COVID-19 related impact such as fewer work fronts and reduced opportunity for engagements. The majority of issues raised are concerned with land access and compensation (26%), economic (17%) and social (13 %).

Grievances

Only 16 grievances were lodged in 2020, continuing the significant decrease (18 in 2019) compared to previous years. All 16 grievances were closed within the 100-day closure timeframe.

State Clan Benefits

All Downstream payments have been cleared. Payment of benefits in the Upstream areas is in progress, with status of payment varying between Petroleum Development License (PDL) areas.

Labor and Working Conditions

Only two grievances were filed in 2020 and no time was lost due to industrial actions. The continuous reduction in grievances has been facilitated by small group engagement sessions such as Lead Country Manager engagement, Senior Manager engagement and HR Manager–Employee engagement sessions to understand challenges. "HR Direct" has also been useful in allowing employees to transmit questions to relevant teams through an automated system.

Face-to-Face counseling was suspended due to COVID-19, and replaced with 24 hour/day, 7 days/week by Magellan Healthcare with Professional Staff virtually available to help with a full range of mental health issues. The Project held a Mental Health Week with various activities including Webinars on building resilience, a quarantine guide and ongoing communications including training on resilience, working from home, leadership communications on mental health and resilience and computer based mental health training.

The issue of Family Violence is being addressed with the workforce though actions such as “Man Up,” a virtual discussion at the PNG Man UP Against Violence – Shine the Light Vigil and the “Say NO to Violence” Webinar/Wear black with Business Coalition for Women (BCFW).

Responding to COVID-19 challenges related to accommodation management took priority in 2020. Changes in camp use, for example, were made to minimize potential for COVID-19 outbreaks. In addition, the Project has developed very detailed COVID-19 protocols covering all aspects of work and camp life, all forms of travel, quarantine, etc. Specific locations have targeted site protocols as well.

Community and Occupational Health

Community health continues to be a component of the CDS program. One of the results of the February 2018 earthquake was to highlight inadequacies in Hela Province health infrastructure and the Project-constructed Juni facility now qualifies for the Government placement of a Health Extension Officer on site. EMPNG has undertaken training for food handlers for over 30 key stakeholders that manage and serve food to the public, an issue identified with an increase in food borne illnesses at Tari Hospital. In the communities surrounding the LNG Plant, EMPNG has contributed to upgrading the Porebada Health Center. With two permanent staff, Porebada clinic is now able to expand their services to the nearby villages.

The occupational health program is world class and continues to perform well in all areas (clinical operations, public health and industrial hygiene), taking into account that in 2020 the program had to work around the COVID-19 pandemic. Overall, the pandemic has been well managed and has included the strengthening of mental health programs to support individuals impacted by the pandemic, especially those under quarantine. An indication of the success of the occupational health program is that it has been audited by the ExxonMobil Audit Department with no comments, as well as by an internal Operations Integrity Management System (OIMS) assessment with no gaps identified.

Occupational Safety

EMPNG Production safety performance through Q4 2020 continues to be excellent. The last Lost-Time Injury (LTI) was in 2017 with more than 40 million man-hours worked since that incident. The 2017 LTI is referred to as an “incident” rather than an “accident” as it was caused by one worker attacking another and was not an actual workplace accident. This is a remarkable testament to a robust safety program.

Cultural Heritage

Cultural heritage management continues to be undertaken, currently in association with the Angore project, and preferred practice continues to be avoidance. In 2020 the focus of cultural heritage activities was to provide awareness on chance finds protocols (no chance finds made in 2020), and also providing awareness to community members to recognize the importance of cultural heritage and how it has intertwined with biodiversity, as undertaken in community engagements in the Lower Kikori. The forward plan for 2021 is to compile cultural heritage related legends from project footprint areas as educational material, targeting school children.

1 INTRODUCTION

RINA Consulting (hereafter 'Rina'), formerly D'Appolonia S.p.A., located in Genoa, Italy, was appointed as the post-financial close Independent Environmental and Social Consultant (IESC) 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-ventures including: Oil Search Limited; Kumul Petroleum Holdings Limited: Santos Limited; JX Nippon Oil and Gas Exploration Corporation; and Mineral Resources Development Company Limited, and their affiliates. Rina'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; Servizi Assicurativi 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 Rina as the IESC within the PNG LNG Project is to evaluate conformance 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), supplemented by the associated environmental and social support plans, also including 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 Common Terms of Agreement (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.

The IESC's review has included the environmental and social (E&S) and health and safety (H&S) management activities of EMPNG. This report has been conducted from a desktop review based on information provided by EMPNG without undertaking a field visit as access restrictions related to the outbreak of the Coronavirus (COVID-19) prevented the IESC from visiting the Project for the second year in a row. The review was therefore based on the documentation provided to the IESC by an agreed cut-off date and presentations undertaken on the basis of conference calls during the weeks of February 15th and February 22nd, 2021. As such, this IESC review is not as comprehensive as presented in past reports as it was not possible to make field observations as is the normal approach to monitoring.

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 review in February 2020, there have been no requirements for the IESC to prepare any supplemental certifications.

1.1 PRODUCTION OPERATIONS OVERVIEW

The Project continues to make excellent recovery from the M = 7.5 February 2018 earthquake, but the biggest news is that in spite of COVID-19, 2020 was the best year since the start of Operations with respect to production, safety, reliability, and flaring. 2020 Production was 8.8 million tons (MTA Eq) with 115 LNG cargoes loaded. It should be recalled that the project was defined to the IESC in 2009 to be a development of 6.3 MTA Eq, so current production is significantly more than originally projected. Figure 1.1 depicts 2020 LNG production. Overall availability in 2020 was 99.4%.

Angore field activities were suspended in November 2018 after execution progress was affected by the earthquake in February, site incursion and vandalism in June 2018, and a near-miss security incident in October 2018. At the time of the last IESC review, a year ago, camp accommodations had just been constructed and rigs mobilized to undertake plugging and abandonment (P&A) activities for wells at Angore Wellpad A. These wells were permanently plugged in 2020 with no work interruptions, and construction of new Angore Wellpad C is expected to start in 2021 after being delayed by the pandemic.

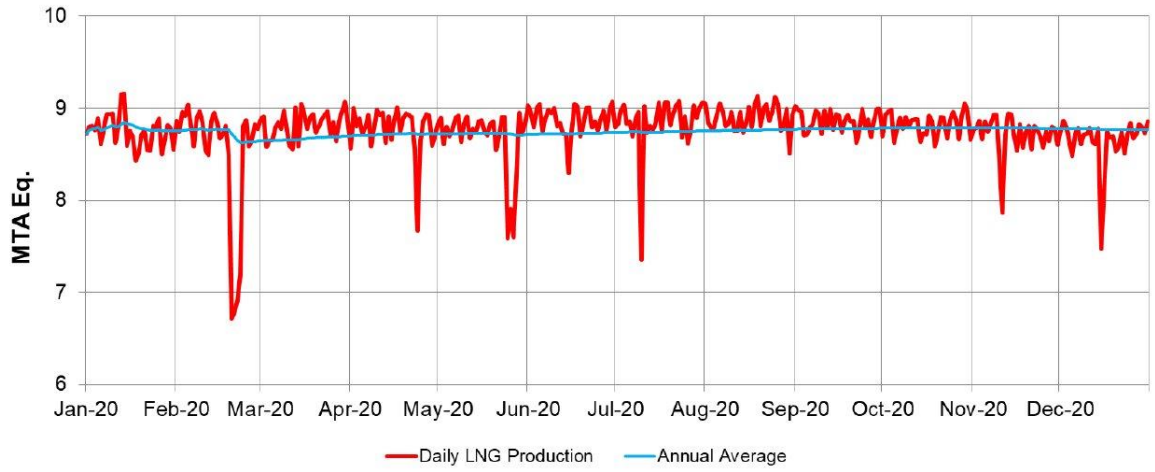

Figure 1.1: 2020 LNG Production

Repairs related to damage from the February 26, 2018 earthquake continue to progress, but there is still more to do. As of the end of December 2020, USD$285 million have been spent against an estimated total forecast of USD$500 million a result of the earthquake. Hides major repairs are close to completion, with only repairs to the HGCP Fire Water Tank and minor structural repairs planned for 2021. Repairs to the Komo terminal, infrastructure repairs and runway preservation (Figure 1.2) were completed by August 2020 and construction of a permanent drainage system is well advanced. Although the runway preservation project is complete, a decision still needs to be made regarding the full repairs that would be required if the runway is to be used by heavy aircraft. Repairs along the Pipeline Right-of-Way (RoW) continue with repairs complete at 5 of 29 repair sites. Work along the RoW is planned to accelerate in Q1 2021 after completion of the Moro Camp expansion.

Figure 1.2: Runway Preservation Project

PNG Nationals now compose 91% of the Project's workforce of close to 2,800. The actual number of the PNG staff is down to 2,539 Nationals from 3,964 at the end of 2019 due to demobilization of project work in response to COVID-19 impacts. In terms of gender, females account for 20% of the PNG workforce, 25% of whom are in the field (the highest percentage in ExxonMobil projects worldwide) and females in management roles rose to 24%.

1.2 SOURCES OF INFORMATION

The main sources of information used to prepare the report are from documents and presentations provided by EMPNG and discussions held with EMPNG personnel via conference calls. As noted above, the IESC was not able to conduct the site visit due to travel restrictions related to the outbreak of the coronavirus.

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 – Pollution Prevention;
- ✓ Section 5.0 – Biodiversity and Ecological Management;
- ✓ Section 6.0 – Social;
- ✓ Section 7.0 – Labor and Human Resources;
- ✓ Section 8.0 – Health and Safety; and
- ✓ 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 (E&S) 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 is 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 E&S 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; and
- ✓ **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.

Item ID	Site Visit	Closing Date	Description	Non-Conformance	Reference	Status	Comments/Report Reference
Environmental Issues – Environmental Management							
M17.1	Nov '17	Feb '21	Wastewater Treatment Plants (WWTPs) are operated at the LNG Plant, Angore, HGCP, and Moro. All of them have problems with their discharges, which have been the subject of numerous Environmental Compliance Incidents (ECIs) and EMP non-conformances (EMP NCs) internally assigned, but in many cases the problems have worsened over 2017.	IESC Observation	EMP Section 9	Closed	Performance is much improved over a year ago. The necessary resources to manage STPs and stormwater runoff are being applied and there is no evidence of adverse impact to the environment. Nevertheless, this has been a chronic problem for environmental management and could easily become an issue where it requires designation as a NC unless careful vigilance of the system is maintained.
M19.1	Desktop review Feb '20		Groundwater monitoring at the HWMF at Kopeanda indicates that waste management operations could possibly be impacting groundwater.	IESC Observation	Upstream EMP Section 9	Open	Our comment to this observation is the same as before. Work that was planned at the beginning of 2020 has not been undertaken due to COVID-19, but the work still needs to be completed. Damaged groundwater monitoring wells should be replaced if they become non-functional. EMPNG should make sure that the entire HWMF has upgradient and downgradient well coverage, and this coverage should specifically characterize the reed bed. A groundwater modeling exercise should be undertaken to calculate the extent of contamination and the rate of infiltration into the Tagari River assuming both the reed bed and landfill as potential sources. This should be part of an overall risk analysis to determine what mitigation measures, if any, might be required for groundwater management at the HWMF.
Environmental Issues - Biodiversity and Ecological Management							
M19.2	Desktop review Feb 2020		PS6 2006 requires mitigation measures to be designed to achieve no net loss (NNL) where feasible, including offset of losses through the creation of ecologically comparable area(s) managed for biodiversity. The Project's stated biodiversity strategy requires the establishment of offsets at each of three elevation zones for the purposes of reflecting representativeness and demonstrating NNL. EMPNG's offset program in the lower and middle elevations has progressed since residual impacts occurred in each zone. Although the Project's approach to offsets in each zone has been quite different, and implementation is still ongoing, the IESC has observed the Project make degrees of progress towards enhancing or establishing protected areas in these two zones. Stakeholder engagement has been focused, external specialist input sought on program development, capacity building undertaken, internal/contractor resources allocated, all contributing to degrees of progress in creating effective protected areas. There is little equivalent demonstrable progress for the upper elevation pursuit of NNL. The IESC acknowledge and note the Project's observation that although security issues have prevented EMPNG's progress so far, the situation appears to be improving.	Low: Level 1	EMPNG Biodiversity Strategy Section 3 EMPNG Biodiversity Implementation and Monitoring Program Section 4 IFC PS6 requirements in relation to Natural and Critical Habitat	Open	Prior to 2020, Component 5 work activities at the Montane elevation were still in the exploratory, preliminary stages. Although some progress is now indicated in the presentation slide bullets provided for this review, the non-conformance remains open until the IESC/Lenders are provided with a clear, targeted program of work and some momentum of early implementation is clear. EMPNG should instigate a clear, targeted program of work (by 2022, or when safe to do so), having sought stakeholder input on candidate conservation site(s), focused on achieving sufficient representative biodiversity gain, that when implemented will enable demonstration of NNL in this upper elevation zone. (Report section reference for further background detail: Section 5.2.2.2)

Item ID	Site Visit	Closing Date	Description	Non-Conformance	Reference	Status	Comments/Report Reference
M20.1	Desktop review Feb 2021		As the Project is located within a legally protected area, it has additional responsibilities to ensure tangible benefits to protection of the area, for example carrying out research needed for it to meet its conservation aims. The Project has undertaken over a decade of solid foundational work with the Lake Kutubu WMA Committee as part of the mid-elevation offset program. However, there is a need to consider the gaps in alignment between the approach taken for offsetting residual impacts on specific biodiversity values versus the requirement to promote and enhance the conservation aims of the protected area within which the Project is located. The Project's intentional exclusion of an updated scientifically robust aquatic biodiversity survey in the Lake Kutubu WMA in 2017, to support the preservation of the freshwater ecosystem, is not in alignment with primary conservation aims of the protected area, in RINA's opinion.	IESC Observation	IFC PS6 Para.11	Open	An updated freshwater biodiversity assessment aligned with the other components of the 2017 PMA3 biodiversity surveys would have provided a comprehensive snapshot of species diversity and abundance, as a basis for the revised WMA Management Plan conservation objectives. The IESC recommends the Project plan to include an updated appropriate assessment of the Lake Kutubu freshwater ecosystem via a PMA3-type biodiversity assessment survey as part of the foundation for enhancing the conservation aims of the WMA.
M20.2	Desktop review Feb 2021		As reported a number of times in previous IESC reports, access to key priority areas by the weed inspection and control contractors has been restricted. Security issues, the 2018 earthquake, and a lack of transportation for weed contractors to get to sites, have restricted the likelihood for effective, widespread weed inspection and control. Now in 2020 further security issues and the COVID-19 pandemic meant that weed inspection/control was further hampered. Obviously, some of the challenges noted are outside of the control of the Project. However, the *consequences* of those challenges are that large parts of the Project's Upstream footprint, including priority ecosystem areas such as the Homa Benaria Ridge, have had little inspection/control for several years. In RINA's opinion, he current situation is not consistent with stated commitments in the EMP, and it is unclear whether the situation represents an immediate threat or impact to priority ecosystem areas. The IESC does not receive any useful analyses of weed inspection/control findings or Project-induced weed distribution/abundance status.	Low: Level 1	Upstream EMP	Open	EMPNG should undertake an analysis of the weed inspection/control data and identify: – Locations (distribution) of P1 weeds of key concern, currently compared to distribution during the PCS; – Areas where P1 weeds are now so well established and persistent that repeated control is required or is proving difficult; – Ecological consequences of P1 weeds remaining established in these areas e.g. any detrimental impacts on the ability of native species to thrive in their natural habitat; – What adaptive management is necessary in the Project's approach. EMPNG needs to work with the weed inspection/control contractor to better resource the team, ensuring sufficient headcount and dedicated vehicles to access weed inspection/control sites as regularly as necessary to meet the requirements of the Upstream EMP.

3 ENVIRONMENTAL AND SOCIAL MANAGEMENT

3.1 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

The Environmental and Social Management System (ESMS) is a mature and active System. As such, it continues to evolve and be revised. Key framework documents to the ESMS are the Project Environmental Management Plans (EMPs), which have been upgraded to an advanced draft with the following objectives:

- ✓ ensure EMPs reflect as-built conditions and reflect current practices;
- ✓ provide clarifications to queries that have been raised since Production commenced;
- ✓ include Regulatory changes that have occurred since Production commenced; and
- ✓ incorporate mitigation measures that were included during construction that are still applicable to Production Projects.

The EMPs were reviewed at the time of the last field visit in February 2019 and found to represent significant improvements to the ESMS. The E&S requirements for the ongoing work to develop the Angore Field are defined in a specific EMP for the Angore Gathering System.

3.2 MANAGEMENT OF CHANGE

Since the last review in February 2020, EMPNG has not undertaken any Management of Change (MOCs) that would require IESC review. A pending MOC, now reported for several years, is the anticipated turnover of Project infrastructure to the PNG Government. No activity has taken place. The PNG Government has not occupied any of the infrastructure and the status quo is being maintained.

3.3 INCIDENTS

Security incidents continue to be monitored and evaluated by EMPNG on the basis of the ExxonMobil Security Incident Risk Analysis Tool (SIRAT), a tool developed to characterize security incidents on the basis of actual consequence, potential consequence, and mitigations. Security improved over 2020 with the single reportable incident taking place on December 16, 2020 when an aggrieved ex-HGDC (Hides Gas Development Company – a local Lanco) employee utilizing a bush knife directed violence at HGDC personnel engaged in road works on the Well Pad Access Road with no injuries.

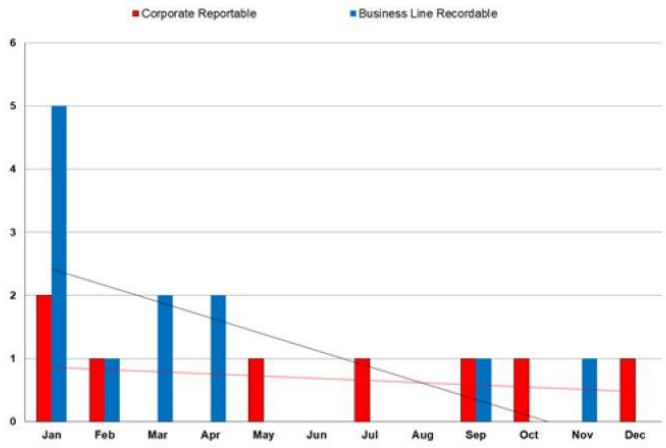

Figure 3.1: PNG LNG Security Incidents by Severity (January 2020 – December 2020)

In terms of environmental incidents, the number of spills in 2020 was similar to 2019, although spill volume was greater (Figure 3.2). There were 50 minor spills and four Corporate reportable spills (>1 bbl), three of which were spills to ground related to equipment failure at Sewage Treatment Plants (STPs) and a fourth was the spill of about 400 liters of polymer in association with the attempted theft of a company IBC (Intermediate Bulk Container) from the Kopeanda Waste Management Facility at Hides. None of these spills had significant environmental consequence.

Most of the Environmental Compliance Incidents (ECIs) and EMP non-conformances (EMP NCs) in 2020 assigned by EMPNG related to water discharges, but less than 2019 (Figure 3.3) and discussed in greater detail in Section 4.1.2 of this report. Open compliance issues carried over from 2018 and 2019 are the presence of invasive fish observed in the HGCP STP retention pond #3 and cane toads sighted at HGCP. Overall, EMPNG continues to do a good job of tracking incidents and non-conformances.

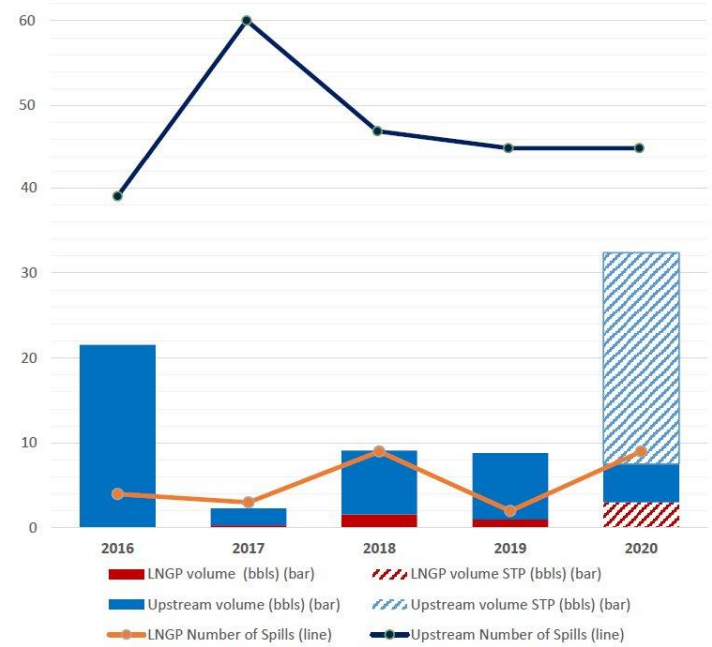

Figure 3.2: EMPNG Spill Performance

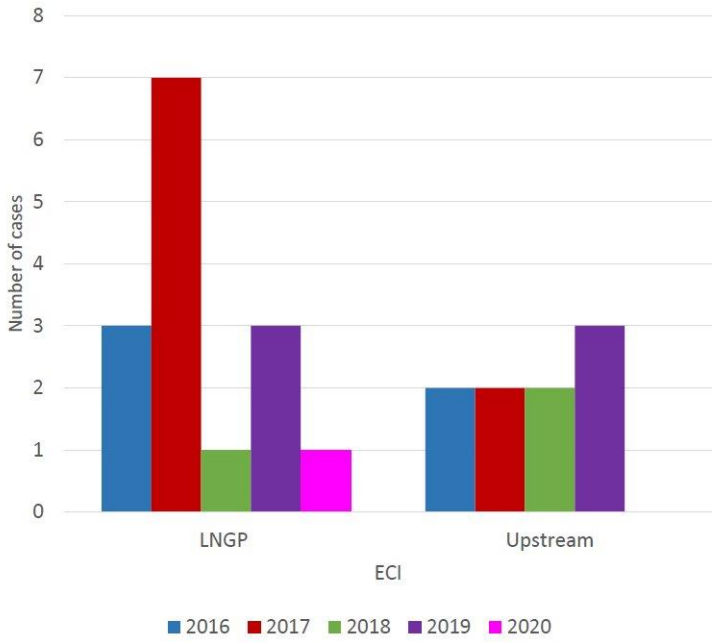

Figure 3.3: Environmental Compliance Incidents

3.4 EMERGENCY RESPONSE

The Emergency Preparedness and Response (EPR) system is fully in place and a new contract has been signed with Falck Pty Ltd to continue the role as Field Emergency Services Provider with increased emphasis on nationalization and collective competency. Emergency response is also the responsibility of Incident Management Teams (IMTs), as well as a Port Moresby (POM) management level Emergency Support Group (ESG). Drills continue to be conducted (ESG 6; Upstream 54; LNGP 42; and 2 ESG/IMT drills), including the first cyber security response exercise, but the most significant activities have related to actual responses.

COVID-19 Response throughout 2020 was managed by means of integrating three site-level IMTs with the ESG in Port Moresby, as well as a Regional ESG and Corporate Working Group. In addition to the response to the pandemic, in 2020 there were 240 total responses:

- ✓ Upstream – 71 (Fire Alarms 57, Bush Fire 1, Road Crash 1, Oil Spill & Hazmat 11, Medical 1); and
- ✓ LNGP – 169 (Fire Alarms 129, Bush/Grass Fire 36, Oil Spill & Hazmat 2, Structural 1, Standby 1).

It should be noted that most “fire alarms” are false in the sense that the alarms can respond to conditions other than actual fires, but all alarms are responded to by residents / emergency responders. The “One Plan” Emergency Response Plan (ERP) suite has been reformatted and developed specifically for Upstream, LNGP and Marine Terminal, POM, and EMPNG requirements, and now includes a Reference Guide. The new ERP documents are intended to have greater usability due to streamlining and consistent tables of contents. Overall, EMPNG continues to have a solid EPR program.

4 POLLUTION PREVENTION

4.1 WASTE AND WATER 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

The amount of waste generated has decreased in the Upstream area and remained fairly steady at the LNG Plant. The total project waste generation is shown in Figure 4.1, where the decrease relates to the deferral of Angore and the earthquake recovery effort past its peak in the Upstream area.

In the Upstream area a decision to operate the incinerator at the Hides Waste Management Facility (HWMF) at Kopeanda has been deferred. Only medical waste is being incinerated at the HWMF. As a result, landfilling continues to be the main method of disposal, which is the main method across the entire Project (Figure 4.2).

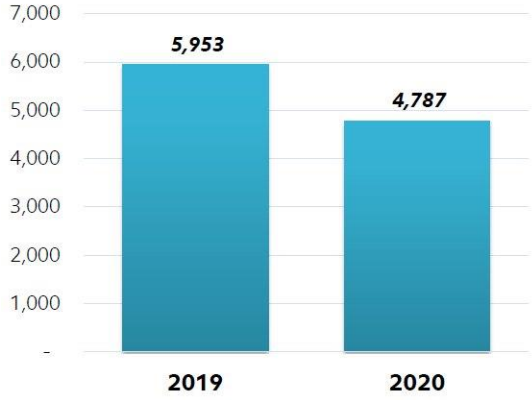

Figure 4.2: 2020 Total Project Waste Generation

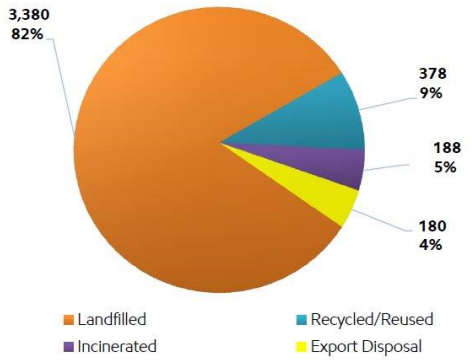

Figure 4.1: 2020 Total Project Waste Disposal

In the Upstream area, landfilling is the most cost-effective solution to the disposal of non-hazardous waste. The Kopeanda landfill is 48% used and estimated by the Project to have 24 more years of life. Another option for Upstream waste disposal planned for several years is the OSL Waste Management Synergy whereby EMPNG and OSL share facilities and take advantage of the best disposal options offered by each company. This effort is just now starting to be reinitiated after delays caused by the earthquake and then COVID-19. There is still the intention of operating a new incinerator at Moro, which is in place but has not been commissioned due to technical issues and EMPNG is working with the vendor to resolve the startup problems.

Waste management at the LNG plant is reaching the limit of what can be undertaken internally as the LNG Plant landfill is 95.5% full, with only 258 m^3 airspace remaining. EMPNG has continued to support Total Waste Management (TWM) in their development of an integrated third-party waste management facility. This has allowed EMPNG to take their LNG Plant incinerator offline and use the TWM incinerator at Roku since the beginning of Q3 2020 for incineration of non-hazardous waste. EMPNG plans to continue work with TWM Roku in 2021 to develop their landfill and industrial wastewater treatment plant facilities.

Other 2021 plans for improving waste management include exploring onsite treatment/recycling options for specific liquid waste streams including waste oil, lube oil via condensate line, and water wash via the HWMF reedbed. Plans are to assess Ramu Sugar for potential waste oil reuse opportunity and other in-country third-party facilities are still

being considered (e.g.; Niugini Tablebirds). Both of these facilities were used during the construction phase of the Project for waste oil disposal.

Figure 4.3: Overview of TWM Facility at Roku

4.1.2.2 Water Management

A Level 1 Non-conformance (NC) was assigned to wastewater treatment in the 2017 IESC report. In 2018, the situation was not fully resolved, but much improved over 2017 and the Level 1 NC was reduced to an Observation. 2019 performance was better than 2017, but the gains made in 2018 did not continue through 2019. In 2020 the overall situation is much improved from 2019 with measurements for the most part better than 2018.

Upstream

In the Upstream area there has been generally good performance:

- ✓ Angore STP compliant since March 2020;
- ✓ HGCP STP generally good performance since March 2020 with a minor excursion of fecal coliforms in August 2020;
- ✓ Moro Camp B generally good: ammonia – nitrogen problems resolved by end of March 2020; otherwise one large excursion of fecal coliforms (October 2020); a small excursion of oil & grease (August 2020); and a small exceedance of TSS (December 2020). The old STP was shut down in April 2020 and new unit stabilized in July 2020; and
- ✓ Stormwater discharges from the HGCP retention pond have been acceptable with minor excursions of TSS and turbidity in October 2020. Fecal coliforms are high but have been demonstrated previously to have non-human origin. Sediment capture devices are now installed and showing evidence of stabilization. The problem of the detection of mercury in the HGCP retention pond has disappeared over the past year and the IESC suspects it was a laboratory artifact. Runoff from HGCP and HWMF during heavy rainfall can exhibit high turbidity and suspended solids, but this is an expected situation with no evidence of chemical contamination. A single test of drainage from Komo did not reveal any exceedances of standards.

The testing of STP effluent and stormwater at the LNG Plant also demonstrates generally good performance:

Groundwater monitoring around the HGCP shows no evidence of groundwater contamination. Conversely, at the HWMF, evidence of infiltration of leachate from the facility has been recorded since 2014. Monitoring events in July and November 2020 continue to show anomalous barium, iron, COD, calcium, magnesium, sodium, nitrogen and ammonia, and total coliforms in wells either downgradient or side gradient from the HWMF, showing the situation is continuing. Two new downgradient wells are being planned for 2021. The IESC recognizes that impact to the nearby Tagari River is probably negligible and there are no users of groundwater in the neighborhood of the HWMF.

LNG Plant

The LNG Plant Toray STP had high ammonia-nitrogen test results in January 2020, but since that time only one other exceedance (August 2020). For other parameters there was only one minor exceedance for oil & grease (September 2020) and one for fecal coliforms (October 2020). Overall, this plant has had good performance. The testing of stormwater showed high turbidity at the beginning of December 2020 where soil debris washed down to the sampling point, an issue resolved with a cleanup along Vaihua Creek on December 14th, 2020.

A problem at the LNG Plant retention pond previously reported by IESC is the presence of amines in water that was coming off the Regenerator Gas Knockout Drum and entering the retention pond. This situation has been resolved and amines have not been detected in discharge water for more than a year and a half. On this basis EMPNG solicited permission from CEPA to discontinue the monitoring and this permission was obtained in a letter dated January 18th, 2021.

The groundwater monitoring network surrounding the landfill has some anomalous measurements of barium, selenium, manganese, and iron, but they do not define an obvious plume in the groundwater where westward flow towards Caution Bay would be expected. As there are also a few anomalous measurements of these same parameters elsewhere across the LNG Plant site, there are no obvious conclusions to be reached. EMPNG plans to have the groundwater monitoring network reviewed by a specialist to evaluate the effectiveness of the monitoring network and undertake data verification.

4.1.3 Recommendations

1. EMPNG should make sure that there is complete upgradient and downgradient groundwater monitoring coverage for the entire HWMF, including the reed bed and that data continue to be gathered and analyzed (repeat recommendation).
2. A groundwater modeling exercise should be undertaken to calculate the extent of contamination and the rate of infiltration into the Tagari River assuming both the reed bed and landfill as potential sources. This should be part of an overall risk analysis to determine what mitigation measures, if any, might be required for groundwater management at the HWMF (repeat recommendation).

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 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. As discussed in greater detail in Section 3.3 of this report, there were four Corporate reportable spills (>1 bbl) in 2020, but none had environmental consequences. The verification of hazardous materials management practice is something that requires field observation, which could not be undertaken for this review, but this is not an issue that the IESC has ever identified during the Production phase of the PNG LNG project.

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

The past year has seen the best flaring performance since the start of production, better than 2019, with flare reductions observed both at the LNG Plant and at Hides (Figure 4.4). Reduced stack emissions testing going from annual to every three years, previously receiving IESC approval, has been approved by the Conservation and Environment Protection Authority (CEPA) and plans are underway to undertake stack testing in Q1 2021 at the

three non-conformant sources from 2018 testing (three Train 2 compressors), as well as the Roku incinerator used to incinerate LNG Plant waste. Noise monitoring was undertaken in 2020 with new equipment across the site to evaluate conformance with standards with no problems to report, and at the Moro camp expansion baseline noise monitoring has been completed with conformance monitoring planned for the first half of 2021.

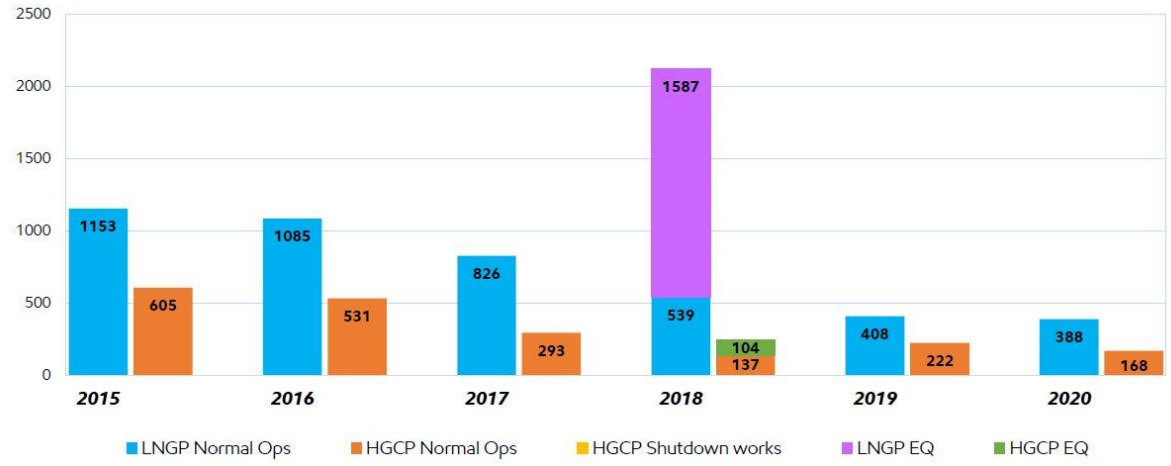

Figure 4.4: Flaring 2015 - 2020 (MSCF)

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

The earthquake caused some serious problems with respect to slope failures in the Upstream area, including at the Komo airfield and along the pipeline route. Much of the work to fully recover from the earthquake is complete inside the facilities, but there is still more to do on the slope stability works. Some of the worst problems were associated with the Komo Airfield, which over the course of 2020 was the focus of the installation of a permanent drainage system expected to be completed by Q3 2021. The Komo Airfield has been divided into four zones (Figure 4.5) for purposes of organizing the erosion and sediment control effort. As of the end of 2020 Zone 2 drainage projects are complete and Zones 1, 3 and 4 are progressing.

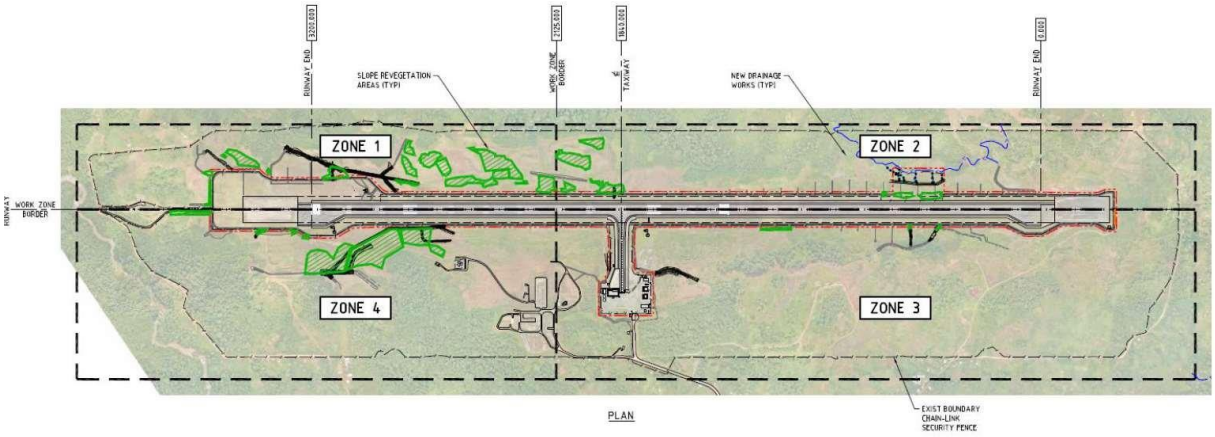

Figure 4.5: Installing Drainage at Komo Airfield

The work at Komo is defined in a Komo Drainage Erosion, Sediment, Reinstatement Plan (ESRP) with several components:

- ✓ Vegetation clearing and topsoil management, including the use of silt fencing and lightly harrowing slopes and batters to provide roughened surfaces that will enhance topsoil retention and minimize lamination and erosion; and
- ✓ Construction of temporary and permanent Erosion and Sediment Control (ESC) measures including cross contour surface drains (berms), Turf Reinforced Matting (TRM), jute mats, check dams (from coir logs), silt fences, filter berms, rock rip rap, gabions, reno mattresses, hydro-seeding, and sediment traps.

To the IESC, the overall program appears to be excellent with the caveat that this is not the first time we have seen the construction of ESC measures and none of the previous attempts to control drainage were fully effective, even before the 2018 earthquake. Nevertheless, we are optimistic that this program will be successful and look forward to the opportunity to see it in person.

Figure 4.6: Drain 17 (Zone 3) Before and After

Pipeline repairs relate mainly to issues of erosion and sediment control and 5 of 29 repair sites have been completed. Some of the most difficult slope stabilization is required where the pipeline traverses the crest of a ridge where the ridge slopes are unstable. In such cases a unique solution has been developed whereby the ridge crest over the pipeline is stabilized by micropiles tied together, the details of which are described in a paper published at the 2020 International Pipeline Conference and Exposition in Calgary by Ladenhauf et al. (2020).[1] The completion of the Moro Camp expansion will facilitate access to the pipeline right-of-way and outside the fence work is expected to start out of Moro Q1 2021.

Figure 4.7: Pipeline Recovery from Earthquake at KP43.5

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[1] Ladenhauf et al., 2020, "Earthquake in Papua New Guinea Results in New Concept for Securing Pipelines in Ridgeline Right-of-Way: The Micropile Contiguous Wall," Proceedings of the ASME 2020 International Pipeline Conference and Exposition, IPC 2020, September 28–October 02, 2020, Calgary, AB, Canada.

Available at https://asmedigitalcollection.asme.org/IPC/proceedings-abstract/IPC2020/84454/V002T06A003/1096007

5 BIODIVERSITY AND ECOLOGICAL MANAGEMENT

5.1 INTRODUCTION

This section provides an updated record of IESC Observations and Recommendations associated with EMPNG's ecological management (both terrestrial and aquatic) including: implementation of the Biodiversity Strategy and related monitoring of areas potentially impacted by the project; the ongoing development and implementation of the biodiversity offset program (to address residual impacts); the reinstatement and regeneration of areas previously and newly cleared by the Project (including pipeline Right-of-Way (RoW), construction 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/upgrade/retention of roads, tracks and the pipeline RoW corridor.

The Project chooses to continue alignment with the 2006 version of the IFC Performance Standards, and as such, the whole Upstream Project area is deemed to be Critical Habitat – as such, no net loss (NNL) of biodiversity remains a key deliverable in relation to significant residual impacts. EMPNG's approach to biodiversity and ecological management is described in the Biodiversity Strategy, the Biodiversity Implementation and Monitoring Plan and Production-phase EMPs, along with other associated documents.

Records from the EIS baseline studies and the Pre-Construction Surveys (see previous IESC reports for background) serve to establish the ecological conditions prior to ground disturbance/clearance or infrastructure development. These records include information on the presence and distribution of invasive species, 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 (*Aproteles bulmerae*) 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 *Phytophthora cinnamomi*). 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 ongoing monitoring studies and surveys.

5.2 BIODIVERSITY STRATEGY & IMPLEMENTATION

5.2.1 Project Strategy

EMPNG's commitment is to safeguard biodiversity in areas where the company operates and in particular, the biodiversity values in the Upstream area. 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 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. To achieve the overall goal, EMPNG's objectives are to:

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

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

- ✓ the large scale, which is the entire Upstream Project Area – biodiversity values at this scale include extensive intact forest, high levels of flora and fauna diversity and endemic species, unique assemblages of species, species of conservation concern, and biodiversity of importance to local communities;
- ✓ the medium scale, which is represented by particularly valuable areas referred to as 'priority ecosystems', including forests in the Hides Ridge and high-altitude Homa-Benaria Ridge areas, the Lake Kutubu area and forests in the Juha area; and
- ✓ the small local-scale, which are sensitive habitats referred to as 'focal habitats' and significant ecological features; these include caves and pinnacles, sinkhole swamps, upland streams, stream refuges in unstable landscapes, lowland rivers in stable landscapes, off-river waterbodies, flora/fauna/habitats of cultural significance and lekking trees/grounds.

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

i. intactness of forest;
ii. trends in species diversity and abundance;
iii. conditions of focal habitats;
iv. occurrence of invasive species/pathogens; and
v. 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 Upstream Area as caused by impacts that are directly Project-related, indirectly Project-related (third party, induced), non-Project (third party, expansion of pre-existing activity), and/or natural change (e.g., landslide). 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 2015 and 2017 periods for a linear infrastructure (LI) corridor containing the PNG LNG RoW, facilities and all other infrastructure within the Upstream area. For 2019, a realigned Assessment Area also includes offset areas – see Figure 13 below;
- ✓ PMA-2: 'condition' surveys of 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 establish, over time, EMPNG's progress with respect to achieving NNL of biodiversity.

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

- ✓ 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;
- ✓ 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; and
- ✓ 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.

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.

To address residual impacts on critical habitat, and in accordance with the Biodiversity Strategy, EMPNG is implementing a Biodiversity Offset Program to ensure no net loss (NNL) in biodiversity. The program components include protected area planning, supporting the national biodiversity strategy, building conservation capacity, enhancing existing protected areas and establishing new protected areas.

EMPNG's Biodiversity Strategy (BS) and Biodiversity Implementation and Monitoring Program (BIMP) documents are publicly available for download at https://pnglng.com/Environment/Biodiversity-management.

5.2.2 Observations

Note: as for 2020, this 2021 review was undertaken through desktop study so the IESC was unable to observe and discuss issues to the same extent as for pre-2020 reviews. Therefore, the observations and opinion reported herein are based solely on presentations provided by EMPNG and documentation requested post-presentation. The IESC appreciates all the information provided, including the extensive follow-up requests after the presentations.

5.2.2.1 Biodiversity Strategy, Implementation and Monitoring Program

PS6 relevant Project incidents

As noted in Section 3.3, information was provided on EMPNG's 2019 Environmental Compliance Incidents (ECI) and EMP Non-Conformances (NC). The two PS6-relevant ECIs that are remain open are:

- ✓ From 2018: The density of cane toads and tadpoles observed in the area continues to increase, but EMPNG continues to implement mitigation measure and record data;
- ✓ From 2019: A large number of fish (Carp and Tilapia) were found dead within the four sewage treatment plant (STP) ponds at HGCP in 2019 – these are invasive species, and incompatible with the EMP objective to prevent priority invasive species (i.e., priority weeds and pests), and plant pathogens from entering or becoming established in or in the vicinity of EMPNG facilities and infrastructure (EMP: Upstream Facilities, Infrastructure and Pipelines, (2019) Section 15.0. EMPNG continues to monitor and remove fish from the STP ponds and discharge areas within the fence, but state they are not monitoring downstream outside of the fence. EMPNG advises they have sought input from external aquatic experts who affirmed the Project's approach - it is not clear whether the experts advised on any potential detrimental ecological impact downstream.

Angore development

As detailed earlier in this report, Angore development continues and PS6 relevant aspects are included in the 2019 EMP. Additional footprint will be required to construct Wellpad C and a PCS has been undertaken for this and the pipeline route. During this desktop review, the IESC sought clarification on potential ecological impacts to Kaloma Creek noted in the EMP from pipeline construction, and how flows will be preserved to protect habitats downstream. The Project confirmed that hydrological and civil studies are due to be completed Q1 2021, and results will inform the final design taking into account the mitigation measures already noted in the EMP. The Project also confirmed that a diversion drainage channel will be put in place to ensure downstream habitats are not affected by any interruption of flow.

Unlike the existing Wellpad A, the existing Wellpad B will not be required for camp accommodation or as laydown. Once Wellpad B is plugged and abandoned, the Project confirms the area will be reinstated according to requirements of the EMP. EMPNG has not yet confirmed that the track to Wellpad B and down the previously proposed tie-in route to the main pipeline RoW will also be reinstated – they state the track will be retained for the moment and discussions related to reinstatement of this track will occur at the time of plug and abandon of the Wellpad B wells. As access to Check Valve -1 may now be possible via the Angore Pipeline route via Wellpad A to the main pipeline RoW, this would allow the Wellpad B track to be closed/reinstated. The Access section below describes the boom gate accessing the Wellpad B access track is now manned – for a long while this was left unlocked and unmanned. Note: PMA1 satellite imagery analysis detailed below observed ongoing loss of forest cover related to conversion by local landowner for agriculture, which is potentially due to enhanced access and thus an indirect Project-related impact. The next IESC review will discuss EMPNG's reinstatement and access plans for this area.

Biodiversity Monitoring Program

Monitoring campaigns have continued on a one/two-yearly cycle as noted in previous reports, and Program Monitoring Activity (PMA) updates are provided below:

- ✓ PMA-1 Remote sensing update:
  - 2019 data has now been analyzed by EMPNG's new contractor, Maxar, for the realigned PMA-1 Assessment Area (AA) as noted in the last report (bounded in red in the figure below). Detections of persistent change occurring between 2017-2019 and 2015-2019 were undertaken. Assessing change from 2017 to 2019 indicates an area of approx. 1.73% (170km^2) has experienced some sort of land cover change, and 1.3% (130km^2) of change from forest to non-forest cover, equating to approx. 1.3% of the AA. However, over 81% of this is due to the 2018 earthquake (115km^2). Following analysis of the non-earthquake affected areas of forest loss, 33 locations were identified as areas of more than 1 hectare indicating a shift from undisturbed to a disturbed state,

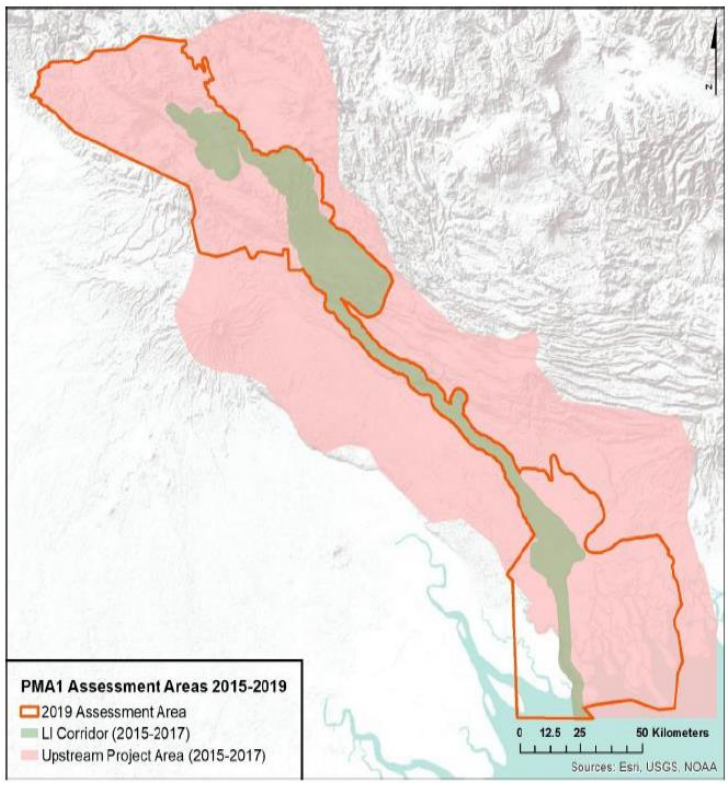

Figure 5.1: Comparison of PMA1 Assessment Areas 2015-2019

- An updated list of priority inspection areas has been derived from the 2019 study. Five priority areas were initially identified in 2015-2017, and three of these continue to experience new disturbances of more than 1 hectare during the period 2017-2019: at Kaiam River Crossing, Angore tie-in/Wellpad B, and at southern end of Komo airfield. Three new priority inspection areas were identified during the 2019 analysis: former Camp 7, area near KP-5, and Moro Rd. Seventeen sites have been identified for ongoing monitoring in Lower Kikori and north of Lake Kutubu. The contractor's process to identify residual impacts potentially attributable to the Project identified the Angore land clearance as potentially Project-related, and an area near KP-5,
- Ground-truthing review was conducted in January 2021 to assess the non-earthquake priority inspection sites in more detail, excluding those areas known to be cleared directly by the Project. Review was done by desktop review of higher resolution imagery, by overflight, and on the ground where sites were accessible by road. EMPNG personnel verified the forest loss sites and concluded that disturbance was related to existing/local landowner clearance either to build new houses/huts or to establish new gardens. Overall, EMPNG advises that assessment results continue to indicate no notable trends in broadscale forest degradation as a result of PNG LNG or other human activity,
- The Project is building a dataset that will allow it to identify and track areas of forest-cover change that might directly/indirectly be due to the presence of the Project. The IESC recommends EMPNG reconsider how the distinction is made whether an observed clearance/forest cover loss event is attributable to the Project when this is done by the community (related to Section 8.2.7 of PMA1 Protocol, queried previously). Of course, local landowners have the right to clear their land but when this is in direct proximity to the pipeline RoW or infrastructure, and therefore access to those areas newly cleared has been enhanced by the presence of the Project (as noted in the PMA3 report), in the IESC's opinion these could be categorized as attributable to the Project as indirect impacts. For example, the PMA1 report flags the forest loss observed at Angore due to its further expansion since the 2015-2017 analysis – the report especially flags the tie-in area from Wellpad B to the pipeline RoW as residual impacts attributable to PNG LNG. In addition, the PMA3 report notes the removal of numerous trees and the establishment of gardens adjacent to the pipeline RoW, on both the Hides Ridge and Agogo Ridge survey areas. They note the removal of trees had increased substantially since 2017 and was likely to be impacting biodiversity in various ways. That EMPNG continues to report no Project-related change following ground-truthing may need some consideration,

- The PMA1 report notes areas of new forest loss of less than one hectare, and newly cleared areas in locations where clearance was observed in previous analyses, and thus a cumulative observation of forest degradation or clearance should be possible. The IESC considers it important to continue to track those areas of forest loss less than one hectare from a cumulative forest-loss perspective,
- In relation to the previous IESC recommendation that all instances of forest degradation/land use change considered potentially Project attributable (direct and indirect), along with their resulting attribution features/justifications and monitoring/mitigation measures, should be clearly documented for future reference – the Project confirmed they are tabulating all such instances,
- In response to the IESC Recommendation that the Project keep the frequency of remote sensing/analysis monitoring at two-yearly intervals (versus EMPNG's proposed move to five-yearly monitoring from 2019):
  - In 2020 the Project responded that a decision will be made following analysis of the 2019 imagery and following input from a workshop where the Project's technical contractors would help inform adaptive management,
  - For 2021, no update was provided during this desktop review;

✓ PMA-2 Visual observations of 'condition' of sites avoided but potentially affected during pipeline construction:

- The Project advises the gradual regeneration of focal habitat and sensitive sites continues, making some sites inaccessible. However, they state security issues continue to limit field activities, and the 2020 PMA2 field surveys were postponed due to COVID-19 restrictions. The Project will reattempt the field surveys during March 2021;

✓ PMA-3 Biodiversity survey updates:

- The results from the 2019 PMA3 rapid biodiversity survey were presented, and the report provided. Building on the two-yearly surveys undertaken in 2015 and 2017, field scientists and EMPNG personnel gathered quantitative datasets to help identify and interpret any trends in species presence, relative abundance and diversity in areas affected by the Project. Surveys in 2019 focused on Hides Ridge and the Agogo Range near Moro (west of Lake Kutubu), studying different elevational bands in each. The 2019 survey was later in the season than in previous years. Extensive damage from the 2018 earthquake was noted in some transect locations, with tree falls opening the canopy and disturbing sub-canopy vegetation. An expansion of the camera trapping program enabled improved statistical modelling and therefore the ability of researchers to make reliable inferences about species behavioral responses to Project infrastructure. The IESC recommends Lenders review the 2019 PMA3 survey report for detailed information on specific findings for frogs, birds, mammals, and bats; suffice to say large numbers (23 for 2019) of as-yet undescribed or species new to science continue to be found with each survey. Environmental Genomics (DNA) surveys were piloted in 2019;
- Primary conclusions relate to:
  - Survey findings continue to indicate that both survey areas retain high biodiversity values for all surveyed taxa,
  - Factors most likely to threaten biodiversity values in both areas surveyed relate to enhanced access due to the pipeline RoW and associated roads. Threats noted include increased hunting pressure and feral dog predation (as captured via camera traps), and the potential spread of exotic rodent species. In one area, Akakubi, (although only comparing data captured on 2 dates and these at different times of year) an eightfold increase in hunting was detected along with a twofold reduction in two IUCN Vulnerable species susceptible to hunting – the Eastern Long-beaked Echidna (*Zaglossus bartoni*) and the Pademelon (*Thylogale* sp.) – further assessment is required (see next bullet),
  - Bat diversity was significantly greater in open areas above the pipeline RoW when compared to the forest interior, indicating an opportunistic change for species favoring forest-edge characteristics,
  - No consistent temporal shifts in frog, rodent or bat species diversity or composition noted since the PMA3 surveys commenced in 2015,
  - Two other findings of note:
    - The invasive Rattus species captured during 2019, like the 2015 survey, were in trap locations close to the forest boundaries or disturbed areas; and
    - Over the three survey years, in some areas on Hides Ridge, the field scientists have noticed canopy trees along the edge of linear clearings are becoming increasingly stressed and, in many cases, dying from dieback. This, they say, is particularly evident for *Nothofagus* trees along the eastern (lower) half of Hides Ridge;
- Enhanced access due to opening up areas not previously easily accessible was highlighted in the EIS. The recommendations made by the field scientist team are important to adapt the program further to help

determine the biodiversity risks. For example, building an understanding of the potential negative consequences from enhanced access and associated human habitation (and therefore attraction to invasive rodents) will be valuable. Plus, repeated specialist hunting/harvesting studies are needed to better understand activities and use of natural resources, especially at Hides Ridge. As a result of these findings, EMPNG intend to implement a structured survey to better understand the situation and any causal link,

- Dieback noted on Hides Ridge could be due to the plant pathogen, *Phytophthera cinnamomi*, to which *Nothofagus* trees are particularly susceptible. See Section 5.5.2.5 for further discussion,
- In response to a Lender question[2] specifically related to whether the Project provides biodiversity data to the Global Biodiversity Information Facility (GBIF, www.gbif.org) EMPNG states they do not. However, they advise the 2015 PMA3 biodiversity survey reports are published, and available from the PNGLNG website, plus 3rd party biodiversity specialists involved in the PMA3 surveys have also published independently in peer-reviewed scientific journals. With the new knowledge value gained through conducting PMA-3 surveys, EMPNG could consider sharing data specifically with GBIF, and therefore align in this regard with the updated Equator Principles;

✓ PMA-4 Evaluation of the efficacy of the offset program, tracking progress in achieving NNL of biodiversity:

- An updated Protocol has now been developed to reflect current/planned offset activities, define performance indicators and track progress towards NNL. The IESC has not reviewed the Protocol in detail, but the Project advises the updated KPI of 'Accumulated offset gains progressing towards NNL targets' is intended to better capture whether gains are being accrued at a sufficient rate over the required timeframe. New performance indicators focus mainly on measurable outputs (rather than outcomes), e.g. adherence to listed activities, establishment of agreements, etc. The key outcome of 'averted loss and restoration gains' measurement is retained. An updated monitoring template has been developed to replace the traffic light template developed previously,
- No updated loss/gain data was provided during this desktop review.

Freshwater Ecology

A freshwater ecology survey was undertaken in 2020, assessing the composition of macroinvertebrate communities at six sites upstream and downstream of the HGCP and the Komo airstrip. Building on 2010-2016 annual surveys, the 2019 and 2020 surveys assessed the recovery of watercourses not only from impacts related to PNG LNG construction, but also from the 2018 earthquake. Where possible, site characteristics are compared back to a pre-construction condition, although as noted in the freshwater study report, due to the observed unpredictable nature of field work in PNG, a mix of historical samples and control/reference sites is necessary to characterize the preconstruction conditions.

As a result of the ongoing erosion control and slope stability work being undertaken at Komo to fix earthquake damage, the IESC queried whether any potentially increased sediment load from incomplete drainage works might have affected the freshwater ecology downstream of Komo.

The 2020 Upstream Freshwater Survey report details the sampling and results. It indicates macroinvertebrate sampling indicates most sites have shown some recovery since the construction phase, despite an increase in clay and silt fractions observed in 2020 at all sites downstream of both Komo and HGCP. The study authors conclude this suggests increased sedimentation has less of an impact on already impacted sites when compared to unimpacted sites. All 3 sampling sites downstream of Komo and HGCP are still considered 'impacted', although classified at a 'weak' level with multivariate analyses indicating all are tracking closer towards reference site conditions.

- ✓ The Akara Creek site (AKAR1) has attained a similar diversity and community composition to its reference sites, and only registers as impacted due to a slightly low macroinvertebrate index in 2020;
- ✓ For the Ariago Creek site (KOM4), the recovery seen at AKAR1 suggests that a similar pattern of recovery should be possible at KOM4, which although having recovered substantially, still has fewer taxa than are present at its associated reference sites;
- ✓ The Wakuba River site (WAKU1) has also recovered when assessed using the original freshwater program indices but has fewer taxa present than it did in 2010.

Periodic freshwater ecology monitoring will continue.

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[2] Note: the latest update to the Equator Principles urges developers of large infrastructure and industrial projects to share non-sensitive biodiversity data from ESIAs and baseline/monitoring surveys into the GBIF network. https://www.gbif.org/publishing-data

5.2.2.2 Biodiversity Offsets

Offset Framework & Technical Rationale

Key to the verification of biodiversity losses and gains, and compliance with PS6 requirements for Natural and Critical Habitat, will be the ongoing implementation of the Project's monitoring program, not least the use of remote sensing and expert-led biodiversity field surveys. We recommended the PMA4 protocol be updated to reflect how knowledge gathered from monitoring would inform updated assessments of the Project's residual impacts. An updated PMA4 Protocol has been developed – see PMA4 section above.

No updated calculations on loss or gain were provided for this desktop review. As noted in our 2019 report, and related to PMA4 observations above.

Offset Program Design and Early Implementation

To achieve NNL, EMPNG's offset program combines both direct and indirect (enabling) components. The Company has provided the IESC with updates on each component:

- ✓ Offset Component 1: Protected area planning. Support to CEPA[3] in meeting its international Convention on Biological Diversity (CBD) commitments via production of a 'Protected Area System Plan' for a Kikori-wide river basin (on World Heritage 'Tentative' list):
  - EMPNG considers this component complete with the publication of the 'Protected Area Planning for the Kikori River Basin' report written by WCS in 2017, and the repeated yet unsuccessful efforts to engage with CEPA to discuss the Plan's implementation. EMPNG considers that further work in relation to conservation areas in the Kikori River Basin be implemented as part of the establishment of protected areas covered in Components 4 and 5 below,
  - The Project did not have an update on the Government's progress for the Kikori Catchment as a World Heritage Site but would query this with CEPA at their next meeting. The Kikori River Basin entry on the UNESCO World Heritage Site website remains on the Tentative list and is still dated 2006[4];
- ✓ Offset Component 2: Support the National Biodiversity Strategy and Action Plan (NBSAP). EMPNG's focus has been to support communication and networking initiatives:
  - Due to COVID-19, no Communicating Conservation meetings were held in 2020 and no newsletters were produced. The Project continues to evaluate the potential for new partnerships and co-sponsorship to continue the communication and networking program. Currently the Project envisages reducing their funding beyond 2021. One meeting is tentatively planned for 2021,
  - EMPNG is to be commended for their support of this program to date. Participants at previous meetings have shown great appreciation for the networking and collaborative opportunities they provide, not least as they allow small local and provincial conservation projects valuable opportunities to meet face-to-face with CEPA representatives and government ministers;
- ✓ Offset Component 3: Enhancing Conservation Capacity Program (ECCP). EMPNG's support is focused on developing and institutionalizing Post-Graduate Diploma and Master's degree courses at University-PNG (U-PNG), providing scholarships, and establishing a framework for placements and mentorships with field-based conservation NGOs:
  - COVID-19 has affected the sponsored take-up of the Post-Graduate/Bachelor of Science degrees during 2020, with no new enrollments, and those enrolled in 2019 unable to complete/graduate. The four students enrolled in 2018 for the Masters in Conservation Biology were unable to graduate in 2020, so this has been delayed to 2021,
  - In the IESC report last year, it was noted that a new format for funding was being explored currently with potential partners, and that the Project were committed to supporting the formal institutionalized capacity building program into the future. For this desktop review, the Project indicates they intend to support the program through to 2025, comprising three more intakes on the Masters course (2021, 2022 and 2024);
- ✓ 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.
  - Three quarterly WMA Committee meetings were held during 2020. The committee is focusing on implementation of their livelihood program, with program activities including training in crop rotation with

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[3] Conservation and Environment Protection Authority, PNG Government.

[4] UNESCO WHS available at https://whc.unesco.org/en/tentativelists/5060/ accessed in March 2021.

legumes, tilapia and endemic fish monitoring, and training in chicken farm management. Again, World Environment Day Awareness was a successful campaign for the Committee, with 1700 participants attending. Lake Kutubu WMA sign boards have been constructed and installed in four villages around the WMA, encouraging the community not to litter. The Committee and community continued with their capacity enhancing program under the guidance of EMPNG's external consultant trainer; 22 participants graduated late 2020 having completed the final modules in mammal and plant survey techniques,

- The IESC has previously made recommendations to revisit and update the Lake Kutubu Enhancement Plan, plus demonstrate that the biodiversity values were defined and WMA Management Plans were developed. The IESC requested that information provided on offset program implementation be more systematic to enable a better understanding of progress towards achieving No Net Loss. EMPNG has reviewed their approach, tied to the adjustments made to the PMA4 Protocol, and the IESC expects to be able to report progress against offset-activity indicators in future reports. The Project has now committed to reviewing and revising the Lake Kutubu WMA Management Plan, and state they are progressing other aspects of the IESC recommendations (which are retained below). The IESC notes a Lake Kutubu WMA Management Plan revision will require extensive consultation with stakeholders to ensure that all views are incorporated,
- EMPNG advise they intend to update the BIMP during 2021, which contains information on the offset program at each elevation. Linked to formalizing the offset activities more systematically to deliver NNL, the IESC recommends the development of biodiversity offset management plans to better define offset activities at each of the elevation zone offset programs, identifying roles, key stakeholder engagements, budget projections, a scheduled work plan and deliverables, etc. Documented management planning would help demonstrate to Lenders that EMPNG's offset implementation is being structured and planned effectively. At the moment, the IESC is unable to confirm the route, timeframe, or contribution from each elevation to NNL. Such a management plan would provide assurance that the offset is being managed for biodiversity and that enhancement of the conservation aims of the projected area will be delivered;

✓ Offset Component 5: Establishing new protected areas.

- At the Lower Elevation Zone (0-600m), EMPNG's intention is to enable the creation of a new community based, regionally gazetted protected area (legal term, a Community Conservation Area) in the vicinity of the existing Aird Hills WMA. This will require the establishment of a Lower Kikori Resource Use Management Plan (LKRUMP), which will help offset residual impacts on biodiversity values affected in the Project's lower elevation footprint. To achieve this, EMPNG is working with former Barging Route Waterways Committee members, the Aird Hills WMA Committee, and a growing number of communities in the Lower Kikori. The Project supports a coordinator (based in Kikori Station at times) to assist with support to the communities and the lower elevation offset program:
  - The offset program appears to be progressing well, even considering COVID-19 related hardships. During an extensive mission to the area in August 2020, 13 village communities were engaged out of a total of 17 currently involved (and 1 at the planning stage). A community leaders meeting attracted 300 participants from across the Lower Kikori, including first time involvement of East and West Kikori Local Level Government (LLG). Communities across a wider area are now connecting, expressing a keen interest to join in the conservation process. As a result of program activities, 10 communities (up from 5 reported last year) are now ready to establish Conservation Deeds, initiating the legal process of area protection. The Project facilitated the Port Moresby Nature Park's release of 27 pig-nosed turtles in the Wau Creek Protected Area, with 100 community members in attendance including LLG representatives. The Project used the opportunity to present printed copies of the 2017 Lake Kutubu and Lower Kikori PMA3 rapid biodiversity assessment report;
- The Upper Elevation Zone (montane >1200m) represents the largest proportion of the overall residual biodiversity impact for the Project. Therefore, the biodiversity gain required is greatest at this higher altitudinal zone, through the creation of ecologically comparable areas managed for biodiversity:
  - Due to the delays in commencing an appropriate offset program at this montane elevation, the IESC flagged this as a Level 1 non-conformance in 2020. Although some progress is indicated, the non-conformance remains open until the IESC/Lenders are provided with a clear, targeted program of work and some momentum of early implementation is clear. The recommendation above on the development of biodiversity offset management plans could be an ideal way for the Project to demonstrate how offset program development and implementation is being structured and planned effectively to ensure NNL is a feasible outcome,
  - EMPNG advises their intention is to propose Gigira (Hides Ridge) as a legally designated Special Protection Area, along with a network of community based protected areas in Hela Province. The Project provided a slide presenting early development steps for community engagement for the

Montane Offset Program. Community engagement plans have now been developed targeting three groups: the HGCP workforce, schools, and village communities. Eight communities and eight schools have been visited, to initiate relationships and introduce the concept of the offset program. A dedicated staff member rotating out of HGCP is now working on Montane Community Engagement programs with guidance from senior staff, and a community engagement specialist will be added to the team during 2021, and

- Although having different components and requirements, the experiences gained from establishing solid foundations for a biodiversity offset program in the Lower Kikori should stand the Project in good stead. In addition, engaging with specialist external partners could bring added credibility and wider experience from successful conservation area protection elsewhere in PNG.

5.2.2.3 Legally Protected Areas

Lake Kutubu is a wetland of international importance, a Ramsar site, renowned for its unique assemblage of endemic freshwater fish species (including IUCN listed Critically Endangered-Vulnerable species). It is regarded the most unusual lacustrine habitat for fish in the New Guinea-Australia region. Due to the unique assemblage of endemic fish, PS6 Critical Habitat thresholds would be triggered for the WMA, and potentially the wider catchment. EMPNG state that it has and will continue to implement additional programs to promote and enhance the conservation status of the Lake Kutubu WMA in conjunction with the WMA Committee, taking into account the Committee's priorities and bringing benefits to the protected area. Indeed, as required in the 2006 version of the IFC PS6, in circumstances where a project is located within a legally protected area, the client has additional responsibilities to ensure tangible benefits to protection of the area, for example carrying out research needed for it to meet its conservation aims. Therefore, for the Lake Kutubu WMA, the IESC has sought clarity on why the assessment of freshwater biodiversity was excluded from the 2017 PMA3 biodiversity surveys noted above, undertaken to help identify key biodiversity values (at both Lake Kutubu WMA and the Lower Kikori)..

One of the significant conservation issues in PNG is the large gap in scientific knowledge of the country's biodiversity due to the lack of systematic surveys and descriptive knowledge[5]. EMPNG's PMA3 surveys are starting to fill some gaps in this regard in a number of Upstream locations, building knowledge on trends in species abundance and diversity. The Lake Kutubu WMA Committee has an understandable interest in the aquatic species of the lake as they determine the conservation values of the WMA prior to an updated Lake Kutubu WMA Management Plan being developed. For example, as flagged by the Project in response to PS6 questions for this review, in 2014 OSL worked with the WMA Committee to commission a fish composition and health survey. Nevertheless, an updated freshwater biodiversity assessment aligned with the other components of the PMA3 biodiversity surveys would have provided a comprehensive snapshot of species diversity and abundance, as a basis for the revised WMA Management Plan conservation objectives.

As Lake Kutubu WMA is the Project's chosen offset site in the mid-elevation zone, the offset program is intended to compensate for unavoidable significant residual impacts on defined biodiversity values, and the Project reiterates that for Lake Kutubu these were assessed as being purely terrestrial. However, as the pipeline is located within a legally designated area (the WMA), PS6 (2006) requires the Project to implement additional programs, as appropriate, to promote and enhance the conservation aims of the projected area – this requirement is necessary for PS6 compliance, even if the protected area includes the Project's offset site and even if Project's residual impacts do not completely align with the WMA conservation aims. The conservation aims of the area were laid out in the Lake Kutubu Catchment Management Plan (2008) and in the Ramsar Site designation, requiring the definition and maintenance of the area's ecological character. The Lake Kutubu Catchment Management Plan includes goals and objectives as developed by the Catchment Management Forum (which included the current Lake Kutubu WMA Committee Chairperson) in the order as listed below:

- ✓ Goal 1: Protect and maintain existing fish populations with the aim of returning them to past abundance;
- ✓ Goal 2: Maintain and protect the integrity of existing forests and biodiversity;
- ✓ Goal 3: Monitor and maintain air quality and prevent further pollution; and
- ✓ Goal 4: Maintain and monitor water quality and prevent further pollution.

Esso Highland Ltd.'s letter to the Chairman of the WMA Committee in 2012 commits the Project to an Enhancement Program, to deliver successful ecological, social and economic conservation outcomes over the longer term, anticipating the program would enable the strengthening of this existing Catchment Management Plan. As indicated in presentations given to the IESC in this desktop review, EMPNG intends to review and revise the Lake Kutubu

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[5] For example, see Lynch et al, 2016: Socio-ecological aspects of sustaining Ramsar wetlands in three biodiverse developing countries. Marine and Freshwater Research, 2016, 67, 1-19, CSIRO Publishing. http://dx.doi.org/10.1071/MF15419 accessed February 2018.

WMA Management Plan during 2021, a process which will likely involve a great deal of external stakeholder involvement and input as is typical in protected area management planning.

The Project has undertaken over a decade of solid foundational work with the WMA Committee as part of the mid-elevation offset program. The IESC Observation in the Issues Table recommends they now consider the gaps in alignment between the approach taken for offsetting residual impacts on specific biodiversity values versus the requirement to promote and enhance the conservation aims of the protected area within which the Project is located. The Project's intentional exclusion of an updated scientifically robust aquatic biodiversity survey, to support the preservation of the freshwater ecosystem, is not in alignment with primary conservation aims of the protected area. The IESC recommends the Project plan to include an updated appropriate assessment of the Lake Kutubu freshwater ecosystem via a PMA3-type biodiversity assessment survey as part of the foundation for enhancing the conservation aims of the WMA.

5.2.3 Recommendations

1. The 2017 and 2019 PMA3 biodiversity reports should be posted on www.pnglng.com alongside the 2015 report. EMPNG might consider sharing PMA3 data directly with GBIF in alignment with the Equator Principles;
2. When an observed clearance/forest cover loss event is deemed to be by the local community in close proximity to Project pipeline RoW and infrastructure, the Project should further consider how the distinction is made as to whether the change is categorized as Project- or non-Project attributable;
3. As worsening dieback has been anecdotally observed by the PMA-3 field scientists, EMPNG should consult appropriate plant pathogen experts to determine whether specialist sampling at dieback sites on Hides Ridge for Phytophthera cinnomomi exotic Type A2 is warranted – a sampling program to rule it out, and reinforcement of required mitigation measures would be prudent;
4. EMPNG needs to update the PMA4 Protocol to reflect how offset efficacy in achieving NNL via Components 4 and 5 will be measured and tracked, especially with regard to better understanding how outputs from PMA1 and PMA3 will inform the NNL calculations, and the verification process going forward (Recommendation is carried over/adapted from 2020 report, pending forthcoming review of the updated Protocol);
5. (Retained from 2020) To more effectively demonstrate progress made in the Lake Kutubu WMA offset, the IESC again recommends:
    a. EMPNG revisit the Lake Kutubu Enhancement Program document to ensure it is current and reflects the Project's complete program of site-specific activities for the implementation of an offset at Lake Kutubu WMA protected area – EMPNG advise this will be undertaken during 2021;
    b. In addition to the valuable general updates usually provided, that future Component 4 Lake Kutubu updates to Lenders/IESC include a more systematic representation of progress made as per the program workstreams, activities and intended conservation outcomes;
    c. The provision of key information relating to delivery of key offset design/implementation components, to provide assurance that the offset is being managed for biodiversity and that enhancement of the conservation aims of the projected area will be delivered:
        - The Offset presentation provided to the IESC includes a diagrammatic Summary of Progress slide for Lake Kutubu. It indicates that:
            – the Biodiversity Values of the WMA have been confirmed – as this stage is marked as completed, we recommend this information be provided to the Lenders/IESC, and detail on the process used to define these,
            – enhancement and/or management plans have been developed/updated – as this stage is marked as completed, we recommend this information be provided to the Lenders/IESC, and detail on the process used to develop/update these,
            – Previous updates to IESC in 2016 and 2017 have indicated that Conservation Objectives would be a focus for the following years – if these have been developed, we recommend these also be provided to the Lenders/IESC, along with detail on the process used to develop these;
    d. In addition (new for 2021) the IESC recommends the development of biodiversity offset management plans to better define offset activities at each of the elevation zone offset programs, identifying roles, key stakeholder engagements, budget projections, a scheduled work plan and deliverables, etc.

5.3 INDUCED ACCESS

5.3.1 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 and in previous IESC reports detailing our 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. The Project's management plans state access by third party vehicles serving operational needs may be sanctioned subject to prior approval from EMPNG, and that 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."

5.3.2 Observations

Ownership of Roads / Infrastructure and Responsibility for Mitigation

EMPNG advises there has been no change to previous updates regarding any requests from the Government related to handover of Project road infrastructure such as the Southern Highway (Gobe to Kantobo road section) and the Kaiam Bridge (see IESC report November 2016, Section 3.2 and Section 5.4.2 p.42-43 for background) – the IESC retains at the end of this section the recommendation noted previously.

EMPNG has completed an internal risk assessment developed in the eventuality of a request for handover of the Gobe-Kantobo section of the 'Southern Highway'. EMPNG intends to develop an MOU with the government to detail commitments for environmental and social protection.

The Project road linking the Kopi shore base to the Kopi Scraper Station at KP was formally handed over to the government in 2016 following their request in 2015.

Access Control - Upstream

Although EMPNG's strategy summarized above is generally to only allow access to EMPNG vehicles, and that access by third party vehicles is only by prior approval, the Access Monitors stationed at the Project's Kantobo to Gobe road essentially continue to allow free movement of vehicles along the 'Southern Highway' section; however, vehicle and destination details are recorded. A similar situation exists at the Project constructed Kaiam Bridge.

EMPNG advises that aerial patrols continue observing the entire RoW – their reports indicate no observed signs of logging adjacent to the RoW/infrastructure, and no bypassing of access control equipment, e.g. driving around locked gates.

Status updates from the Project on specific access measures that differ from the EMP Version 3 (now available on www.pnglng.com) include:

- ✓ The boom gate near KP-12 (Angore Wellpad B track) noted in the 2020 IESC report as having been removed by the community, is now replaced by a manned gate. Prior to being removed, the gate had been left open to facilitate access related to Angore development and to reach the RoW to access CV1. As noted above in PMA1, areas of forest loss have been noted in this area. Previously the Project noted the area had experienced high levels of unrest;
- ✓ At Benaria Station, vehicular access to MLV1 is made possible through continued use of the track and bridge built during pipeline construction. The community also continues to use the bridge, as the government constructed bridge is no longer usable.

As noted in the last report, this IESC report is based on desktop information only, we therefore propose that the next IESC site visit include a road-trip from Moro to Kopi (as has been undertaken previously) to allow direct observation of access controls in place, including verifying presence and function of Access Monitors. Upstream of Moro, in addition to the usual helicopter flyover, the ability to visit and directly observe readily accessible access controls in place (where security allows) would also help provide further assurance to Lenders on the status of control measures in place. This would also allow for on-the-ground observation of reinstatement/regeneration at points along the pipeline RoW where this intersects with the OSL/EMPNG/public road.

Access Control – data collection of Upstream vehicle movements

The last IESC report noted that EMPNG had undertaken a review of how vehicle data were being recorded by Access Monitors, how vehicles were categorized, and how data was quality assured. Vehicle data categorization was to be simplified and standardized with some historical data being regrouped, allowing improved analyses and trends more easily visualized. A complete analysis was to be available for this IESC review/visit. However, the Project report they have had technical issues with the adopted contractor's system.

Once the new approach is working, the Project should ensure that the historical context of observed vehicle use of Project roads reported previously is still valid and comparable to new data.

High level data for 2020 provided by the Project shows the Southern Logistics Route is mostly used by private vehicles, rather than 2019 used most often by OSL and their contractors – EMPNG explains this is likely due to a reduction in both PNG LNG and OSL vehicle usage dur to COVID-19 restrictions to work activities through the area. Note: vehicle data breakdown/analysis from Benaria Station Access Monitor is no longer provided, last dataset seen was 3rd quarter 2015) and no data presented from the manned gate now at Angore track to Wellpad B.

Access Control – LNG Plant

Previous IESC reports have noted repeated vehicular incursions into the pipeline landfall RoW area during 2018-2019, with evidence of mangrove trees being cut and extracted. During 2020 concrete blocks were placed blocking off the vehicular access route and this has stopped people driving into the area. The Project reports there has been a reduction in local people accessing the area and there is now minimal mangrove harvesting.

EMPNG Community Affairs and Field Environmental Specialists continue with community liaison messaging, multi-lingual signs have been installed and surveillance is undertaken by Security using fence-line CCTV.

5.3.3 Recommendation

1. As previously, EMPNG should ensure as part of any negotiations with the PNG government regarding transfer of ownership of roads/infrastructure that every effort is made 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.

5.4 REINSTATEMENT AND REGENERATION

5.4.1 Project Strategy

EMPNG's objectives are to promote regeneration of temporary work areas disturbed during construction and achieve vegetation succession according to established benchmarks. Where new ground is disturbed, the objectives are to establish stable landform conditions and create ground conditions conducive to natural regeneration to then achieve vegetation succession as above.

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. Project-affected areas undergoing natural restoration are visited, and progress compared against benchmark sites determined previously. The methodology is detailed in Appendix 3 of the Upstream EMP available at ww.pnglng.com, and supplements EMPNG's regular aerial assessments of regenerating areas to check for evidence of encroachment or slope failure.

5.4.2 Observations

5.4.2.1 Reinstatement & Revegetation

As this review is a desktop review, the IESC is not able to provide direct observations on reinstatement/revegetation progress. As noted in the Induced Access section above, the IESC proposes a road-trip between Moro and Kopi

during the next IESC visit as this would also allow for on-the-ground observation of reinstatement/regeneration at points along the pipeline RoW where this intersects with the OSL/EMPNG/public road. Coupled with the usual helicopter overflight, this will allow IESC to report more fully on reinstatement in the next IESC report.

At Komo, reconstruction of slopes and drainage channels is ongoing following extensive site damage from the 2018 earthquake, as discussed in Section 4.4 above. Active revegetation will occur in the green areas of Fig 4.5 to stabilize soils shortly after ground preparation. During seed application, and to avoid any unintended seed being dispersed through drainage offsite, the Project confirms that hydro-seeding will only be undertaken when it is dry, and the forecast is for dry weather for the duration of the application drying process. In addition, any run-off from subsequent rain events is controlled by sediment and siltation traps, such as coir logs, which are monitored daily. The Project is overseeing the hydro-seed application and will monitor to determine success or whether re-seeding or fertilization is necessary. The strike rate is estimated at 1 month, and the sooner the seeds germinate, the sooner some stability is provided to minimize sediment run-off and loss of topsoil (or biotic seed media equivalent).

Seed import permits for Couch and Carpet grass seeds were provided. The Project confirms they have assessed the invasive characteristics of seed species being applied, and the selection of species was based on guidance developed by their external weed specialist consultant at the time when Komo was originally being revegetated. Japanese Millet used extensively at Komo following airfield construction is not being used this time. Vetiver is also being used at Komo, and the Project advise control measures applied at Kopeanda Waste Facility will be applied at Komo (vetiver has been used for some time at Kopeanda in the water filtration ponds downstream of the landfill). Vetiver was sourced from within PNG so no import permit was necessary.

5.4.2.2 Regeneration Monitoring

Static photo points to monitor LNG Plant mangrove restoration were setup several years ago. For 2020's desktop review, EMPNG was able to provide comparative photographs of mangrove restoration progress but these were not available in time for this review. See Access section above, for updates on tackling the issue of mangrove harvesting at the pipeline landfall RoW.

In the Upstream area (from Hides to Kopi) findings from the BRC regeneration surveys undertaken in February-March 2019 were presented and the report provided to IESC. The same methodology has been used consistently across the 2015, 2017 and 2019 surveys. A total of 63 plots were assessed, across 12 vegetation types, plus 6 transects for each forest type. Headline conclusion is that the recovering RoW vegetation is regenerating as expected on the succession path towards forest restoration, apart from two areas of note:

- ✓ firstly, areas of high grass cover at low and mid elevations (versus what would be expected on the succession path for those vegetation types); and
- ✓ secondly, the Project Non-Conformance incident report last year where 204 km of the forest alongside the RoW was accidently cleared of primary and regenerating forest (by EMPNG's community Clan Caretaking whilst doing RoW maintenance). South of Moro, this affected 14 of the usual regeneration plots used as part of BRC's regeneration surveys, and are still noted in the 2019 survey as a critical area requiring attention. Post-incident investigations have identified actions to avoid this reoccurring; some actions are complete, some currently ongoing.

Some areas in the lowlands have now reached the species composition and biomass equivalent to an early secondary benchmark reference plot but has not yet occurred at higher elevations. The IESC concurs with the Projects approach which is to continue the regeneration surveys 2-yearly until tree dominated vegetation reaches the entire RoW. The Project also advises that the accidentally cleared plots will continue to be monitored separately in 2021 to assess long term vegetation recovery. The next BRC survey is planned for Q1 2021, and ideally the report will be available in time for results to be presented to IESC early 2022.

5.4.3 Recommendation

There are no recommendations on this topic at this time.

5.5 INVASIVE SPECIES, PESTS AND PLANT PATHOGENS

5.5.1 Project Strategy

EMPNG's objectives are to prevent invasive species (i.e., priority weeds and pests) and plant pathogens from entering or becoming established in (or in the vicinity of) their facilities and infrastructure, and contain existing priority weeds, pests and plant pathogens already present. A Weed Identification Manual has been developed, the Weed Monitoring Protocol revised (as per the revised audit approach in 2018), and a Register of Invasive Species,

Pests and Pathogens was previously kept to track any changes in invasive species type, abundance and distribution (previously updated through external specialist audits). Now, records are made by EMPNG's external contractor MosquitoZone and staff members where weeds are noted and control measures performed.

The project footprint is split into separate Weed Management Zones (WMZs), each delineating broad ecological units based on previously understood patterns of distribution and abundance of weed populations; these zones were used for the phased mitigation approach as pipeline construction/reinstatement progressed through the Project area. 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; P3 weeds are deemed low risk, receive minimal attention and may provide value in soil stabilization during regeneration.

EMPNG commits to manage the threat of spread of *Phytophthora cinnamomi* 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.

5.5.2 Observations

5.5.2.1 Weed inspection and control

The new contractor with the remit for weed management is now in place (ISOS), with previous contractor staff retained and re-hired by ISOS. ISOS typically provides health, occupational health and medical services including medical evacuation and their expertise in specialist weed management services is not apparent. Following the recommendation in last year's report, the new contract with ISOS now includes weed management along the pipeline RoW not just above ground installations. The intention is that weekly/monthly control visits are undertaken, and weeds controlled via manual removal or chemical treatment. Reports on activities and findings are reported weekly by ISOS.

Lenders will recall previous IESC reviews trying to gain an understanding of the distribution, abundance and spread of weeds, what ecological risks might arise from weeds observed in areas where they weren't seen previously, locations where weed control is particularly challenging, updates on priority areas for P1 high priority weeds control, etc. This information is still not being presented. EMPNG has provided an updated weed register with no analysis of weed control data.

As reported a number of times in previous IESC reports, access to key priority areas by the weed inspection and control contractors has been hampered by logistical (e.g. availability of cars) and security challenges. Then in 2018 the earthquake meant that some areas were inaccessible, although at the same time vast expanses of areas newly uncovered ground would allow any weeds the opportunity to rapidly spread. In 2019, security and earthquake recovery efforts also meant difficulty in accessing areas and availability of vehicles to visit weed inspection/control areas. In 2020 security and the COVID-19 pandemic meant that weed inspection/control was further hampered. It is clear some of the events noted are outside of the control of the Project, however the IESC perceive a lack of prioritization of resources available for widespread weed inspection, control and analysis. The consequence of restricted weed inspection and control across the Upstream footprint means there are large expanses of the Project's footprint, including priority ecosystem areas such as the Homa Benaria Ridge, where regular systematic weed inspection and control has not occurred for several years. This is therefore noted as a Level 1 Non-conformance in the Issues Table as the IESC is required to flag the issue to Lenders. The current situation is not consistent with stated commitments in the EMP, and it is unclear whether the situation represents an immediate threat or impact to priority ecosystem areas.

5.5.2.2 Specialist Weed Audits

The 2019 weed audit survey report by BRC was provided to the IESC in mid-2020 and detailed feedback was provided to the Project.

The study seeks to assess Upstream-wide species diversity and population size of priority weeds, any areas of high density of weeds and provide advice on weed management, information on new weed species, population changes and range extensions, and monitor trends in weed diversity and abundance over time.

This is the second such audit using this methodology. A total of 367 transects (of 500m^2 each) were undertaken across four altitudinal zones in the Upstream area: Lowlands (0-110 m), Foothills (110-1250 m), Lower Montane

(1250-1750 m) and Higher Montane (1750-2750 m). P1 species represented 10-16% of all weeds in each of the zones. In each zone, two species represented over half of all Priority 1 records:

- ✓ Lowlands and Foothills: *Ludwigia leptocarpa and Piper aduncum*;
- ✓ Lower and Higher Montane: *Desmodium sequax and Piper aduncum*.

Piper aduncum is the most abundant P1 species across the whole surveyed area, representing 25-43% of P1 records in each elevation zone, and thus BRC recommends a more focused control of *P.adumcum*, especially in the Foothills zone. Between 2018 and 2019, the study noted a 15% decline in the overall number of weed species per transect, although 2 data points is a limited dataset from which to draw a broader conclusion. The study did not detect any significant population increase or new arrivals of P1 species.

During review of the study report, one area the IESC flagged was that the study's conclusions were primarily drawn from the two years of surveys, and yet some conclusions would have benefitted from reference back to Pre-Construction Survey baseline studies. For example, the study assumes populations of *Ludwigia leptocarpa* to be stable, but this was based on only the two years of data gathered using BRC's methodology. As the study assumed the species to be stable, it recommends the species does not require active management at present. The IESC would caution that a longer-term comparison to PCS weed distribution would also be valuable, allowing additional context for a population perhaps now established in an area where it might not have been present previously. Note: *L.leptocarpa* was primarily absent from large parts of its current distribution and is a plant that has opportunistically expanded its distribution via cleared ground during pipeline construction – the Project has itself flagged the changes observed in its distribution since early IESC reviews. The Project did clarify that not all recommendations in the study would be adopted. Secondly, it presents the need for active control based on the effort required to mitigate already widely established species, rather than the risk of environmental harm and potential for system-wide impacts. This would seem to differ from the already established system of risk-based weed prioritization described within the EMP.

The next weed audit survey is planned for end of Q1 2021.

5.5.2.3 Cane Toads

As reported in the last few IESC reports, cane toads (*Rhinella marina*) are becoming an increasingly challenging invasive species in the Upstream Highlands area. This toxic pest affects native fauna that die due to ingestion of their poison and can create imbalance across ecosystems wherever they are found. Following the detections of cane toads at Kopi Shore base during construction, at Tamadigi (around 2012/13), in Moro-B in 2015, at HWMF in 2016, and HGCP in 2018, a recorded increase in the number of sightings at HGCP and HWMF has prompted an increased Project response.

The Project's cane toad program strategy is to limit the introduction of cane toads into priority ecosystems (Hides Ridge, Homa-Benaria Ridge and Lake Kutubu WMA). The program approach is three-fold:

- ✓ Prevention: talking posters and awareness raising brochures in English, Pidgin and Huli; ongoing vehicle/cargo and ground inspections; inspection quality and process verification;
- ✓ Detect: encouraging sightings/reporting/mitigation by project personnel; ongoing data collection and analysis;
- ✓ Respond & Recover: implementation of Cane Toad Management Procedure; targeted focus on vehicle/cargo and ground inspection where necessary.

Target areas for prevention, detection and response are the HGCP, the Hides vehicle-washdown facility, the Hides Waste Management Facility at Kopeanda, Moro, Komo and Angore. The Project has gathered a lot of valuable data, collating and categorizing findings for eggs/tadpoles and juveniles/adults. Observed number of juveniles/adults are quite staggering; although some sites only report 10's of cane toads a month, others such as the Hides Waste Management Facility are recording 10's of thousands of juveniles/adults a month.

The Project confirm they continue to receive external specialist guidance and advice (as noted last year) and have adjusted management protocols to include additional target locations. As cane toads were in PNG prior to Project construction, it appears EMPNG is currently taking reasonable mitigation measures to try to address a very difficult challenge. Key from a Lender risk perspective is that the Project continues to receive specialist advice from external experts and acts responsively to their recommendations.

5.5.2.4 Invasive Fish

An ongoing EMPNG environmental compliance incident (ECI) is the large number of fish (Carp and Tilapia) being found in the STP ponds at HGCP. The incident was first observed in 2019 when fish were found dead within the ponds. These are invasive species, contrary to EMP and Lender requirements and conditions within the

Environmental Permit. EMPNG continues to monitor and remove fish from the STP ponds and discharge areas within the fence.

The Project has installed barricades and surveillance cameras so try to rule out the possibility that someone physically put the fish in the ponds (although the presence of such cameras might be a deterrent to any guilty party re-approaching the ponds to extract fish). The Project is attempting to prevent the spread of fish and/or fish eggs outside of the facility through the installation of gillnets in the ponds, and sediment traps and screens installed at drainage discharge points. Vegetation is removed from in and around the pond to avoid fish eggs becoming trapped and hidden. The ponds are regularly inspected, and an Inspection procedure is being developed. Any fish or fish eggs found are scooped out, reported and burned. EMPNG is considering a long-term response is to manage and control the fish population, whilst minimizing any impact. Fishing nets were found on site in Q4 2020.

EMPNG states they are not monitoring downstream outside of the fence, although external aquatic experts are reported to have affirmed the Project's approach – it is not clear whether the experts advised on any potential detrimental ecological impact downstream and the IESC recommends this be better understood from a specialist aquatic ecological perspective. This is especially important if it is now a long-term problem.

5.5.2.5 Dieback

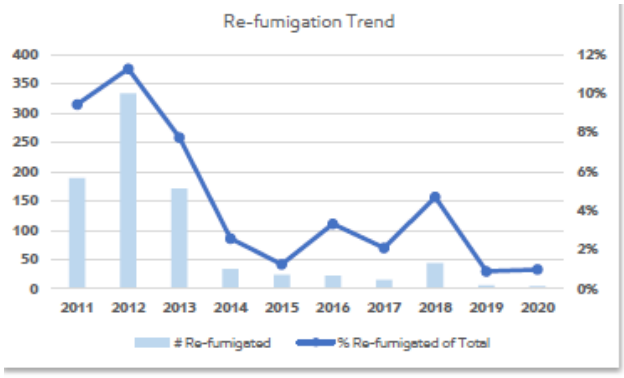
As noted above in Section 5.2.2.1 when discussing results from the PMA3 biodiversity surveys, worsening dieback in *Nothofagus* trees along the forest edge on Hides Ridge has been observed over the last few years. This could potentially be due to the plant pathogen, *Phytophthera cinnamomi,* to which *Nothofagus* trees are particularly susceptible. EMPNG should consult appropriate pathogen experts to determine whether specialist sampling at dieback sites on Hides Ridge for exotic Type A2 is warranted – note Type A2 had only previously been recovered at sites below the HGCP, and measures such as the vehicle washdown were implemented to avoid Type A2 reaching and affecting the Hides Ridge priority ecosystem. As noted in the Esso Highlands Ltd 2013 report, 'Understanding and Management of *Phytophthera'* manual, Type A2 is a relatively recent introduction to PNG and the full potential impact of this mating type on native vegetation is not yet known. Therefore, consideration of a sampling program and reinforcement of necessary mitigation measures would be prudent.

5.5.2.6 Quarantine

The National Agriculture and Quarantine Inspection Authority (NAQIA) is the public-funded institution under the Ministry of Agriculture and Livestock whose role is the protection of Papua New Guinea from infectious pests and diseases that have the potential to seriously harm our unique animal and plant life and affect economic growth.

Prior to construction, a Lender concern was to ensure the project did not increase pressure on NAQIA resources, hence the IESC has tracked the number of NAQIA inspections of EMPNG-related imports.

The number and volume of import shipments has reduced since the main construction period. EMPNG's own data and table included below represents the numbers of shipments, and the need for NAQIA inspection and refumigations. Over time, the proportion of containers (as a proportion of those NAQIA inspect) requiring further refumigation has decreased, as EMPNG shipping contractors and suppliers have gradually adopted the practices required of them. Indeed, the number of re-fumigations required in 2020 was the lowest since start-up. The Project is to be commended on the information processes they have developed over time, to better understand why inspections may be occurring, and why re-fumigation might be required. Any re-fumigation is now investigated and discussed with NAQIA, who now in turn are prepared to discuss details with the Project, so an overall improved quarantine system has resulted.



CUMULATIVE SUMMARY : 2011 - 2020					
YEAR	# Shipments	# Inspected	# Re-fumigated	% Inspected	% Re-fumigation
2011	2000	1407	189	70%	9%
2012	2962	2413	334	81%	11%
2013	2204	1112	171	50%	8%
2014	1316	283	34	22%	3%
2015	1904	341	24	18%	1%
2016	690	111	23	16%	3%
2017	762	119	16	16%	2%
2018	935	259	44	28%	5%
2019	1301	93	6	7%	1%
2020	**878**	**12**	**3**	**1%**	**1%**

Figure 5.2: Summary of Project-Related Shipments, NAQIA-Required Inspections and Re-Fumigations

Table 5.1: Summary of Project-Related Shipments, NAQIA-Required Inspections and Re-Fumigations

5.5.3 Recommendation

1. Regarding the invasive fish incident at the HGCP STP ponds, EMPNG should consult specialist aquatic ecology experts to determine and advise on the potential for detrimental ecological impacts downstream if fish or fish eggs were to have escaped beyond the fence boundary. If necessary, inspections and monitoring downstream of the ponds should be considered to determine any escape or deleterious impact, and ensure any escape is fully understood.

6 SOCIAL

6.1 LAND ACCESS, RESETTLEMENT, AND LIVELIHOOD RESTORATION

6.1.1 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 (PS) 5.

6.1.2 Observations

6.1.2.1 Pipeline Resettlement Recommendation

The IESC 2019 recommendation that the Project could complete its existing resettlement responsibilities (one remaining household displaced for pipeline repairs) by resolving one issue and documenting the results. This has been done, thus Project has no additional responsibility for this household.

6.1.2.2 Resettlement Required for Angore Wellpad C and Hides Spineline Exclusion zone

The table below shows the resettlement impacts for Angore Wellpad C and the Hides Spineline Exclusion zone.

Table 6.1: Affected Economic Assets

Location	Physical displacement	Auxiliary Structures	Gardens	Status
Angore Wellpad C (Wellpad Construction & Buffer Zone)	11	6	77	• RAP Addendum Accepted by IESC, • Cash compensation obligations completed, • Some in-kind compensation unable to be attained at this time, • Outcome evaluation to be conducted when staff able given COVID-19 restrictions.
Hides Spine line Exclusion Zone (Landslip)	0	3	17	• RAP Addendum Accepted by IESC, • Agreement with Households Concluded, • Compensation Payments are ready.

6.1.2.3 Reorganization Implications

Land & Community Affairs (L&CA) now reports directly to the Operations Manager to facilitate responses of the day-to-day operations that drive land and community affairs issues and most benefit from L&CA mitigations. The Operations Manager oversees Land and Community Affairs assets while the Asset Manager coordinates all activities impacting the Project's asset (individual projects, wells, SHE, etc.).

6.1.3 Recommendations

None arising from this review.

6.2 COMMUNITY IMPACTS MANAGEMENT AND SECURITY

6.2.1 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;
- ✓ maintain a monitoring and evaluation program that is community-based, participatory, and transparent and covers all phases of production and decommissioning; and
- ✓ Elements of the Production Community Development Support (CDS) 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.

6.2.2 Observations

Tribal conflicts in the Upstream areas continue to be relatively calm. The Project's CDS Law and Justice component and other entities continue to support programs focused particularly on youths with the aim of reducing conflict over the longer term. The Project is cooperating with the United Nations PNG Highlands Joint Programme *Converging Toward Peace & Development* with a focus on Hela and Southern Highlands provinces. The three-year Programme is administered by a Multi-Partner Trust Fund consisting of the Government of PNG, the European Union, USAID, FAO, UNICEF, UNDP and the UN Peacebuilding Fund.

The Programme Document *PNG Highlands Joint Programme for Peace and Development* notes "Recognising the presence of sizeable private sector presence (Oil Search and ExxonMobil) in both provinces involved in community development efforts as well as supporting government service delivery…. it is vital for the programme to collaborate with these actors." The Programme level outcomes, to which the EMPNG project will contribute in various ways, are:

- ✓ Communities affected by conflict in the Highlands have increased capacity to promote and demand for peace and social cohesion;
- ✓ Highlands' communities and households have improved resilience to manage risks and mitigate shocks from conflict and man-made/natural disasters;
- ✓ Traditional/non-traditional leaders and service providers have enhanced knowledge and skills to integrate peacebuilding and human rights strategies into service delivery in conflict affected areas in the highlands; and
- ✓ Public institutions in the Highlands have people-centered, proactive and transparent/accountable systems to support effective leadership that promotes peace, security and human rights.

6.2.3 Recommendation

The IESC requests that it receives more detailed information on the Project area Highland community security situation and conflict between clans and communities for the next IESC review.

6.3 COMMUNITY DEVELOPMENT SUPPORT PROGRAM

6.3.1 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. The objectives of the CDS program apply also to project functions undertaking other 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.

6.3.2 Observations

6.3.2.1 Governance – Project Wide Community Development Support Contributions

The IESC 2019 Report recommended that all community development support activities, whether implemented by CDS, another Project unit or the Project as a whole, should contribute to the overarching goal of "promoting development of conditions conducive to enhancing economic self-reliance of individuals while also mitigating potential project impacts." Selection of activities should be based on the potential of the activity to contribute directly to achieving the overall Project community support goals and each selected activity should be evaluated and reported on through a collective process. To accomplish this, a special committee (perhaps a community development Stewardship Committee) is necessary to coordinate activities and to give final approval for projects the various units will implement.

The Project has made significant progress toward achieving such a comprehensive and coordinated program.

In terms of governance and internal structure, CDS and National Content now report directly to the Production Manager in an effort to elevate their visibility from being embedded in a support function to a direct line to Senior Leadership. In addition, a number of cross functional committees have been established and are active, including:

- ✓ **Strategic Community Investment Coordination Committee** (SCICC) meets monthly to align on community investment activities across business unit;
- ✓ **Asset Teams** (Upstream and plant site) meet quarterly to provide oversight on community issues and engagement and CDS program execution. Asset Managers represent:
  - Land & Community Affairs,
  - Global Projects Team,
  - Public & Government Affairs,
  - Security,
  - SHE (Environment),
  - Medicine & Occupational Health,
  - Procurement/Controls, and
  - National Content CDS (Secretariat).
- ✓ **National Content Coordination Committee** (NCCC) has overall oversight and meets every other month to review progress on National Content related programs.

In addition to coordinated planning, efforts are underway to "develop a standard progress and outcome format for use by each of the CDS components irrespective of which function implements them to enable the Project to assess progress toward achieving the overall goal of its community development support", as recommended by the IESC. For example, one of the key outcomes of the CDS and National Content Refresh and MOC process is development of metrics and an M&E Framework which are in progress.

6.3.2.2 2020-21 Main CDS Activities

Upstream

CDS activities were reprioritized in March 2020 to shift focus to helping Project Area COVID-19 response. Main Project contributions include:

- ✓ Supported Hela Provincial Health Authority in their COVID-19 awareness roll out;
- ✓ Provided support to key health facilities in Hela project area (donation and food support);
- ✓ Provincial level engagements with Provincial Administration and Governor:
  - Education and Health still remain priority for the province,
  - Texas Children Hospital (TCH) partnership with other development partners to address Health, and
  - Tari Market development.

Upstream Community Livelihood Support

The livelihood strategy development was put on hold due to COVID-19 and Management of Change (MOC) in progress. Livelihood project activities were reduced to focus on the fresh produce market support in Hides and Juniarea. Paja'ipa Women's Agribusiness Group continued to facilitate the fresh produce market with the communities.

CDS plans to construct a market at Hides-Well Pad A in 2021.

Upstream Education

The Business and Professional Women's Club Scholarship was rolled out in 2020. More than 860 applications were received. Of the 40 shortlisted applicants, 29 are from the Upstream and majority of those from Hela Province.

The Project funded replacement of a new staff house at Kutubu school to replace the staff house damaged by the earthquake.

Upstream Health

In response to a request by the Hela Provincial Health Authority, the Project replaced the previous hospital at Tari, the center of Huli country in Hela, that did not meet National Health Services Standards for a provincial hospital. The Project also provided sterilizers to the hospital.

The Project also supported the Hela Provincial Health Authority in its response to COVID-19 by printing posters for health workers to use in the awareness campaign with communities and donations of WASH kits and cleaning materials to Tari Hospital and other Project area health facilities.

Upstream Law and Justice

The Project continues to support sports programs that promote community cohesion. For example, since the establishment of the Rugby League in Komo, tribal fighting in the area has greatly reduced. Participation in the Komo League is popular among youths, especially since two of its players were selected to represent Hela in the National Rugby League Competition. Advantages of having a Rugby League are spreading, as now the Angore communities are in the process of starting an Angore community league. The Provincial Government, through the Governor's office, is supportive in advancing this program throughout the area.

The Project is cooperating with Government and Development Partners to improve Law and Justice, partly as a result of the earthquake recovery support and peace discussions. The largest of these programs is the three-year PNG Highlands Joint Programme for Peace and Development that is targeted to the provinces of Hela and Southern Highlands. See Section 6.2.2 above for additional information.

Plant Site CDS

As in the Upstream Project areas, CDS work with Plant Site communities, schools and local government was re-prioritized to provide support in their response to COVID-19. At this stage in its program, CDS has been able to rely on its strong relationships with key stakeholders such as:

- ✓ Women's Groups (Sewing/ Agriculture/ Cultural revival);
- ✓ Youth and Sport Groups;
- ✓ LLG Ward Councilors;
- ✓ Community Police Post;
- ✓ Community Health and Education Institutions in the communities;
- ✓ Provincial Government, and
- ✓ Central Province Health Authority.

The sections below give an overview of Plant site area CDS supported activities not directly related to COVID-19 response assistance.

Plant Site Livelihood Support

The Women's Sewing Group, consisting of women from the four LNGP communities, were engaged to sew face masks for schools. The 2,700 masks sewn were distributed to 19 schools at the LNGP area. The Group is facilitated through Advancing PNG Women's Leaders Network.

CDS is currently having discussions with Central Province Fisheries to work with them, Gas Resources (GR) Directors and LLG (village) Councilors to set up fisheries cooperatives. The process involves updating the plan

developed in 2019 to progress establishment of a Fisheries Corporative and to provide support to Buria Police Post with Jetty incursion monitoring and other law & order activities.

Plant Site Education

The following projects were identified through collaborative engagements with the Gas Resources Directors and the newly elected village councilors. Projects include:

- ✓ Staff houses at Lealea Primary School and Redscar High School – have been completed;
- ✓ New fencing for Boera Primary School – has been completed; and
- ✓ New Porebada Elementary classrooms – has started.

Plant Site Health

A rapid engagement with plant site schools identified 19 schools needing support. Support from CDS included:

- ✓ To each school: provision of soap, hand wash stations, infra-red thermometer and face masks for teachers and students;
- ✓ Papa Primary School, Lealea Primary School and Redscar High School were provided first aid centers, along with basic first aid training for two teachers in each school;
- ✓ Collaborated with village councilors to establish COVID-19 community awareness booths in each village.

Plant site law and justice

The Project continues to work closely with the Department of Transport, RPNGC, local Government officials from the four villages, EM's Village Liaison and CA officers and Security and Operations to monitor and identify fishers trespassing into the jetty's restricted zones. As part of this effort, the Buria Police Post Officer has been conducting awareness to fishers on not fishing at the Terminal and the Department of Transport and PNG Police have been assisted to establish billboards advertising the ban on fishing near the Terminal. These coordinated efforts resulted in a favorable downward trend in fishermen trespassing into the restricted zones with only four incidents by December 2020.

6.3.3 Recommendations

None arising from this review.

6.4 NATIONAL CONTENT PROGRAM COMPONENT

6.4.1 Project Strategy

A key objective of the Project's National Content (NC) 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 the PNG works will be in accordance with the requirements of this Exhibit and relevant law. The first priority is to be given to local persons (proximate to Company locations), while the second priority is to regional citizens, and third priority to persons elsewhere in PNG. It also specifies that the contractors should give preference to local LANCOs for provision of employees.

6.4.2 Observations

6.4.2.1 Reorganization Implications

National Content now reports directly to the Production Manager in an effort to elevate its visibility from being embedded in a support function to a direct line of sight to Senior Leadership. CDS remains with National Content. These two programs are broader than Land & Community Affairs (L&CA), thus being tied to the Production Manager enables better cross functional integration.

6.4.2.2 National Content Team

During 2020, the Project refocused the National Content strategy to capture opportunities noted during the Production phase that will help expand long term value for key stakeholders and the project. A new National Content

team was formed under the Production Manager to elevate NC and accelerate implementation of the updated NC strategy. The Team's purpose is to drive leadership and execute the updated Strategy in a more focused manner and place National Content into the Project's larger effort to bring benefits to communities and Country. The new National Content Team consists of the following members:

- ✓ National Content Manager;
- ✓ National Content Senior Advisor National Content Analyst;
- ✓ Community Development Support (CDS) Lead;
- ✓ CDS Analyst Upstream;
- ✓ CDS Analyst.

6.4.2.3 Workforce Statistics

PNG Nationals now compose 91% of the Project's workforce. The actual number of PNG staff is down to 2,539 Nationals from 3,964 at the end of 2019 due to demobilization of project work in response to COVID-19 impacts. The actual proportion of PNG Nationals in the workforce, however, is the highest since the Project began. Of the 91%, 46% come from the Project Impact Areas. In terms of gender, females account for 20% of the PNG workforce, 25% of whom are in the field (the highest percentage in EM projects worldwide) and females in management roles rose to 24%.

6.4.2.4 Competency Enhancement

In terms of Competency Enhancement, 86,000 training hours were delivered in 2020, consistent with prior years despite COVID-19 constraints. Employee development was also enabled via the supervisor network and employee development forums, the mentoring program and staffing and development processes. The focus on building leadership and supervisory skills was enhanced. A second year graduate management program assists in early identification and accelerated development of leaders for support organizations.

Highlights of 2020 training include:

- ✓ 60 PNG employees now in leadership roles;
- ✓ 9 Supervisor roles nationalized in 2020;
- ✓ PNG Machinery Engineer selected to support EM in Guyana, and
- ✓ 2 PNG employees on Expat assignments.

The Project also worked with its Suppliers to nationalize/eliminate >10 expat roles.

6.4.2.5 Operations and Maintenance (O&M) Progress

Achievements include:

- ✓ 100% PNG Citizen Operations Technicians in Control Rooms, Plants, Well pads and Pipeline; Pipeline Supervisors (1st female O&M supervisor);
- ✓ Pipeline and HGCP Ops Shift 3 fully nationalized;
- ✓ LNGP Operations lead roles -100% occupied by PNG citizens (3/8 Female);
- ✓ Maintenance lead roles – 4/12 positions occupied by PNG citizens (2 Instrument, 1 Electrical, 1 Mechanical);
- ✓ CAS Craft Field Assessors –36/78 (46%) are PNG citizens (6/36 Female);
- ✓ Five O&M Technicians on broadening assignment in 2020 -Technical Writer, EMIT, OIMS, Contract Administration; and
- ✓ Three Operations Technicians assigned to Marine (2 Female).

A Talent & Development Committee is focusing on growing the future for PNG Citizen leaders. O&M Technicians are included in this effort.

The Operations Support – Training team is partnering with Kumul Petroleum Academy (KPA) for continuous improvement of course material and training support. The Operations Support – Training team is also updating Facility Specific Training (FST) instructor lead training material and converting induction packages to eLearning modules.

Intake 6

During 2020, O&M Intake 6 sponsored 17 Operations Trainees (15 Operations, 2 Marine) at KPA. The Junior Technician training program that started in March 2020 will be finished at the end of March 2021. The Project plans for these trainees to join EMPNG in June 2021. Trainees are composed of 5 females and 12 males, of which four are from the project impacted areas.

Intake 7

Recruitment for Intake 7 began on 8 January 2021 with a target of up to 22 trainees (14 Operations, 2 Marine, 6 Instrumentation) and a plan to commence Junior Technician program at KPA in April 2021.

6.4.2.6 Additional Professional Development Support

A number of virtual efforts to assist in professional development are made available to staff. Examples include:

- ✓ **Supervisor Network** – provides supervisors with information to get the best out of their teams and themselves as leaders;
- ✓ **Employee Development Forums** - focus on important information and guidance for employees to get the best out of their careers and themselves as individuals and promote learning resources/modules in the weekly newsletter;
- ✓ **Mentoring Program** - provides employees opportunity to broaden their knowledge base in partnership with seasoned senior staff in the organization;
- ✓ **Toastmasters Program** – continues virtually to help grow communications skills;
- ✓ **LCM annual awards** to recognize and reward staff practicing outstanding core value behavior. Candidates for awards are nominated by the Country Leadership Team and selected by the Country Leadership Team; and
- ✓ **Financial Planning Training** - Second installment of Financial Planning Training for staff with 1-on-1 personal financial coaching.

6.4.2.7 Local Procurement and Supplier Development - Highlights

- ✓ EMPNG has spent over PGK 4.6b in-country during Production to date with almost PGK 2.9b with Papua New Guinean businesses and PGK1.4b spent with Lancos;
- ✓ In 2020, more than PGK 817 million spent by EMPNG in-country, of this over PGK 311 million with Lancos;
- ✓ 211 Papua New Guinean owned businesses (including 15 Lancos) engaged by EMPNG for production-related activities;
- ✓ In-country spend has increased by > 50% and number of businesses engaged doubled since first Production; and
- ✓ To date EMPNG has invested over PGK 27 million in PNG business development through the IBBM Enterprise Centre (EC).

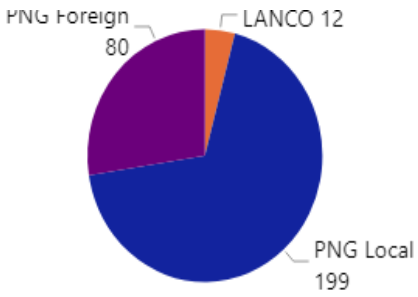


Figure 6.1: PNG Staff

During 2020, the Project accomplished the following actions:

- ✓ Updated EC plans to enable self-sustaining operations;

- ✓ Revised National Content Exhibit for contracts;
- ✓ Localized maintenance lifting & hoisting services;
- ✓ Awarded LNGP grass cutting scope to LANCO (Laba);
- ✓ Moved to using PNG business Total Waste Management incinerator providing offsite waste disposal capacity, and
- ✓ Presented Inaugural Contractor NC Award to HESL.

6.4.3 Recommendations

Community Development

1. The last report recommended that a standard progress and outcome format be developed for use by each of the CDS components irrespective of which function implements them to enable the Project to assess progress toward achieving the overall goal of its community development support. CDS undertook a refresh during 2020 with one of the key outcomes being development of metrics and M&E Framework that are currently underway. The IESC looks forward to the opportunity to discuss the metrics and framework as they are developed.
2. The IESC requested in its 2019 Report that future presentations and documents all contain either a list of acronyms or the full name given with the acronym the first time it is mentioned. This was not done for the 2020 Audit, thus the IESC requests that it be done for the next IESC Audit.

National Content

None arising from this review.

6.5 STAKEHOLDER ENGAGEMENT AND COMMUNITY GRIEVANCE MANAGEMENT

6.5.1 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.

6.5.2 Observations

6.5.2.1 Engagement Overview, January - December 2019

The number of community members participating in engagements in both highlands and plant site area during 2020 decreased from recent years because of COVID-19. Comments and issues, however, are still being communicated to the Project via letters and email. The table below shows the number of engagements and communities by Project area.

Table 6.1: Community Engagements in 2020

Location	Engagements	Attendees 2020	Attendees 2019
Upstream	4,273	31, 667	58,500
LNG Facility	1,065	4,814	7,623
POM Area	70	165	203
Totals	**5,408**	**36,646**	**66,326**

6.5.2.2 Issues and Grievances Overview January - December 2020

Issues

Issues decreased to 513 in 2020 compared to 791 in 2019. The decrease is attributed to improved stability in the Highland areas, as well as COVID-19 related impact such as fewer work fronts and reduced opportunity for engagements. The majority of issues raised are concerned with land access and compensation (26%), economic (17%) and social (13 %).

Grievances

Only 16 grievances were lodged in 2020 continuing the significant decrease in grievances (18 in 2019) compared to previous years. All 16 grievances were closed within the 100-day closure timeframe. Meeting the closure target is attributed to good team collaboration intra-P&GA (Public and Government Affairs) and cross-functional communication and coordination.

6.5.3 Recommendations

None arising from this review.

6.6 STATE CLAN BENEFITS INTERFACE - UPDATE

6.6.1 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 in its effort to pay landowner State Cash benefits in accordance to the laws of PNG. Its main challenge in this objective is to help ensure safe, accurate, timely and effective delivery of cash benefits without having any actual control over the process. The IESC notes that the Projects' assiduous documentation of its support for the benefit sharing process is critical for risk management.

6.6.2 Observations on Status

The Project's strategy remains to mitigate near-term risk, support resolution of underlying issues, and capture lessons for potential future projects. To these ends, the Project continues to engage in positive engagements with CoVs, PNG Government and other stakeholders. The involvement of the Judiciary in the process of determining benefit recipients remains a challenge.

The information given below is the Project's best understanding regarding the status of benefits distribution. Benefits distribution and related LOBID / ADR processes are government managed and executed. EMPNG provides logistical support to government activities as appropriate.

2020 Status

Downstream

- ✓ PGK11.42M of Royalties and Equities released 4th Quarter 2019;
- ✓ A total of PGK22.2M has been paid since 2017; and
- ✓ All downstream payments have been cleared.

Upstream areas in progress

- ✓ PDL 7: State lawyers set aside interim injunction in October 2020; account opening completed December 2020; pending Director Elections – Expecting Payment in the 2nd Quarter 2021;
- ✓ PDL 1: State releases PGK19M to court plaintiffs in December 2020 – this compromising to withdraw court injunctions to start account opening. 14 Matters still before the courts;
- ✓ PDL 8: ADR report completed 4 of 5 blocks; Awatangi block under dispute and subject to Ministerial Determination (MD); ADR report and mediated agreements uplifted from courts for Ministerial Determinations. Status - Pending Ministers action;
- ✓ PDL 9: Juha field CVP / LOBID work complete. The final report for Ministerial Determinations is pending Ministers action; and
- ✓ PL 4: All pipeline segments completed in October 2019. Payments done in the 1st Quarter 2020 for Segments 7- 4. Payments for Segments 3-1 are expected in the 1st Quarter 2021.

6.6.3 Recommendations

None arising from this review.

7 LABOR AND HUMAN RESOURCES

7.1 LABOR AND WORKING CONDITIONS

7.1.1 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.

7.1.2 Observations

7.1.2.1 Adaptation to COVID-19

Response to COVID-19 required some workforce adaptations, such as:

- ✓ The Project offered six weeks of full pay to employees who were initially unable to reach site after which those employees would take their leave entitlement until switching to no pay status. All these employees were then able to reach site within the six week period;
- ✓ Hat contractors received full pay for the 2 week lockdown period in March 2020;
- ✓ Some 3rd party staff on the Angore project were demobilized due to project suspension. All demobilized staff received a one-time lump sum payment;
- ✓ Some employees (23) of Staff Contractors were put on reduced rate including:
  - 15 expatriates due to travel restrictions received the base rate without allowances when working from home country,
  - The 6 national staff moved to POM office on a reduced work basis received base pay only with no rotational allowance anymore,
  - 2 nationals were set to 50% while awaiting flight to home,
  - Home country mandated required quarantine cost for expatriates is paid.

7.1.2.2 Labor Grievance Management

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. The labor grievance management process remains part of the Project's Procedures & Open Door Communication Policy.

Only two grievances, both for harassment, required investigation. No time was lost in 2020 due to industrial actions. Issues and grievances are also reduced due to small group engagement sessions to proactively understand the organization's pulse and reinforce key messages. These sessions include:

- ✓ Kofi naPaw Paw (Lead Country Manager engagement sessions);
- ✓ TokTokWantaim (Senior Manager engagement sessions, commenced Q4 2020); and
- ✓ HR Engagement Sessions (HR Manager–Employee engagement sessions to understand challenges).

The Project introduced 'HR Direct' for employees to transmit questions to relevant teams through an automated system, resulting in a significant reduction in response time (average response <1 day). Most of the 240 questions received in 2020 related to Benefits,Policy and payroll. 97.5% users of the system provided a positive response. The Project maintains effective logistics teams on site to support and ensure quick resolution of staff logistics-related issues (such as accommodation issues).

7.1.2.3 Counseling Services

Face-to-Face counseling was suspended due to COVID-19. Support is now provided virtually 24 hours a day, 7 days a week by Magellan Healthcare with Professional Staff available to help with a full range of mental health issues. The service has been shown to be particularly useful during this last year with the COVID-19 situation.

The Project also held a Mental Health Week with various activities including Webinars on building resilience; a guide for staff going into quarantine and ongoing communications including training on resilience and working from home for supervisors and staff, leadership communications on mental health and resilience and computer based mental health training.

7.1.2.4 Workforce Initiatives on Family Violence

The issue of Family Violence was addressed for the Project workforce with actions such as:

- ✓ "Man Up": Virtual discussion with the PNG ManUp, Solomon Kantha and Ganjiki Wayne, Voice Behind "Justice for Jenely at the PNG ManUP Against Violence – Shine the Light Vigil;
- ✓ "Say NO to Violence" Webinar/Wear black with BCFW.

7.1.3 Recommendations

None arising from this review.

7.2 WORKFORCE ACCOMMODATION

7.2.1 Observations

Responding to COVID-19 challenges took priority in 2020 in terms of camp and accommodation management. Changes in camp status in order to properly minimize potential for COVID-19 outbreaks are shown below.

LNGP

- ✓ Camp A – 400 typical POB; and
- ✓ Camp B – No longer in use.

Upstream

- ✓ HGCP – 450 typical POB;
- ✓ Moro B – 90 typical POB (Moro X camp to provide additional 78 temporary beds for Earthquake Recovery); and
- ✓ Angore – 75 typical POB.

In addition, the Project has developed very detailed COVID-19 protocols covering all aspects of work and camp life, all forms of travel, quarantine, etc. Site protocols guide specific locations, for example, for EMPNG Upstream, there are Upstream Island Mode Protocols (all sites-Moro specific, Komo specific and Angore specific). LNGP has its own Island Mode Protocol. Protocols are also tailored for particular work groups based on the type and mode of each group's work.

7.2.2 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 are 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 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 Q4 2020 continues to be excellent. The last Lost-Time Injury (LTI) was in 2017 with more than 40 million man-hours worked since that incident. The 2017 LTI was actually an “incident” rather than an “accident” as it was caused by one worker attacking another and was not an actual workplace accident. The Total Recordable Incident Rate (TRIR) is excellent and 2020 was better than 2019 with the TRIR dropping from 0.10 to 0.06 on the basis of 200,000 work-hours with both years approaching 14 million work hours. There was a slight reduction in O&I numbers, which plateaued as a result of personnel reduction due to COVID19 restrictions. Overall, worker safety exhibits a remarkable record.

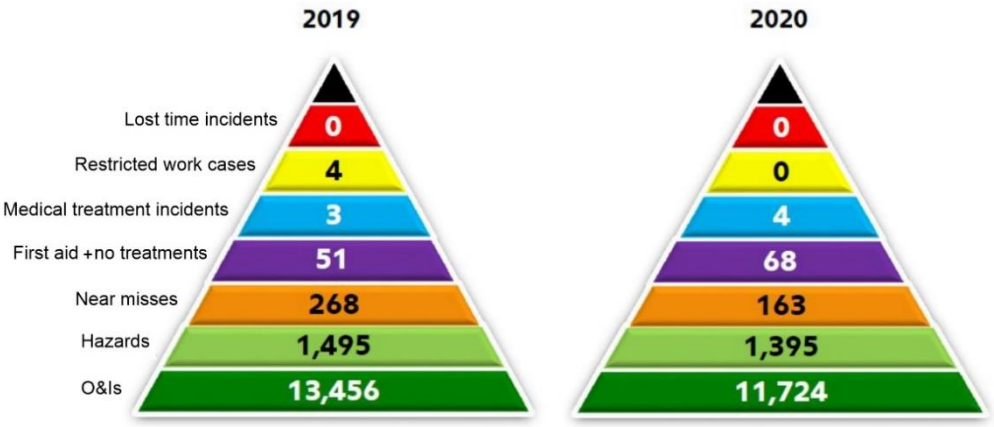


Figure 8.1: Safety Record 2019 - 2020

8.1.2.2 Worker Health

The occupational health program is world class and continues to perform well in all areas (clinical operations, public health, and industrial hygiene), taking into account that in 2020 the program had to work around the COVID-19 pandemic. Overall, the pandemic has been well managed and has included the strengthening of mental health programs to support individuals impacted by the pandemic, especially those under quarantine. An indication of the success of the occupational health program is that it has been audited by ExxonMobil Audit with no comments, as well as by an internal OIMS assessment with no gaps identified.

8.1.3 Recommendations

The H&S program continues to be implemented as a "best practice" system. The IESC does not offer any recommendations arising from the present review.

8.2 COMMUNITY HEALTH

8.2.1 Observations

Community health continues to be a component of the CDS program, with the focus in 2020 including supporting local health authorities in their management of the COVID-19 pandemic. Plant Site Health focus was on COVID-19 response efforts to schools and communities:

- ✓ Quick engagements were made with 19 schools identified to be supported;
- ✓ Each school was supported with soap, hand wash stations installed, infra-red thermometer and face masks for teachers and students;
- ✓ In addition, Papa Primary School, Lealea Primary School and Redscar High School were supported with establishing first aid centers. This support also included teaching two teachers from each school on basic first aid training. This would enable the schools to quickly respond with first aid support where needed;
- ✓ Collaboration was made with village councillors in rolling out community awareness booths in each village on COVID-19.

In the Upstream area in 2020 the Project supported Hela Provincial Health Authority to respond to COVID-19 with:

- ✓ Printing of posters for the health workers to roll out awareness in communities;
- ✓ Donation of WASH kits and cleaning materials to Tari Hospital and Project area health facilities;
- ✓ Completion and handing over sterilizers and a building to Tari Hospital, requested by Hela Provincial Health Authority to help replace the old sterilizer. The building was built to replace the old one that did not meet the National Health Services Standards for a provincial hospital.

In addition to providing COVID-19 support, the CDS program has also served to provide food supplies to Hela Province health clinics and the Texas Children Hospital (TCH) partnership with other development partners to address community health issues is continuing.

8.2.2 Recommendations

None arising from this review.

9 CULTURAL HERITAGE

9.1 PROJECT STRATEGY

Production has adopted Cultural Heritage 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

Cultural heritage management continues to be undertaken, currently in association with the Angore project, and preferred practice continues to be avoidance. In 2020, the focus of cultural heritage activities was to provide awareness on chance finds protocols (no chance finds made in 2020), and also providing awareness to community members to recognize the importance of cultural heritage and how it has intertwined with biodiversity, as undertaken in community engagements in the Lower Kikori. The forward plan for 2021 is to compile cultural heritage related legends from project footprint areas as educational material, targeting school children.

Figure 9.1: Example of Reconstructed Lapita Pottery Sherds from LNG Plant Site at the National Museum & Art Gallery (NMAG) in Port Moresby

Most of the artifacts collected at the LNG Plant site are still in the hands of Monash University. The intent has always been to return the artifacts for permanent curation/display at the PNG National Museum and Art Gallery (NMAG), but it is understood they have storage issues. NMAG has been advised that support for curation could be obtained from EMPNG's community development support program. In any case, any decision to bring the artifacts back to PNG will be up to NMAG.

GVE02/AAG/LMZ/BG/EN:cattr

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