TOTAL
TOTAL E&P PNG LIMITED

PAPUA LNG PROJECT

UPSTREAM ENVIRONMENTAL IMPACT STATEMENT

VOLUME 1: MAIN REPORT

Chapter 13: Impacts - Social

TOTAL E&P PNG LIMITED

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13. Impacts: Social

13.1 Introduction

The principal objective of the social impact assessment is to provide an assessment of potential adverse and positive social impacts arising from Project activities, and to identify mitigations to manage these impacts.

A full description of social baseline characteristics for the Project area of influence (PAOI) communities is presented in Chapter 9 based on Parts 14 to 18 of Volume 2. This chapter focuses on distinguishing key baseline characteristics, identifying, mitigating and assessing potential impacts based on interactions between various Project activities (Chapter 4) and PAOI communities presented in Figure 13.1.

13.1.1 PAOI Communities

The PAOI includes 39 villages (including one settlement) and one government station with a combined population in 2016 of 12,763 people. The main populations lie along the coast, an area inland of Orokolo Bay, and an area spanning the Purari River delta that roughly conforms with the upper tidal reaches.

All villages in the Purari River delta are located on the banks of the Purari River's tributaries. Other than for the Orokolo area, population densities are low.

The PAOI is located across two local-level government areas (LLGs) – Baimuru Rural LLG and Ihu Rural LLG – in Kikori District, Gulf Province. The PAOI has seven distinct language groups – Pawaia, Koriki, Iare, Ahia, Kaimare, Maipua and Orokolo. Villages within each language group have similar history, cultural beliefs and traditional practices.

Language group is one of two features that contribute strongly to the homogeneity of each of the seven community groups in the PAOI, the second being ecological zone (defined in Section 7.7.3 and summarized as the environmental setting in which communities are located). The language that people speak defines where people came from, their ancestors and ancestral migration history (from the land on which they originated to the land they occupy in the present). As a result, it defines their cultural values, with whom they communicate, trade and marry, and in many cases, the behavioral and social norms they are expected to observe. People in the PAOI depend significantly on their natural resources for survival and wellbeing; hence, their environmental setting significantly influences their day-to-day activities.

The most common sources of income in the PAOI are the sales of betel nut, fish, crabs, garden produce and sago. Small business activities, such as selling fuel and trade stores, also contribute to household income for some people; however, the majority of people in the PAOI are involved in subsistence activities and are not formally employed.

Consistent with onshore Project activities, the PAOI is divided between three areas as defined in Chapter 1, being PRL-15, the export pipeline route, and the river transport corridor.

13.1.2 PRL-15

PRL-15, in the upper Purari River catchment, is in the Gulf Province, in the Kikori District and Baimuru Rural LLG area.

The Pawaian people (i.e., people who speak the Pawaia language) are the principal users of the PRL-15 area and the Pawaian people occupy parts of the Simbu, Gulf and Eastern Highlands

POTENTIALLY-AFFECTED COMMUNITIES IN THE PAOI

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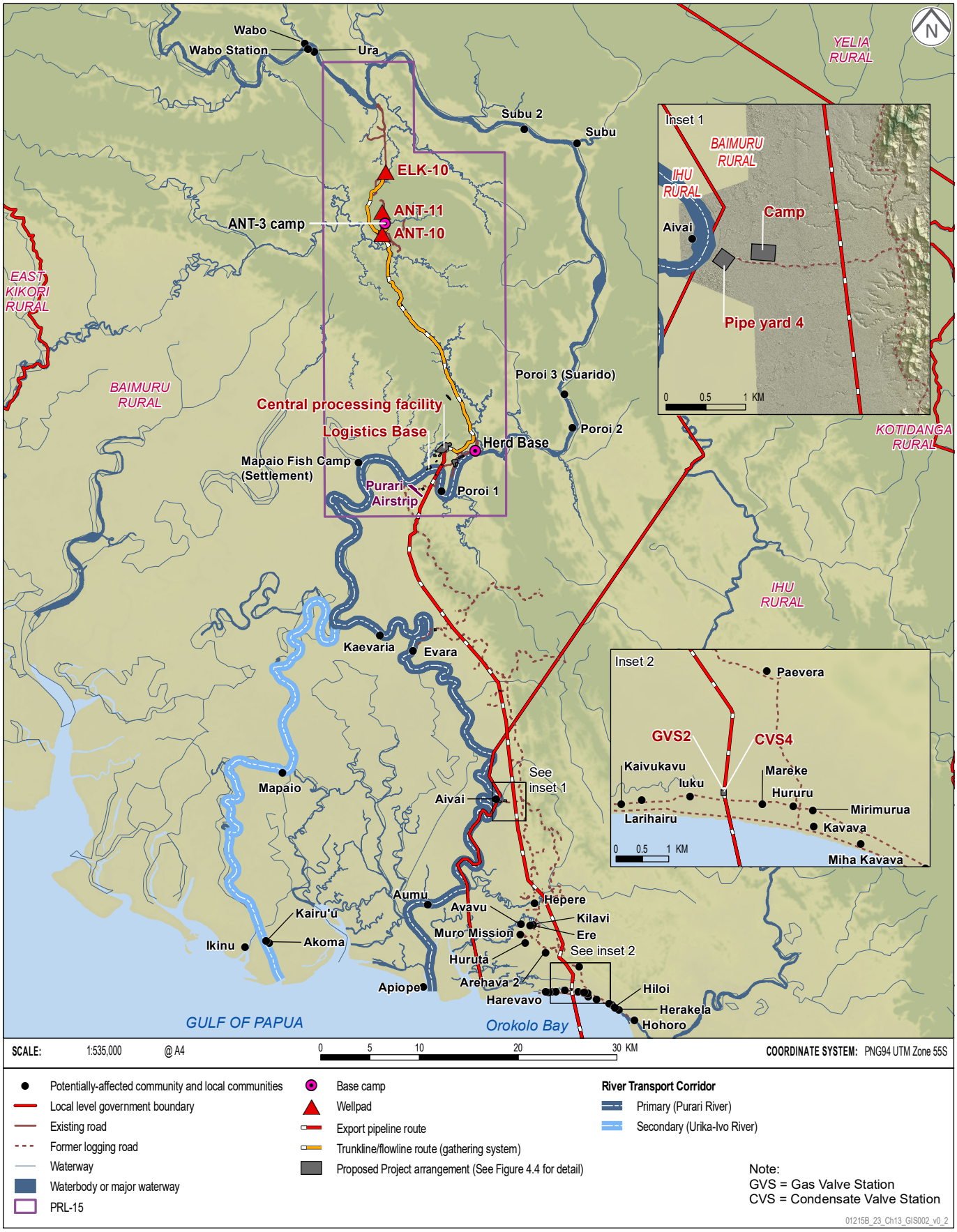
FIGURE 13.1



provinces. The Pawaians who reside along the Purari River bank, near the Elk-Antelope gas field, are generally referred to as the lowland Pawaians.

Nine villages (including one settlement) have been identified in or near the PRL-15 area. Those inside the PRL-15 boundary include Poroi 1 and the settlement of Mapaio Fish Camp and a single residence (Purari Airstrip House). Those outside but near the PRL-15 boundary include Poroi 2 and Poroi 3, Subu, Subu 2, Ura, Wabo and Wabo Station. All communities are small, isolated and have limited access to basic services like schools and health clinics (see Figure 13.2). Low population density in the PRL-15 area has meant that there has been little agricultural pressure on the land, and primary forest or logged hill forest and alluvial forest covers the vast majority of Pawaian territory.

Access to and within the PRL-15 area is limited, with no roads linking PRL-15 with other parts of Gulf Province or other provinces. Access is via boat on the Purari River, via air using the Purari Airstrip, or on foot using existing tracks.

There are three major means of access to the PRL-15 area:

- People may walk down to Wabo, Ura and Wabo Station from the highlands, potentially drawing upon their pre-existing social relationships and connections with Pawaia people.
- People may also access this area by boat or canoe along the Purari River, meaning that in-migrants will be able to reach this area from the coast (or other villages in the Purari delta) or from further upstream past Wabo.
- Access by air is unlikely for most in-migrants not already associated with local residents (i.e., through marriage, adoption, partnerships and business ventures) or with the Project (i.e., through employment or contracts).

In 2016, in-migration to the PRL-15 area was already evident. At Ura village, 15 families had migrated from Karimui and other locations in the highlands in search of work. In 2012, one study noted that migrants from the Highlands region, including Karamui in Simbu province and Eastern Highlands and Enga provinces, were residing at Wabo (Sullivan, 2012).

The baseline studies (see Chapter 9) indicate that relatively limited out-migration has occurred from the PRL-15 area, compared with the river transport corridor or export pipeline route areas, which may reflect the limited period of interaction that the PRL-15 area villages have had with other parts of Papua New Guinea.

13.1.3 Export Pipeline Route

The onshore export pipeline route is located in the Ihu and Baimuru LLG areas in the Kikori District in the Gulf Province. Pawaian speaking people occupy the northern end of the onshore export pipeline route nearest PRL-15. In the south, communities in Orokolo Bay speak Orokolo language[1].

From south of the PRL-15 boundary, there are no villages located along the export pipeline route until it nears Hepere in the Orokolo Bay hinterland. From there it tracks in the vicinity of the coastal villages of Arehava 2, Paevera, Iuku and Mareke on its approach to the shore crossing. These villages generally range in size from less than 200 people to more than 800 people.

1 From a social perspective, Orokolo Bay communities maintain their own cultural heritage identify (Part 17 of Volume 2).

COMMUNITY FACILITIES IN AND AROUND PRL-15

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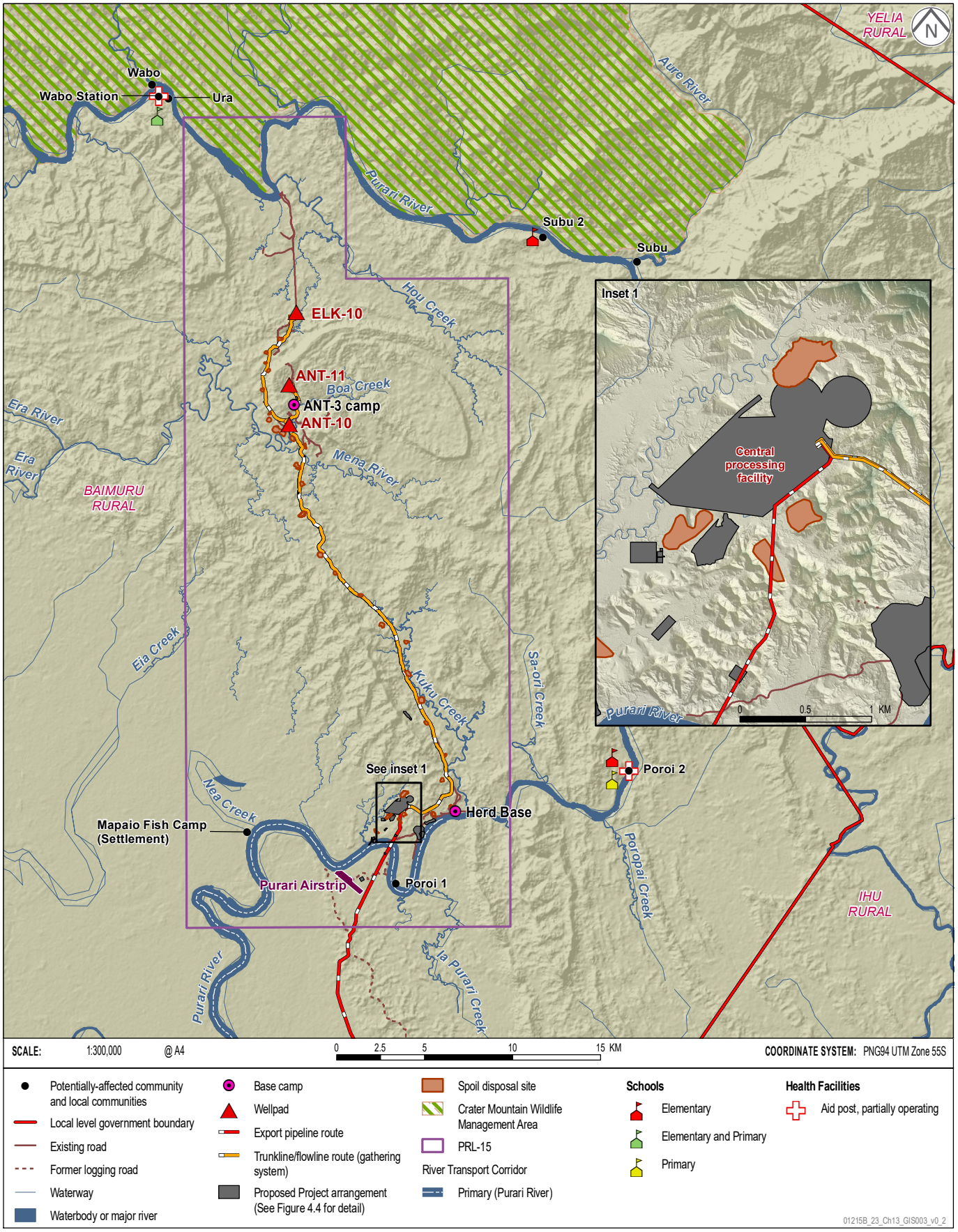
FIGURE 13.2



Communities in PRL-15 and also communities along the Purari River (e.g., Aivai, on the river transport corridor, see Section 13.1.4) use the remote northern part of the export pipeline route for hunting and collecting of native flora and fauna. In the south, along coastal villages, people are engaged in subsistence and income earning activities through harvesting sago palms, coconuts, bananas, garden produce, and fishing activities.

There are no public roads along the Orokolo Bay coastline where most of the Project-affected communities and local communities are located around the export pipeline route. Access is primarily by boat or on foot, as the beach provides a pathway connecting villages along the coast (Section 13.9).

Approximately 10,000 people live in Orokolo Bay villages with some living outside the PAOI (see Chapter 9). The Orokolo people have experienced a much longer history of engagement with outside groups due to the coastal location of many of these villages. These villages were historically involved in trade and exchange activities that extended along the southern coastline of mainland Papua New Guinea – most notably the *hiri t*rade (see Section 9.2.2). There is a much higher level of population movement between these villages, Kerema and Port Moresby. Orokolo villages record the highest level of out-migration in the PAOI, which is likely to be due to their access to coast transport and historical engagement with outsiders. Communities in Orokolo Bay have greater access to community facilities such as schools and health facilities than communities in and around PRL-15 (Figure 13.3).

13.1.4 River Transport Corridor

Two Purari River delta distributaries will be used for Project transport and logistics activities, these are located in Baimuru Rural and Ihu Rural LLGs. The main river transport route is expected to be the Purari River; and the route will pass by Apoiope, Aumu, Aivai, Evara, Kaevaria and Mapaio Fish Camp settlement before reaching the proposed new Logistics Base and Herd Base. The Urika-Ivo River will be used as a secondary transport corridor when the Purari River is impassable, and river traffic would pass by Akoma, Kairu'u, Ikinu, Mapaio, and Mapaio Fish Camp settlement before reaching the proposed new Logistics Base and Herd Base.

Eight villages have been identified as directly adjacent to, and are dependent on, the two main Purari River delta distributaries to access food, materials and services to support their livelihood, and hence may be affected by Project activities. Five languages belonging to the Trans-New Guinea family (Koriki, Iare, Ahia, Kaimare and Maipua) are spoken by communities along the riverway access.

Wild sago and planted banana are the primary staple foods for riverway communities. Protein is obtained from fishing and hunting of wild pigs, cassowary, bandicoots, crocodiles and turtles.

Locations of PAOI villages and related language groups can be seen in Figure 9.2. As described in baseline studies in 2016 (see Chapter 9), all villages in the river transport corridor area are located close to these rivers and are therefore easily accessed by canoe or boat from the coastal areas (or conversely, from inland via the Purari River). Temporary roads have been constructed around the river transport corridor for logging activities.

The baseline studies indicate only modest population increase among the Koriki, Iare and Kaimare language groups over the last 100 years, estimated at approximately 34%, 27% and 10%, respectively. These communities record a higher level of out-migration than the onshore export pipeline route and PRL-15 communities, considered to be due to their access to coastal transport and historical engagement with outsiders. People have migrated in search of employment and economic opportunities and access to better services, reflecting the isolation, limited opportunities and service provision in the river transport corridor.

COMMUNITY FACILITIES ALONG THE EXPORT PIPELINE ROUTE

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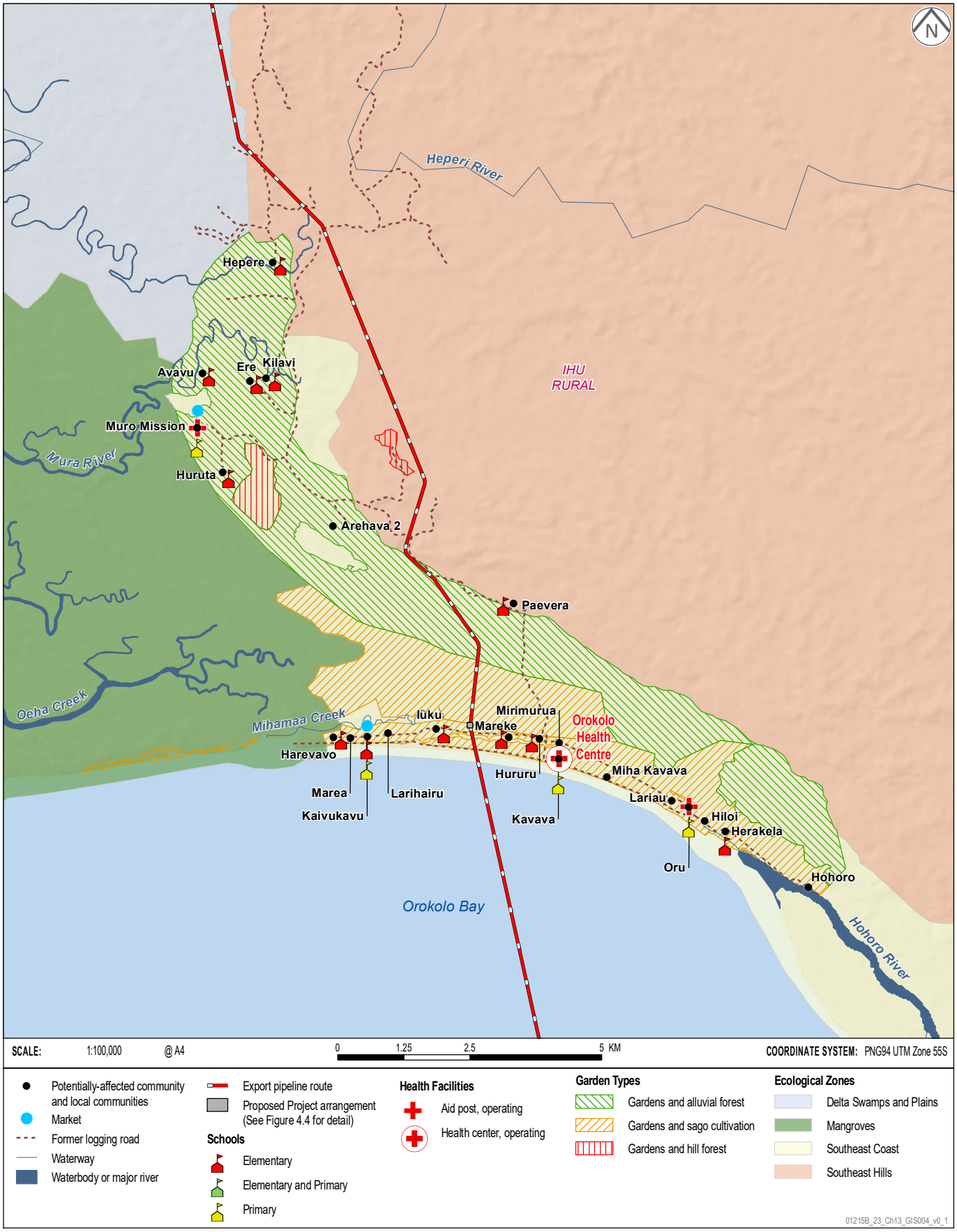
FIGURE 13.3



13.1.5 National Context

As discussed in the socio-economic baseline reports and summarized in Chapter 9, the formal economy in Papua New Guinea is dominated by resource exploration and production, commercial agriculture, tuna processing and logging, with a small manufacturing sector. The informal economy, which supports approximately 85% of the population, primarily depends on subsistence agriculture (ADB, 2015). Papua New Guinea has experienced strong growth in its gross domestic product over the past decade, with much of the growth in 2014 and 2015 attributed to the PNG LNG Project.

Oil has been extracted from the Gobe Main and South East Gobe oil fields located in the Kikori River catchment since 1998. Although not in operation, the exploration and development stages of the Papua LNG Project have provided an important source of local employment (and various other services), particularly among Pawaia villages.

The majority of Papua New Guinea's prawns are captured in the Gulf of Papua and subsequently processed in Port Moresby. The main industries in Gulf Province are oil production and petroleum exploration, prawn fishing and logging.

Gulf Province contains five large-scale logging operations. Large-scale economic activity in the PAOI includes the Vailala Block 3 logging project operated by Frontier Holdings (where activity is winding down). PRL-15 is in commercial logging concession Baimuru Block 3.

13.1.6 Project Social and Economic Development Context

The economic development potential to be considered in this social impact assessment is that the Project is expected to generate financial benefits to Papua New Guinea that will increase the gross domestic product and national government revenue. The preliminary median capital cost estimate for the upstream portion of the Papua LNG project is estimated at US$4.0 billion in 2018 Real Terms for the initial development, plus about US$0.9 billion for the subsequent compression phases. This estimate only considers costs incurred after final investment decision and excludes costs incurred prior to final investment decision such as significant exploration and appraisal costs to discover the Elk and Antelope fields costs, reservoir studies costs, studies to define the development scheme, and so on.

The initial estimate of direct and indirect statutory benefits to the government during the upstream construction phase is anticipated to be approximately US$2 billion or an additional annual revenue of approximately US$0.3 billion. During the upstream operations phase, the incremental revenue for the government is estimated at approximately US$3 billion or an additional annual revenue of around US$140 million. These estimates reflect only the upstream portion of the Project and the benefits described accrue due to the integrated nature of the upstream and downstream segments of the Project and synergies achieved by sharing downstream costs with other upstream projects in PNG so that the incremental benefit to Papua New Guinea of the combined upstream and downstream project is likely to be higher.

The forward-looking estimates described are preliminary and will be further refined as the Project matures. These forward-looking estimates consider many factors including, without limitation, those concerning the cost of material required to construct the upstream project, LNG prices and the completion and commencement of commercial operations of the Project. Although TEP PNG is of the opinion that the analysis reflected in such forward-looking estimates is reasonable, actual results could differ materially from those set out in the forward-looking estimates.

The aim of TEP PNG's strategy is to develop a PNG workforce, involve local businesses and assist with the socio-economic development of communities in the PAOI and Papua New Guinea

as a whole. The Project aims to achieve a maximum percentage of nationals working on the Project (upstream), including both directly hired and contracted workers, approximately one to two years after operations commence (see Chapter 4).

13.1.7 In-migration

Project-induced in-migration, or influx involves the movement of people into an area in anticipation of, or in response to, economic opportunities associated with the development and/or operation of a new project (IFC, 2009). This is a common phenomenon at all resource development projects in Papua New Guinea and a major source of social impact (Bainton & Banks, 2018; Bainton, 2017). The Papua New Guinea Constitution (PNG Constitution, 1975) grants citizens freedom of movement throughout the country, and resource companies cannot legally prevent people from migrating to the PAOI; however, companies can implement measures to manage and mitigate the impacts associated with in-migration (Bainton et al., 2017).

Project-induced in-migration can comprise:

- Workers from outside of area but that are brought in directly by the project and its contractors and are living in camps and accommodations provided by the Project.
- Families/relatives of these workers that may decide to move into the area.
- Opportunistic migrants that are not hired or contracted by the Project, but which nevertheless move in the area with the hope to benefit indirectly from the Project value-chain.

In-migration can benefit trade and business, employment, infrastructure, and services. This same phenomenon can also negatively affect the PAOI and host communities, especially with regards to environmental, social and health issues. It can be either a short-term phenomenon or longer lasting. In the short term, migrants may move temporarily to a Project-affected area to claim or support local claims to State financial payments related to land ownership as evidenced by the PNG LNG project (D'Appolonia et al, 2014). In the long term, migrants may create new settlements around areas of high Project activity or stay in existing settlements for the same reasons. D'Appolonia et al (2014) also reports there was no significant in-migration directly related to the PNG LNG project. As in-migration already exists in the PAOI, and an influx of people is likely to contribute to the social impacts derived from the Project, it is therefore considered in this impact assessment as a source of further induced impacts in all social aspects assessed (i.e., health, education, etc.). This section provides background to potential major drivers for and locations where influx may occur.

13.1.7.1 Major Drivers for In-migration

Major drivers for in-migration are likely to be Project employment, the expectation of access to State financial payments or indirect economic opportunities created by the Project workforce, and anticipation of overall development of the area, e.g., expectations of improved social and health infrastructure and services through increased government spending and Project community investment programs. In-migration can mainly be expected to occur close to the construction and operation areas, and areas where workers and contractors are accommodated.

Indicators favoring in-migration include:

- Accessibility from other population centers (i.e., Kerema, Baimuru, Port Moresby) or villages.
- Evidence of pre-existing migration pathways and clan/social relationships.
- Close proximity to areas where construction and operation activities will, or are expected to take place, and where there are likely to be expectations of employment opportunities.

- Presence of business opportunities associated with the Project (i.e., service-based businesses), or where community development initiatives, such as improvements to education or health facilities, are planned.
- Villages where clan groups reside that claim customary ownership over land that will be directly impacted by the Project, and where State financial payments are likely to be distributed or Project opportunities may occur.

13.1.7.2 Potential Locations where Influx may Occur in the PAOI

In-migration may be greatest during the construction phase when more local jobs will be available but may continue through operations when local income levels rise (i.e., from State financial payments) and people identify business opportunities due to these higher incomes. During the construction phase when the workforce will be largest, people may also migrate into villages or settlements (or attempt to create new settlements) in PRL-15 or neighboring villages (e.g., Mapaio Fish Camp and Poroi 1) in the hope of providing goods or services to Project workers. Access to these areas is only by river, which may, limit population increase.

Table 13.1 presents areas where Project-induced in-migration has the potential to occur, based on the indicators favoring in-migration.

Table 13.1 – Areas in the PAOI Where Project-induced In-migration Could Occur

PAOI Communities Potentially Affected by In-migration	Accessibility	Pre-Existing In-migration	Proximity to Project Camps and Facilities	Proximity to Project Business Opportunities or Benefits	Proximity to Beneficiaries of State Financial Payments
Wabo Station	Low - existing pathways from the highlands, Wabo airstrip, Purari River.	Yes	No	Yes	Yes
Wabo	Low - existing pathways from the highlands, Wabo airstrip, Purari River.	Yes	No	Yes	Yes
Ura	Low - existing pathways from the highlands, Wabo airstrip, Purari River.	Yes	No	Yes	Yes
Subu	Very isolated - only the Purari River.	No	No	Yes	Yes
Poroi 3	Very isolated - only the Purari River.	No	No	Yes	Yes
Poroi 2	Very isolated - only the Purari River.	Yes	No	Yes	Yes
Poroi 1	Low - Purari River and Purari Airstrip.	Yes	Yes	Yes	To be confirmed
Mapaio Fish Camp Settlement	Low - Purari River and Purari Airstrip.	Yes	Yes	Yes	To be confirmed
Aivai	Very isolated - only the Purari River.	Yes	Yes	Yes	Yes
Apiope	Very isolated - only the Purari River.	Yes	No	Yes	No

Table 13.1 – Areas in the PAOI Where Project-induced In-migration Could Occur (cont'd)

PAOI Communities Potentially Affected by In-migration	Accessibility	Pre-Existing In-migration	Proximity to Project Camps and Facilities	Proximity to Project Business Opportunities or Benefits	Proximity to Beneficiaries of State Financial Payments
Iuku	Isolated - only by sea.	Yes	Yes	Yes	Yes
Mareke	Isolated - only by sea.	Yes	Yes	Yes	Yes
Other PAOI villages in Orokolo Bay	Isolated - only by sea.	Yes	No	Yes	To be confirmed

The level of Project-induced in-migration is considered negligible due to an absence of the drivers described in Table 13.1 for all other villages in the PAOI.

13.2 Social Impact Assessment Method

The significance assessment approach described in Chapter 3 was used to characterize social impacts, which have been grouped into the following seven categories:

1. Economic displacement and livelihoods.
2. Economic development and employment.
3. Education and workforce training.
4. Community health and safety.
5. Governance, leadership and social structure.
6. Social cohesion, conflict, law and order.
7. Transport and access.

These categories were developed and refined iteratively during the process of impact identification, their purpose being to provide a structure to the impact assessment. The categories are not intended to be rigid or mutually exclusive: some impacts fall into multiple categories, in which case they are placed in the most relevant category and assessed and assigned mitigation, management and optimization measures accordingly.

Explanation on how both pre-existing and Project-induced vulnerability have been considered in the social impact assessment is provided in Box 13.1.

Box 13.1 – Consideration of Vulnerability in Social Impact Assessment

Vulnerability is generally defined as the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made change. The concept is relative to the local context and dynamic in that it can change over time as either circumstances change or people's capacity changes. Vulnerability is most often associated with poverty, but it can also arise when people are isolated/remote, insecure and defenceless in the face of risk, shock or stress and other factors.

Best practice social impact assessment requires project proponents to identify vulnerable groups and individuals, and to tailor mitigation and management measures to address the issues unique to these groups (IFC, 2012).

Most people living in the PAOI present some pre-existing vulnerability characteristics. Women's groups (and village leaders' groups) identified households headed by women, single mothers and widows to be the main disadvantaged people in communities. Village leaders identified disability as a main type of disadvantage, second to households headed by women.

Box 13.1 – Consideration of Vulnerability in Social Impact Assessment (cont'd)

Baseline studies clearly define the use of terms 'vulnerability' and or 'disadvantage/d' for the purposes of and use in this document. Vulnerability is defined in terms of both pre-existing and Project-induced vulnerability as follows:

- Pre-existing vulnerability, where groups or individuals find it difficult to sustain themselves or their families under everyday conditions, irrespective of project development.
- Project-induced vulnerability, where groups or individuals have a diminished capacity or lack of capacity to understand, anticipate, cope with, resist or recover from the consequences of a potential impact or other threat (TOTAL general specifications).

This social impact assessment focuses on identifying both pre-existing and Project-induced vulnerable groups and individuals across the PAOI against the 9 vulnerability criteria and related findings summarized in Table 9.21 in Chapter 9. Potential impacts related to these groups have been identified throughout this and other chapters in the EIS and summarized in the table below.

Summary of Potential Pre-existing Vulnerability and Gender Inequality Impacts

Vulnerability Criteria	Potential Impact	Reference Section/ Chapter
Local identification	Increased pressure on pre-existing vulnerability and gender inequality.	Various – see below
Poverty	♦ An increase in direct and indirect employment opportunities. ♦ A decrease in direct and indirect employment opportunities.	Section 13.4
Food security	Ecosystems services impacts identified in Chapter 16.	Chapter 16
Housing	Improved housing and living conditions as a result of increased economic activity and employment.	Section 13.4
Livelihood security	♦ Reduction of livelihood of PAOI communities. ♦ Further impacts identified in Chapter 16.	Section 13.3 and Chapter 16
Household composition	♦ Changes to traditional way of life. ♦ Improvements to housing and living conditions.	Section 13.4
Access to infrastructure	♦ Improved economic infrastructure. ♦ Improved access to economic infrastructure ♦ Temporary loss of access to education, health and economic services.	Section 13.4 Section 13.9 Section 13.9
Education	♦ Increased pressure on local education services and facilities. ♦ Improved workforce skills, training and experience.	Section 13.5
Women	♦ Increased opportunity for women's involvement in decision-making processes. ♦ Changes to traditional way of life. ♦ Increased tension related to antisocial behavior and crime. ♦ Impacts associated with social determinants of health (specific to gender, substance abuse and violence). ♦ A reduction in the use of cultural health practices, such as traditional medicines and attribution to sorcery. ♦ Increased acceptance of modern health practices and a reduction in the practice of sorcery or traditional medicines.	Section 13.7 Section 13.4 Section 13.8 Section 13.6 Section 13.6 Section 13.6

13.2.1 Identification of Potential Impacts

This chapter identifies and assesses impacts based on:

- The regulatory framework presented in Chapter 2.
- Definitions of direct, indirect and induced impacts provided in Chapter 3 and 21.
- The Project description and associated activities presented in Chapter 4.
- Stakeholder engagement activities presented in Chapter 6.
- Interaction between the Project and the cultural heritage and archaeological environment described in Chapter 14.
- Assessment of impacts to terrestrial, marine, cultural heritage, amenity and climate change contexts along with ecosystems services described in Chapters 11, 12, 14, 15 and 16 respectively, and how these may influence social impacts.

13.2.2 Assessment of Potential Impacts

The assessment of initial and residual impacts is conducted by examining both the magnitude of the potential impact (Table 13.2) and the sensitivity (Table 13.3) of the individuals, organizations, groups or resources (receptors) (Table 13.4) being impacted. The Project phase in which the activity and the impact occurs has also been considered.

Analysis of the likelihood of the impact has not been included, since the impacts described are all assessed as being credible outcomes of Project development (see Chapter 3).

13.2.2.1 Magnitude

As described in Section 3.5.2.2, the criteria used to define the magnitude of an impact reflect the size and nature of the change based on several elements, namely, the geographical extent, duration, scale and frequency of the change generated:

- Geographical extent: The spatial extent of the impact where this is defined as site (which may be localized to all, parts or a part of the site), local, regional or widespread (e.g., provincial, national or transboundary).
- Duration: The timeframe over which an impact will occur; this may include temporary (less than six months), short term (six months to one year), medium term (one to five years), long term (more than five years) and permanent (beyond the life of the Project).
- Reversibility: The degree or scale of disruption or improvement at a household or community level, to livelihoods, quality of life and social structure. For example, an impact that leads to a fundamental change in the way of life of people, in the nature of relationships in a community, or in livelihood patterns that could be highly disruptive or beneficial, while one that results in only subtle changes in conditions could be low in disruption or benefit. Reversibility could occur in the temporary, short or longer term and irreversible would be permanent.
- Frequency: The consistency or periodicity of an impact. A ‘constant’ impact is defined as 'permanent', 'often' occurs at least once a month, 'occasional' occurs at least once every six months, 'rare' occurs about once a year, and 'remote' occurs less often than once a year or is an impact that will only occur once.

Magnitude criteria used for the socio-economic impact assessment are presented in Table 13.2.

13.2.2.2 Sensitivity of Receptor

Sensitivity is defined as the susceptibility of the social receptor to change, including its capacity to adapt to or accommodate the kinds of changes that the Project may bring about. There is possibility for sensitivity to change over time, particularly in the case of human capital and where capacity building occurs (e.g., increased skills and health outcomes). Sensitivity considers:

- Social capital (social networks and organizations, culture, religion and decision-making structures).
- Human capital (skills, education, health and leadership capacity).
- Natural capital (land, forests, water and biodiversity).
- Economic capital (diversity, legitimacy and productivity of livelihoods, cash and income).
- Infrastructure, equipment and facilities.
- Formal status (where this may be assigned by statutory or regulatory authorities or by appropriately recognized national or international organizations.

This can involve legislation, regulations, international conventions or other mechanisms, rarity or uniqueness in and beyond the immediate area of interest (i.e., its vulnerability, and level of replaceability), and importance to local communities and society or its iconic or symbolic importance to cultural value systems.

Sensitivity criteria used for the socio-economic impact assessment are presented in Table 13.3.

13.2.2.3 Social Receptors

Social receptors are the individuals, organizations, groups or resources that can be affected by Project activities. For this social impact assessment, receptors can be broadly defined according to the groups presented in Table 13.4.

These groups comprise individuals and groups that may have different levels of vulnerability and that vulnerability is multidimensional (e.g., one individual may be vulnerable to one type of impact, but resilient to another). The social impact assessment has assessed impact significance based on the overall sensitivity of the broader group given in Table 13.3 but, where relevant, the description of the impact also identifies individuals or groups in the wider receptor group who may be particularly vulnerable to the specific impact.

Vulnerable groups identified in the overall population are described in Chapter 9 and outlined in Section 13.8.

13.2.2.4 Initial and Residual Assessment

Initial impacts are identified and assessed according to the interaction between magnitude, sensitivity and receptors in the absence of mitigation and management. Residual impacts are assessed assuming the effective implementation of (i) avoidance, mitigation and management measures for adverse impacts and (ii) measures to optimize opportunities. This interaction between magnitude and sensitivity is expressed in an impact assessment matrix, presented in Table 13.5.

Table 13.2 – Social Impact Assessment Magnitude Criteria

	Very High	High	Medium	Low	Negligible	Positive
E	♦ Impacts may be widespread, i.e., large number of people affected/experienced on a provincial, national or transboundary level. ♦ Single/multiple loss of life or permanent damage to persons due to Project-related activities.	♦ Impacts may be regional, i.e., experienced by all or almost all of the PAOI communities. ♦ Reversible injury or moderate irreversible damage or impairment to one or more persons, due to Project-related activities. Typically, a lost time injury.	♦ Impacts may be moderate and experienced by specific community/ies or small part of the PAOI. ♦ Reversible/minor injuries due to Project-related activities, not leading to restricted duties. Typically, a medical treatment.	♦ Impacts localized and may be experienced by individual community/ some households only. ♦ Low level or short-term inconvenience or symptoms, due to Project-related activities, typically treated by first aid.	♦ No appreciable adverse impact/change compared to baseline conditions to safety, security, community activities, health, education, human rights and/or social functioning. ♦ No lost time injuries and low first aid treatments required due to Project-related activities.	♦ Impacts may be experienced on a transboundary, national, provincial, local or PAOI level. ♦ Permanent, temporary, long or short term/often or occasional improvement compared to baseline conditions to: – Safety, security, community activities, health, education, human rights and/or social functioning. – Social diversity and equality. – Local/regional and/or national investment. – Development of new social structure which adequately satisfies the needs of the local communities.
D	♦ Permanent, adverse impact/change compared with baseline conditions to health, safety, security, community activities, community services, human rights and/or social functioning.	♦ Long-term (more than five years), adverse impact/change compared to baseline conditions to safety, security, community activities, health and education, human rights and/or social functioning.	♦ Medium-term (one to five years), adverse impact/change compared to baseline conditions to safety, security, community activities, health, education, human rights and/or social functioning.	♦ Short-term (six months to one year), adverse impact/change compared to baseline conditions to safety, security, community activities, health, education, human rights and/or social functioning.	♦ Temporary impact/change compared to baseline conditions to safety, security, community activities, health, education, human rights and/or social functioning.	
R	♦ Irreversible adverse impact/change to demographic and social structure, key economic activities, access and/or livelihoods.	♦ Adverse impact/change to demographic and social structure, key economic activities, access and/or livelihoods, reversible in the long term (after five years).	♦ Adverse impact/change to demographic and social structure, key economic activities, access and/or livelihoods, reversible in the medium term (one to five years).	♦ Adverse impact/change to demographic and social structure, key economic activities, access and/or livelihoods, reversible in the short term (less than one year).	♦ No appreciable impact/change to demographic and social structure, key economic activities, access and/or livelihoods.	
F	♦ Adverse impacts are constant due to Project-related activities, i.e., permanent.	♦ Adverse impacts are often due to Project-related activities (at least once a month).	♦ Adverse impacts are occasional due to Project-related activities (at least once every six months).	♦ Adverse impacts are rare due to Project-related activities (once a year).	♦ Adverse impacts are remote or never occur due to Project-related activities.	

E = Extent, D = Duration, R = Reversibility, F = Frequency.

Table 13.3 – Social Impact Assessment Sensitivity Criteria

Low	Medium	High
♦ The social receptor is easily adaptable/more resilient to change (or no change required). High capacity to realize opportunities evidenced by communities, items or areas already demonstrating resilience to this impact, prior to Project interaction. ♦ Highly skilled and experienced labor 'pool'. ♦ The resource or area has minimal importance to cultural or traditional value systems. ♦ The resource upon which local people are rarely dependent for providing food, income, health or infrastructure. ♦ The community has the capacity to access nearby alternatives to the affected resource or service. ♦ The resource can be relocated or replaced or is a type that is common in the surrounding region. ♦ The attribute or quality is considered unimportant to the relevant community. ♦ Changes due to Project activities will not noticeably degrade attributes or quality of the resource or social receptor. ♦ The health attribute or quality has plentiful capacity and means to absorb change.	♦ The social receptor has some resilience to change, or capacity to realize opportunities. ♦ Some sign of exposure to this impact is already evident in the community, item or area prior to Project interaction. ♦ Some skills in the labor 'pool' with only limited experience. ♦ The resource or area has moderate importance to cultural or traditional value systems. ♦ The resource on which local people are occasionally dependent for providing food, income, health, infrastructure, etc. ♦ The community has limited capacity to access nearby alternatives to the affected resource or service, on which parts of the community depend. ♦ The resource can be relocated or replaced, or data/artefacts recovered in consultation with stakeholders. ♦ Changes due to Project activities may lead to some degradation of the attributes or quality of the resource or social receptor. ♦ The health attribute or quality is considered to be of some importance to the relevant community and has limited capacity to absorb change.	♦ The social receptor limited or no capacity to adapt to change, limited or no capacity to realize opportunities. ♦ The community, item or area is unaffected by this impact prior to Project interaction or has been affected and has demonstrated no capacity to adapt to change. ♦ The resource or area has high symbolic importance to cultural or traditional value systems. ♦ Lack of a skilled and experienced labor 'pool'. ♦ The resource that provides the sole source of food, income, health or infrastructure for local people, or on which they are frequently dependent. ♦ Many communities depend on the resource, benefit or service, and have no capacity to access nearby alternatives. ♦ The resource cannot be relocated or replaced without major loss of cultural values. ♦ Changes due to Project activities would lead to substantial changes to attributes or quality of the resource or social receptor. ♦ The health attribute or quality is considered of critical importance to the relevant community and has very little capacity or means to absorb any change.

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Table 13.4 – Social Receptors

Receptor	Description
Project Area of Influence Communities	
In and around PRL-15	
Project-affected persons	Individuals or groups who live in PRL-15, or have legal or customary rights to land or assets in PRL-15, that could be affected by land access, relocation, or loss of income associated with Project-changes in use of land, water and/or other natural resources.
Project-affected communities	Communities and settlements in PRL-15 that could be directly affected by Project activities Poroi 1and Purari Airstrip House.
Local communities in and around PRL-15	Communities and settlements located in or near PRL-15, that could be indirectly affected by Project activities: Mapaio Fish Camp settlement, Poroi 2, Poroi 3 (Suarido), Subu, Subu 2, Ura, Wabo, Wabo Station.
Traditional leadership	Traditional leaders and structures in communities in or nearPRL-15 that could be indirectly affected by Project activities.
Religious leadership	Religious leaders and structure in communities in or nearPRL-15 that could be indirectly affected by Project activities.
Landowner organizations and Community Owned Companies.	Organizations representing the interests of landowning clans and persons in or near PRL-15.
Export Pipeline Corridor	
Project-affected persons	Individuals or groups who live adjacent to the proposed export pipeline right of way, or have legal or customary rights to land or assets along the right of way, that could be directly affected by land access, or loss of income associated with Project-changes in use of land, water and/or other natural resources.
Project-affected communities	Communities who live adjacent to the export pipeline route that could be directly affected by Project activities, including: Hepere, Arehava 2, Paevera, Iuku and Mareke.
Local communities along the export pipeline route	Communities along the export pipeline route that could be indirectly affected by Project activities.
Traditional leadership	Traditional leaders and structures in communities along the export pipeline route, which could be indirectly affected by Project activities.
Religious leadership	Religious leaders and structure in communities adjacent to the export pipeline route that could be indirectly affected by Project activities.
Landowner organizations and Community-owned companies.	Organizations representing the interests of landowning clans and persons along the export pipeline route.
River Transport Corridor	
Project-affected communities	Communities along the Purari and Urika-Ivo rivers (the primary and secondary transport corridors) that could be directly affected by Project river transport activities, including: Apiope, Aumu, Aivai, Evara, Kaevaria along the Purari River; and Mapaio, Kairu'u, Akoma, Ikinu, along the Urika-Ivo River. Mapaio Fish Camp settlement and Poroi 1 are common to both distributaries on the river transport corridor.
Traditional leadership	Traditional leaders and structures in communities along/near the river transport corridor that could be indirectly affected by Project activities.
Religious leadership	Religious leaders and structure in communities along/near the river transport corridor that could be indirectly affected by Project activities.
Project Area of Influence Services and Infrastructure	
Schools	Local schools located in the PAOI.
Health facilities	Local health facilities and aid posts in the PAOI.
Police force	Local police responsible for law enforcement in the PAOI.

Table 13.4 – Social Receptors (cont'd)

Receptor	Description
Project Area of Influence Services and Infrastructure (cont'd)	
Logging and mining businesses	Resource companies and businesses operating in the PAOI.
Project workforce – skilled workers	Workers employed on the Project (direct and contracted). Skilled workers are more likely to be able to access jobs and are likely to have greater awareness of their employment rights than unskilled workers.
Project workforce – unskilled workers	Workers employed on the Project (direct and contracted). Unskilled workers are likely to face more challenges accessing jobs and have lower awareness of their employment rights than skilled workers.
Local, Provincial and National	
District, local level government and wards	Baimuru Rural LLG, Ihu Rural LLG, and Kikori District representatives (technical and political staff). Wards: Aikavaravi, Akoma, Apiope, Ara'ava, Aumu, Ikinu, Kairimai, Kapai, Kapuna, Kinipo, Maipenairu, Mapaio, Mariki, Poroi and Wabo Wards (within Baimuru LLG) and Arehava, Avavu, Harevavo, Harilarewa, Kaivukovu, Kavava and Lariau (within Ihu LLG).
Provincial government	Gulf Province representatives (technical and political staff).
National government	Technical staff in relevant government agencies and members of parliament.
National, provincial and local level business community	National economic actors including Small and Medium Sized Enterprises (SMEs), larger companies, contractors, sub-contractors and professional services companies.
Supply chain workers	Workers indirectly employed in the Project supply chain (e.g., agri-labor workers that supply food products to the Project).

Table 13.5 – Social Significance Assessment Matrix

Magnitude of Impact	Sensitivity of Receptor		
	High	**Medium**	**Low**
Very High	Severe	Major	Moderate
High	Major	Moderate	Moderate
Medium	Moderate	Moderate	Minor
Low	Minor	Minor	Minor
Negligible	Negligible	Negligible	Negligible
Positive	Positive	Positive	Positive

13.3 Economic Displacement and Livelihoods

13.3.1 Context

Project-related land access and restrictions on land use or on the use of communal property or on the access to natural resources can adversely impact communities and persons that use this land or communal property. Involuntary resettlement refers both to physical displacement (e.g., relocation or loss of shelter) and to economic displacement, i.e., loss of assets or access to assets that leads to loss of income sources or other means of livelihood due to project-related land access and/or restrictions on land use (IFC, 2012).

The majority (97%) of land in Papua New Guinea is under customary ownership, and most of the population resides on customary-owned (clan) land where people have rights of ownership, access or control. In the PAOI, all land is customary owned except Wabo Station, Muro Mission and Kapuna Health Center, which have been alienated. Alienated land is no longer held under customary ownership because it has been excised by the Government as either state land (2%) or private freehold land, including conditional freehold land (1%) (see Section 9.2.3).

Access to land required for petroleum extraction and infrastructure development is granted under the terms and conditions of the *Oil and Gas Act 1998* via the award of a petroleum licence. The *Oil and Gas Act 1998* declares a broad list of petroleum-related activities to be a 'public purpose'. The list appears sufficiently broad that it will encompass the scope of the Project to the extent it is presently defined. Once granted, licencees have the right to enter the land and use that land to the extent reasonably necessary to conduct the operations for which the licencee has been granted. Such access rights are conditional upon providing appropriate compensation to the lawful owners and rightful occupiers of the land (see Section 2.2.2.2). Compensation can be payable under either or both the *Oil & Gas Act 1998* and the *Environment Act 2000* for loss of or damage to an interest in land. This could include damage to improvements on the land, such as crops, trees, structures and cultural heritage sites, and social inconvenience from lack of ongoing access to portions of the claimants' land.

The *Oil & Gas Act 1998* (Section 118) and the *Environment Act 2000* (Part VII, Division 3) provide for compensation to be paid to landowners, and to lawful occupants on land owned by the State of Papua New Guinea, and also provides for compensation to a broader set of claimants, i.e., 'owners and occupiers of, and any person with customary rights in, any private land in relation to their several interests'.

TEP PNG's approach to acquiring the rights of access to land needed for the exploration phase and development studies for the Project has been through good faith negotiation of clan land-use agreements and short- term leases conditional upon providing compensation to the lawful owners and rightful occupiers of the land.

Short-term leases are used by TEP PNG to effectively reserve uninhabited land for relatively short durations (e.g., 12 months, extendable by up to two six-month terms) in return for payment of a 'Restricted Use Fee'. Short-term lease conditions enable owners and occupants to continue their existing land uses particularly for access to natural resources but restrict them from settling or constructing new homes or buildings on a defined parcel while TEP PNG determines where its permanent facilities will be located.

For the next phase of the Project, in compliance with the *Oil and Gas Act 1998*, the Regulator Department of Petroleum and Energy (DPE) will review and validate the customary landowners identified through the social mapping and land investigation (SMLI) studies and make recommendations for the Minister of Petroleum and Energy to issue a Ministerial determination.

TEP PNG will engage in negotiations with the landowners for the long-term lease (50 to 99 years) covering the permanent facilities and the export pipeline route.

The PNG Government plays a central role in land access processes. Identifying the lawful landowner and the rightful land occupiers is the subject of legal landowner identification and mapping processes under the *Oil and Gas Act 1998* (see Section 2.2.2.3) that are outside the scope of this EIS. Those processes determine rights to customary lands and thus entitlements and compensation for permanent and or temporary loss of the land. Although compensation is negotiated and agreed by the licencee/ permit holder under both the Oil and Gas and Environment Acts, where necessary the valuation of property can be sought and administered under the *Valuation Act 1967* (Chapter 327) and the *Valuation (Amendment) Act 2016* (see Section 2.3) however the *Oil and Gas Act 1998* also makes reference to the Valuer General's Compensation Schedule for trees and plants (Filer et al. 2000).

In Papua New Guinea the *Land Act 1996,* prevents customary landowners from directly leasing land to developers. Thus, landowners wishing to engage in direct land dealings are able to enter into a freehold sale or lease back arrangement with the government. The land will then be leased from the government by the Project to conduct operations on the land. The customary landowners will receive rental payments for the land used by the Project and royalty payments from the Government via the establishment of Incorporated Land Groups (ILG). Land accessed by the Project will revert to its customary owners once Project activities have been completed and/or at the expiration of the lease.

International Finance Corporation performance standard 5 (IFC PS5) applies to physical and/or economic displacement resulting from land access processes including: expropriation or other compulsory procedures; negotiated settlements with property owners or those with legal rights to the land if failure to reach settlement would have resulted in expropriation or other compulsory procedures; involuntary restrictions on land use and access to natural resources cause a community or groups; project situations requiring evictions of people occupying land without formal, traditional, or recognizable usage rights; and restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, freshwater, medicinal plants, hunting and gathering grounds and grazing and cropping areas. IFC PS5 (2012) was developed on the premise that cash compensation alone is frequently insufficient for restoring displaced people's living standards and livelihoods. Accordingly, IFC PS5 promotes provision of resettlement assistance, replacement housing and measures to restore livelihoods in addition to cash compensation.

13.3.2 Identification and Initial Assessment of Potential Impacts

Approximately 1,800 ha of land will be required for the Project. Land requirement estimates at pre-FEED stage are set out in Table 13.6 and include:

- 140 ha of customary-owned (clan) land already used by TEP PNG during the exploration and early Project phases.
- 912 ha of additional land required for Project facilities.
- 230 ha (or 15%) contingency for potential unexpected land intake during construction.
- 518 ha of land acquired around the CPF area to establish a safety and security exclusion zone.

The final land requirements will be refined during FEED and the physical construction of the facilities and will account for future pre-construction survey findings.

Table 13.6 – Estimated Customary Land Requirements at Pre-FEED Stage

Project Facilities	Total Land Requirements (ha)
(A) PRL-15 Production Facilities	
Well Pads (ANT-10, ANT-11, ELK 10)	21
Drilling camp and log base (old ANT-3 camp)	21
Water dams (Ant 10, ELK 10)	2
Trunklines and flowlines (40 m wide average ROW)	170
Sub-total for A	***214***
(B) Industrial Area (CPF) in PRL-15	
New Logistics Base	7
CPF (Production facility, camps, construction area, flare and vent, waste and landfill storage)	100
Sub-total for B	***107***
(C) Other Infrastructure in PRL-15	
Herd Base Operations Camp (with an additional lay-down area for the export pipelines)	58
Purari Airstrip and access road	103
Project roads R1, R2, R4, R5, R6, R7	132
Spoil dumps and their access	120
Quarries	52
Telecommunications	3
Sub-total for C	***468***
(D) Onshore Pipeline Export Route (PER)	
PER 61 km x 40 m ROW (incl. four valve stations and spoil dumps)	244
Export pipelines – laydown areas and a construction camp	19
Sub-total for D	***263***
Summary	
Total land required for Project facilities (A+B+C+D)	1,052
(i) Land currently in use	140
(ii) Additional Project impacted area	912
15% Design and Construction Contingency	230
CPF exclusion zone	518
Estimated Total Land Requirement	***1,800***

Note: area estimates are approximate.

Customary clan land will be acquired, leased or secured by short-term and long-term land agreements. Clan land generally includes common areas of land in which all clan members can fish, hunt and collect resources, and specific land areas allocated to families where people will live and make gardens. Land areas allocated to families are most often the more fertile where gardens can be grown and, because of this fact, are generally close to where villages have been established.

The proposed Project design and its onshore infrastructure incorporated the findings of the socio-economic baseline studies in order to avoid the permanent loss of primary residential structures or shelter (physical displacement or resettlement) of PAOI individuals or communities. Acquiring land will cause the temporary and permanent loss of land and resources used for livelihoods (economic displacement) in the Project footprint and, in some cases, will also cause involuntary

restrictions on land use and access to natural resources and communal property for PAOI communities.

Most land (approximately 73% or 1,300 ha) to be acquired for Project components is in the largely unpopulated PRL-15. This land includes a safety and security exclusion zone of approximately 518 ha that will be established around the CPF. The Project will not adversely affect this exclusion zone. Engagements will take place with customary landowners and land users to enable access to natural resources, while the land use restrictions to avoid any development or settlements near the CPF are respected. The remainder of the Project's land required (approximately 27%) will be needed for the export pipeline route (which is largely unpopulated except for the shore crossing at Orokolo Bay), and associated infrastructure (construction camp, pipe yards, condensate and gas valve stations).

Thus, Project land access will primarily impact Project-affected persons, Project-affected communities and local communities in and around PRL-15 and, to a lesser extent, Project-affected persons who live around the export pipeline route.

13.3.2.1 Reduced Livelihood of Project-affected Persons Living in and Around PRL-15 due to Land Access

Land access for the construction and operation of all permanent and temporary Project components in PRL-15 will remove approximately 0.95% of the area of PRL-15, that may be used for subsistence resources for Project-affected persons living in and around the PRL-15 area. These groups are wholly dependent on land natural resources, some of which are located outside of PRL-15, for their subsistence-based livelihoods, including for food (e.g., forest animals, fish, and plants), medicine, housing and canoe building materials and firewood for fuel (see Section 9.8.6).

All clan land to be acquired by the Project in PRL-15, is on land that comprises either primary or logged hill forest and alluvial forest (Table 16.5). The availability of forest habitat for wild food provisioning is considered a medium value priority ecosystem service for inland communities, as these communities have greater access to forest resources in surrounding areas (Table 16.8), i.e., these resources are largely replaceable. The loss of natural resources due to land access is largely replaceable for Project-affected persons living in and around PRL-15, therefore, a ***Medium*** sensitivity rating is applied.

Project-affected persons living in and around PRL-15 have had previous experience of land access processes since exploration activities commenced in PRL-15 in 2006 (see Section 1.4). These groups have had and continue to have exposure to land leasing arrangements with the commercial logging industry under the Baimuru Block 3 logging lease which covers PRL-15 (see Section 9.8.3). Project-affected persons living in and around PRL-15 are; therefore, considered to have some resilience to change having already had exposure to land access impacts, thus a ***Medium*** impact magnitude rating is applied to land access for these communities. The initial social impact significance is therefore assessed as ***Moderate.*** This rating is applied to the Project operations phase which will have the longer duration of impact compared to the temporary and smaller construction areas that will only be utilized for a short (1 to 4 years) period of time.

13.3.2.2 Reduced Livelihood of Project Affected Persons Living around the Onshore Export Pipeline Route due to Land Access

TEP PNG will acquire approximately 263 ha of land for the onshore export pipeline ROW, including land for associated temporary and permanent infrastructure and facilities. Temporary land access may also include land along the Purari River, as the construction camp and pipe yard 4 near the Purari River opposite Aivai will require an estimated 19 ha. Permanent land-use

restrictions to preserve the integrity of the pipeline will apply over the export pipeline right of way once restoration and rehabilitation works are complete. The gas and condensate valve stations (a total area of 6 ha) will be permanently fenced.

In the export pipeline route approximately 0.6% (6 ha) of the land to be accessed by the Project is in customary gardens and sago cultivation while approximately 8.2% (81 ha) comprises customary-owned stands of wild sago and forest complexes (Section 16.12). These forest and garden complexes are assessed as providing high value provisioning ecosystem services for communities, and particularly for Project-affected persons living in the Orokolo Bay coastal area (Section 16.4.3). These services include wild foods (e.g., plants, nuts and fruits), food crops (sago), firewood (including marine driftwood), timber and wood products, fresh water for domestic use, transportation, access and fisheries. While communities around Orokolo Bay rely on these food sources with some limitations to source alternatives, the overall area of land to be acquired for construction and operation of the onshore export pipeline is comparatively small, thus an overall ***Medium*** impact magnitude and sensitivity rating is applied. Thus, the initial social impact significance is assessed as ***Moderate***.

Section 13.9 discusses the potential impacts associated with community access to the Purari River, nearshore marine environment and beaches along Orokolo Bay during pipeline construction; therefore, these impacts are not assessed further in this section.

13.3.2.3 Reduced Livelihood of Project-affected Persons due to Loss of Income from Forest Logging Resources

Most of the land in commercial logging concession Vailala Block 3 to the south of the Purari River has already been logged. PRL-15 is in commercial logging concession Baimuru Block 3. Construction-related clearing will remove an estimated 745 ha of potentially commercial production forest in PRL-15, of which 150 ha has already been logged and 595 ha is unlogged (Section 16.5.1.8). The estimated construction-related clearing area represents less than 0.2% of Baimuru Block 3. Chapter 16 assesses the potential loss of commercial forestry resources in terms of ecosystem services for commercial asset owners and royalty payments to landowners; therefore, these impacts are not assessed further in this section.

13.3.2.4 Reduced Access for Project-affected Communities along the River Transport Corridor

Rivers are the main transport routes for communities to access schools, hospitals, markets, food gardens, sago processing sites and fishing areas (see Figure 13.1). The predicted increase in barge traffic associated with Project construction activities is unlikely to restrict access and community use of the primary and secondary river transport corridors, respectively Purari River and Uriko-Ivo River.

Section 13.9 discusses the potential impacts associated with community access to the Purari River, nearshore marine environment and beaches along Orokolo Bay during pipeline construction; therefore, these impacts are not assessed further in this section.

13.3.2.5 Increase in Community Tension due to Land Access, Compensation and State Financial Payments

In Papua New Guinea clan disputes over land ownership and associated compensation and State financial payments have driven community tension on most of the large resource extraction projects to date (Section 9.14.2). While no significant land disputes have occurred between customary landowners related to the Project temporary land access in the PAOI, land disputes were a major cause of tension among Pawaia groups for a proposed hydropower dam in the

Purari River catchment in the past (see Part 15 of Volume 2). In Gulf Province too, logging activities have the potential to be a source of adverse social and environmental impact causing clan disputes, as landowners are generally not benefited as expected (see Part 15 of Volume 2).

Section 13.8 discusses the potential impacts associated with increases in community tension including impacts related to land access activities; therefore, these impacts are not assessed further in this section.

13.3.2.6 Summary of Identified Potential Impacts of Economic Displacement to Livelihoods

The Project has the potential to cause economic displacement and reduce livelihoods in PRL-15 and along the onshore export pipeline route to due land access activities.

The following embedded design controls address potential impacts of economic displacement and livelihoods:

- Project design is based on a risk-management approach, considering geotechnical constraints (e.g., flooding, landslides risks, geohazards) and anticipating and avoiding, or where avoidance is not possible, minimizing environmental and social impacts (e.g.: avoidance of sensitive features, physical and economic displacement, priority ecosystem services, and minimization of project footprint, land clearing and disturbance, emissions and discharges) [ED013].
- The Project will maintain a grievance mechanism that is legitimate, accessible, predictable, equitable, right-compatible, and transparent [ED033].

13.3.3 Proposed Mitigation, Management and Optimization Measures

The PNG legal land access and leasing processes that will apply to the Project are outlined in Section 13.3.1. In securing the rights to land necessary for planning, constructing and operating the Project, TEP PNG is committed to meeting the requirements of PNG legislation, the IFC PS 5 and TOTAL's own corporate policies, standards and guidelines (see Chapter 2). TEP PNG will make compensation and lease payments directly to the affected clans or individual landowners in separate agreements for each area of damage or loss, and for each lease.

TEP PNG will develop a Land Access and Resettlement Framework (LARF) for the Project, as a precursor to preparing a Land Access and Livelihood Development Plan (LALDP) and where required a Resettlement Action Plan (RAP). Based on the Project design described in Chapter 4, physical displacement is avoided, and a RAP is therefore, not expected to be required. Nonetheless, it is not possible to disregard the need to prepare a RAP until completion of detailed engineering design, which will define final Project land requirements, and the Project-affected communities and businesses that will be physically and/or economically displaced by the Project.

The LARF will comprise measures to mitigate the potential impacts arising from land access, economic displacement, and possible physical resettlement of Project-affected persons that are described in Table 13.7. Land access is required to commence early works and construction.

Mitigation measures to be implemented during various Project phases to further manage these impacts are described in Table 13.7.

Table 13.7 – Land Access and Economic Displacement Mitigation Strategies and Management Plans

Potential Impact	Mitigation Measures	Relevant Management Plan
Land Access		
Reduction of livelihood of Project-affected persons living in and around PRL-15, around export pipeline route due to land access.	♦ All sites proposed for development as part of the Project will be subject to a preconstruction survey to clearly identify acid sulfate soils, sensitive sites and habitats, e.g., roosting, breeding, nesting and threatened species sites, archaeological sites, burial sites, sites of religious importance to be subject to specific mitigation measures (EM001]. ♦ Development of Project Land Access and Livelihood Development Plans (LALDP) consistent with the goals, objectives, principles and processes described in the Land Access and Resettlement Framework (LARF) and continuously drawing on lessons learned from the land access and resettlement activities. The LALDP will adequately cater for the respective interests of the Project-affected persons (PAPs) in accordance with criteria for eligibility and the PAPs' choice of type of compensation (e.g., cash or in-kind). The LALDP will: – Describe processes for appropriate disclosure of information, consultation and the informed participation of Project-affected persons with the aim of obtaining their free, prior and informed consent. – Provide a compensation framework with compensation for loss of assets at replacement cost; – Design livelihood programs which aim to improve or at least restores the livelihoods and standards of living of displaced persons which choose to remain in the project area of influence; and – Include special provisions for identified vulnerable individuals or groups. – If physical displacement of primary residents is required; include provisions to improve living conditions among displaced persons which have chosen in-kind compensation through provision of replacement housing. – Provide a monitoring framework for the implementation of LALDP [SM001]. ♦ The Project will, in consultation with local communities, government and civil society, design and deliver a diversified livelihood program that provides eligible Project affected people which choose to remain in the project area of influence with opportunities for improving their existing livelihoods and that contributes to the diversification of skills with the aim of triggering income generating activities. Livelihood programs will consider how project affected persons can be involved in Project employment opportunities (direct and indirect) and how skills learned on the Project can be applied to other sectors in the local area [SM002]. ♦ As part of the Land Access and Resettlement Framework (LARF): – Provide a framework for stakeholder engagement on land access and livelihoods including public consultation, disclosure and grievance resolution. – Provide preliminary information to stakeholders (e.g., government, civil society) about the standards and procedures for the LARF [SEM003].	Land Access and Livelihood Development Plan; Resettlement Action Plan (if required); Community Development Plan; Stakeholder Engagement Plan.

13.3.4 Residual Impact Assessment

The following section provides the assessment of residual impacts of Project land access to livelihoods of Project-affected persons, including to local business asset operators in the Project area, assuming successful implementation of the proposed mitigation measures.

13.3.4.1 Reduction in Livelihood of Project Affected Persons Living in and Around PRL-15 due to Land Access

The Project will acquire a very small part (estimated 0.95%) of PRL-15 to construct and operate the Project. As PRL-15 is largely uninhabited, the natural resources are assessed as being non-priority and replaceable resources for the PRL-15 Project-affected persons and communities. Under the LARF, eligibility for compensation and livelihood assistance will be determined with reference to the provisions of *the Oil and Gas Act 1998* and IFC PS 5. The definition of eligible groups, their compensation entitlements and compensation rates will be progressively refined based on the findings of the household and socio-economic surveys, land and asset inventories, market price studies and through consultation with the Project-affected persons.

Eligible groups will be compensated in cash (at full replacement cost) and/or in-kind compensation and will participate in livelihood development programs. In addition, there will be other measures that will favor Project-affected persons in Project local procurement and employment opportunities and will provide special assistance to vulnerable or disadvantaged individuals or groups. These specific mitigation measures for displacement impacts, alongside potential benefits arising from the Project Community Development Plan (described throughout this chapter) are expected to largely reduce potential livelihood losses due to Project land access.

Thus, a ***Low*** residual impact magnitude is attributed to a reduction in livelihood as a result of land access. As outlined in Section 13.3.2.1, potential loss of livelihood from land access is attributed ***Medium*** sensitivity for PRL-15 Project-affected persons. Based on these ratings, the impact significance to livelihoods of PRL-15 Project-affected persons from Project land access is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment.

13.3.4.2 Reduction in Livelihood of Project-affected Persons Living around the Export Pipeline Route due to Land Access

The Project will acquire an estimated 263 ha of land over the approximate 61 km of the export pipeline route and associated infrastructure near Aivai. Permanent land-use restriction will apply on the final right of way upon its restoration and rehabilitation, and the condensate and gas valve station of approximately 6 ha will be permanently fenced.

As for PRL-15, under the LARF, eligible groups along the export pipeline route will be compensated in cash (at full replacement cost) and/or in-kind compensation and will participate in livelihood development programs. In addition, there will be other measures that will favor Project-affected persons in local procurement and employment opportunities (see Section 13.4.3) and will provide special assistance to vulnerable or disadvantaged individuals or groups.

Thus, a ***Low*** residual impact magnitude rating is attributed to land access processes along the export pipeline route and for associated infrastructure near Aivai.

Potential loss of livelihood from land access is attributed ***Medium*** sensitivity. Based on these ratings, the residual impact significance due to Project land access along the export pipeline route is reduced from ***Moderate*** for the initial assessment, to ***Minor*** for the residual assessment.

13.3.5 Summary of Residual Economic Displacement and Livelihoods Impacts

A summary of the assessment of residual impacts to economic displacement and livelihoods is provided in Table 13.8, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.7.

Both residual impacts are assessed to be ***Minor***.

Table 13.8 – Summary of Assessment for Residual Impact Significance for Economic Displacement and Livelihoods

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Land access.	Reduction of livelihood of Project-affected persons living in and around PRL-15 due to land access.	Direct	Project-affected persons, living in and around PRL-15.	C, O	♦ EM001 ♦ SM001 ♦ SM002 ♦ SEM003	Medium/Low	Minor
	Reduction of livelihood of Project-affected persons living around the export pipeline route due to land access.	Direct	Project-affected persons, along the export pipeline route.	C, O		Medium/Low	Minor

C = Construction, O = Operations.

13.4 Economic Development and Employment

13.4.1 Context

The formal economy in Papua New Guinea is dominated by resource exploration and production, commercial agriculture, tuna processing, logging and a small manufacturing sector. The informal economy, which supports approximately 85% of the population, primarily depends on subsistence agriculture (ADB, 2015).[2] Most people in the PAOI live predominantly subsistence-based lifestyles, with some employment by government, church agencies, logging and petroleum exploration. Most households earn cash income from the sale of betel nut, sago, fish and garden produce, and village leaders from Mapaio, Aivai, Upaia and Wabo identified logging royalties as a main source of cash income for their villages.

Cumulative impacts associated with economic development and employment are discussed in Chapter 17.

13.4.1.1 Income and Livelihoods

The main occupation in the PAOI is subsistence activities, where 63% of males and 76% of females aged 16 years and above were engaged primarily in providing food, water and shelter in 2016 (see Part 15 of Volume 2).

Men and women in the PAOI perform distinct roles. Men are primarily, but not totally, responsible for heavy manual labor tasks, such as hunting, making canoes and building houses, while women will more likely spend time making sago and performing other duties, such as caring for children, collecting water, cleaning and cooking.

Most of the workforce is engaged primarily in subsistence activities; although, 46% of males and 14% of females aged 16 years and above have had some previous formal work experience. The most common types of employment were laboring positions, logging/milling (7%), administration/clerical positions, carpenters, cooks/catering, pastors and security; however, various additional technical positions were also identified, including plumbers, plasterers, painters and surveyors. The main employers identified during the baseline surveys were the government, churches and TEP PNG contracting agents, the latter being particularly prevalent among Pawaia villages.

The average fortnightly income was PGK299 per household; however, this was heavily skewed due to a few relatively high incomes. The median fortnightly income level, which often better reflects the population, was PGK80 per household, which could be extrapolated to PGK2,080 per household per annum. This is PGK312 per capita per annum. Income levels are; therefore, low when compared to PNG standards; and furthermore, income is also irregular, as 21% of households recorded no cash income in the fortnight prior to the survey.

Most households earn some form of income from the sale of products derived directly from the local environment. Wages provided the main source of income for 9% of households, and business activities were the main source of income for an additional 7% of households. The most common business activities are trade stores, fuel sales and canoe or dinghy hire.

2 The informal economy is not monitored by any form of government nor is it taxed. Unlike the formal economy, activities of the informal economy are not included in the gross national product or gross domestic product.

The main constraints to household income identified during baseline surveys were poor transport access and high transport costs. Added to this, relatively few buyers visit the PAOI to purchase local products.

Most household expenditure across the PAOI was allocated to food (29% of all expenditure), fuel and transport costs (16% of all expenditure), alcohol and tobacco (9% of all expenditure), and customary payments and business costs (combined 7% of all expenditure).

Table 9.21 identifies that households living below the national poverty line are present in all baseline survey-participating communities in the PAOI (21 to 63% of households) and that most communities have households that did not receive any income in the previous two weeks. Almost two thirds of communities from most language groups, except the Maipua people from Apiope in the Purari river transport corridor, also had households that regularly went a day without eating and 30% of communities amongst the Iare, Koriki, Orokolo and Pawaia language groups surveyed had households that spent more than 40% of their income on food.

The same table identifies only one or two households from the Orokolo communities of Harevavo and Herekela, and the Kaimare community of Mariki did not participate in subsistence activity in the previous two weeks (11% of communities and 3% of each of those two language groups). Given the extent and importance of subsistence activity in the PAOI, failure to participate in subsistence activity over an extended period of time is likely to contribute to hardship and vulnerability, but they are not significantly present at this time.

In addition, households headed by women were present in all but one language group, particularly the Iare communities where they made up almost 10% of households, and households with all female members were present in five of the seven language groups, except the Koriki and Maipua communities.

These are all indicators of pre-existing vulnerability (see Section 9.15.1).

13.4.1.2 Housing and Household Assets

Most houses in the PAOI are made from traditional materials gathered locally; although, house designs vary substantially, particularly between the Pawaian and coastal communities.

The most common main sources of power for lighting are solar (53% of households), torches (26% of households) and battery-powered lamps (17% of households). The main sources of drinking water are rainwater catchments (37% of households), tanks (32% of households), rivers and creeks (16% of households) and shallow wells (8% of households). Rainwater catchments include any drums, pots or other containers that can be used to collect and store rainwater from a roof.

Most households own various basic assets, many of which are required for gardening, fishing, hunting or house construction. Very few households own such items as refrigerators, freezers, chainsaws, a gun or a rifle. Approximately 66% of households have canoes, while only 15% of households have a dinghy and 21% of households own an outboard motor (which could be attached to either a canoe or dinghy). No motor vehicles or motorbikes were recorded in the PAOI.

Data collected during baseline surveys indicated the Pawaia (PRL-15) and Orokolo (export pipeline route) language groups had the greatest percentage of households (46%) above the average village household size (6.1 people per household in Gulf Province), which is a proxy for overcrowding, followed by the Iare (PRL-15 and river transport corridor) communities at 41%. Overcrowding is likely to exist to some extent in all language groups and is a potential source of pre-existing vulnerability (see Section 9.15.3).

13.4.1.3 Economic Infrastructure

Economic infrastructure is defined in the EIS, as the physical structures and services in the PAOI, excluding transport infrastructure (which is described separately in Section 13.9). Economic infrastructure in the PAOI is limited when considering access to communications, electricity, banks and other commercial services.

Approximately 66% of villages surveyed have mobile phone reception, and the only source of electricity is from generators or solar power. Twenty-eight percent of households have access to generators, and 53% have access to solar panels (providing electricity).

Most communities had households that did not have access to electricity across all language groups. The Koriki (river transport corridor) communities were the highest with 55% of households without electricity. No or limited access to electricity is a source of potential pre-existing vulnerability, e.g., it prevents people from fulfilling basic needs, generating income and communicating.

No banks or banking agencies exist in the PAOI. The nearest bank is in Kerema. Thirty-one percent of households surveyed indicated that they (or at least one family member) had a bank account (see Part 15 of Volume 2).

13.4.2 Identification and Initial Assessment of Potential Impacts

13.4.2.1 Increase in Business Activity and Employment Opportunities

PAOI community income levels are anticipated to increase due to the Project through:

- State financial payments (i.e., statutory benefits, development grants).
- Project benefits, compensation and lease payments.
- Direct and indirect employment opportunities (i.e., the Project workforce and supply chain)
- Expanded local business activity due to:
  - An increase in local sales of fish, betel nut and garden produce and/or an increase in the extraction and sale of timber products or cash crops.
  - An increase or expansion in local trade stores, cooked food, transport hire and guesthouses due to higher income levels in the PAOI.

The construction period is projected to provide the highest number of local jobs and employment opportunities, with the operations phase providing fewer opportunities. Income and employment levels are expected to return close to pre-Project levels after Project construction, and then after operations, due to a reduction in workforce requirements.

The opportunity to earn income from employment or other Project-related activities will attract people from neighboring areas and elsewhere in Papua New Guinea. Project-induced in-migration is discussed in Section 13.1.7.

Financial Payments and In-kind Benefits

The Project will make direct or indirect payments to the State of Papua New Guinea, the provincial and local-level governments and relevant landowners, which will extend to the end of the Project operations phase (i.e., it will be different than income from employment and procurement). Four types of benefits include: (i) statutory benefits (i.e., royalties, development levy, production levy and equity benefits) (ii) statutory development grants, (iii) Project benefits, and (iv) compensation and lease payments.

Of the four types of benefits, the State of PNG administers the following 'State financial payments':

- Statutory benefits: The *Oil and Gas Act 1998* states that a royalty (equal to 2% of the value of wellhead production paid to the national government), a development levy (equal to 2% of the value of wellhead production), a production levy[3] (equal to 2% of the value of wellhead production) and equity benefits (equivalent to 2% of the dividends, provided the national government takes an equity share in the Project, limited to 22.5%) will be shared among the relevant provincial and local-level governments and the licence area landowners in proportions determined by the Minister for Petroleum and Energy during the Development Forum.

  Project area landowners (as defined in the *Oil and Gas Act 1998*) will receive benefits that depend on the activities carried out on their land and are split three ways:

  – 30% to a Future Generations Trust.

  – 30% to a Community Infrastructure Trust.

  – 40% cash payment to defined landowners or landowner entities.

- Statutory Development Grants: Infrastructure Development Grants (IDG) are allocated by the State of PNG for infrastructure development and maintenance in the affected Project communities, local level government, district and province. Business Development Grants (BDG) are also provided by the State of PNG to assist landowner companies in business development activities. Both the IDG and BDG are negotiated and agreed during the Development Forum between the State of PNG, landowners and government representatives, independent of the Project.

The Project administers the following 'Project benefits and compensation payments':

- Compensation and lease payments, made under the *Oil & Gas Act (1998)* and the *Environment Act (2000)* for loss of or damage to an interest in land for Project land access, are discussed and assessed in Section 13.3.

- Project benefits. This is a non-technical term used in this chapter to refer to contributions by TEP PNG for relevant provincial and local community development projects in health, education, livelihoods, environment and/or other areas. The objectives of Project benefits are to maintain and enhance TEP PNG's social license to operate and to mitigate potential socio-economic impacts associated with the Project. Funds provided through the Project benefits stream may be used on programs implemented by nongovernmental organizations, TEP PNG and/or for-profit organizations.

State financial payments along with Project benefits, compensation and lease payments are likely to contribute to economic impacts either because they cause increased income or because they increase the liquidity of the recipient (compensation, see Section 13.3); in both instances they contribute toward an increased cash economy.

As described in State financial payments earlier, the Project will provide revenue to the State of PNG which will allocate funds to the relevant provincial and local level governments; the magnitude and allocation is decided at the Development Forum. The Project will contribute to Papua New Guinean gross domestic product growth, export growth and government revenue at a

3 The Project has agreed to pay this production levy to the State; and it is not yet, but is expected to be, a statutory requirement.

national, provincial and local level. Formal employment will also increase at a national and provincial level.

As described in Section 13.7, opportunities arising from State financial payments may not be realized in an equitable nor timely manner by Project-affected persons, communities and local communities, due to potential increased challenges to government administration.

Direct and Indirect Employment

Fifty to 6,000 workers are anticipated to be required during the initial stages of early works to the period of peak construction activities. The construction workers will be demobilized once construction is completed. The operation of the upstream facilities (e.g., wellpads, trunklines, flowlines, CPF and export pipelines) will require approximately 180 Project workers and 70 security workers. Further information on workers can be found in Chapter 4.

The number of workers from the PAOI has not been estimated; however, TEP PNG is committed to conducting skills assessment surveys, and providing training and employment opportunities according to a geographic hiring prioritization scheme, which gives the highest priority to people most affected by the Project TEP PNG has set the following objectives and activities to develop the local (i.e., PAOI) and national workforce in its National Content Plan:

- Use early works to provide on-the-job training to local workers in the lead-up to the construction phase.
- Developing technical and vocational education and training initiatives to facilitate local workforce participation in the Project construction phase.
- Developing the skills of PNG nationals employed during the construction phase, and working with contractors and their subcontractors to implement short training courses to assist in meeting this objective so that Papua New Guineans develop new skills intended to outlast the Project lifetime.

The number of expatriates employed by the Project is expected to decline steadily over time as PNG nationals acquire relevant competency and experience, and according to training and localization plans approved by the PNG Government.

The employment focus will remain on meeting and delivering the National Content Plan objectives and activities, given the low literacy and low education levels in the PAOI (see Section 13.5), and the limited number of people with relevant technical skills or experience.

Opportunities for moderately skilled and unskilled workers exist in security, camp cooking and maintenance. While some local people may gain employment and have relatively high wage levels, the overall impact on income levels in the PAOI, particularly for Project-affected persons and communities in and around PRL-15 and along the export pipeline route, due to direct Project employment may be relatively small. The PNG LNG project found that most low-skilled workers during the construction phase were local workers with limited training who were engaged for short periods and; therefore, left with limited capacity to gain further employment (Voigt-Graf & Odhuno, 2019).

Given the lack of previous business experience in the petroleum (or other) industries, there is risk that a relatively small proportion of contracts (by value) is awarded to community-owned businesses in the PAOI, except for joint ventures between local (PAOI-based) companies and larger, experienced companies from elsewhere in Papua New Guinea or abroad. Some local business people may be awarded contracts with TEP PNG or their major contractors, but the main direct benefit to local people will be in the employment created by these contracts; however,

many of the employees will need to be sourced from outside the PAOI if the contracts require technical skills. The degree to which local business contracts increase income levels in the PAOI may potentially be relatively small.

Consistent with Section 129 of the *Oil & Gas Act 1998*, the Project will procure goods and services from local businesses, whenever those goods and services are available under comparable terms and conditions with foreign suppliers. In addition, and under its National Content Plan, TEP PNG has committed to develop objectives and initiatives to encourage in-country procurement, development and support of PNG businesses. Objectives and initiatives are focused on work packages specifically designed for local sourcing, supporting training and capacity building, and appointing Business Development Officers to assist small and very small-scale business in the Project area.

Expanded Local Business Activity

A range of direct and indirect business opportunities in the PAOI may be created due to an increased cash economy and a modest increase in wealth due to Project employment and procurement. Opportunities may include produce sales in trade stores, cooked or processed food sales in local stalls, transport services (particularly dinghies), fuel sales, and potentially guesthouses, as people migrate towards the PAOI in search of employment or business opportunities. These opportunities are expected to occur predominantly where population growth is expected from natural increases and or in-migration (see Table 13.1) and where community development initiatives such as improvements to education or health services are planned.

The expected increase in wages due to direct and indirect Project employment may also increase local expenditure, which will represent an input into the local economy.

Food prices are likely to rise in the short term, in line with higher income levels, but prices may subsequently fall as more people enter the business market (i.e., through in-migration or a greater take-up of commercial opportunities by locals) and bring competition and diversification. Other negative impacts to health, community cohesion, and law and order associated with an increase in income and wealth are discussed in Sections 13.6 to 13.8.

The greatest impact, in terms of the increase in store foods available, and a reduction in price, is expected to occur in the Pawaian villages, where few stores exist, and prices are currently the highest in the PAOI.

Vulnerability Considerations

Local communities highly value employment opportunities and expectations that local communities will be prioritized for employment are high. Education and relevant skills amongst local communities are limited (see Section 13.5), which limits their potential to benefit from some of the Project's employment opportunities.

Further indicators for pre-existing vulnerability are apparent across most of the PAOI including those related to health conditions, poverty, food security, housing, livelihood security and access to infrastructure. Without active measures to promote the education and employment of women, employment opportunities for women from local communities may be limited due to existing cultural gender norms and inequalities.

Initial Impact Assessment

Increased direct and indirect national and local business activity, and employment and development opportunities are expected due to Project employment and procurement (and

including State financial payments and Project benefits, compensation and lease payments), which will increase income, wealth and skills in general.

The Project will contribute to Papua New Guinean gross domestic product growth, export growth and government revenue at a national, provincial and local level. Formal employment will also increase at a national and provincial level. This direct and indirect impact is expected to be experienced by the national, provincial and local level business community, and supply chain workers in the short to long term. Permanent positive impacts may also occur, hence a magnitude rating of ***Positive***. A sensitivity rating of ***Medium*** is applied, as some capacity to realize opportunities of this scale exist, albeit strained due to challenges with government administration (see Section 13.7). The initial social impact significance with regard to direct and indirect increased business activity and employment opportunities on a national level is assessed as ***Positive*** based on these ratings.

On a local scale, increased direct and indirect business activity, employment and development opportunities are expected to be experienced predominantly by Project-affected persons and Project-affected communities, and local communities in PRL-15 and along the export pipeline route, and to a lesser degree along the river transport corridor. Areas that may benefit to a greater degree include Wabo, Ura, Wabo Station, due to potential in-migration and where customary owners reside (see Table 13.1), Poroi 1, Mapaio Fish Camp, Subu, Aivai, Iuku and Mareke, as they are near construction activities, the shore crossing and where increased economic opportunities are expected or where clans claiming ownership over PRL-15 reside. Positive impacts may be felt at a regional level through targeted mitigations such as workforce training and development (see Section 13.5) that are considered in the residual significance assessment.

Greater employment opportunities are expected in the short to long term and are expected to increase income and wealth in general, which may positively impact on social development more broadly, and infrastructure and functioning, hence a magnitude rating of ***Positive*** has been applied to PRL-15, the export pipeline route and river transport corridor. A sensitivity rating of ***High*** is applied, as there is currently limited or no capacity to realize opportunities of this nature in PRL-15, and along the export pipeline route or river transport corridor. The overall initial social impact significance regarding direct and indirect increased business activity and employment opportunities on a local level is ***Positive*** based on these ratings.

13.4.2.2 Decrease in Business Activity and Employment Opportunities After the Commissioning and Decommissioning Phases

Income levels in the PAOI will likely return close to pre-Project levels after Project construction, as Project employment and business contracts will decrease and, again, after Project decommissioning. As a consequence, income from local business activities (e.g., trade stores, fuel sales and dinghy hire) will also likely decrease in PRL-15, along the export pipeline route and to a lesser degree, along the river transport corridor.

Many people are unlikely to have prepared adequately for seeking employment beyond the Project; although some people may have accumulated savings and others may have invested in sustainable economic activities such as cash crop production.

Initial Impact Assessment

A decrease in direct and indirect employment opportunities is expected when Project construction is completed, and contractors demobilize. Similarly, operations jobs will be lost following Project decommissioning. These losses in Project employment will have flow-on effects to related business contracts and other businesses locally, regionally and nationally. This impact is expected to be experienced predominantly by Project-affected persons and Project-affected

communities and local communities in and around PRL-15, along the export pipeline route, and to a lesser degree, along the river transport corridor. Areas that may be impacted to a greater degree include Wabo, Ura, Wabo Station, where population is expected to increase and where customary owners reside (see Table 13.1), Poroi 1, Mapaio Fish Camp settlement, Subu, Aivai, Iuku and Mareke, as they are near the construction activities, shore crossing and where increased economic opportunities are expected or where clans claiming land ownership in PRL-15 reside (see Table 13.1). Skilled and unskilled workers and supply chain workers may also be impacted.

Without mitigation, impacts may be felt in the longer term but are potentially reversible and are; therefore, ***Medium*** in magnitude in PRL-15 and along the export pipeline route, and ***Low*** along the river transport corridor. There is currently limited or no capacity for impacted communities across the PAOI to adapt to this change; hence a ***High*** sensitivity rating has been applied, as with the potential impact related to employment opportunity.

The initial social impact significance regarding a decrease in business activity, and direct employment and development opportunities for PRL-15 and the export pipeline route, is ***Moderate***, and for the river transport corridor, is ***Minor*** based on these ratings.

13.4.2.3 Reduction in Community Cohesion

The amount of household and subsistence labor is likely to increase for women and children, as PAOI communities, and men in particular, dedicate more time to Project activities including direct employment, business development opportunities, and landowner and benefit sharing discussions. There is an additional risk that the introduction of higher cash incomes may have potential adverse impacts on families despite the Project generating direct and indirect employment. Men, unaccustomed to high levels of disposable income, may choose to spend money on prostitution (evidenced in nearby logging camps, see Chapter 9) or alcohol, e.g., leading to family disputes, and a potential increase in separation and divorce. Women are particularly vulnerable, as divorce and separation are uncommon across the PAOI and, in the case of some Pawaias, has allegedly led to repercussions including sorcery.

Impacts relating to increased income and associated changes to social and leadership structures are discussed and assessed in Section 13.7. Issues relating to the loss of a sense of community are discussed and assessed in Section 13.8, and issues relating to potential loss of intangible cultural heritage are discussed and assessed in Chapter 14.

These shifts in culture may negatively affect community cohesion amongst Project-affected communities.

Initial Impact Assessment

The wealth brought by Project employment, business development opportunities and State financial payments to some families may reduce community cohesion in some communities. This impact is expected to be experienced during construction and operations, as this is when income-earning opportunities will be highest; however, if they are unmitigated, they have the potential to be longer-term. Project-affected and local communities in and around PRL-15 and along the export pipeline route, and to a lesser extent along the river transport corridor are expected to be adversely impacted. Areas that may be impacted to a greater degree include Wabo, Ura, Wabo Station, where population may increase and where customary owners reside (see Table 13.1), Poroi 1, Mapaio Fish Camp, Subu, Aivai, Iuku and Mareke, as they are near the construction activities, shore crossing and where increased economic opportunities are expected or where clans claiming ownership over PRL-15 reside (see Table 13.1).

Impacts are not expected to be reversible without mitigation, and; therefore, are ***High*** in magnitude in PRL-15 and along the export pipeline route and ***Medium*** along the river transport corridor. A ***Medium*** sensitivity rating has been applied, as there is currently some capacity for impacted communities across the PAOI to adapt to this change. The initial social impact significance regarding adverse impacts due to changes in community cohesion in and around PRL-15, along the export pipeline route and along the river transport corridor, is ***Moderate*** based on these ratings.

13.4.2.4 Changes in Livelihood and Subsistence Practices

The Project has been designed so that facilities and infrastructure will avoid villages and gardens as far as practicable. Impacts to livelihoods (due to land access) and to subsistence practices (for provisioning ecosystems services) are discussed in Section 13.3 and Chapter 16, respectively, and therefore are not assessed further in this section.

13.4.2.5 Improved Housing and Living Conditions

The increase in income levels in the PAOI is expected to allow some people to invest in housing to improve their living conditions. Houses may be upgraded by using iron sheets for roofs or, e.g., procuring generators or solar power, installing electric lights or water tanks, or buying modern appliances, such as a refrigerator or television.

Constraints limiting investment in housing in the PAOI include the high cost of transporting materials and the lack of any commercial services (e.g., for installing electrical connections or repairing refrigerators).

The most significant changes to any housing and living conditions are expected to be associated with Project-affected persons in PRL-15 and along the onshore export pipeline, as their income levels are expected to increase the most.

Initial Impact Assessment

Improvements to housing and living conditions are expected, as indirect positive impacts of Project employment and procurement. This impact is expected to be experienced during construction and operations, as this is when State financial payments and Project benefits, compensation and lease payments are expected. Those that may be impacted are expected to be predominantly Project-affected persons in PRL-15 and along the export pipeline route. As this is seen as a positive impact in an area with low housing conditions, without any real need for mitigation and some capacity amongst receptors to realize opportunities, magnitude and sensitivity ratings of ***Positive*** and ***Medium*** are attributed respectively, hence an initial social impact significance of ***Positive***.

13.4.2.6 Summary of Identified Potential Impacts to Economic Development and Employment

The Project may cause both positive and negative impacts on economy, employment and livelihoods, including:

- Increase in business activity, and direct employment and development opportunities.
- Decrease in business activity and direct employment opportunities after the Project's commissioning and decommissioning phases.
- Reduction in community cohesion.
- Improved housing and living conditions.

Currently, the Project has not had any direct impacts to economic infrastructure, but opportunities for positive impact exist through the Project's Community Development Plan.

13.4.3 Proposed Mitigation, Management and Optimization Measures

Mitigation and optimization measures to be implemented during various Project phases to manage these impacts are described in Table 13.9.

Table 13.9 – Economic Development and Employment Mitigation and Optimization Strategies and Management Plans

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Increase in business activity and direct employment opportunities during Project construction and operations.	♦ Establish a set of local employment and procurement policies that: – Ban employment applications 'at the gate'. – Includes measures to protect the workforce, in particular to identify and avoid child labor and forced labor. – Gives priority to Project-affected persons and members of Project-affected communities (and in particular women) for local employment opportunities. – Maximizes the employment and training of national citizens including persons from project affected communities. – Includes measures for gender-fair hiring and workplace policies [SM003]. ♦ Community owned company capacity building: Provide support to governance and capacity building programs to improve business development and planning [SM005]. ♦ The Project will maximize the procurement of Goods and Services from local companies including community owned companies. Major contractors will be required to demonstrate measures and staff organization they will implement to maximize national content. The Project will support eligible small-scale enterprises through capacity building programs and advisory/mentoring services aiming, e.g., to improve business plans, to strengthen management capabilities and to facilitate access to information on project employment and business opportunities. At a local level, business development officers will be appointed to identify and assist eligible small and very small-scale businesses in the Project area [SM006]. ♦ Develop initiatives to enhance education and training of youths from the PAOI, e.g.: – A scholarship program to provide opportunities for eligible students from the project affected communities to pursue their studies. – Internships and/or training opportunities with the Project or its contractors specifically focusing on transferable, nationally recognized trade skill development [SM007].	Labor Management Plan; Community Development Plan; Stakeholder Engagement Plan; National Content Plan

Table 13.9 – Economic Development and Employment Mitigation and Optimization Strategies and Management Plans (cont'd)

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Decrease in business activity and direct employment opportunities during Project commissioning and decommissioning.	♦ Institutional capacity building: Provide support to capacity building programs aiming to enhance national and local government capacity to foster diversified economic growth and their capacity to deliver local public services [SM004]. ♦ Community owned company capacity building: Provide support to governance and capacity building programs to improve business development and planning [SM005]. ♦ Develop initiatives to enhance education and training of youths from the PAOI, e.g.: – A scholarship program to provide opportunities for eligible students from the project affected communities to pursue their studies. – Internships and/or training opportunities with the Project or its contractors specifically focusing on transferable, nationally recognized trade skill development [SM007]. ♦ Investigate options to work with local partners to support the development of sustainable ward development plans in the PRL-15 area and along the export pipeline route [SM009].	Labor Management Plan; Community Development Plan; National Content Plan.
Reduction in community cohesion.	♦ Undertake a feasibility assessment in consultation with local stakeholders on delivering capacity and resilience building programs for Project-affected communities and clan/village leaders, e.g., on financial literacy training and conflict resolution training [SM008].	Community Development Plan.
Improved housing and living conditions.	No additional strategies proposed.	Community Development Plan.

13.4.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to economic development and employment, assuming successful implementation of the proposed mitigation and optimization measures.

13.4.4.1 Increase in Business Activity and Employment Opportunities

Increased national and local, direct and indirect business activity, employment and development opportunities are expected due to Project employment and State financial payments, and will increase income, wealth and skills generally across the domestic economy.

On a macro scale, and given mitigations described above, the permanent positive impacts (particularly through increased training and development (see Section 13.5), are expected to be further maximized, thus the impact magnitude would remain ***Positive***. A sensitivity rating of ***Medium*** is applied, as there currently exists some capacity to realize opportunities of this scale, albeit strained due to challenges with government administration (see Section 13.7). The overall residual impact assessment regarding increased business activity and direct and indirect employment opportunities on a national level is ***Positive*** based on these ratings.

On a local scale, business activity, and direct employment and development opportunities resulting in increased income, wealth and skills are expected in the short to longer-term. This has the potential to also positively impact social development, infrastructure and functioning more broadly.

Ratings of ***Positive*** magnitude and ***High*** sensitivity have been applied across the PAOI, as a noticeable promotion of investment locally is expected, albeit in the absence of a skilled and experienced labor 'pool'.

13.4.4.2 Decrease in Business Activity and Employment Opportunities

Income and employment levels are expected to decrease both after Project construction, and then after operations, due to a reduction in workforce requirements. This is likely to have indirect implications for business activity that was associated with increased wealth and population. This is likely to affect Project-affected persons and communities, and local communities in and around PRL-15, along the export pipeline route and to a lesser extent along the river transport corridor, skilled and unskilled Project workers, the national business community and supply chain workers.

There is limited experience in the petroleum sector in Papua New Guinea in terms of formal planning for decommissioning; although, there is substantial experience in the mining sector, with closure plans required for all major mines at least five years before the planned closure date. Experience from mines such as Ok Tedi, Porgera and Hidden Valley indicate low savings rates amongst most landowners, limited investment in non-mining activities, and limited thought as to how people will maintain income levels following closure.

The Project shall consider supporting sustainable income diversification and growth initiatives, capacity- and resilience-building initiatives, and improving economic infrastructure where possible, to assist in overcoming adverse impacts from a decrease in direct and indirect employment opportunities.

Magnitude ratings of ***Low*** for PRL-15 and the export pipeline route, and ***Negligible*** along the river transport corridor are applied, as training and support (via mitigation measures) is expected to have long-term benefits, resulting in increased resilience to change and reversibility of potential adverse impacts. A sensitivity rating of ***Medium*** is applied across the PAOI, as it is expected that mitigations will increase capacity and resilience to changes in business activity and employment opportunities.

The impact significance regarding a decrease in direct and indirect employment opportunities for PRL-15 and the export pipeline route is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment based on these ratings. For the river transport corridor, the initial assessment of ***Minor*** is reduced to ***Negligible*** for the residual assessment.

13.4.4.3 Reduction in Community Cohesion

An indirect impact of changes to and community cohesion is expected due to Project employment and procurement for the reasons outlined in Section 13.4.2.3. This impact is expected to be experienced during construction and operations, as this is when income-earning opportunities will be highest, and, through mitigation, may have a permanent impact. Project-affected and local communities in and around PRL-15 and along the export pipeline route, and to a lesser degree along the river transport corridor are expected to be predominantly impacted.

Low magnitude impacts are expected, as they are likely to be experienced only by a few communities in the PAOI and the capacity-building and cultural programs (see Chapter 14) proposed are expected to increase the capacity of PAOI communities to adapt to changes brought on by the Project and to support cohesion through strengthened leadership and a maintenance of cultural values. A ***Medium*** sensitivity rating has been applied, as there is currently some capacity for impacted communities across the PAOI to adapt to this change.

The impact significance regarding changes to community cohesion in and around PRL-15, along the export pipeline route and along the river transport corridor is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.3.4.4 Improved Housing and Living Conditions

The initial impact was rated as positive in an area with low housing conditions and there is no real need for mitigation; however, opportunity for improvements to economic infrastructure remain. There also remains some capacity amongst receptors to realize change. Magnitude and sensitivity ratings of ***Positive*** and ***Medium*** respectively are therefore applied, hence a residual impact significance of ***Positive***.

13.4.5 Summary of Residual Economic Development and Employment Impacts

A summary of the assessment of residual impacts to economic development and employment is provided in Table 13.10, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.9.

All residual impacts are assessed to be ***Negligible*** to ***Minor*** or ***Positive.***

The most substantial and positive economic impact for local communities can be derived from effectively managing State financial payments and Project benefits. The Project cannot deliver this strategy alone, and it will be pursued in partnership with local-level, provincial and national governments.

Various options are available to improve economic infrastructure in the PAOI; although, the Project is not expected to impact directly on communications, energy, banking or credit.

Table 13.10 – Summary of Assessment for Residual Impact Significance for Economic Development and Employment

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Increased business activity and direct employment opportunities.	Direct and indirect	National business community, supply chain workers.	C, O, D	♦ SM003 ♦ SM005 ♦ SM006 ♦ SM007	Medium/ Positive	Positive
			Project workforce (both skilled and unskilled). Project-affected persons, Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.			High/ Positive	
	Decrease in business activity and direct employment opportunities.	Direct and indirect	Project workforce (both skilled and unskilled), national business community, supply chain workers. Project-affected persons, Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	O, D	♦ SM004 ♦ SM005 ♦ SM007 ♦ SM009	Medium/ Low	Minor
			Project-affected persons, Project-affected communities, and local communities along the River transport corridor.			Medium/ Negligible	Negligible
	Reduction in community cohesion.	Indirect	Project-affected persons, Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	C, O, D	♦ SM009	Medium/ Low	Minor
	Improved housing and living conditions.	Indirect	PRL-15 and export pipeline route Project-affected persons.	C, O	None	Medium/ Positive	Positive

C = Construction, O = Operations, D = Decommissioning and closure.

13.5 Education and Workforce Training

13.5.1 Context

Education infrastructure in the PAOI is poor, with low literacy and education levels evident, particularly in the more remote inland areas. Relatively few people in the PAOI have workforce skills and experience.

13.5.1.1 Education Infrastructure

Baseline surveys identified 32 functioning elementary or primary schools in the PAOI, which does not contain any secondary, tertiary or vocational schools. Most are made of very basic materials and have very limited facilities and equipment. Few schools had access to electricity, and more than half of the schools did not have adequate drinking water.

Approximately 75% of schools have received some external assistance in the past decade. This often includes the construction of a double classroom or one or more teacher's houses, but also commonly is a gift of timber, roofing iron or water tanks. The not-for-profit sector, the private sector and government have all provided some form of assistance to schools in the PAOI.

TEP PNG continues to support PAOI communities with education initiatives, such as providing classrooms at Muro, Poroi 2, Kavava and Arehava Harevavo primary schools in partnership with Digicel Foundation, and donation of various books, stationery and materials to other communities in the PAOI. TEP PNG has also recently (August 2019) provided logistical support and funding of a literacy trainer from the National Volunteer Service to assist with mentoring volunteer community tutors for two years in and around PRL-15.

13.5.1.2 Enrolment and Literacy Levels

School enrolment and attendance in the PAOI is very low, as described below:

- The majority of elementary schools in the PAOI are government-run, and a single teacher services many of these. Church agencies run most of the primary schools. None have boarding facilities. The nearest secondary schools are at Ihu, Araimiri, Kerema and Kikori.
- Ten percent of males and 21% of females aged 16 years and above from those surveyed have never attended school. This includes more than half of the females aged 16 years and above from Pawaian villages.
- In 2016, just 31% of boys and girls aged from six to 15 years were attending school. This net enrollment rate compares poorly with Department of Education estimates for Papua New Guinea (53%) and Gulf Province (42%) for 2007.
- On average, schools were attended by three teachers and approximately 70 students, with an average of 23 students per teacher and 24% of teacher positions vacant. Teacher vacancies and class size were particularly high for elementary schools.
- Women's groups have identified absent teachers as the overwhelming reason for schools either not operating year-round or being closed.
- The most frequently cited reason for poor attendance was that students were required to help at home with gardening, making sago or other work.

The low education levels reflect the distribution of elementary, primary and secondary schools in the PAOI. Approximately half of all males and females aged 16 years and above have completed between Grade 1 and Grade 6. Approximately 32% of males aged 16 years and above have completed between Grade 7 and Grade 10, compared to only 24% of females in the same age

category. Very few males or females from the PAOI have completed vocational or technical schools or attended university.

A self-assessment of literacy conducted during the household survey showed that 19% of males and 33% of females aged 16 years and above cannot read or write in any language (Table 9.9). Literacy levels are an indicator of pre-existing vulnerability.

13.5.1.3 Workforce Experience and Training

Thirteen percent of males and 6% of females from those surveyed were formally employed in 2016 when baseline surveys were conducted. A total of 350 males (46%) and 98 females (14%) had previous work experience. As outlined in Section 13.4, the most common types of employment included laboring positions, logging/milling, administration/clerical, carpenters, cooks/catering, pastors and security. Additional technical positions were also identified, including plumbers, plasterers, painters and surveyors.

13.5.2 Identification and Initial Assessment of Potential Impacts

13.5.2.1 Increased Pressure on Education Services and Facilities

Education infrastructure that is already inadequate in terms of servicing the existing population in the PAOI may be placed under additional pressure as an indirect consequence of Project-induced in-migration. Overall enrolment and attendance may increase due to in-migration and population increase in general.

Increased enrolment and attendance will place additional pressure on existing schools and teachers. Schools around the PRL-15 and export pipeline route (Orokolo Bay), in particular, where a population increase is expected to be greatest (see Section 13.1), will likely be under most pressure from increased enrolment and attendance. Less of an impact may be felt in villages along the river transport corridor.

A proportion of State financial payments allocated to provincial and local-level governments (see Section 13.4), may potentially be used to improve the quality or number of education facilities in the PAOI or more broadly depending on the deliberations of the Development Forum. As noted in Section 13.7, ineffective use of government revenue may limit any improvement in school infrastructure and services in the PAOI. Effectively using government revenue to improve school infrastructure and services, particularly in more remote communities, would benefit PAOI communities, given the existing low levels of investment.

Existing poor literacy levels is a key indicator supporting pre-existing vulnerability in the PAOI. As noted during interviews with teachers during the social baseline studies, many of the teachers in the PAOI are frustrated with poor school infrastructure, poor living conditions, limited teaching resources, isolation, difficulties accessing their salaries, and lack of support by the community and provincial government. Some teachers may seek Project employment, both to alleviate the problems they face when teaching and to increase their income. This is likely to leave some schools with even more teacher vacancies than currently exist, while forcing some smaller (single teacher) schools to close. A reduction in teachers is likely to contribute to reductions in school enrolment and attendance, and consequently in lower education and literacy levels in the PAOI.

Initial Impact Assessment

Project employment and procurement has the potential to induce increased pressure on education and infrastructure, through Project-induced in-migration. Receptors that may be impacted the most include schools in villages with a high risk of in-migration in and around PRL-15 and Orokolo Bay (see Table 13.1), as these areas are expected to feel the greatest

population increase. The same receptors may be impacted less along the river transport corridor where the population is not expected to increase as much.

Impacts if unmitigated, are expected to be medium-term and experienced by specific community/ies or small part of the PAOI (by less than a third of the communities in the PAOI), hence a magnitude of ***Medium*** is applied. A sensitivity rating of ***High*** is also applied, as there is limited or no capacity to adapt to increased pressure on already challenged education services and facilities, this results in an initial social impact significance of ***Moderate***.

13.5.2.2 Increased Population Workforce Skills, Training and Experience

The Project will make maximum use of existing skills present in the national labor market; however, it will be necessary to provide education and training to upskill the population workforce to meet targets on national content (see Section 13.4). The increase in the level of skills and safe working practices has the potential to contribute to an overall improvement in the skill-base of the local and national workforce. There is potential for developing a more educated and skilled workforce, likely to be experienced by men (as men typically hold most of the jobs in resource industries) and in areas where higher levels of in-migration are predicted (see Section 13.1.7). In-migration may increase the local labor pool, which has the potential to benefit other local businesses and industries. In-migrants may also bring new skills and innovations, which can improve productivity in existing businesses and lead to new business opportunities locally.

As described in Section 13.4.2.1, local communities highly value opportunities for employment (and related improvement in skills, training and experienced) and expectations that local communities will be prioritized for employment are high. Levels of education and skills amongst local communities are low and this limits their current potential to benefit from some of the Project's employment and training opportunities.

Further, without active measures to also promote the education and employment of women, employment opportunities (and therefore skills, training and experience opportunities) for women from local communities may be limited due to existing cultural gender norms and inequalities.

Initial Impact Assessment

An increase in population workforce skills, training and experience may be experienced due to Project employment and procurement.

Without mitigation measures, this is expected to be experienced predominantly by the skilled workforce, business communities and supply chain workers, which are all well-placed to benefit from any workforce skills, training and experience opportunities, and have a high capacity for and resilience to change. Therefore, ***Positive*** magnitude and ***Low*** sensitivity ratings are applied across these receptors. This results in an initial social impact significance is ***Positive*** for skilled workers, the national business community and supply chain receptors.

Potential receptors also include the unskilled workforce, Project-affected persons, Project-affected communities, and local communities in and around PRL-15 and along the export pipeline route, as this is where in-migration may be highest, and to a lesser degree along the river transport corridor. Without mitigation and management measures, a ***Negligible*** magnitude and ***High*** sensitivity rating have been applied across these receptors. This results in an initial social impact rating of ***Negligible*** for these receptors.

13.5.2.3 Summary of Identified Impacts to Education and Workforce Training

The Project has the potential to impact on education and workforce training as follows:

- Increased pressure on education services and facilities.

- Increased population workforce skills, training and experience.

13.5.3 Proposed Mitigation, Management and Optimization Measures

Mitigation and optimization measures to be implemented during various Project phases to manage these impacts are described in Table 13.11.

Table 13.11 – Education and Workforce Training Mitigation and Optimization Strategies and Management Plans

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Increased pressure on education services and facilities.	♦ Develop initiatives to enhance education and training of youths from the PAOI, e.g.: – A scholarship program to provide opportunities for eligible students from the project affected communities to pursue their studies. – Internships and/or training opportunities with the Project or its contractors specifically focusing on transferable, nationally recognized trade skill development [SM007]. ♦ Partner with development organizations to deliver an education and awareness program (or include such awareness in other community development programs) to enhance the understanding of women's rights, e.g., their right to work, their right to education, more equitable labor activities, and to tackle gender-based violence [SM010]. ♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve education infrastructure and capability, and to strengthen education outcomes. While having a focus on elementary and primary schools in the PAOI, secondary and vocational schools in the province might also be considered [SM011].	Community Development Plan; Stakeholder Engagement Plan
Increased workforce skills, training and experience.	♦ Establish a set of local employment and procurement policies that: – Ban employment applications 'at the gate'. – Includes measures to protect the workforce, in particular to identify and avoid child labor and forced labor. – Gives priority to project affected persons and members of project affected communities (and in particular women) for local employment opportunities. – Maximizes the employment and training of national citizens including persons from project affected communities. – Includes measures for gender-fair hiring and workplace policies [SM003]. ♦ Develop initiatives to enhance education and training of youths from the PAOI, e.g.: – A scholarship program to provide opportunities for eligible students from the project affected communities to pursue their studies. – Internships and/or training opportunities with the Project or its contractors specifically focusing on transferable, nationally recognized trade skill development [SM007].	Labor Management Plan; National Content Plan; Community Development Plan

13.5.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to education and workforce training, assuming successful implementation of the proposed mitigation and optimization measures.

13.5.4.1 Increased Pressure on Education Services and Infrastructure

As described in Section 13.5.2.1, Project employment and associated business opportunities have the potential to induce an increased pressure on education and infrastructure across the PAOI, through Project-induced in-migration. Receptors that may be impacted the most include Project-affected communities with a high risk of in-migration in and around PRL-15 and Orokolo Bay (see Section 13.1.7), as these areas are expected to feel the greatest population increase. The same receptors may be impacted less along the river transport corridor where the population is not expected to increase as much.

The Project is committing to undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve education infrastructure and capability, and to strengthen education outcomes. Further mitigations aimed at awareness raising activities and scholarships, will potentially improve education services and infrastructure receptors to be experienced beyond the life of the Project. The design of these initiatives will need the mandate for providing education services to remain with the relevant and competent institutions and development organizations to avoid dependency and create long term benefits that can outlast Project support.

Considering these mitigations measures, a ***Low*** residual impact magnitude rating is assigned. An increased capacity to realize opportunities over the short to long term is expected with mitigation, hence a reduced sensitivity rating of ***Medium*** is applied.

The impact significance regarding increased pressure on education services and infrastructure is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.5.4.2 Increased Workforce Skills, Training and Experience

Mitigation measures focused on local employment and capacity building are expected to realize greater workforce skills, training and experience opportunities for the unskilled workforce, Project-affected persons, communities and local communities, both in the short- (6 to 12 months) to longer-term, extending beyond the life of the Project. A further educated and skilled workforce will result, which has potential for positive national impacts, hence a ***Positive*** magnitude and ***Medium*** sensitivity rating have been applied to these receptors, resulting in a residual significance assessment of ***Positive***.

The residual significance assessment remains ***Positive*** for skilled workers, all business communities and supply chain receptors.

13.5.5 Summary of Education and Workforce Training Residual Impacts

A summary of the assessment of residual impacts to education and workforce training is provided in Table 13.12, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.11.

Both residual impacts are assessed to be ***Minor*** to ***Positive.***

Table 13.12 – Summary of Assessment for Residual Impact Significance for Education and Workforce Training

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Increased pressure on education services and facilities.	Induced	Project-affected persons, Project-affected communities, and local communities including schools in and around PRL-15, along the export pipeline route and along the river transport corridor. Baimuru and Ihu LLG. Kikori District	C, O, D	♦ SM007 ♦ SM010 ♦ SM011	Medium/ Low	Minor
	Increased workforce skills, training and experience.	Direct	Project workforce (both skilled and unskilled), national business community, supply chain workers. Project-affected persons, Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	C, O, D	♦ SM003 ♦ SM007	Medium/ Positive	Positive

C = Construction, O = Operations, D = Decommissioning and closure.

13.6 Community Health and Safety

13.6.1 Context

A high burden of disease and limited health infrastructure and services, combined with poor social determinants of health and some pre-existing vulnerability characteristics, result in poor health indicators for communities across the PAOI. Community members must often travel significant distance by boat or foot to access health services, and many continue to use traditional medicines.

The treatment of vulnerability in this chapter is described in Box 13.1

Impacts relating to community health and safety only have been assessed in this section. Workforce and relevant workforce mitigation measures have been included where it is identified that workforce may potentially contribute toward any community health and safety impacts; however, this does not constitute a workforce health and safety impact assessment.

13.6.1.1 Health Infrastructure

The 12 health facilities in the PAOI comprise one health center, one subhealth center and 10 aid posts. A number of these are closed (2) or only partially operating (3), with staff, medical supplies and equipment limited at those that are open. All health facilities are along the riverways and the coastline except for aid posts at Wabo and Poroi 2 (partially open) (see Figures 13.2 and 13.3).

Drug and medical supplies, and health professionals are inadequate across all health facilities. Access to facilities in terms of distance, time, availability and cost of transport is a barrier to attendance for those villagers not located nearby.

Kapuna Health Center, managed by Gulf Christian Services, is the only facility in the PAOI with a medical doctor on the staff. It is also the only facility to have electricity, and only half of all facilities have a safe water supply and toilet facilities. The Incentive Fund Program (Australian Aid) selected the Kapuna Health Center in 2018 to receive support to upgrade to a level 4 rural hospital. TEP PNG provides logistical support to this initiative for the transport of building materials and volunteers to the site. The Kapuna Health Centre upgrades include the following renovations and construction; outpatient department, nutrition unit, antenatal ward and kitchens, pediatric ward, adult ward, maternity ward, birthing suites, operating theatre and ICU, accidents and emergency, dental clinic and physiotherapy, drug storage and general storage, solar system and battery house, electrical grid upgrades, water infrastructure upgrades, offloading pontoon and staff housing.

The expected outcome is improved public health care services delivery to a catchment population of more than 10,600 of Baimuru LLG, Kikori District, Gulf Province (see Part 14 of Volume 2).

13.6.1.2 Illness and Disease

Part 16 of Volume 2 outlines the different illnesses and diseases that are present in the PAOI, and their status, which can be summarized as follows:

Communicable:

- Vector-related diseases in the PAOI largely comprise malaria and lymphatic filariasis; however, the area is also at risk to flaviviruses (e.g., dengue, Japanese encephalitis, zika and chikungunya) and less common alphaviruses (e.g., Ross River). Community surveys documented malaria as a notable health problem in communities and households in the PAOI; however, as outlined in Section 9.7.4, it is not uncommon for general respiratory

symptoms to be conflated with malarial symptoms (e.g., InterOil studies (Cross et al., 2014) showed a less than 1% prevalence of malaria from a study on 366 people plus a further 175 people, as follow up across all ages from eight Pawaia villages).

- Respiratory disease, including tuberculosis (TB), pneumonia, pertussis (whooping cough) and measles, is the leading cause of reported morbidity across the PAOI. TB is at epidemic levels across Gulf Province and in 2016, the Gulf Provincial Health Office recorded a 767 per 100,000 case notification rate, more than double the national level. Health professionals are increasingly concerned about the TB prevalence in Papua New Guinea and the rise of drug-resistant strains of TB (i.e., MDR-TB and XDR-TB), which are difficult to treat and have a very poor prognosis. International organization supporting TB programs in Papua New Guinea include The Global Fund, Australian Government, The World Health Organization, Word Bank Group, United States Agency for International Development and Médecins Sans Frontières.
- Low immunization rates (e.g., in 2015 immunization against measles is significantly lower in Gulf Province (19%) than the national level (40%) (NDOH, 2015), high household occupancy rates and an already high burden of respiratory disease across the PAOI, particularly TB, indicates that the population is highly vulnerable to disease, with children under 5 years, adults over 65 years and those with pre-existing medical conditions being most susceptible.
- High levels of animal husbandry across the PAOI increases the risk of zoonotic disease (e.g., avian influenza). During baseline studies (Chapter 9) the lowest rates of chicken husbandry were recorded in the Pawaia (42%) and Koriki villages (48%), and the highest rates were recorded in the Kaimare villages (83%) and the Ahia village of Evara (86%). The highest rates of pig ownership (more than 60% of households) and the largest herds were reported in the Kaimare, Koriki and Maipua villages.
- While overall sexually transmitted infections (STI) data across the PAOI is sparse, health center data is generally consistent with national human immunodeficiency virus (HIV) data for rural locations (i.e., less than 1% prevalence rate (0.4% and 0.5% for Kapuna and Kerema health centers respectively). Understanding and awareness of STI transmission was mixed, with 16% of women's groups surveyed indicating that everyone knew how STIs are transmitted and 19% of women's groups surveyed reporting they were not sure how STIs were transmitted. The cultural stigma associated with STI diagnosis resulted in a high likelihood of underrepresentation in reported data. Papua New Guinea has a high prevalence, compared to developed nations of human immunodeficiency virus (HIV) and other STIs, and in 2016 recorded the highest prevalence and incidence of HIV in the Pacific (UNAIDS, 2019).

Non-communicable:

- Many people and communities in Papua New Guinea still face the threat of under-nutrition. Food- and nutrition-related issues including food security are highly relevant to communities in the PAOI, as most still live a traditional lifestyle of subsistence farming, hunting, and fishing.
- Households across the PAOI are primarily engaged in subsistence agricultural activities, which reduces the likelihood of noncommunicable diseases. Betel nut, a known human carcinogen, and alcohol, tobacco and marijuana are likely contributors to noncommunicable diseases in the PAOI.

13.6.1.3 Water and Sanitation-related Issues

Only 40% of the Papua New Guinean population has access to a safe water supply and 80% is without access to adequate water. The number of people in the PAOI with access to a safe water supply is lower than the national average.

People in most (76%) of the villages wash in a river or creek, and 34% of households indicated they used the bush, river or sea for toilets. Waste is disposed of in the environment; tins and batteries are either disposed of in the bush, sea or river or buried; and paper and plastic is burnt. These factors all lead to an increased risk of sanitation-related illnesses, such as gastrointestinal diseases.

13.6.1.4 Exposure to Potentially Hazardous Materials and Pollutants

There is currently little exposure to anthropogenic hazardous materials, as the PAOI is a predominantly rural, subsistence agricultural environment. Project-related impacts to air quality, greenhouse gases and climate change, noise, soils, water and major hazards have been identified and assessed in Chapters 11, 12, 15 and 18, and have therefore not been assessed further in this chapter.

13.6.1.5 Food Security and Nutrition

All communities in the PAOI practice a subsistence lifestyle, and this increases the likelihood of food security issues if local resources are depleted through additional demand due to population influx, contamination (i.e., via sewerage, chemicals or hydrocarbons) or natural events.

Baseline studies indicate that food availability and perceptions of food availability are not a concern to households. Food sources are seasonal, but adequate food is available (Parts 14 and 18 of Volume 2).

Despite an apparent adequacy of food and nutritional sources across the PAOI, child malnutrition rates are high. Gulf Province recorded 33% of children with moderate and severe weight-for-age malnutrition in 2016, higher than the national figure of 23% (Part 16 of Volume 2). Further, social baseline survey data suggests that almost two thirds of communities from most language groups surveyed, except the Maipua people from Apiope, had households that regularly went a day without eating. The survey also established that 30% of communities in the Iare, Koriki, Orokolo and Pawaia language groups spent more than 40% of their income on food (see Chapter 9).

Impacts related to land access impacts on natural resources and related livelihood security are discussed and assessed in Section 13.3 and Chapter 16, and impacts related to increased disputes related to food security are discussed and assessed in Section 13.8. These impacts are; therefore, not assessed further in this section.

13.6.1.6 Accidents and Injuries

Accidents and injuries from marine and river traffic or associated with daily activities are an under-appreciated morbidity burden across the PAOI and account for 5 to 10% of health center morbidity caseloads. Community surveys and observations made during field visits indicate that accidents and injuries occur from various daily activities, including clearing gardens, handling knives, encounters with snakes and crocodiles, and fighting. The perceived primary causes of accidents and injuries are often related to sorcery. Domestic violence-related injuries were commonly reported during these surveys and are likely to be underreported in health facility data.

Gulf Province has minimal emergency services, and less than 3% of health centers have an ambulance (Howes et al., 2014). None of the PAOI villages has any emergency response services.

13.6.1.7 Social Determinants of Health

The World Health Organization defines social determinants of health as the 'conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life (WHO, 2019). They include access to education, economic and job opportunities, access to quality health care, exposure to crime and violence, literacy levels, social norms and attitudes. The following are considered in this assessment; access to and quality of education, economic and employment opportunities, exposure to crime and cultural beliefs and social structures.

The population in the PAOI is young, with a low life-expectancy and poor social determinants of health, including low education levels (see Section 13.5) and limited economic and employment opportunities (see Section 13.4), and most communities are engaged primarily in subsistence activities. Women in the PAOI also experience poorer social determinants of health, due to lower education levels, marrying at a young age, maternal morbidity and child-rearing responsibilities.

Cultural beliefs and social structures also influence health outcomes in the PAOI. Early marriage, sometimes during childhood, influences women's health, with reproductive health issues a risk for younger women. A strong belief in sorcery can influence how health issues are identified and addressed, and behaviors such as substance abuse, violence, including gender and domestic violence, and promiscuity are also factors.

Male alcohol consumption is common and alcohol abuse is regarded as a law and order concern, as it is associated with issues such as fighting and domestic violence. Marijuana use is also reportedly widespread (Chapter 9).

Domestic violence and sexual assault are pervasive problems in the PAOI. Women from every village reported a past domestic violence incident either involving their husband or another family member. According to baseline studies (Chapter 9), women from 26 villages (87%) indicated an assault had occurred over the 12 months prior to the survey in 2016. This compares with 67% of women nationally who are believed to have been the victims of domestic violence (Amnesty International, 2010).

13.6.1.8 Cultural Health Practices

Health issues are understood in relation to strong cultural beliefs, including the belief in sorcery. Traditional medicine still features strongly in most PAOI communities, and some descriptions of traditional medicine are more reflective of 'magic' and superstition than medicine, which poses a risk to vulnerable people, including women and children.

13.6.2 Identification and Initial Assessment of Potential Impacts

13.6.2.1 Increased Pressure on Health Services and Facilities

Health infrastructure that is already inadequate in servicing the existing population in the PAOI and may be placed under additional pressure, as an indirect consequence of an increase in population due to Project activities and Project induced-in-migration. Services that may be particularly impacted are those in and around PRL-15, where the most drivers for in-migration occur. Community health issues may escalate in and around PRL-15, as there is only one aid post at Wabo Station, an aid post in Poroi 2 and another aid post at Evara.

A proportion of State financial payments allocated to provincial and local-level governments (see Section 13.4), may potentially be used to improve the quality or number of health facilities in the PAOI or more broadly subject to the deliberations of the Development Forum. As noted in Section 13.7, ineffective use of government revenue may limit any improvement in health

infrastructure and services in the PAOI. The effective use of government revenue to improve health infrastructure and services, particularly in more remote communities, would have a beneficial impact on PAOI communities and more broadly, given the existing low levels of investment.

Initial Impact Assessment

The Project has the potential to increase pressure on the already strained health facilities due to an increase in population. This induced impact is likely to occur more in areas prone to Project-induced in-migration in and around PRL-15 (see Box 13.1), where most of the Project activities will take place and to be experienced from the Project construction phase into operations. Unmitigated, impacts are expected to be medium-term (1 to 5 years) and experienced by less than one third of the Project affected communities in the PAOI, hence a magnitude of ***Medium*** is applied. A sensitivity rating of ***High*** is applicable, as there is limited or no capacity to adapt to increased pressure on already challenged health services and facilities. This results in an initial impact significance of ***Moderate***.

13.6.2.2 Improved Access to Health Services and Infrastructure

The Project has the potential to improve health infrastructure and capacity in the PAOI. Currently, TEP PNG is working in partnership with the Digicel Foundation and the Gulf Province Administration to develop new health infrastructure projects such as providing aid posts at Evara (2018) and Poroi 2 (2019). TEP PNG is also supporting the placement of two female volunteer community health workers at Wabo and Poroi 2 aid posts respectively, two aid posts close to PRL-15, through the PNG Government's National Volunteer Services program.

TEP PNG has and continues to provide further support through donation of various medical equipment (e.g., delivery beds and a GeneXpert machine to diagnose multi-drug-resistant TB), various resource materials and medical supplies to health facilities and the distribution of 6,000 mosquito nets to communities in the PAOI.

TEP PNG has an agreement with the Kapuna Health Center to provide logistical support for their teams to carry out health patrols and to train Pawaians from communities in and around PRL-15 to become Community Health Workers.

Initial Impact Assessment

State financial payments, Project benefits, Project employment and procurement and associated business opportunities, have the potential to indirectly improve access to health services and infrastructure in the PAOI via an increase in wealth and the capacity to afford access to these services. As noted in Section 13.7; however, ineffective use of government revenue may limit any improvement in health infrastructure and services in the PAOI.

Receptors that may be impacted greatest include Project-affected communities and local communities and their associated health facilities in Kikori District, Baimuru and Ihu LLG, in and around PRL-15 and around the export pipeline route. The same receptors may be impacted less along the river transport corridor

The sensitivity of health infrastructure in the PAOI is rated as ***High***. The initial assessment of impact significance is that a ***Positive*** magnitude rating is appropriate without additional management measures given the activities already being delivered. The initial social impact significance is; therefore, ***Positive***.

13.6.2.3 Increased Frequency, Severity and Risk of Diseases

Vector-related Diseases

The Project has potential to induce an increase in vector-related diseases in the areas of the PAOI prone to Project-induced in-migration. Vector-related diseases (e.g., malaria, dengue, lymphatic filariasis) already exist in the PAOI; however, reliance on clinical diagnosis (i.e., presentation of symptoms) for malaria due to a lack of laboratory facilities in health facilities in the PAOI means that the existing level of prevalence is unknown. An increase in migrant workers, population in general and increased movement of people associated with the Project workforce may increase the frequency and/or severity of vector-related disease outbreaks. In-migration may see different disease strains brought into the PAOI, as denser living arrangements can lead to an increase in the prevalence of a disease while also introducing new mosquito breeding and harborage sites.

Project infrastructure, including workers accommodation, also has the potential to increase vector breeding and harborage. This is more likely during the construction period, when existing breeding or harborage sites are disturbed or new ones are created (e.g., pooling water in poorly drained hardstands) and when staffing numbers are high.

Initial Impact Assessment

Malaria and other vector-borne diseases are already present in the PAOI; therefore, the sensitivity rating attributed to all PAOI communities is ***Medium***. The potential magnitude of an increase in vector-borne diseases due to Project activities, in the short to medium term, is assessed as ***Low*** for Project-affected and local communities along the river transport corridor, and as ***Medium*** for Project-affected and local communities in PRL-15 and along the onshore export pipeline route. The latter communities will be closer to planned construction activities and therefore could be potentially more exposed to vector harborage sites. This provides an initial social impact significance assessment of ***Minor*** for river transport corridor Project-affected and local communities and ***Moderate*** for Project-affected and local communities around PRL-15 and along the export pipeline (e.g., Evara and Orokolo Bay communities).

The sensitivity is rated as ***Medium*** for the Project workforce that will be accommodated in camps in PRL-15, as a large percentage will be PNG workers (see Section 4.7.1.3) who will have been previously exposed to these diseases. The magnitude assigned in the absence of additional mitigation measures is ***Low***, as the level of company control over the accommodation provided for the workforce is high. This provides an initial social impact significance assessment of ***Minor***.

Respiratory Diseases

Respiratory disease rates are high in the PAOI, including epidemic-levels of TB. A population increase can introduce new disease strains and increase the spread of respiratory disease through overcrowding due to increased population density. This impact is more likely to occur during the construction phase.

Increased population and overcrowding may also lead to a greater prevalence of noncommunicable respiratory diseases associated with wood smoke, as most of the communities in the PAOI rely on burning wood for fuel (see Chapter 16).

Initial Impact Assessment

The Project has the potential to induce an increase in the incidence of respiratory disease across the PAOI, through an increase in population. Potential receptors include the Project workforce along with Project-affected communities and local communities in areas prone to Project-induced

in-migration as described in Section 13.1.7. Any impacts would be permanent in the case of drug resistant TB.

An initial sensitivity rating of ***Medium*** has been assigned, given the epidemic levels of TB and other respiratory diseases already evident in the PAOI, and the limited capacity of the health system to diagnose or treat them. The initial magnitude rating is ***High***, given the potential for impacts initiated during the construction phase, to be long term, and to affect most receptors, resulting in an initial impact significance assessment of ***Moderate***.

Zoonotic Diseases

A combination of increased population and movement, potential import of goods from outside of the PAOI, and the reliance on or demand for locally sourced foods have the potential to cause a zoonotic disease outbreak (e.g., avian influenza).

Health facilities in the PAOI are not equipped to identify or treat zoonotic illness, thereby potentially increasing the impact were a disease outbreak to occur.

Initial Impact Assessment

The potential for Project-induced in-migration may induce an increase the incidence of zoonotic disease in the PAOI, through increased population, and associated movement and trade in goods and livestock. Potential receptors include project affected communities and local communities in areas prone to project-in-migration as described in Box 13.1. Any impacts would occur from the construction phase onwards, therefore short- to long-term duration.

The initial sensitivity of PAOI communities is rated as ***High,*** given the lack of capacity to address an outbreak of zoonotic diseases in the PAOI. The initial magnitude of the impact is ***Medium*** since such diseases could cause moderate impacts compared to baseline conditions due to the high levels of animal husbandry of PAOI communities, particularly those inland. The initial impact significance assessment rating is; therefore, ***Moderate***.

Sexually Transmitted Infections

Papua New Guinea has among the highest prevalence of human immunodeficiency virus (HIV), syphilis and other STIs in the Asia-Pacific region (see Part 16 of Volume 2). The virus compromises the immune systems, increasing susceptibility to infectious diseases such as TB. Mother-to-child transmission is also a risk without appropriate preventive care and treatment, which is not currently available in the PAOI. The Project may induce an increase in the prevalence of STIs, including HIV/acquired immune deficiency syndrome (AIDS), because of a combination of a population increase, workforce movements, increased income and increased high-risk behaviors including prostitution. An increase in STIs is more likely around construction camps or areas where workers could interact with local communities, and in areas where in-migration is predicted to be higher (see Table 13.1).

The transient nature (i.e., fly-in, fly-out) of the construction workforce may increase the rates of STIs, including HIV. The Project workforce will be mobilized from different locations around Papua New Guinea and internationally via Port Moresby. Human immunodeficiency virus is prevalent nationwide, with urban centers, including Port Moresby, through which workers must transit, providing access to commercial sex workers. A predominantly male workforce with increased income and rostered weeks off may increase the potential for promiscuity and commercial sex transactions, increasing the risk of STI infections, which may be transferred to communities in the PAOI and more broadly.

Low community awareness of STIs and how they are spread, combined with stigma that deters seeking treatment, may exacerbate this issue.

Initial Impact Assessment

The Project has potential to induce an increase the incidence of STIs in the PAOI, through a combination of increased income, project induced population influx and a transient workforce. The rate of sexually transmitted infections may increase in the Project workforce, along with Project-affected communities and local communities in areas prone to in-migration as described in Table 13.1.

A sensitivity rating of ***High*** is assigned, given the prevalence of STIs in communities in the PAOI, the pre-existing high levels of gender-based violence, including sexual assault and rape, the stigma around these types of diseases, and the limited capacity of the health system to diagnose or treat them. Any impacts may be short to long term. A magnitude rating of ***High*** is assigned in the absence of additional mitigation measures, which provides an initial social impact significance assessment of ***Major***.

Noncommunicable Diseases

Noncommunicable diseases (e.g., diabetes and heart disease) can arise from consuming unhealthy food and/or harmful substances (e.g., excessive alcohol). The Project has the potential to change the subsistence practices of some community members in the PAOI through an increase in income, employment and business opportunities, and the increased availability and consumption of store-bought and processed foods. An independent audit report (D'Appolonia S.p.A, 2012) on the PNG LNG Project highlights the impact of a change in diet, including for the project construction workforce, which may have contributed to an increase in obesity and lifestyle-related diseases and long-term health risks.

Changes to the consumption of store-bought and unhealthy foods causing an increase in noncommunicable diseases are likely to be minimal outside Project camps, with any impact concentrated in locations that have experienced significant in-migration (see Section 13.1.7) or in locations close to the development of commercial trading stores.

Initial Impact Assessment

The Project has potential to induce an increase noncommunicable disease in the PAOI by changing livelihood practices, including decreased reliance on bush food and increased dependence on store food with a concomitant more sedentary lifestyle.

Project-affected communities, and local, communities in the PAOI are assigned a ***Medium*** sensitivity rating, as most are already exposed to some, albeit low, extent to consumables and store-bought products. An initial magnitude rating of ***Low*** is assigned to the river transport corridor communities, as they are not expected to benefit from greater incomes over a short to medium term, and the existence of more opportunities to purchase these products in most communities is unlikely. In areas prone to Project-induced in-migration or close to the development of commercial trading stores in and around PRL-15 and around the export pipeline route; however, an initial magnitude rating of ***High*** is assigned, as this is likely to be the area where both income and population may increase (see Section 13.1.7), and impacts could be long term depending on lifestyle choices. The Project workforce may also be exposed to this magnitude due to the Project providing meals on work sites.

This provides an initial social significance impact assessment of ***Minor*** for Project-affected and local communities along the river transport corridor, and ***Moderate*** for Project-affected

communities prone to in-migration in and around PRL-15 and around the export pipeline route, and the Project workforce.

Water and Sanitation-related Diseases

Village water sources, particularly for coastal villages, are shallow and highly susceptible to contamination from domestic and wild animals, latrines and chemicals. Groundwater studies (Part 4 of Volume 2) indicate widespread microbiological contamination in shallow wells in the PAOI. The physical nature of village-based water sources, combined with animal husbandry practices and limited and/or poor sanitation options, leads to a vulnerability to water-, soil- and sanitation-related issues.

A population influx, particularly during the construction phase, would exacerbate the likelihood of water- and sanitation-related health issues. Poor sanitation infrastructure and personal behaviors (e.g., hand washing) can influence the spread of diarrheal and other gastrointestinal diseases such as gastroenteritis, cholera, typhoid, acute diarrhea and dehydration. The risk to communities increases with the low immunization levels in the PAOI. Children are at particular risk, even more so in settings where health services are limited. Project-induced population influx may also place pressure on local freshwater water supplies, forcing communities to access and use less sanitary or potable sources.

Initial Impact Assessment

The Project has potential to induce an increase in water and sanitation-related diseases in the PAOI in area prone to Project-induced in-migration as described in Section 13.1. In these areas, likely receptors include project-affected communities, and local communities Any impacts would be short to long term during the Project's construction and operations phases.

Sanitation practices and water quality in shallow wells are already low in the PAOI, and the related health attribute is considered of critical importance; therefore, an initial sensitivity rating of ***High*** is assigned. Sanitation-related diseases are predicted to rise where in-migration is predicted to occur (see Table 13.1). The magnitude is rated as ***Medium*** in the absence of additional mitigation measures, since they will be experienced by specific communities, giving an initial social significance impact assessment of ***Moderate***.

13.6.2.4 Increased Malnutrition Rates due to Reduced Food Security

Despite food availability and perceptions of food availability not being a concern to households, and depending on individuals' choices, the Project may lead to or exacerbate nutritional issues due to:

- Economic displacement where loss of access to subsistence resources (e.g., food gardens, planted sago and wild plant foods) may cause food insecurity and; therefore, nutritional status (Section 13.3 and Chapter 16).
- Any changes or reduction in agricultural land or land used for subsistence resources due to an increase in population (Table 13.1 and Chapter 16).
- An increase in store food prices making store foods unaffordable (Section 13.4).

The initial impact significance to livelihoods from Project land access and any related economic displacement is assessed as ***Minor*** in and around PRL-15 and along the export pipeline route for reasons explained in Section 13.3. Loss of food gardens, planted sago and wild plant foods due to Project activities is rated ***Negligible*** in initial social impact significance for reasons explained in Section 16.5 and is not assessed further.

Some potential of decreased nutritional status from reduced food security remains if impacts are unmitigated, and based on the initial social impact significance applied to livelihoods from Project land access and any related economic displacement. Any impacts would be induced due to Project activities including construction and Project employment and procurement. Receptors would include Project-affected persons, Project-affected communities, and local communities in and around PRL-15, and to a lesser degree along the export pipeline route and along the river transport corridor. Impacts are likely to be localized and reversible since communities have capacity to access nearby alternatives, hence ***Low*** sensitivity and ***Low*** magnitude ratings are applied to the PAOI.

The initial social impact significance of increased malnutrition rates due to reduced food security is assessed as ***Minor*** based on these ratings.

13.6.2.5 Project-related Accidents and Injuries

Direct Impacts

The PAOI currently has no emergency services, so people suffering from trauma are required to transport themselves to a health facility to seek medical treatment. The inability to access immediate first aid and assistance can increase the likelihood of further injury or even mortality in the event of severe physical trauma.

The increase in river traffic, particularly large barges transporting Project materials and supplies, during the construction period, poses a risk of increased incidents involving community members who primarily travel the river in canoes or small outboard motor–powered dinghies. Accidents may occur due to large waves overturning canoes or collisions between vessels.

There are no public roads in the PAOI, so interaction between Project and public vehicles cannot occur. Project vehicles will operate in Project worksites, including the pipeline right of way, where public access will be prohibited during construction.

The export pipeline access track will be used intermittently during operations for maintenance purposes, during which time accidents may occur between vehicles and pedestrians. Risk of pedestrian/vehicle accidents will also be present during operations for Project roads in PRL-15 that may be accessed by local inhabitants.

There will also be an exclusion zone around the central processing facility (CPF) to avoid opportunistic settlements in this currently uninhabited area and further reduce the chance of Project-related accident and injuries.

Major Hazards are discussed in Chapter 18.

Indirect Impacts

In addition to an increase in barge traffic, an increase in dinghy traffic on the Purari River distributaries may occur due to increasing population and income, as local people invest their income in motorized boats. An increase in dinghy and canoe accidents causing injury or mortality may occur, given the absence of navigation aids on the Purari River and basic safety equipment, such as lights and lifejackets, in dinghies and canoes.

Initial Impact Assessment

Increased logistics and transport have the potential to directly increase Project-related accidents and injuries where Project activities take place. Likely receptors include the Project workforce, Project-affected communities, and local communities in and around PRL-15, along the export

pipeline route and along the river transport corridor. Any impacts could be short to long term and reversible to permanent depending on the individual case.

The safety of Project-affected communities and the Project workforce is of the highest importance, and the initial sensitivity rating is accordingly rated as ***High***.

A magnitude of ***High*** is assigned to potential accidents related to the Project workforce, given the standard safety controls and workplace safety systems already in place, and the potential for lost-time injuries. This results in an initial impact rating of ***Major***.

A magnitude rating of ***Very High*** is assigned to the potential seriousness of a Project-related accident that could result in loss of life, resulting in an initial significance impact assessment rating of ***Severe*** for this impact.

13.6.2.6 Impacts Associated with Social Determinants of Health

The Project may influence social determinants of health in the PAOI, causing positive and negative impacts to PAOI communities. In this section, impacts on social determinants of health specific to gender, substance abuse, violence, employment and education are addressed. A discussion on the treatment of vulnerable peoples is included in Box 13.1. Impacts relating to increased tension, and law and order issues are discussed and addressed in Section 13.8.

Women in the PAOI are particularly vulnerable to poorer social determinants of health, given their pre-existing low education levels (see Section 13.5), their high reproductive rates and the cultural expectations about social roles and responsibilities. Social investment in health services and community education focused on improving the social determinants of health of women may improve reproductive health services, improve community awareness of reproductive health, family planning, and education and awareness programs focused on gender equality issues. Furthermore, increased income in the PAOI has the potential to facilitate greater investment in individual and family health and nutrition.

A prevalent belief in sorcery influences where and how people seek health care, and can also restrict movements in an area, as people are fearful of further repercussions. It also results in violence in and between communities.

Increased income may encourage some people to misuse substances, such as alcohol, tobacco, betel nut or marijuana, thereby reducing mental and physical health, and leading to an increase in other high-risk behaviors, such as promiscuity and unprotected sex, with consequent increase in STIs or unplanned pregnancies. Substance abuse also has the potential to increase violence, including domestic violence. Risks to the community are potentially posed by the increase in population associated with people attracted to the Project area through the potential for business opportunities. Risks associated with the Project workforce are considered negligible as they will reside in closed camps or return to their place of origin while not working or once employment or contracts are complete.

Poor health could cause PAOI community members who are seeking Project employment failing the necessary pre-employment checks. This may place the local population at a disadvantage compared to candidates from outside of the PAOI, (e.g., Port Moresby) where healthcare is generally more accessible. This could limit the potential for PAOI communities to secure employment outcomes and benefit from the Project. Women are not well positioned to benefit directly from the Project through economic opportunities and may see an increase in domestic duties should the men of the family gain employment (see Section 13.4).

Better education is often associated with better health outcomes. The potential impacts on education are discussed in Section 13.5 and may have subsequent effects on health for those communities that have improved access to education services.

Initial Impact Assessment

The Project, through an increase in disposable incomes, has potential to induce a decrease social determinants of health in the PAOI, the effect of which would be compounded by increases in population in areas prone to Project-induced in-migration as described in Box 13.1. In these areas, the likely receptors include project-affected communities, and local communities.

A sensitivity rating of ***Medium*** is assigned, as social determinants of health are already low for PAOI communities but have capacity for improvement. The Project could indirectly increase the consumption of drugs and alcohol, possibly increasing crime and violence in the absence of mitigation measures. A ***High*** initial magnitude rating is assigned, as the Project could negatively affect community health indicators over the long term, causing an initial social impact significance assessment of ***Moderate***.

13.6.2.7 Impacts on Cultural Health Practices

Any disease outbreaks or accidents and injuries may be viewed as being caused by spirits or sorcery, as part of some traditional beliefs and cultural practices. A reliance on traditional medicine and health practices exists in the PAOI, and the presence of the Project and subsequent investment in health services, have the potential to improve access to better-quality health services, minimizing additional harm through further spread of disease or incorrect diagnosis or treatment causing further physical harm to an individual.

Potential impacts associated with cultural health practices include:

- An increase in perceived sorcery-related events and the associated retaliation or ostracization. This is often focused at women.
- A loss of knowledge and/or practice of traditional medicines and cultural practices (discussed in Chapter 14).
- A greater acceptance of modern health practices.

Initial Impact Assessment

The Project has potential to increase induced impacts associated with cultural health practices in the PAOI, through an increase in population. Likely receptors include Project-affected communities in areas of high-risk for Project-induced in-migration (see Section 13.1.7).

Communities in the PAOI live largely traditional lifestyles and still practice sorcery, which is often attributed by community members as causing accidents and injuries; therefore, the sensitivity of all communities to changes to cultural practices is considered ***High***.

Communities may possibly associate Project-related accidents, injuries or misfortune with sorcery. However, there are likely to be minimal changes in community practice of sorcery-perceived events compared to the current state. The initial magnitude of this impact is rated as ***Low***, which results in an initial social impact significance assessment for an increase in perceived sorcery-related events of ***Minor***.

There is expected to be greater acceptance of modern health practices as a result of Project operations in the PAOI, generating positive outcomes for Project-affected communities, Project-affected persons and local communities. The initial magnitude of this impact is rated as ***Positive***, resulting in an initial impact assessment of ***Positive***.

13.6.2.8 Summary of Potential Impacts

The Project has the potential to interact with various community-related health, safety and wellbeing aspects in the PAOI, causing positive and negative impacts as follows:

Positive Impacts

- Increased access to health services and facilities.
- Increased acceptance of modern health practices leading to better health outcomes.

Negative Impacts

- Increased pressure on local health services and infrastructure.
- An increase in frequency, severity or risk of:
  - Vector-borne disease.
  - Respiratory disease.
  - Zoonotic disease (e.g., avian influenza).
  - Sexually transmitted infections, including HIV.
  - Noncommunicable diseases.
  - Water- and sanitation-related diseases.
- Increased malnutrition rates.
- Project-related accidents or injuries.
- Impacts associated with social determinants of health specific to gender, substance abuse and violence. Impacts associated with improved employment and education are discussed in Sections 13.4 and 13.5, respectively.
- Increase in perceived sorcery related events and associated violence and injuries.

The following embedded design control addresses potential impacts on Community Health and Safety:

- The Project will maintain a grievance mechanism that is legitimate, accessible, predictable, equitable, right-compatible, and transparent [ED003].
- Continue pre-employment and ongoing health and fitness to work screening and annual medical checks for all workers working for the Project in the Project Area [ED034].
- Design Project infrastructure (including workforce accommodation) to minimize vector harborage (e.g., minimize pooling water, proper waste disposal) and human exposure (e.g., screening of doors and windows) to minimize spread of disease [ED035].

13.6.3 Proposed Mitigation, Management and Optimization Measures

Mitigation measures to be implemented during various Project phases to further manage these impacts are described in Table 13.13.

Table 13.13 – Community Health and Safety Mitigation, Optimization Strategies and Management Plans

Potential Impact	Mitigation and Optimization Strategy	Relevant Management Plan
Improved access to health services and facilities.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve health services and infrastructure, and to strengthen health outcomes [SM012].	Project-induced In-Migration Management Plan; Community Health, Safety and Security Management Plan.
Increased acceptance of modern health practices.	No additional mitigation measures proposed.	NA
Increased pressure on local health services and infrastructure.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve health services and infrastructure, and to strengthen health outcomes [SM012]. ♦ Engage with communities and local-level governments to discourage the development of informal settlements along Project access routes and near Project facilities [SM028]. ♦ Establish Project recruitment centers away from PRL-15 and construction areas to prevent in-migration [SM029]. ♦ Demobilize all Project workers to their point of hire after their shift/employment is completed [SM030].	Community Development Plan; Project-Induced In-Migration Management Plan; Community Health, Safety and Security Management Plan
Increased frequency, severity and risk of diseases.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve health services and infrastructure, and to strengthen health outcomes [SM012]. ♦ Partner with relevant organizations to develop a Health and Wellness Awareness Program for the Project workforce and Project affected communities, particularly in high-risk, in-migration areas. Topics may include preventing and managing communicable and noncommunicable diseases, women's health, nutrition, hygiene and sanitation, and transport safety [SM013]. ♦ In areas of high risk of project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives aimed at improving water, waste, sanitation and hygiene services (WASH) [SM014]. ♦ Develop a tuberculosis (TB) prevention and control program for the Project workforce, including measures to screen and confirm the medical status of TB prior to employment or assignment in the Project area. Project workers diagnosed with active TB will be demobilized to their point of hire, they will be advised to seek treatment and the government will be notified to follow-up with their immediate family members as part of the national TB program. After treatment, a medical evaluation and fitness to work certificate will be required to resume work [SM015]. ♦ Provide healthy and culturally appropriate food choices at workforce accommodation [SM017]. ♦ Restrict community access to Project sites [SM018].	Labor Management Plan; Community Development Plan; Community Health, Safety and Security Management Plan; Stakeholder Engagement Plan.

Table 13.13 – Community Health and Safety Mitigation, Optimization Strategies and Management Plans (cont'd)

Potential Impact	Mitigation and Optimization Strategy	Relevant Management Plan
Increased malnutrition rates.	See Table 13.7	Land Access Resettlement Framework; Land Access and Livelihood Development Plan; Resettlement Action Plan (if required)
Project-related accidents or injuries.	♦ In consultation with relevant stakeholders, develop a community emergency preparedness and response policy and procedure that clearly define roles of stakeholders in the event of Project-related emergencies or accidents affecting the community [SM016].	Community Health, Safety and Security Management Plan; Labor Management Plan; Traffic and Transport Management Plan; Stakeholder Engagement Plan.
Impacts associated with social determinants of health (specific to gender, substance abuse and violence).	♦ Partner with relevant organizations to develop a Health and Wellness Awareness Program for the Project workforce and Project affected communities, particularly in high-risk, in-migration areas. Topics may include preventing and managing communicable and noncommunicable diseases, women's health, nutrition, hygiene and sanitation, and transport safety [SM013]. ♦ In areas of high risk of Project-induced In-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives aimed at improving water, waste, sanitation and hygiene services (WASH) [SM014].	Community Development Plan; Community Health, Safety and Security Management Plan; Stakeholder Engagement Plan.
Increase in perceived sorcery related events.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to improve health services and infrastructure, and to strengthen health outcomes [SM012]. ♦ Partner with relevant organizations to develop a Health and Wellness Awareness Program for the Project workforce and Project affected communities, particularly in high-risk, in-migration areas. Topics may include preventing and managing communicable and noncommunicable diseases, women's health, nutrition, hygiene and sanitation, and transport safety [SM013]. ♦ See Table 13.17 for measures designed to support law and order in the PAOI.	Project-induced In-Migration Management Plan; Community Health, Safety and Security Management Plan.

13.6.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to community health and safety, assuming successful implementation of the proposed mitigation and optimization measures.

13.6.4.1 Increased Pressure on Health Infrastructure

The Project has potential to induce an increase pressure on health services and infrastructure in area of the PAOI prone to project-induced in-migration. Receptors that may be impacted include project affected communities in areas that are expected to feel the greatest population increase as described in section 13.1.7. The same receptors may be impacted less along the river transport corridor where the population is not expected to increase as much.

The sensitivity of health infrastructure in the PAOI remains as ***Medium***. Implementation of the mitigation measures, which are aimed at supporting sustainable priority health initiatives, combined with managing in-migration, will potentially lead to some improvement to health infrastructure when compared to baseline conditions, thus the magnitude of the potential impact of increased pressure on health infrastructure is rated as ***Low***. The impact significance regarding increased pressure on health infrastructure is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.6.4.2 Improved Access to Health Services and Infrastructure

The Project has potential to directly and indirectly improve access to health services and infrastructure in project-affected communities in the PAOI, through State financial payments; however, ineffective allocation and/or use of government revenue may limit any improvement in health infrastructure and services in the PAOI, as noted in Section 13.7.

Receptors that may be impacted the most include project affected communities in and around PRL-15 and along the export pipeline route and to a lesser degree long the river transport corridor.

Support provided to improve existing health infrastructure and to improve local capacity to deliver health services will be planned in consultation with the National Department of Health, the provincial and local governments, and other health service providers in the PAOI. The objective is to develop initiatives that are strategic, aligned with development priorities and Project policies, multi-stakeholder driven, sustainable with a viable handover strategy and with measurable outcomes. The design of these initiatives will need the mandate for providing health care to remain with the relevant and competent health services, to avoid dependency and create long term benefits that can outlast Project support.

A ***Positive*** magnitude rating and a ***Medium*** sensitivity rating are still applicable with the proposed management measures to support and improve health infrastructure, including the existing programs in Wabo and Poroi 1. The initial social impact significance assessment for improved access to health infrastructure remains ***Positive*** for the residual assessment based on these ratings.

13.6.4.3 Increased Frequency, Severity and Risk of Diseases

Preparation and planning for disease outbreaks will be undertaken in consultation with government and other health service providers to agree roles, responsibilities and resourcing requirements. The objective is to develop initiatives that are strategic, aligned with development priorities and project policies, multi-stakeholder driven, sustainable with a viable handover strategy and with measurable outcomes.

Vector-related Diseases

Project activities have potential to indirectly increase the incidence of vector-related disease. For vector-related diseases such as malaria, disturbance to or creation of vector breeding and harborage due to Project activities will be mitigated through appropriate design, such as preventing water pooling and managing waste appropriately.

The sensitivity rating attributed to all communities remains ***Medium***. Part 16 of Volume 2 highlights that WASH programs reduce the spread of preventable waterborne diseases. The Project's participation in sustainable WASH programs with local and provincial governments, and other programs to improve priority health services and facilities in the PAOI, is expected to improve the control of vector-related diseases. The potential magnitude of an increase in vector-borne diseases due to Project activities is; therefore, assessed as ***Negligible*** for Project-affected

communities and local communities along the river transport corridor and as ***Low*** for Project-affected communities and local communities in and around PRL-15 and along the onshore export pipeline route after mitigation measures are implemented. The impact significance is reduced from ***Minor*** for river transport corridor Project-affected communities and local communities and ***Moderate*** for Project-affected communities and local communities around PRL-15 and along the export pipeline (e.g., Evara and Orokolo Bay communities) for the initial assessment to ***Negligible*** and ***Minor,*** respectively***,*** for the residual assessment based on these ratings.

The sensitivity remains ***Medium*** for the Project workforce. Embedded design controls on the Project facilities, such as window and door screens, can limit human exposure. Implementation of these measures reduces the magnitude to ***Negligible.*** The impact significance is reduced from ***Minor*** from the initial assessment to ***Negligible*** for the residual social impact significance assessment.

Respiratory Diseases

The Project has potential to induce an increase the incidence of respiratory disease in the PAOI, through Project-induced in-migration. Likely receptors include the Project workforce, Project-affected communities, and local communities in areas prone to in-migration as described in Section 13.1.7 in and around PRL-15, along the export pipeline route and along the river transport corridor.

Respiratory diseases represent the most significant disease burden in the PAOI, and TB is already at epidemic levels. Proposed management measures involve working with government and nongovernmental organizations to evaluate and deliver control measures in identified high risk areas in the PAOI with links to nationwide programs to facilitate TB control. The objective is to develop initiatives that are strategic, aligned with development priorities and Project policies, multi-stakeholder driven, sustainable with a viable handover strategy and with measurable outcomes.

Project infrastructure, including accommodation camps, will be designed to minimize the potential to spread respiratory disease, and community and workforce health programs will educate people about preventive behavior and how to seek treatment. In-migration management will be important in minimizing spread through informal settlements, and the TB-DOTS program will be available to the Project workforce and their families.

The sensitivity rating of ***Medium*** remains relevant for this impact. Any impact is expected to be limited when compared to baseline conditions due to measures outlined earlier and in Section 13.6.3; therefore, a magnitude rating of ***Medium*** is assigned. The initial social impact significance assessment for the increased incidence of respiratory disease remains ***Moderate*** for the residual assessment, based on these ratings.

Zoonotic Diseases

The Project has potential to induce an increase in the incidence of zoonotic disease in the PAOI, through Project-induced in-migration. Likely receptors include the Project workforce, Project-affected communities, and local communities in areas prone to in-migration as described in Box 13.1.

The sensitivity of PAOI communities remains rated as ***Medium***. The magnitude of the impact is assigned a rating of ***Low***, considering the mitigation measures outlined in 13.6.3; therefore, minimal change is expected compared to baseline conditions. The residual impact significance for the increased incidence of zoonotic disease is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

Sexually Transmitted Infections

The Project has potential to induce an increase the incidence of STIs in the PAOI in areas prone to project-induced in-migration. Sexually transmitted infections may affect the project workforce, project-affected communities, and local communities in these areas as described in Box 13.1.

At-risk Project-affected persons and communities, and the Project workforce will be made aware of sexually transmitted infection, high-risk behaviors and preventive measures. Reducing the stigma around STIs and HIV is also important to encourage people to both seek and undertake appropriate care.

A sensitivity rating of ***Medium*** was initially assigned to this impact and this remains relevant. Awareness programs will mitigate some of this risk but the causal factors cannot be fully mitigated; therefore, a magnitude rating of ***Medium*** is assigned. The impact significance for the increased incidence of STIs is reduced from ***Major*** for the initial assessment to ***Moderate*** for the residual assessment, based on these ratings.

Noncommunicable Diseases

An increased reliance on store food, a decreased reliance on bush food and a more sedentary lifestyle has the potential to induce an increase in noncommunicable disease in the PAOI. These lifestyle-related diseases may be driven by increased income from the Project, which makes store food more affordable. Papua New Guinean nationals living in Project accommodation may also experience a shift in diet and nutrition, with potentially positive (i.e., improved nutrition) and negative (i.e., increased incidence of obesity) impacts.

Communities in the PAOI were initially assigned a ***Medium*** sensitivity rating, and this remains unchanged. A magnitude rating of ***Low*** for most communities in the PAOI also remains applicable. For communities in and around PRL-15; however, a magnitude rating of ***Medium*** is assigned, as workforce and community health education programs will mitigate the negative impacts. The impact significance for the incidence of noncommunicable disease; therefore:

- Remains ***Minor*** for communities along the river transport corridor for the residual assessment.
- Is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment for communities around the onshore pipeline route.
- Remains ***Moderate*** for communities in and around PRL-15 and the Project workforce for the residual assessment.

Water- and Sanitation-related Diseases

The Project has potential to induce an increase in water and sanitation-related disease in area of high risk for Project-induced in-migration (see Section 13.1.7). Likely receptors include the Project workforce, Project-affected communities, and local communities in the areas of the PAOI prone to in-migration.

The initial sensitivity rating of ***High*** remains relevant. Community education and improved sanitation, waste and freshwater infrastructure in areas identified as high-risk for Project-induced in-migration (see Box 13.1) delivered through government or other relevant organizations partnered programs will mitigate the risk of increased sanitation-related diseases, thus the magnitude is rated as ***Low.*** The impact significance for the increase water and sanitation-related disease is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.6.4.4 Increased Malnutrition Rates due to Reduced Food Security

The residual impact significance to livelihoods from Project land access and any related economic displacement is assessed as ***Minor*** in PRL-15 and along the export pipeline route for reasons explained in Section 13.3***.***

Any risk of increased malnutrition rates due to reduced food security (rated as ***Low*** sensitivity in Section 13.6.2.4), is seen as non-appreciable when compared to baseline conditions given mitigations focused on avoiding, minimizing and compensating for any economic displacement, therefore a ***Negligible*** magnitude rating is applied to the PAOI.

The residual impact significance of increased malnutrition rates due to reduced food security is lowered from ***Minor*** for the initial assessment to ***Negligible*** for the residual assessment, based on these ratings.

13.6.4.5 Project-related Accidents and Injuries

Logistics and transport have potential to directly increase Project-related accidents and injuries in the PAOI. Likely receptors include the Project workforce, project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.

The health and safety of local communities and the Project workforce are of the highest importance, and the sensitivity rating was accordingly rated as ***High*** initially and this remains relevant. The potential for serious accidents occurring will be minimized, with the mitigation measures proposed in Section 13.6.3, hence a ***Low*** magnitude rating is applied. The potential for Project-related accidents and injuries is reduced from ***Severe*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.6.4.6 Impacts Associated with Social Determinants of Health

The Project has potential to induce a decrease in social determinants of health in the PAOI. Likely receptors include Project-affected communities, and local communities in areas prone to Project-induced in-migration as described in Section 13.1.7.

Management measures designed to mitigate the indirect effects of an increase in income and resulting antisocial behaviors are discussed in Sections 13.4 and 13.8. The potential impacts on education are discussed in Section 13.5 and sorcery related impacts are discussed further below in this section. A sensitivity rating of ***Medium***, as for the initial significance assessment, remains relevant. Based on experience in other resource projects in Papua New Guinea, even with mitigation measures in place, the Project remains likely to indirectly cause increased consumption of drugs and alcohol, and possibly a consequent increase in crime and violence (Section 13.8). Therefore, a ***Medium*** magnitude is assigned. Based on these ratings, the initial social impact significance assessment for impacts associated with social determinants of health remains ***Moderate*** for the residual assessment.

13.6.4.7 Impacts on Cultural Health Practices

The Project has potential to induce create both positive and negative impacts associated with cultural health practices in communities across the PAOI. Likely receptors include Project-affected persons, and Project-affected communities in and around PRL-15, along the export pipeline route and along the river transport corridor. Any impacts would be short to long-term and have potential to be permanent (positive).

The sensitivity of communities throughout the PAOI to an increase in perceived sorcery-related events remains ***High*** as Project-related accidents, injuries or misfortune may continue to be

associated with sorcery, and retribution will be sought. Through mitigations aimed at improving health services and facilities and ensuring access to remedy is available to community members, some positive change is expected, hence a magnitude rating of ***Positive***. Based on these ratings, the initial social impact significance assessment of an increase in perceived sorcery-related events of ***Minor*** becomes ***Positive*** for the residual assessment.

The initial impact rating for a greater acceptance of modern health practices as a result of Project operations in the PAOI is rated as ***Positive*** in Section 13.6.2.7, and the residual significance rating remains ***Positive***.

13.6.4.8 Summary of Residual Community Health and Safety Impacts

A summary of the assessment of residual impacts to community health and safety is provided in Table 13.14, including when and where (in which Project phase and location) these impacts are expected to occur. The table should be read in conjunction with the specific mitigation measures provided in Table 13.13.

All residual impacts are assessed to be ***Negligible*** to ***Minor*** or ***Positive*** except for impacts described below which are assessed to have a ***Moderate*** residual impact:

- Increase in respiratory disease rates and frequency or severity of outbreaks.
- Increase in sexually transmitted infections, including HIV and AIDS.
- Increase in non-communicable diseases (for Project workforce (CPF, accommodation camps) and for Project-affected persons and Project-affected communities in and around PRL-15).
- Impacts associated with social determinants of health specific to gender, substance abuse and violence.

The Project is unlikely to significantly impact on community health with robust mitigation measures and has the potential to improve health outcomes by improving infrastructure, services and community education programs. Positive outcomes include:

- Improved access to health services.
- The potential for an increased acceptance of modern health practices and a reduction in the practice of sorcery.

Table 13.14 – Summary of Assessment of Residual Impact Significance for Community Health and Safety

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Increased pressure on local health services and infrastructure.	Induced	Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor. Kikori district, Baimuru and Ihu local level government.	C, O, D	♦ SM012 ♦ SM028 ♦ SM029 ♦ SM030	Medium/Low	Minor
	Improved access to health services and infrastructure.	Indirect	Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor., Kikori district, Baimuru and Ihu local level government.	C, O, D	♦ SM012	Medium/ Positive	Positive
Construction activities, dredging, drilling, waste generation, storage and management, discharge of surface runoff.	Increase in vector-borne disease rates, frequency and severity of outbreaks.	Induced	Project-affected communities, and local communities in and around PRL-15 and along the export pipeline route.	C, O, D	♦ SM012 ♦ SM013	Medium/Low	Low
		Induced	Project-affected communities, and local communities along the river transport corridor.			Medium/ Negligible	Negligible
		Indirect	Project workforce (skilled and unskilled).			Medium/ Negligible	Negligible

Table 13.14 – Summary of Assessment of Residual Impact Significance for Community Health and Safety (cont'd)

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Increase in respiratory disease rates and frequency or severity of outbreaks.	Induced	Project workforce. Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	C, O, D	♦ SM012 ♦ SM013 ♦ SM015 ♦ SM018	Medium/ Medium	Moderate
		Induced	Project workforce Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	C, O, D	♦ SM012 ♦ SM013	Medium/Low	Minor
	Increase in sexually transmitted infections, including HIV and AIDS.	Induced	Project workforce Project-affected communities, and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor.	C, O, D	♦ SM012 ♦ SM013 ♦ SM018	Medium/ Medium	Moderate
	Increase in non-communicable diseases.	Induced	Project workforce Project-affected communities, and local communities in and around PRL-15.	C, O, D	♦ SM013 ♦ SM017	Medium/ Medium	Moderate

Table 13.14 – Summary of Assessment of Residual Impact Significance for Community Health and Safety (cont'd)

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement (cont'd).	Increase in non-communicable diseases (cont'd).	Induced	Project-affected communities, and local communities around the export pipeline route and along the river transport corridor.	C, O, D	♦ SM013 ♦ SM017	Medium/Low	Minor
	Increase in frequency of water- and sanitation-related (e.g., gastrointestinal) disease outbreaks.	Induced	Project workforce Project-affected communities, and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor.	C, O, D	♦ SM013 ♦ SM014	High/Low	Minor
Land access.	Increased malnutrition rates resulting from reduced food security.	Induced	Project-affected persons. Project-affected communities, and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor.	C, O	♦ SM001 ♦ SM002 ♦ SEM003	Low/ Negligible	Negligible
Logistics and transport.	Project-related accidents and injuries.	Direct	Project workforce Project-affected communities, and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor.	C, O, D	♦ SM016	High/Low	Minor

Table 13.14 – Summary of Assessment of Residual Impact Significance for Community Health and Safety (cont'd)

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Impacts associated with social determinants of health (specific to gender, substance abuse and violence).	Induced	Project-affected communities, and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor.	C, O, D	♦ SM013 ♦ SM014	Medium/ Medium	Moderate
	An increase in perceived sorcery-related events.	Induced	Project workforce Project-affected communities, and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor.	C, O, D	♦ SM012 ♦ SM013 ♦ See Table 13.17 for measures designed to support law and order in the PAOI.	High/Positive	Positive

C = Construction, O = Operations, D = Decommissioning and closure.

13.7 Governance and Leadership

13.7.1 Context

Elected local government representatives currently play a limited role in local village governance. Most villages in the PAOI are largely self-governing; although, churches and some private-sector organizations assist some communities. Traditional leaders, comprising clan leaders and village elders, and religious leaders primarily govern communities in the PAOI.

13.7.1.1 Government Administration

The lack of capacity in the Papua New Guinean public service is well documented by the Lowy Institute (Hayward-Jones, 2015); and despite consistent investment, particularly by the Australian Government, the World Bank's Worldwide Governance Indicators show little overall improvement in governance in Papua New Guinea between 1998 and 2014 (World Bank, 2015).

In general, government authorities have minimal presence in PAOI villages and have limited impact on their day-to-day lives; although, government representation varies across the PAOI. Communities located along the export pipeline route and along Orokolo Bay are generally better represented by government (e.g., through ward councilors and village court magistrates) than villages in and around PRL-15. This may be due, in part, to the relative isolation and small size of Pawaian villages, particularly Poroi 1, Poroi 3, Subu and Subu 2.

While ward development committees are increasingly becoming redundant in Papua New Guinea due to a lack of funding, some members of parliament have assisted villages in the PAOI, such as installing water tanks and new health facilities, but this assistance has often been plagued by implementation problems (Part 15 of Volume 2).

13.7.1.2 Traditional Leadership

The tribal groups in the PAOI have retained and continue to practice traditional leadership. The traditional leaders are usually clan leaders and village elders. Traditional leaders have the authority to speak on behalf of their group or village; although, consultation among the group or village may be expected before decisions are made or shared with outsiders.

The role of traditional leaders in the past has been associated with resource access, including defending land and resources, and social relationships. Managing communally owned land may involve educating other members about the land boundaries and the history of the boundaries, defending the boundaries, allocating land to families or family groups (e.g., for food gardens) and overseeing any decisions that involve using land or resources in the communal area. Maintaining social relationships may involve traditional exchange, clarifying the timing of cultural rituals or other events, or maintaining peace and law and order, both between and within villages. The role of traditional leaders has changed over time, as government officials and church leaders have played more prominent roles in various aspects of village life.

Coordinated leadership tends to be weaker in PRL-15 and adjacent communities relative to other parts of the PAOI due to their isolation, nomadic origins and lack of a chieftainship system (Kinkin et al., 2008) among Pawaian communities.

13.7.1.3 Religious Leadership

Church leaders play a key role in village society, not only in terms of religion but also in maintaining the peace, resolving disputes, providing youth leadership and organizing support for

the elderly and other disadvantaged[4] groups. Voluntary community work is often organized through women's, church or youth groups and is common practice in PAOI villages. Voluntary community work is an important component that contributes toward the social structure and sense of communities amongst PAOI villages in terms of maintaining health, education and church facilities, cleaning public areas, and providing care and assistance to the elderly, sick or otherwise disadvantaged individuals in the community.

All villages in the PAOI except for Poroi 1 indicated that they had church leaders; and all except for Wabo have a church group (see Part 15 of Volume 2).

13.7.1.4 Women's Involvement

Gender distinctions exist in all communities. Women and girls do not enjoy the same social status nor are they afforded the same rights or are able to exert the same influence as men and boys (see Chapter 9) but some variation exists between the more remote, inland communities and the larger, coastal communities.

Community and household surveys (Part 14 of Volume 2) showed that women's understanding of the Project and its impacts was considerably lower than that of men. This is partly due to cultural protocols making it more difficult for women to engage in Project activities than men and because men from the PAOI communities often do not readily share information about the Project with women. There are also often language constraints, as many women prefer to speak their local language, rather than *Tok Pisin* or English, and many older women only speak their local language.

TEP PNG has set-up quarterly meetings with local leaders in PRL-15 to Provide project updates and respond to concerns, and in these meetings, women are invited to participate. In particular, two female representatives of each of the following villages attend the Lidas Kibung (Wabo/Ura, Subu, Poroi 2 and Evara). Some Pawaian women have been nominated as 'clan executives' on Incorporated Land Groups, but it is unknown how this process functions in practice.

13.7.1.5 Other Organizations and Support

External support or assistance for any public good has been provided to all but five villages in the PAOI in the past, as is described in Chapter 9. By far, the most common source of external support has been for water supplies; however, assistance has also been provided for schools, health facilities and communications. According to the communities surveyed, assistance has been provided by the European Union, Department of Foreign Affairs and Trade (formerly AusAID), the Japanese International Cooperation Agency, InterOil (the previous PRL-15 operator), PNG Energy Developments Limited (no longer operating), logging companies, and the Kapuna and Muro missions.

No nongovernmental organization (NGO) has a permanent presence in the PAOI; although, Médecins Sans Frontières has recently established a base at Ihu to the east of the PAOI to implement a program to help combat tuberculosis, and aims to establish another base at Kapuna.

A full description of these and other stakeholder individuals and groups is included in Chapter 6.

4 The terms 'disadvantaged' and 'vulnerable' groups are defined and discussed in Chapter 9 and Box 13.1.

13.7.2 Identification and Initial Assessment of Potential Impacts

13.7.2.1 Increased Challenges to Government Administration

The Project's fiscal contributions to the State of Papua New Guinea are outlined in Section 13.4. Positive impacts related to State financial payments and Project benefits are also discussed in Section 13.4.

Papua New Guinea is in a period of growth, particularly in regard to resource development. With this growth also comes increased pressure on local and national government due to an increased need for their services in managing and monitoring potential resource project-related environmental and social impacts. Demand for government to engage with communities will also likely increase, adding further pressure on government capacity and resources that are currently facing challenges.

In addition, issues with accountability and transparency in the key institutions managing resource project revenues in Papua New Guinea have been described in the Papua New Guinea Extractive Industries Transparency Initiative Report (PNG EITI, 2017).

The combination of increased pressure on local and national government, with accountability and transparency issues could potentially cause perceived or real inequitable or untimely distribution of State financial payments, particularly royalty or equity entitlements, as has been experienced during the process of other large-scale resource projects in Papua New Guinea (e.g., PNG LNG, the Gobe oil projects and the Hidden Valley and Simberi mines). Based on these projects, and the difficulty that the government, landowners or courts face when resolving disputes concerning the allocation of resource project benefits (Section 13.8.1.2), there is potential that State financial payments will not increase income levels in the PAOI to the degree or in the timeframe landowners and local communities expect.

Lack of understanding, and therefore frustration, over the distribution of State financial payments can often cause increased disputes, and law and order problems, leading to a decline in community cohesiveness (see Section 13.8). Bell (2009) has documented the inequitable and untimely distribution of project benefits giving rise to new forms of social stratification and sustained conflict.

If landowner groups are unprepared to participate in the Development Forum, e.g., through weak leadership coordination (Section 13.8.1.2), or are provided with insufficient resourcing for participation, outcomes may be compromised that later also become a source of sustained tension (see Section 9.14).

Initial Impact Assessment

State financial payments have potential to indirectly increase challenges to government administration that would be experienced by all levels of government.

All levels of government may experience further challenges to already stretched and under-resourced capacity (short-term and widespread adverse change when compared to baseline conditions) without mitigation. The initial magnitude and sensitivity ratings of ***High*** during the construction phase and ***High*** during the operation phase have been applied, as there is currently limited capacity to realize opportunities related to this impact, which is likely to be felt most when State financial payments are expected to be distributed. This results in an initial social impact significance assessment of ***Major***.

13.7.2.2 Increased Challenges to Traditional Leadership and Community Governance

Increased pressure is likely to be placed on local community leaders due to an increased need for their services on behalf of their communities in negotiating Project benefits, monitoring Project activities, helping to manage potential Project related environmental and community impacts such as economic displacement, population influx, and managing landowner companies. Some of the elderly traditional leaders, who may not be fluent in *Tok Pisin* or English, may have difficulty engaging in Project land negotiations and the government-led benefit-sharing negotiations, and may have to rely on younger men, often those able to speak *Tok Pisin* and/or English, to participate in these Project-based discussions. Sullivan (2012) describes how younger men can see older leaders as enfeebled, unable to communicate well in either *Tok Pisin* or English, and therefore unsuitable to participate in project-based discussions.

Clan members may challenge the capacity of traditional leaders to fully engage if they perceive Project benefits to be inequitably distributed. Distrust of traditional leadership may be exacerbated if communities feel isolated from decision-making processes due to a lack of engagement. This places pressure on local leaders to undertake continued engagement with affected communities, which can be a challenge with limited capacities and resources.

Combined with these factors, increased income and wealth generated by State financial payments, Project benefits, compensation and lease payments, and employment and procurement activities leading to a transition from a subsistence to increased cash-based economy (see Section 13.4), can shift the focus away from cultural beliefs, values and traditional practices, as there is little or no historical bond, societal tie or shared value between traditional leaders and those more focused on economics. This shift, indirectly driven by State financial payments and Project benefits, compensation and lease payments, also has potential to challenge and weaken traditional governance and leadership.

Another factor contributing to the potential breakdown of traditional leadership is the case where, despite low establishment in PAOI villages (see Chapter 9), community opinion influencers such as village office holders, village officials and teachers, take up paid employment with the Project, thereby weakening the village institutions where they may have provided guidance. Increased community disputes and law and order problems can also result from weakened traditional leadership or leadership that is being challenged, leading to a decline in community cohesion (see Section 13.9). Any challenges to and resulting weakening of traditional leadership may create pressure on religious leadership to provide further support amongst Project-affected PAOI communities.

PRL-15 and adjacent communities, and parts of the export pipeline route are likely to feel the impact, as this is where potential State financial payments and induced in-migration are expected to be concentrated.

Initial Impact Assessment

Receptors including traditional leadership and Project-affected persons, project-affected communities and local communities in and around PRL-15, and around the export pipeline route may experience increased challenges to traditional leadership and governance without mitigation. There is currently limited capacity to realize Project opportunities, as traditional establishments like village courts are not functioning effectively. This impact is likely to be felt during all Project phases, as Project related discussions continue. Thus, initial magnitude and sensitivity ratings of ***Medium*** and ***High*** have been applied, respectively. This results in an initial social impact significance assessment of ***Moderate***.

13.7.2.3 Summary of Identified Potential Impacts to Governance

The Project has the potential to impact government administration and traditional leadership in the PAOI, as follows:

- Increased challenges to government administration.
- Increased challenges to traditional leadership and community governance.

The following embedded design controls address potential impacts related to governance and leadership:

- The Project Operator makes payments of taxes and royalties in an accurate and timely manner during construction and operations phases. The Project Operator reports within the PNG Extractive Industry Transparency Initiative (EITI) framework, the amounts of taxes and royalties paid, within its operated perimeter [ED036].
- The Project Operator will continue the employment and where possible the recruitment of women in community relations positions (community liaison officer, village liaison officer, etc.) to conduct specific engagements with women and ensure that women's views and interests are identified [ED037].

13.7.3 Proposed Mitigation, Management and Optimization Measures

The potential for impacts to community governance and leadership may be countered and optimized by measures designed to:

- Support the capacity building of local-level and provincial governments to improve the planning and implementation of local development plans.
- Support the inclusion of women in Project benefits and decision-making.
- Support stronger, more resilient communities that are more likely to benefit from the Project and to manage potential adverse impacts more effectively.
- Limit Project-induced in-migration to PAOI communities.

Mitigation and optimization measures to be implemented during various Project phases to further manage these impacts are described in Table 13.15.

Table 13.15 – Governance and Leadership Mitigation, Optimization Strategies and Management Plans

Potential Impact	Mitigation and Optimization Strategy	Relevant Management Plan
Increased challenges to government administration.	♦ Enhance compliance with business ethics: – The Project and its contractors will require that all direct and contracted workers undertake anti-bribery, corruption, ethics and compliance training. – The Project will establish an employee whistleblowing system, thereby providing a confidential mechanism to report, e.g., any cases of bribery and corruption, or labor rights infringements in the workforce [SM019].	Community Development Plan; National Content Plan; Stakeholder Engagement Plan.

Table 13.15 – Governance and Leadership Mitigation, Optimization Strategies and Management Plans (cont'd)

Potential Impact	Mitigation and Optimization Strategy	Relevant Management Plan
Increased challenges to traditional leadership and community governance.	♦ Develop and implement targeted engagement activities with women in the Project-affected communities to help build their knowledge of the Project so that their views and rights are considered throughout its ongoing development [SM020]. ♦ The Project will work with traditional leaders and ward councilors to encourage community volunteers to participate in the Project's social monitoring and evaluation [SM021].	Community Development Plan; Stakeholder Engagement Plan

13.7.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to governance and leadership, assuming successful implementation of the proposed mitigation.

13.7.4.1 Increased Challenges to Government Administration

There is potential that the administration of State financial payments will indirectly increase challenges to all government levels leading to further adverse impacts such as increased disputes and law and order problems (see Section 13.9). Project mitigation measures focused enhancing compliance with business ethics will assist to moderate potential impacts in the PAOI and, more broadly, at provincial and national levels (see Section 13.4).

A ***Low*** magnitude rating and a ***Medium*** sensitivity rating have been applied to the PAOI, as mitigations are expected to contribute toward short- to long-term financial investment occurring in an equitable and timely manner in the PAOI and will also increase capacity to realize opportunities in various government levels.

The impact significance regarding increased challenges to government administration is reduced from ***Major*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.7.4.2 Increased Challenges to Traditional Leadership and Community Governance

Increased challenges to traditional leadership and governance due indirectly to State financial payments, Project benefits, compensation and lease payments, and employment and procurement activities is expected to be greatest in communities in and around near PRL-15, and parts of the export pipeline route, where the impacts of increased wealth from landowner benefit payments to PRL-15 customary landowners and a population influx are already present to some degree. Potential impact may be felt in the short to longer term as Project related discussions continue and particularly by receptors including traditional leaders and Project-affected persons and project-affected communities and local communities in and around PRL-15 and around the export pipeline route.

The following is an example of increased challenges to traditional leadership due to wealth from landowner benefit payments and population influx experienced during similar projects:

> In Papa village (near the LNG plant), an international contractor had become wittingly or unwittingly entangled in village politics and contributed to the polarization of the villagers and village leadership over competing lancos – almost to the detriment of [company name's] efforts to establish an umbrella lanco. It was clear to the IESC from a relatively brief discussion that the division created in Papa remains un-reconciled. This is an unhealthy situation given the seed money and employment benefits that are about to flow. It is in no-one's interest that the village leadership be divided and unable to take advantage of the seed money that is due to it. While the

> situation is not of [company name's] making, it might consider whether there is value in seeking some third-party intervention (either from higher levels of government or through a civil society group with conflict resolution skills) to broker some reconciliation between the two sides. (D'Appolonia 2010).

Adverse indirect impacts may be experienced in the shorter term only and the degree of disruption is expected to be reversible due to mitigations focused on building capacity, raising awareness and sustainable community development. A magnitude rating of ***Low*** and sensitivity rating of ***Medium*** has been applied.

The impact significance regarding increased challenges to traditional leadership and governance for Project-affected persons and Project-affected communities and local communities in and around PRL-15 and around the export pipeline route is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment, based on these ratings.

13.7.5 Summary of Residual Governance and Leadership and Impacts

A summary of the assessment of residual impacts to governance and leadership is provided in Table 13.16, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.15.

Both residual impacts are assessed to be ***Minor***.

Significant potential exists for positive impact where State financial payments are directed toward local communities; however, strengthening technical capacity will need to be supported with increased resources provided through local and national government benefit allocation. Focus will be placed on some of the key Project impacts and mitigation measures linked to employment, procurement, in-migration, land compensation, royalties and benefits.

Table 13.16 – Summary of Assessment for Residual Impact Significance for Governance, Leadership and Social Structure

Key Sensitivity	Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
							Sensitivity/ Magnitude	Significance
Economic activity.	Project employment and procurement.	Increased challenges to government administration.	Indirect	National, provincial, district and local government/s.	C, O, D	♦ SM019	Medium/Low	Minor
Governance and leadership structures.	Project employment and procurement.	Challenges to traditional leadership and community governance.	Indirect	Traditional leaders, Project-affected persons, Project-affected communities and local communities in and around PRL-15, around the export pipeline route.	C, O, D	♦ SM020 ♦ SM021	Medium/Low	Minor

C = Construction, O = Operations, D = Decommissioning and closure.

13.8 Law and Order

13.8.1 Context

Issues surrounding disputes and tension can be generally understood in the context of community cohesion, law and order and security issues, i.e., 'Law and order' generally describes community policing and the state's capacity to intervene to restore peace and to enforce justice in the communities. This is traditionally a challenge in the PAOI, due to poor or little Police presence (e.g., little manpower, low budget, no accommodation and poor transportation means). The government is primarily in charge of law and order. Project contributions can only assist the government to mitigate the effects of Project development on law and order.

13.8.1.1 Community Cohesion

Rapid population growth, urbanization and modernization in Papua New Guinea are causing a diminishing observance of traditional leadership practices and a greater focus on individual wealth.[5] The Project has the potential to exacerbate and accelerate these changes through the introduction of social changes,[6] economic opportunities and new migrants into remote communities, many of which have not had prior experience in managing issues of this type. These changes are often associated with increased community tension.

In Papua New Guinea, disputes associated with resource development projects may arise due to:

- The process of development and implementation of benefit sharing agreements negotiated between the State of PNG, landowners and government representatives, independent of the Project. These agreements describe how the statutory benefits will be shared with landowners, local level governments and provincial governments (see Sections 13.4 and 13.7, respectively).
- Increased income and wealth, and the introduction or expansion of a cash economy, leading to social and economic change where the focus shifts to economic benefits rather than sharing aspirations that are more valued among the customary landowners, such as the need for social development (see Sections 13.4 and 13.9). Increased income and wealth may also lead to increased antisocial behaviors (e.g., consumption of drugs and alcohol, gambling, prostitution), crime and gender-based violence (see Section 13.6).
- Pressures on natural resources and ecosystem services relied upon by rural communities for subsistence (see Section 13.3 and Chapter 16).
- Clashes involving the country's armed security forces and excessive use of force.

There is potential for Project-related tension to arise in relation to any of these issues; however, no significant security incident had been registered with TEP PNG or documented in the baseline studies.

13.8.1.2 Law and Order

There is little or no police presence in the PAOI. The ratio of number of policemen per inhabitant is 1 to 4,200 in Gulf Province, versus 1 to 1,500 in Papua New Guinea compared to 1 to 400 recommended by the UN. The provincial police headquarters is located in Kerema; and in 2016,

5 Bell (2015) presents examples of such changes and associated impacts, particularly tension with waterway communities.

6 This is particularly so when the number or power of people with historical ties and shared values has declined, allowing the boundaries of 'acceptable behaviour' to shift outward.

the provincial police had 48 regular police officers and approximately 500 reserve police and community-based constables. Police are based at Ihu, Baimuru and Kikori. The locations had one police officer each with no functioning vehicle, dinghy or radio communication during the baseline studies. At end of 2019, there is now an operational dinghy at Baimuru and the Kikori police boat engine is under maintenance repair.

Traditional and church leaders also often play a direct role in conflict resolution and/or determining compensation (as discussed in Section 13.7), as do the designated land mediators.

The main law and order problems in the PAOI include stealing (generally, the theft of garden produce), fighting and domestic violence (NSO, 2013). Crime is often associated with the consumption of alcohol or illicit drugs (predominantly marijuana), and gambling and prostitution are common.

Leaders in the Orokolo villages identified more law and order problems than those from villages in and around PRL-15, which is likely to be attributable to the involvement of village court officials in the village leader meetings and their willingness to talk openly about such problems. The main security concerns expressed by village leaders were sorcery and violence (including domestic violence and sexual assault) (see Chapter 9). Leaders often indicated that the level of security had improved in recent years, due primarily to the reintroduction and strengthening of the village court system in the PAOI; although, the majority of women surveyed indicated no change.Village leaders in Aumu, Wabo, Ura, Mareke, Ere and Kilavi, and women's groups in Evara, Kaivukavu and Larihairu reported a decline in security.

The village court system is the main mechanism in the PAOI for dealing with relatively minor crimes and disputes, as there is little or no police presence, and it is relatively active, except in the Pawaian villages. The role of the village courts is to promote peace and harmony in the communities in which they operate, and they are obliged to attempt to resolve disputes initially with mediation. Traditional and church leaders often support the village court officials. Disputes that cannot be resolved are referred to the courts in Kerema.

13.8.1.3 Security

TEP PNG has been working with the government and police forces to implement a community-policing program at Wabo Station. TEP PNG has also signed a memorandum of understanding with the Royal Papua New Guinea Constabulary, outlining the support to be provided by regular and reserve police to its activities in PRL-15 and the terms and conditions of this engagement. Specifically, this includes the requirement for security procedures and measures applied under the memorandum to be compliant with the Voluntary Principles on Security and Human Rights (VPSHR, 2000).

TEP PNG has engaged three private security providers: G4S and Black Swan in Port Moresby and Guard Dog at Herd Base, all of whom are unarmed.

No significant security incidents had been recorded on site prior to the baseline studies and is likely to be due to the remoteness of PRL-15 and the PAOI in general, combined with a sparse local population.

13.8.2 Identification and Initial Assessment of Potential Impacts

Increased tension and a decline in customary social systems may arise due to rapid social and economic change, concerns over State financial payments and competition for employment and/or local economic inequity.

13.8.2.1 Decline in Customary Social Systems

Section 13.4 discusses increased income and wealth, and the introduction or expansion of a cash economy leading to social and economic change. The key cause for tension in this scenario is when this change shifts social focus to economic benefits rather than sharing aspirations that are more valued among the customary landowners, such as the need for social development.

Various government levels are largely responsible for distributing State financial payments and disputes surrounding this issue and impacts on extractive projects and their affected communities are well documented. D'Appolonia (2016) discusses how the 'failure of the Government to meet its commitments under the Benefit Sharing Agreement (including payment of royalties) provoked Hela province landowners to attack the (PNG LNG) project in the hope of getting Government's attention', causing damage to project equipment and project delays. D'Appolonia (2016) also suggests the PNG LNG Project continues to see a decrease in security incidents; however, serious community protests have occurred and are likely to continue until government commitments are met. The best approach offered by D'Appolonia (2016) is a combination of engagement and 'good intelligence' where affected communities are made aware of the project's effort to facilitate government in meeting its commitments.

There is the potential for these challenges to government administration including past issues related to State financial payments to contribute to social stratification between landowning groups where one group may benefit more than others from State financial payments. This may lead to an increase in tension and possibly conflict between landowning groups.

Project employment and business opportunities can benefit PAOI communities, but they can also become sources of tension, particularly if migrants are seen to benefit from local employment and business opportunities more than local community members do.

Section 13.7 discusses intergenerational tensions and related opportunities for asserting leadership and associated changes to traditional governance and leadership. Coordinated leadership tends to be weaker in and around PRL-15 than in villages in Orokolo Bay (see Part 15 of Volume 2).

Communities with strong leadership are more likely to resolve disputes and grievances before they become larger problems. Those with weak leadership often experience a decline in customary social systems, sense of belonging and potentially a breakdown in social and family structures.

Further impacts to customary social systems include those relating to community health and safety, particularly an increase in anti-social behaviors, discussed in Section 13.6 and assessed in Section 13.8.2.3.

The changes listed earlier have potential to increase tension, contributing to a decline in customary social systems, which itself can lead to further disputes.

Project affected communities in and around PRL-15, and parts of the export pipeline route may feel the greatest impact, in areas prone to Project-induced in-migration and where potential State financial payments may be concentrated.

Initial Impact Assessment

A decline in customary social systems and increase disputes due to rapid social and economic change induced by State financial payments, and Project employment and procurement, may be greatest in areas where income levels are expected to increase the most substantially, where in-migration is expected to be focused (see Table 13.1), and the village courts are not functioning properly. Bell (2009) provides examples of a gradual decline in customary social systems leading

to further tension due to extractive industry projects in Purari River delta communities. Any potential impact may be felt during all Project phases, as Project-related discussions and activities continue.

Potentially-affected receptors include traditional leadership, project-affected persons, project-affected communities and local communities in and around PRL-15 and around the export pipeline route, and to a lesser degree, along the river transport corridor.

Without mitigation, receptors in and around PRL-15, and along the export pipeline route may experience a potentially frequent disputes related to State financial payments and an irreversible decline in customary social systems, potentially contributing to further tensions. Initial magnitude and sensitivity ratings of ***High*** have been applied, as there is currently limited or no capacity for change related to customary social systems, which is likely to be felt most during the Project's construction and operation phases when State financial payments are expected to be distributed. Some communities along the river transport corridor may only be moderately impacted and are assessed as being ***Medium*** in magnitude, but ***High*** in sensitivity for the same reasons as stated earlier.

This results in an initial social impact significance assessment of ***Major*** for receptors in and around PRL-15 and along the export pipeline, and ***Moderate*** for river transport corridor receptors.

13.8.2.2 Disputes Due to Competition Over Natural Resources

Community cohesion is generally stronger in the smaller, more isolated communities in the PAOI, where the villagers have abundant land and resources, and limited interactions with outsiders, and where they demonstrate high levels of community work (i.e., volunteering) and leadership. Political and economic agendas that promote a more individual or segmented approach can impact on community cohesion when resources are in shorter supply.

Project-induced in-migration associated with resource projects have the potential to lead to disputes and tension over access to or competition for local resources. The possibility also exists that any migrants may not respect or conform to traditional leaders' customs or traditions and may access resources inadvertently or illegitimately or without clan approval.

Un-approved access to natural resources may occur along the onshore export pipeline access road and areas in PRL-15 that are near access roads, and along the Purari River, with potential access points provided at Aivai and Evara (i.e., via existing logging camps and tracks). This is discussed in more detail in Section 13.1.7.

Potential impacts upon land and the natural environment, and on livelihoods present a focus for grievances and have the potential to generate tensions within the communities. Any impacts on natural resources (e.g., food, water, firewood) are likely to be experienced disproportionately by women, as they generally have the primary responsibility for providing food and water for their families (see Chapter 9).

Associated pressures on natural resources and ecosystem services rural communities rely on for subsistence are assessed in Chapter 16.

Initial Impact Assessment

Increased disputes due to increased access to or competition for natural resources, as an induced impact from Project employment and procurement, and population increase, may be experienced in the PAOI for reasons outlined earlier. Any potential impact may be felt during all Project phases, particularly by receptors including Project-affected persons, Project-affected communities and local communities.

Receptors may occasionally experience this potentially reversible adverse change without mitigation. Initial magnitude and sensitivity ratings of ***Medium*** and ***High*** have been applied, respectively, to PAOI communities, as there is currently limited or no capacity for change related to this impact. This results in an initial social impact significance assessment of ***Moderate***.

13.8.2.3 An Increase in Antisocial Behavior and Crime

Antisocial behaviors in local communities, including excessive alcohol consumption, smoking marijuana, gambling and prostitution are commonly reported in resource project areas in Papua New Guinea (UNDP, 2014). These behaviors may occur due to an increase in income and wealth, and a limited local capacity to expend that income. Verifying whether local people or migrants are responsible for introducing or promoting these behaviors is difficult and may instead be due to a combination of an increase in wealth and in population more generally These behaviors, irrespective of the role played by migrants, can create rifts between local people and migrants, between the older and younger generations, and between men and women, again adversely impacting community cohesion.

Problematic behaviors toward women can include the risk of sexual violence, the spread of sexually transmitted diseases, and the pressure to engage in prostitution or marry migrant men (see Section 13.6).

Law and order problems related to antisocial behavior may be experienced most by project-affected communities and local communities in areas prone to Project-induced in-migration (see Section 13.1.7) around PRL-15 and around the export pipeline route, as this is where income levels are expected to increase the most, population is expected to be concentrated, and the village courts are not functioning effectively. A known trade in illicit drugs, such as marijuana imported from the highlands, already exists in and around PRL-15, (Bell, 2006), and the use and trade of illicit substances is likely to increase with the availability of more money in this area. Less impacts may be felt along the river transport corridor.

Initial Impact Assessment

Project-affected and local communities in areas prone to Project-induced in-migration in and around PRL-15 and around the export pipeline route may experience occasional increase in antisocial behaviour and crime without mitigation. Initial magnitude and sensitivity ratings of ***Medium*** and ***High*** have been applied, respectively, as there is currently limited or no capacity for change related to this impact. Some communities along the river transport corridor may be only moderately impacted and are assessed as being ***Low*** in magnitude, but ***High*** in sensitivity for the same reasons as stated earlier.

This results in an initial social impact significance assessment of ***Moderate*** for receptors in and around PRL-15 and export pipeline, and ***Minor*** for receptors along the river transport corridor receptors.

13.8.2.4 Potential Human Rights Abuses Committed by State and Non-state Security Forces

Excessive use of police force in Papua New Guinea is and continues to be common. Dinnen (2017) discusses the Royal Papua New Guinea Constabulary (RPNGC) human rights abuses rates and the strong informal networks that exist between private security companies and the RPNGC, with many senior industry employees having previous police or military experience in Papua New Guinea and overseas.

TEP PNG has signed a MoU with RPNGC in 2016. This MoU regulates the framework in which police intervene in PRL-15, including training for Voluntary Principles of Security and Human Rights. Enforcing this MoU has proved solid since 2016 with no violation reported, and a permanent exchange of information between TEP PNG security management and the police at provincial and regional levels has taken place.

Initial Impact Assessment

There is a potential risk of excessive use of force and confrontation with local community members particularly where anti-social behavior and crime may increase and where in-migration is expected to be focused (see Section 13.1.7), and where the village courts are not functioning effectively, without adequate training of state and non-state security personnel on the appropriate use of force. Any potential impact may be felt during all Project phases, as Project related activities continue. Key receptors include Project-affected persons, Project-affected communities and local communities in and around PRL-15, and to a lesser degree, around the export pipeline route and along the river transport corridor.

Receptors in and around PRL-15, along the export pipeline route and along the river transport corridor may experience occasional impacts due to interactions between state and non-state security personnel and identified communities. Initial magnitude and sensitivity ratings of ***Low*** and ***High*** have been applied, respectively, due to the security training arrangements already in place and the lack of violations recorded since 2016, and the limited or no capacity for communities to absorb increased conflict.

This results in an initial social impact significance assessment of ***Minor*** for all receptors.

13.8.2.5 Summary of Identified Potential Impacts to Law and Order

The Project has the potential to increase tension and decrease community cohesion, and law and order in the PAOI, causing the following potential impacts:

- A decline in customary social systems.
- Disputes due to competition over natural resources.
- An increase in antisocial behaviors and crime.
- Potential human rights abuses by security forces.

The following embedded design control addresses potential human rights abuses by security forces:

- The Project has been and will continue to work with security forces in alignment with Voluntary Principles on Security and Human Rights [ED038].

13.8.3 Proposed Mitigation, Management and Optimization Measures

Potential increase in tension and decreases in community cohesion, and law and order in the PAOI can be managed and optimized by measures designed to:

- Support stronger, resilient communities that are more likely to be able to resolve disputes and grievances before they become larger problems.
- Support traditional leaders to maintain local governance arrangements (see Section 13.7).
- Support increased landowner understanding and governance of the benefit-sharing process (see Section 13.4).

- Investigate options to work with relevant local-level and provincial governments to support sustainable law and order initiatives.
- Limit in-migration, particularly to communities in and around PRL-15 (see Section 13.1).
- Train private security forces on Voluntary Principles for Security and Human Rights (VPSHR).

Mitigation and optimization measures to be implemented during various Project phases to further manage these impacts are described in Table 13.17.

Table 13.17 – Law and Order Mitigation and Optimization Strategies and Management Plans

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Decline in sense of customary social systems.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to encourage regulation and monitoring of in-migration [SM022]. ♦ The Project will establish governance arrangements for the implementation and monitoring of community investment and development programs [SM023]. ♦ Support sustainable initiatives to strengthen village law and order organizations (e.g., village courts, local police and churches) [SM024].	Project-induced In-migration Plan; Community Development Plan.
DIsputes due to competition over natural resources.	♦ In areas at high risk of Project-induced in-migration in the PAOI, undertake a feasibility assessment in consultation with relevant stakeholders on initiatives to encourage regulation and monitoring of in-migration [SM022]. ♦ The Project will establish governance arrangements for the implementation and monitoring of community investment and development programs [SM023]. ♦ See mitigations relevant to ecosystem services (Chapter 16) and economic displacement and livelihoods (Sections 13.3 and 13.4).	Project-induced In-migration Plan; Community Development Plan; Land Access and Livelihood Development Plan;
Increase in antisocial behaviors and crime.	♦ Support sustainable initiatives to strengthen village law and order organizations (e.g., village courts, local police and churches) [SM024].	Community Development Plan; Community Health, Safety and Security Management Plan
Potential human rights abuses committed by security forces.	♦ The Project will ensure private security personnel are screened and trained on the Voluntary Principles on Security and Human Rights [SM025].	Labor Management Plan; Community Health Safety and Security Management Plan.

13.8.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to law and order, assuming successful implementation of the proposed mitigation and optimization measures.

13.8.4.1 Decline in Customary Social Systems

A decline in customary social systems may be induced from a transition to a cash economy linked to increases in income from State financial payments, and Project employment and procurement may be felt during all Project phases. The most susceptible receptors are likely to be Project-affected persons, project-affected communities and local communities in area prone to in-migration in and around PRL-15 and along the export pipeline route, and to a lesser degree, along the river transport corridor. A decline in customary social systems is expected to be

substantially attenuated, and may only be experienced by individual communities, with mitigations aimed at supporting stronger, resilient communities that are more likely to be able to resolve disputes and grievances before they become larger problems, hence the impact is rated ***Low*** in magnitude. A sensitivity rating of ***Medium*** is applied with implementation of these same mitigations.

The impact significance regarding a decline in customary social systems due to rapid social and economic change and increased disputes over State financial payments is reduced from ***Major*** for receptors in and around PRL-15, and around the export pipeline, and ***Moderate*** for receptors along river transport corridor for the initial assessment, to ***Minor*** for the residual assessment for all receptors based on these ratings.

13.8.4.2 Increase in Disputes Due to Competition Over Natural Resources

Disputes over access to, or competition for, local natural resources, as an induced impact from Project-induced in-migration in some communities (see Table 13.1) may increase. Minimal change is expected when compared to baseline conditions with mitigation aimed at building capacity and resilience, strengthening law and order services, discouraging informal settlements, and minimizing adverse impacts to ecosystems services (see Chapter 16) and the environment in general.

Any potential impacts are expected to be localized and reversible in the short term, impacting Project-affected persons, communities and local communities in and around PRL-15, around the export pipeline route and along the river transport corridor. A ***Low*** magnitude rating has; therefore, been assigned across these receptors. Mitigation is also expected to increase resilience to change, hence sensitivity is rated as ***Medium***, reduced from ***High*** in the initial assessment.

The impact significance for disputes over natural resources in the PAOI is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual significance assessment, based on these ratings.

13.8.4.3 Increase in Antisocial Behaviors and Crime

Increased income and available cash in communities, compounded by potential Project-induced in-migration may cause an increase in law and order issues associated with antisocial behavior and crime. These impacts are likely to be induced by State financial payments, and Project employment and procurement, and may be experienced particularly by traditional leadership and Project-affected persons, communities and local communities in areas prone to in-migration in and around PRL-15 and around the export pipeline route. The application of mitigation measures aimed at strengthening village law and order organizations and police services and targeting the awareness and reduction of gender-based violence and sorcery accusations is expected to result in impacts being short term. A ***Low*** magnitude rating has; therefore, been assigned and sensitivity remains ***High***.

The impact significance for an increase in antisocial behaviour and crime for receptors in and around PRL-15, and along the export pipeline is reduced from ***Moderate*** for the initial assessment to ***Minor*** for the residual assessment. The initial and residual significance assessment is ***Minor*** for receptors along the river transport corridor, based on these ratings.

13.8.4.4 Potential Human Rights Abuses by State and Non-state Security Forces

There could always be a risk of human rights violations from external police forces. The risk of human rights violations committed by Project-related security forces is remote, as the private security forces must comply with TOTAL Code of Conduct, TEP PNG's procedure and

commitment for VPSHR, and government security forces intervening on account of the Project work according to the signed MoU. Potentially impacted receptors include Project-affected communities and local communities in and around PRL-15, along the export pipeline route and along the river transport corridor. A ***Negligible*** magnitude rating has been assigned with screening and training of Project-contracted security forces, targeted engagement, and an appropriate grievance mechanism. A ***High*** sensitivity rating has been assigned to the PAOI, as no exposure to this impact has been reported previously.

The impact significance regarding an increase in tension between communities and security forces is reduced from ***Minor*** for all receptors for the initial assessment, to ***Negligible*** for all receptors based on these ratings.

13.8.5 Summary of Residual Law and Order Impacts

A summary of the assessment of residual impacts to law and order is provided in Table 13.18, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.17.

All residual impacts are assessed to be ***Minor,*** except for one impact assessed as ***Negligible***.

Avoiding a decline in community cohesion and an increase in law and order issues will be difficult (hence the predominance of ***Minor*** residual significance assessments), particularly in the communities containing licence area landowners, even with robust mitigation measures in place. Outside of the Project's responsibilities, an improvement in Government administration and timely State financial payments (and therefore any support provided by TEP PNG to both) would substantially decrease the significance of this impact.

The maintenance of law and order is the role of the Papua New Guinean Government, but TEP PNG has an opportunity to contribute toward building capacity and strengthening the resilience of PAOI communities so that they are more likely to be able to resolve disputes and grievances among themselves before they become larger problems.

Table 13.18 – Summary of Assessment for Residual Impact Significance for Law and Order

Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation and Management	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Project employment and procurement.	Decline in Customary Social Systems.	Induced	Traditional leadership, project-affected persons, project-affected communities and local communities in and around PRL-15, around the export pipeline route, and along the river transport corridor	C, O	♦ SM022 ♦ SM023 ♦ SM024	Medium/Low	Minor
	An increase in disputes due to competition over natural resources.	Induced	Project-affected persons, Project-affected communities and local communities in and around PRL-15, around the export pipeline route, and along the river transport corridor	C	♦ SM022 ♦ SM023 ♦ See mitigations relevant to Chapter 16 and Sections 13.3 and 13.4.	Medium/Low	Minor
	An increase in antisocial behaviors and crime.	Induced	Traditional leadership, Project-affected persons, project-affected communities and local communities in and around PRL-15, around the export pipeline route, and along the river transport corridor.	C	♦ SM024	High/Low	Minor
	Potential human rights abuses committed by state and non-state security forces.	Direct and indirect	Project-affected communities and local communities in and around PRL-15, around the export pipeline route and river transport corridor.	C, O, D	♦ SM025	High/ Negligible	Negligible

C = Construction, O = Operations, D = Decommissioning and closure.

13.9 Transport and Access

13.9.1 Context

This section discusses potential Project impacts on community transport and transport access. Commercial traffic and transport are discussed in Chapter 15.

The lack of transportation and communication infrastructure is a major constraint in the PAOI and, in particular, in the upstream area of the Purari River, inhabited by the Pawaian people. Transport around the PAOI is mainly undertaken on rivers with dugout canoes, motorized dugout canoes or dinghies. Distances between villages are great, travel costs are high, and local communities report numerous travel accidents (not involving Project vessels), both in the river and at sea.

13.9.1.1 River and Sea Travel

Most people living along the Purari River rely predominantly on dinghies and canoes for transport. Canoes are used daily when fishing, accessing garden or sago areas, attending school or accessing markets and health facilities in particular for communities which are not already equipped with community facilities.

Around one in five households in the PAOI own an outboard motor, which can be attached to a dinghy or larger canoe and used to facilitate travel over longer distances, e.g., to access markets or health facilities (Kapuna Hospital) or to travel to Baimuru or Kerema. Travel depends on weather and sea conditions, on access and affordability of fuel for motorized canoes or dinghies and can be dangerous in particular when traveling at sea, sometimes resulting in fatalities.

13.9.1.2 Roads and Walking Tracks

The only roads in the PAOI are those constructed by resource companies, i.e., the roads connecting drilling wells to Herd Base (in PRL-15) and temporary logging roads used to bring logs to current river ports (i.e., Evara and Poroi 2).

Walking is often the main form of transport for people living along Orokolo Bay or in the Muro area (i.e., where there is no access to a river). Roads constructed during the colonial era along Orokolo Bay to Ihu and inland to Muro Mission are now used as walking tracks. A well-established track connects the inland Orokolo villages of Avavu, Ere and Kilavi with Huruta, Arehava 2 and Paevera in the center with the coastal Orokolo villages of Harevavo, Kaivukavu, Marea, Larihairu and Iuku. The track is used to access health services and to trade food.

The only other significant walking tracks in the PAOI are those connecting the Pawaian villages, including Wabo, to villages in Simbu and the Eastern Highlands. Walking these tracks typically takes three to five days and is only suitable for people who are in good health.

13.9.1.3 Airstrips

The only operational airstrips in or near the PAOI are at Wabo and at the Purari Airstrip. Air travel is too expensive for most of the population in the PAOI.

13.9.2 Identification and Initial Assessment of Potential Impacts

13.9.2.1 Short-term Disturbance of Access to Community Services or Natural Resources

The Project will not impact on public road traffic in the PAOI, as there are no public roads and no private vehicles recorded in the PAOI.

The construction of the export pipeline shore crossing could cause a temporary disturbance to foot traffic access along the beach and dunes between villages either side of the shore crossing location (see Figure 13.3), as the right of way and a temporary construction area for facilities, equipment and a safe operating area (see Plate 4.8) will be present. This has the potential to disrupt Orokolo Bay communities' access to schools, health facilities and markets at Kavava for a short time, as these communities frequently use the beach and back dunes, as their primary form of access between villages. Villagers also use the beach as a way to recreate and connect with neighboring villagers.

The construction of the onshore export pipeline will cross the road/walking track (see Section 13.9.1.2) between inland and coastal Orokolo villages, and foot traffic access will be restricted in the short term, which could affect movement of Iuku and Mareke inhabitants. Construction of the pipeline between the shore crossing into the offshore area may cause short-term disturbance of the use of the inter-tidal zone for nearshore fishing by Iuku and Mereke communities.

Initial Impact Assessment

A short-term disturbance of access to community services or natural resources due to the export pipeline construction at the shore crossing may directly affect export pipeline route Project-affected communities in Orokolo Bay; (e.g., Iuku resident's access to health facilities at Kavava; Mareke resident's access to Kaivukavu markets). There is also the potential for short-term disturbance of access between inland and coastal Orokolo villages (export pipeline route local communities) due to onshore pipeline construction, where it crosses the walking track. The sensitivity rating applied is ***High***, as there is limited capacity to access alternatives to the already limited services and resources along the coastline. An initial magnitude rating of ***Low*** is assigned, as the villages closest to the export pipeline route and more broadly in this part of Orokolo Bay would experience short term, and reversible disturbance without mitigation measures. An initial social impact significance of ***Minor*** results for a disturbance of access to services for export pipeline route Project-affected communities and local communities due to onshore pipeline construction, with full access being reinstated once construction is complete.

Construction, including trenching, of the Orokolo Bay export pipeline shore crossing and offshore pipeline construction activities at the export pipeline shore crossing will be a temporary activity (i.e., several weeks) but will require an exclusion zone for safety reasons. A sensitivity rating of ***Low*** is assigned to the export pipeline route Project-affected communities in Orokolo Bay (Iuku and Mareke) inter-tidal and marine resources as these communities have the capacity the access nearby alternatives. Some localized inconvenience may be experienced compared to baseline conditions, and an initial magnitude rating of ***Negligible*** is assigned, given the temporary duration of this activity. This results in an initial social significance of ***Negligible*** for a disruption of access to inter-tidal and marine resources due to the export pipeline shore crossing construction, and therefore, this impact is not assessed further.

The main river transport route for Project logistics and transport is expected to be the Purari River; and the route will pass by Mapaio Fish Camp, Kaevaria, Evara, Aivai, Aumu and Apoiope. The Urika-Ivo River will be used for short-term periods in rare occasions when the Purari River is impassable, and river traffic would pass by Mapaio Fish Camp and Mapaio, Kairu'u and Akoma. The river is the only form of transport to and from services and resources for most of these communities, (only Evara and Aivai have access to inland established tracks), and is central to maintaining livelihoods to communities along the river transport corridor. The sensitivity of river transport corridor Project-affected communities to a disturbance of access due to an increase in barge traffic, particularly during the construction period, is therefore rated ***High.*** The majority of

the river traffic will occur during the construction period (approximately five years), with fewer barges using the river during the operations phase. Use of the main river transport corridor (Purari River) for barge traffic will be frequent (i.e., daily) and re-occurring over this five-year timeframe. However, given the length of the river, at any given point in time during the day it is estimated that there will not be more than 1 barge every 50km, and at any point on the river the disturbance associated with a barge will last only a few minutes. Thus, a magnitude rating of ***Low*** is assigned. This results in an initial social impact significance of ***Minor*** for a disturbance of access to services and natural resources due to an increase in barge traffic on the Purari River, primarily during the construction phase.

13.9.2.2 Loss or Damage of Assets due to Increased River Traffic

Villages along the Purari River often store their personal belongings close to or along the river banks, making them susceptible to disturbance by waves caused by large vessels. Village leaders from communities along the Purari River identified that waves from the barges currently using the Purari River for exploration and logging activities caused loss or damage to canoes through capsizing them or breaking their moorings, and loss of cooking and eating utensils that may have been left on the river bank to dry.

Assets, such as canoes, are highly valued and central to livelihood maintenance for most people in the PAOI; therefore, loss or damage of these assets or the food or tools stored in them can be significant for the individuals involved. This is especially the case for vulnerable groups and individuals such as families with no or poor food security and households that do not receive any income.

Initial Impact Assessment

An increase in the number and frequency of barges using the Purari River for logistics and transport, particularly during the construction phase, could directly cause the loss or damage of personal assets such as canoes or fishing equipment. This could occur for river transport corridor Project-affected communities.

Barges already operate along this route and these communities have some level of exposure to barge movements and the impacts associated with wash; therefore, a sensitivity rating of ***Medium*** is assigned.

Project barges are not anticipated to be substantially larger or to travel faster than those already used to service Herd Base; therefore, any wave damage (i.e., scour of the riverbed and banks due to propeller wash and vessel wake) associated with additional barge traffic could result from increased barge frequency (Section 11.3.3.1). An initial magnitude rating of ***Medium*** is assigned, as loss or damage caused by Project barges would be localized (i.e., relevant to communities along the primary transport route), temporary (i.e., primarily restricted to the construction phase and much lower during operations) and largely reversible. This results in an initial social impact significance of ***Moderate***.

13.9.2.3 Transport-related Accidents and Injuries

Transport-related accidents and injuries are discussed under Community Health and Safety in Section 13.6 and are not assessed in this section.

13.9.2.4 Increased Access to Economic Opportunities

The onshore export pipeline access track will be near several villages in the Orokolo Bay and Muro areas, which are already connected by an established track. No villages further north will be

located on or near the pipeline access track. Access will be limited to Project vehicles and anyone willing to walk along it, as private vehicle ownership is currently non-existent.

The pipeline access track is unlikely to greatly improve access between the PAOI inland, and coastal communities and Kerema, as the track ends at Orokolo Bay.

Initial Impact Assessment

Transportation and communication infrastructure in the PAOI is currently very poor, with limited connectivity between villages and a heavy reliance on walking and canoe transport; therefore, a sensitivity rating of ***High*** is assigned to all Project-affected communities in the PAOI. The new onshore export pipeline access track could improve access and associated economic opportunities for some communities in the PAOI (e.g., the nearest villages to the track outside the Orokolo Bay area will be Aivai and Evara, where access tracks will connect the river to the track); however, it is unlikely that these opportunities will be taken up, due to the long travel distances required and the lack of markets inside the PAOI.

No appreciable change compared to baseline conditions is predicted, and an initial magnitude rating of ***Negligible*** is assigned. This provides an initial social significance of ***Negligible*** for an increase in access and economic opportunities associated with the export pipeline access track, and therefore this impact is not assessed further.

13.9.2.5 Summary of Potential Impacts

The Project has the potential to cause the following impacts associated with traffic and transport:

- Short-term disturbance of access to community services and natural resources.
- Loss or damage to assets due to increased river barge traffic.

13.9.3 Proposed Mitigation, Management and Optimization Measures

The potential impacts relating to Project activities will be managed and optimized by measures designed to:

- Maintain foot traffic and access between inland and coastal Orokolo villages during pipeline construction.
- Minimize the loss or damage of assets associated with an increased number of barges along the Purari River.

Mitigation, optimization and management measures to be implemented during various Project phases are described in Table 13.19.

Table 13.19 – Transport and Access Mitigation and Optimization Strategies and Management Plans

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Short-term disturbance of access to community services and natural resources.	♦ Maintain designated crossing locations during construction of the onshore export pipeline and shore crossing to enable community access [SM026]. ♦ See mitigations listed in Chapter 15 (Table 15.41) and Chapter 11 (Table 11.22).	Traffic and Transport Management Plan; Stakeholder Engagement Plan; Land Access and Livelihood Development Plan; Community Development Plan

Table 13.19 – Transport and Access Mitigation and Optimization Strategies and Management Plans (cont'd)

Potential Impact	Mitigation or Optimization Strategy	Relevant Management Plan
Loss or damage to assets as a result of increased river barge traffic.	♦ Engage with communities potentially affected by barging operations about the barge movements and define a community development program recognizing the inconvenience that waterway communities may experience [SM027]. ♦ See mitigations listed in Section 13.3. ♦ See mitigations listed in Chapter 15 (Table 15.41) and Chapter 11 (Table 11.22).	Land Access and Livelihood Development Plan; Community Development Plan; Stakeholder Engagement Plan; Traffic and Transport Management Plan.

13.9.4 Residual Impact Assessment

The following section provides the assessment of residual impacts to transport and access, assuming successful implementation of the proposed mitigation and optimization measures.

13.9.4.1 Short-term Disturbance of Access to Community Services or Natural Resources

Early engagement with project-affected communities in Orokolo Bay will be undertaken so that appropriate measures can be implemented to maintain access along the beach or dunes, while managing community safety and with minimal inconvenience to villagers.

The sensitivity of export pipeline route Project-affected communities in Orokolo Bay was assessed as ***High*** due to limited capacity to access alternatives to the already limited services and resources along the coastline. Once mitigation measures are applied, alternative access to key services and resources will be maintained at all times during the construction of the onshore export pipeline and shore crossing, thus a magnitude rating of ***Negligible*** is assigned. The impact significance for access to community services or natural resources is reduced from ***Minor*** for the initial assessment to ***Negligible,*** for the residual assessment, for the short-term disturbance of access to community services and natural resources for export pipeline route Project-affected communities and local communities, respectively.

The sensitivity of Project-affected communities along the primary and secondary river transport routes was assessed as ***High,*** as the river is the only transport route to and from services and resources for most of these communities and is central to maintaining livelihoods. Community use of the river may be influenced by the perception that additional barge traffic heightens the danger associated with travel in dinghies or canoes (see Section 13.6).

The mitigation measures in Section 13.9.3 are expected to have very localized change in inconvenience compared to baseline conditions. As these changed conditions will extend during Project construction, i.e., for the medium term, a residual magnitude rating of ***Negligible*** is assigned. Based on these ratings, the short-term disturbance of access to community services or natural resources for residents of Project-affected communities along the main river transport corridor during construction is reduced from ***Minor*** for the initial assessment to ***Negligible*** for the residual assessment.

13.9.4.2 Loss or Damage to Assets due to Increased River Traffic

Early engagement with residents of Mapaio Fish Camp, Kaevaria, Evara, Aivai, Aumu and Apoiope about the barging schedule and potential impacts during the Project construction phase will support community resilience to the potential for loss or damage to assets. Lower barge speeds in sensitive areas (see Table 11.22) will minimize the wash associated with passage and

the potential for damage to canoes or loss of cooking utensils. When barges do cause loss or damage of an asset, the processes set out in the Grievance Mechanism and, where relevant, in the Land Access and Resettlement Framework will be followed to record the grievance, assess the damage caused by Project activities and identify the eligible parties for compensation.

A residual magnitude rating of ***Low*** is assigned, as the loss or damage of assets will be temporary and completely reversible. Given the ***Medium*** sensitivity rating assigned (see Section 13.9.2.2), the initial assessment of ***Moderate*** is reduced to ***Minor*** for the residual assessment for the loss or damage to assets due to increased barge traffic for river transport corridor Project-affected communities during the construction and operations phases.

13.9.5 Summary of Residual Impact Assessment for Transport and Access Impacts

A summary of the assessment of residual impacts to community transport and access is provided in Table 13.20, including in which Project phase and location these impacts are expected to occur. The table should be read with the specific mitigation measures provided in Table 13.19.

All residual impacts are assessed as ***Negligible*** to ***Minor***.

Table 13.20 – Summary of Assessment for Residual Impact Significance for Transport and Access

Main Activity	Potential Impact	Direct/ Indirect/ Induced	Location of Impact/ Receptor	Project Phase	Mitigation or Management Measure	Residual Assessment	
						Sensitivity/ Magnitude	Significance
Onshore pipeline construction; construction, including trenching, of Orokolo Bay export pipeline shore crossing.	Short-term disturbance of access to community services, and natural resources	Direct	Project-affected and local communities around the Export pipeline route in Orokolo Bay and along the main river transport corridor	C, O, D	♦ SM026 ♦ See mitigations listed in Chapter 15 (Table 15.41) and Chapter 11 (Table 11.22).	High/ Negligible	Negligible
Logistics and transport (barging along the Purari River).		Direct	Project affected communities and local communities.	C, O, D		High/ Negligible	Negligible
	Loss or damage to assets as a result of increased river traffic.	Direct	Project affected communities along the main river transport corridor.	C, O, D	♦ SM027 ♦ See mitigations listed in Section 13.3. ♦ See mitigations listed in Chapter 15 (Table 15.41) and Chapter 11 (Table 11.22).	Medium/Low	Minor

C = Construction, O = Operations, D = Decommissioning and closure.

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