

Ok Birim Tailings Storage Facility Project

Environmental and Social Impact Assessment

Appendix M

Social characterisation report



OK BIRIM TAILINGS STORAGE FACILITY PROJECT

Social Characterisation Report

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APPENDICES

APPENDIX A TSF COMMUNITIES – SOCIOECONOMIC DATA

APPENDIX B CONSTRUCTION HAULAGE ROUTE COMMUNITIES – SOCIOECONOMIC DATA

ABBREVIATIONS

Acronyms/Abbreviations	Definition
ASM	Artisanal and small-scale mining
CEPA	Conservation and Environment Protection Authority
CMCA	Community Mine Continuation Agreement
CR&S	Community Relations and Sustainability
EP4	Equator Principles 4
ESIA	Environmental and social impact assessment
FGD	Focus group discussions
FPIC	Free, prior and informed consent
GISTM	Global Industry Standard on Tailings Management
ICMM	International Council on Mining and Metals
IFC PS	International Finance Corporation Performance Standard(s)
ITCS	Infrastructure Tax Credit Scheme
ILO	International Labour Organization
KII	Key informant interview
LLG	Local Level Government
NGO	Non-government organisations
NSO	National Statistics Office
OTDF	Ok Tedi Development Foundation
OTEMA	<i>Ok Tedi Environment Management Act 2019</i>
OTML	Ok Tedi Mining Ltd
PLBN	Pos Lintas Batas Negara
PGK	Papua New Guinean kina
PMV	Public motor vehicles
PNG	Papua New Guinea
RPNGC	Royal Papua New Guinea Constabulary
TB	Tuberculosis
TSF	Tailings storage facility
UNGPs	United Nations Guiding Principles on Business and Human Rights

1. INTRODUCTION

Tetra Tech Coffey has been engaged by Ok Tedi Mining Ltd (OTML) to prepare an environmental and social impact assessment (ESIA) for the proposed Ok Birim Tailings Storage Facility Project (the project), located within the Western Province of Papua New Guinea (PNG).

This social characterisation report describes the existing characteristics, values and features of potentially affected communities and groups, including their demographics, culture, livelihoods, land and natural resource use, infrastructure and services, community safety, health and education. The information presented in this report provides a basis from which the project's potential impacts on social values, human rights and ecosystem services can be assessed.

1.1 PROJECT OVERVIEW

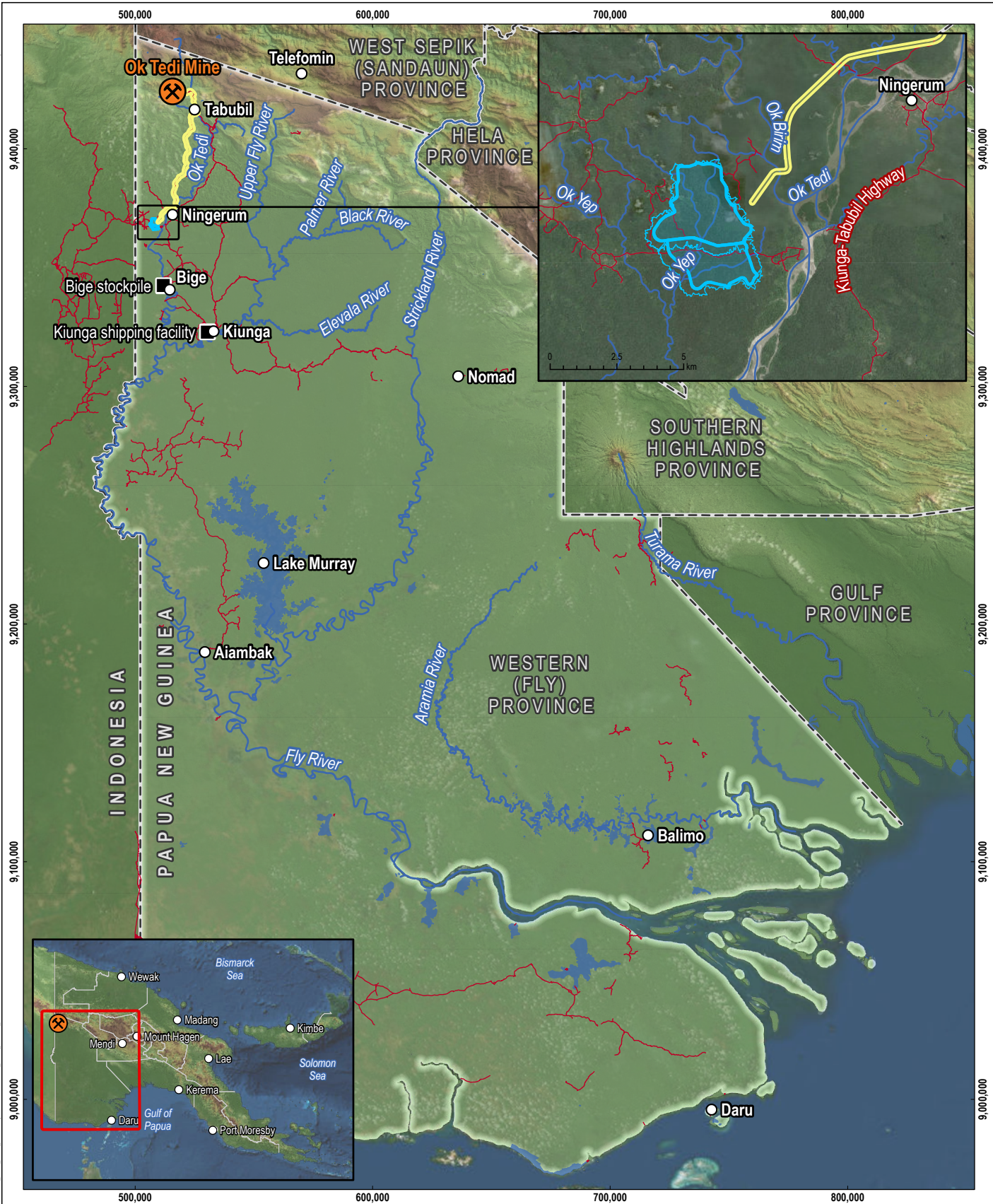
Ok Tedi Mine is an open cut copper, gold and silver mine in the Western Province of PNG. The mine commenced operations in 1984, and is wholly owned and operated by OTML, with 67% of shares directly owned by the Independent State of PNG and 33% owned by the State and people of Western Province (OTML 2024).

Ok Tedi Mine currently uses riverine disposal of tailings and waste rock. This involves discharging tailings into the Ok Kumiup and placing waste rock in on-site eroding waste rock dumps. The tailings and waste rock material is transported downstream via the Ok Tedi, with dredging undertaken at Bige to recover some of the sand and tailings for land deposition. Over the 40 years of mine operations, the riverine disposal of tailings and waste rock has had significant environmental and social impacts.

To support the continued operation of the mine while addressing these legacy impacts, OTML proposes to construct a tailings storage facility (TSF) to store future tailings. The TSF is proposed to be located west of the confluence of the Ok Birim and Ok Tedi, about 50 km south (direct line) of the existing Ok Tedi Mine, or 90 km via the Kiunga-Tabubil Highway. Key components of the project are:

- A hydro-cyclone house for separating coarse and fine tailings, with coarse underflow used for embankment construction and fine overflow directed to the TSF impoundment.
- A ring-dyke TSF comprising internal storage cells developed progressively.
- An 87-km-long tailings delivery pipeline from the existing tailings pyrite plant at Ok Tedi Mine to the proposed TSF site, including associated pumping and piping distribution systems (i.e., one pump station at mine site and two choke/valve stations).
- A pipeline access road including three bridges and several minor water crossings.
- Ancillary infrastructure including site offices, laydown areas, workshops, maintenance stations, waste and sewage management facilities, fuel storage, borrow and gravel pits and accommodation camp (as required).
- Power supply, primarily from on-site diesel generators with an installed capacity of approximately 11 MW during operations.
- Water supply sourced primarily from existing mine site supply, TSF decant water during operations, supplemented by rainfall and potential abstraction from nearby watercourses or groundwater for construction and potable water (if required).

Figure 1.1 shows the preferred location of the proposed TSF and infrastructure corridor route.



LEGEND

- Ok Tedi Mine
- Key infrastructure
- Town
- Road/track
- Watercourse
- Waterbody
- Province boundary
- Proposed TSF footprint
- Proposed infrastructure corridor



SCALE 1:2,250,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Proposed infrastructure from KCB and OTML.
Topographic features from OSM.
Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

OK TEDI MINING LIMITED
OK BIRIM TAILINGS STORAGE FACILITY PROJECT

FIGURE 1.1
Project location



DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TSI2_F01.01.GIS

1.2 OBJECTIVES AND SCOPE

The objectives of this social characterisation report are to:

- Describe the social context of potentially affected communities and peoples.
- Characterise land, water and natural resource use in potentially project affected areas including land used for gardening, cash cropping, artisanal and small-scale mining (ASM), and bush resources; water sources; and rivers and creeks used for subsistence or livelihood activities.
- Identify the social values potentially affected by the project design, and construction, operation, and decommissioning activities.

This report focuses on communities potentially affected by the proposed TSF and associated infrastructure, including access roads, tailings pipeline, and ancillary facilities. It describes existing community conditions across five areas that reflect the location of different project infrastructure and activities and the expected variation in the type and extent of potential impacts. They include:

- TSF communities: villages located near to the TSF development area.
- Infrastructure corridor communities: communities situated along the proposed tailings pipeline and access road, between the Ok Tedi Mine and the TSF.
- Construction haulage route communities: villages and settlements situated along the Kiunga-Tabubil Highway between Kiunga and Tabubil.
- River communities: villages situated along the Ok Tedi downstream of the mine, including those between the mine and the TSF site, and those downstream of the TSF site to the Fly River.
- Regional centres: key towns that support regional services, logistics and workforce supply.

1.3 STRUCTURE OF THIS REPORT

This report is structured as follows:

- Section 1 (this section) provides an introduction to this report, including project overview, and the objectives, scope and structure of this social characterisation report.
- Section 2 outlines the legislative framework, international standards and guidelines that inform the approach to social characterisation.
- Section 3 describes the methods used, including scoping, defining social study areas, desktop analysis, and key assumptions and limitations.
- Section 4 summarises the engagement conducted for this social characterisation with potentially affected communities and other stakeholders and also feedback received.
- Section 5 provides an overview of the regional context, including the project location, existing mine operations and development conditions in Western Province.
- Section 6 describes the local context, including social characteristics, values and features of potentially affected communities, across the five areas.
- Section 7 lists the references used in the preparation of the social characterisation.

2. LEGISLATION, STANDARDS AND GUIDELINES

This section provides an overview of the legislative requirements, international standards, and industry guidelines relevant to this social characterisation.

2.1 LEGISLATION

The Ok Tedi Mine operates under a project-specific legal regime. The *Mining (Ok Tedi Agreement) Act 1976* (Ok Tedi Agreement) and supplemental agreements under this Act set the legal foundation for Ok Tedi Mining Limited (OTML) operations, while the *Ok Tedi Environment Management Act 2019* (OTEMA) establishes a standalone environmental management framework tailored to the Ok Tedi Mine.

2.1.1 Mining (Ok Tedi Agreement) Act 1976

The Ok Tedi Agreement was established to provide the legal framework to facilitate the development exploration and extraction of resources at the Ok Tedi Mine. The act reflects the specific historical and socio-economic context of the Ok Tedi Mine when PNG was transitioning towards independence, and has since regulated the mining operations, along with each of the eleven successive supplemental agreements. The Ok Tedi Agreement governs OTML's tenure, rights and obligations through a binding contractual framework with the State.

The Ok Tedi Agreement does not provide for the grant of tenure and other associated compensation and resettlement. The *Mining Act 1992* (Mining Act) is the relevant legislation for these functions.

2.1.2 Ok Tedi Environmental Management Act 2019

OTEMA is the principal legislation for regulating the social and environmental effects of the Ok Tedi Mine. Administered and regulated by the PNG Conservation and Environment Protection Authority (CEPA), OTEMA establishes a comprehensive environmental management framework for governing the Ok Tedi Mine.

The 'environment' is defined in Section 2 of OTEMA and includes people and communities; natural and physical resources; amenity values; and qualities and characteristics of locations, places and areas that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community.

OTEMA sets out matters of national importance that must be recognised and provided for in decision making. These include preservation of traditional social structures, maintenance of clean water and subsistence food sources to enable traditional lifestyles to be maintained, protection of significant biological diversity, recognition of landowners' roles in resource development, and responsible, sustainable development. The project is considered a major amendment under OTEMA, requiring submission of an Environmental Impact Statement (referred to as an ESIA in this social characterisation report). The ESIA must include, among other things, '*an adequate description of the nature and extent of physical and social environmental impacts which are likely to result from the carrying out of a proposed activity*'.

This social characterisation report includes information on the characteristics, values and features of potentially affected communities and groups to allow the assessment of the potential impacts on the social, community, amenity, and natural resources matters outlined above.

2.1.3 Mining Act 1992

Mining activities in PNG are regulated by the Mining Act and is the relevant legislation for the grant of tenure and other associated compensation and resettlement for the Ok Tedi Mine. A lease for mining purposes may be granted in connection with mining operations for the deposition of tailings under s68 of the Mining Act, while mining easements may be granted for facilities connected to mining or treatment operations, including pipelines, roads and bridges, under s83 of the Act.

Principles of compensation to landowners for entering and occupying land for exploration, mining or related operations are outlined in s154 of the Mining Act. This includes, among other things, loss of possession or use of land; land severance; loss or restriction on access; disruption to agricultural activities and loss of earnings for land under cultivation; and social disruption.

This social characterisation report includes information on use of land for livelihood activities.

2.2 INTERNATIONAL STANDARDS AND GUIDELINES

Table 2.1 summarises the international standards relevant to the assessment of social impacts of the project, including this social characterisation.

Table 2.1 International standards and guidelines

Standard	Relevance to the assessment of social impacts
International Finance Corporation Performance Standards (IFC PS) (IFC 2012)	<p>The IFC PS outline commitments, roles and responsibilities relating to environmental and social sustainability (IFC, 2012). The IFC PS comprises eight performance standards, of which those relevant to assessment of social impacts, and this social characterisation, include:</p> <ul style="list-style-type: none"> • PS1 – Assessment and Management of Environmental and Social Risks and Impacts, which provides the overall framework for identifying and managing social risks and impacts, and supports the integration of social considerations in project planning. • PS5 – Land Acquisition and Involuntary Resettlement, which applies to the physical and/or economic displacement from acquisition of land or land use rights, and restrictions on land use and access to natural resources. • PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources, which supports assessment of community dependence on natural resources such as bush food, water, and forest products. • PS7 – Indigenous Peoples, which guides the identification of Indigenous communities and culturally appropriate engagement, with emphasis on free, prior and informed consent (FPIC) and requires proponents to anticipate and avoid adverse impacts from their projects on Indigenous peoples. <p>This social characterisation report collates data to inform the assessment of potential social impacts in line with the requirements of these performance standards.</p>
Equator Principles 4 (EP4) (July 2020)	<p>EP4 provides a framework for financial institutes to determine, assess, and manage environmental and social risks in projects. It reinforces application of IFC PS and includes specific requirements for human rights due diligence, stakeholder engagement, and ecosystem services assessment.</p>
The Copper Mark (Responsible Minerals Initiative and The Copper Mark Company, 2023)	<p>The Copper Mark is a voluntary assurance framework that promotes responsible production and sourcing of copper. Copper Mark assists copper producers to demonstrate their commitment to environmental, social, and governance standards. It outlines expectations for human rights due diligence, community engagement, grievance mechanisms, and social impact management aligned with leading international standards.</p> <p>This social characterisation report includes data and information to inform the assessment and management of potential social impacts of the project's construction and operation, including on ASM, and Indigenous Peoples' lands, livelihoods and resources.</p>

Standard	Relevance to the assessment of social impacts
Global Industry Standard on Tailings Management (ICMM et al., 2020)	GISTM establishes global best practices for tailings facility safety, governance, and social responsibility. The standard includes requirements for: <ul style="list-style-type: none"> • Assessment of impacts on social, cultural, and spiritual values associated with land and water. • Identification of community concerns and potential vulnerabilities. • Engagement with affected parties and development of management measures based on the social context.
International Council on Mining and Metals (ICMM) Tailings Management Good Practice Guide (ICMM, 2021)	This guide provides practical strategies for the safe and responsible management of tailings storage facilities throughout their lifecycle. The guide complements the GISTM and informs the ESIA's approach to TSF risk management, governance, and closure planning, with reference to ICMM's commitments to transparency and community engagement.
Social Impact Assessment: Guidance for assessing and managing the social impacts of projects (IAIA, 2015)	The International Association for Impact Assessment provides internationally accepted principles and methods for conducting social impact assessments and the adaptive management of identified impacts. These principles have been incorporated into the method development for the assessment of social impacts, including this social characterisation.
UN Guiding Principles on Business and Human Rights (UNGPs) (United Nations 2011)	The UNGPs outline the corporate responsibility to respect human rights and provide access to remedy for affected people. These principles inform the human rights impact assessment, particularly in relation to land access, Indigenous rights, and community consultation.
United Nations Declaration on the Rights of Indigenous Peoples (2007)	Provides principles to respect Indigenous rights, cultural integrity and participation in decision-making. Relevant to human rights impact assessment and Indigenous engagement obligations.

2.3 OTML POLICIES AND STANDARDS

OTML is committed to responsible environmental management and supporting sustainable livelihoods for its communities and workforce. This includes safeguarding the health, safety, and security of the communities in which it operates, as well as the wellbeing of its employees. This commitment is put into practice through OTML's integrated management system, which includes a suite of systems, standards, processes and procedures covering all areas of the business.

The OTML Social Baseline & Economic Impact Management Standard (CR-STD003-2019) sets the minimum requirements for collecting information to determine social baseline conditions; effects of OTML activities, both positive and negative; and implementation of mitigation and development plans (OTML 2020). The method for the assessment of social impacts, including this social characterisation, is consistent with the requirements of the management standard.

The OTML Integrated Management System Standard 1.11 External Stakeholder Engagement and Reporting sets minimum requirements for stakeholder engagement. The standard recognises the importance of understanding stakeholder issues, viewpoints or concerns through proactive engagement. The engagement activities conducted for this social characterisation were consistent with the requirements of this standard.

3. METHOD

This section describes the method used to develop this social characterisation, including the approach for defining, reviewing and analysing existing social conditions; study area; community and stakeholder engagement; and assumptions and limitations.

3.1 SCOPING OF POTENTIAL IMPACTS

A preliminary review of the project and existing information was carried out to identify likely social, ecosystem services and human rights issues of the project and potentially affected communities and groups, to inform the definition of the study area for the social characterisation (and subsequent impact assessments), and the data and information to be collected for this social characterisation report. This involved:

- Review of project information, including the proposed project design and layout, and environmental and social issues identified in the project Environmental Inception Report.
- Review of OTML socio-economic data and information on potentially affected communities, including population data, and information on community services, livelihoods and food security.
- Consideration of requirements of international standards relevant to the assessment of social, ecosystem services and human rights impacts, including IFC PS, and UNGPs.
- Engagement with OTML environment and community relations teams.
- Identification of key themes for the social characterisation and gaps in information needed to support the assessment of social, ecosystem services and human rights impacts.

3.2 ANALYSIS OF EXISTING SOCIAL CONDITIONS

Information on the social characteristics, values and features was collected through desktop review and analysis on existing socio-economic data and information on potentially affected communities, and collection and analysis of primary data collected through engagement undertaken for the social studies and ESIA.

A desktop review was conducted of existing socio-economic data and reports for potentially affected communities, including:

- Demographics, livelihood, water and sanitation, and community infrastructure data, reports, studies held by OTML for the Community Mine Continuation Agreement (CMCA) villages.
- Population and health data and information from the PNG National Statistics Office (NSO).
- Publicly available literature on the social context of potentially affected communities, including from reports, studies and other information from government agencies, non-government organisations, industry associations, and academic institutions.
- Review of outcomes of other technical investigations for the ESIA (e.g., cultural heritage impact assessment, terrestrial biodiversity, aquatic ecology assessment).

This social characterisation has also been informed by primary data collected during fieldwork and engagement with potentially affected communities and other stakeholders (see Section 4). This included:

- Household surveys conducted by staff from OTML's Community Relations and Sustainability (CR&S) Department within the seven TSF villages, which collected information from individual households on demographics, housing and assets, livelihoods, income and expenditure, health and education, resource use, and food security.

- Village surveys for each of the TSF villages, which were conducted by Tetra Tech Coffey with village leaders and other relevant stakeholders and gathered information on population, community services, community cohesion, and resource use.
- Community focus group discussions (FGDs), including with people from the seven TSF villages, Alice Pit, and villages along the Kiunga-Tabubil Highway between Ningerum and Tabubil.
- Mapping of community livelihood resources (e.g., gardens, hunting grounds, fishing areas, water sources, and access tracks) as part of the FGDs with men and women from the TSF villages.
- Key informant interviews (KIIs) with community leaders, service providers and other stakeholders in Kiunga, Ningerum and Tabubil.
- Visual surveys of roadside trade stalls along the Kiunga-Tabubil Highway, between Ningerum and Ok Tedi Mine.

The social characterisation is presented with an organising framework based around four identified social values – people, community identity and place; economy and livelihoods; infrastructure and services; and peoples' productive capacities. These are detailed in Table 3.1, along with the attributes used to understand these values within the context of the project. The framework provides the basis for collecting social baseline data and assessing the potential social impacts of the project's construction, operation and decommissioning.

Table 3.1 Social characterisation – organising framework

Social value	Attributes
People, community identity and place <i>Describes how a community defines itself in terms of civic participation, resilience, feelings of trust and safety and sense of belonging and place.</i>	<ul style="list-style-type: none"> • Demographics • Migration • Cultural identity • Social capital • Social cohesion and community safety • Landscape and amenity
Economy and livelihoods <i>Describes how people make a living and the economic structure of the affected community.</i>	<ul style="list-style-type: none"> • Natural resource use • Employment, income and expenditure • Housing
Infrastructure and services <i>Describes the infrastructure and services that meet the needs and priorities of the affected community including municipal and social infrastructure and associated services.</i>	<ul style="list-style-type: none"> • Health infrastructure • Education infrastructure • Support infrastructure • Sanitation
Peoples' productive capacities <i>Describes the skills, knowledge, and experience that are vital to survival and participation in society and its economy.</i>	<ul style="list-style-type: none"> • Health • Education status • Food security • Water security

Source: After Smyth & Vanclay (2017).

3.3 SOCIAL STUDY AREA

The study area for this social characterisation and subsequent social, ecosystem services and human rights impact assessments, considers those communities that may experience changes to living conditions, livelihoods or wellbeing from the siting of project infrastructure, or proposed construction, operation and rehabilitation activities.

The study area includes villages, settlements and urban centres surrounding the proposed project infrastructure, haulage routes, and the Ok Tedi. It includes communities west of the Ok Tedi between the mine and the southern extent of the proposed TSF site; along the Kiunga-Tabubil Highway between the Ok Tedi

Mine and Kiunga; and along the Ok Tedi south of the proposed TSF site to the Fly River. The study area is divided into five sub-areas that recognises potential for the type, scale and timing of impacts on communities and groups to vary based on factors such as:

- Proximity to project infrastructure (e.g., TSF, tailings pipeline, access roads, river crossings) and construction haulage routes.
- Proximity to the Ok Tedi.
- Their regional function in relation to employment, business, services and infrastructure.

The study area for this social characterisation is described in Table 3.2, and shown on Figure 3.1.

Table 3.2 Social study area

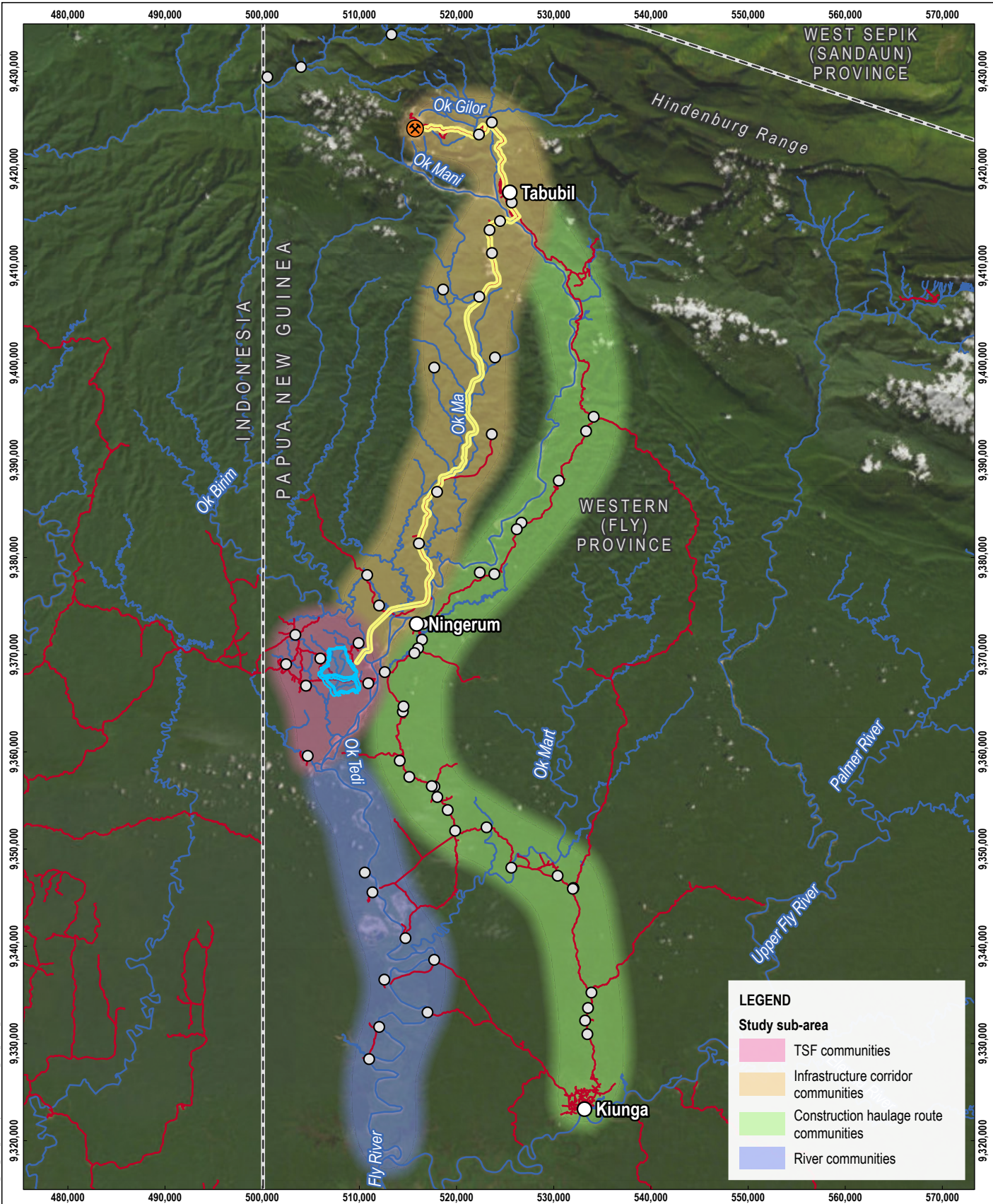
Sub-area	Communities
TSF communities	<p>This area comprises the seven villages surrounding the proposed TSF site:</p> <ul style="list-style-type: none"> • Kungim. • Ambaga. • Birimkamba. • Karandimok. • Kungembit. • Putmambin. • Komokpin. <p>People in these villages may experience impacts from construction, operation and decommissioning of the project due to their proximity to the proposed TSF site and associated infrastructure, including from changes to land and water resources, amenity, local access, and population.</p>
Infrastructure corridor	<p>This area comprises villages and settlements located along the proposed tailings pipeline and tailings access road between Ok Tedi Mine and the TSF, including those along:</p> <ul style="list-style-type: none"> • East of the Ok Tedi, including: <ul style="list-style-type: none"> o Antikink. o Finalbin. o Atemkit. o Bultem. o Kavorabip. o Wangbin. • West of the Ok Tedi, including: <ul style="list-style-type: none"> o Kumkit. o Ankit. o Ok Ma settlement (including Ok Teditau, Boungkim, Nioksikwi). o Kolebon. o Wombon. o Ningerum-Tamaro. o Digam. o Bolewogam. o Wogam. o Walawam. <p>People in these villages may experience impacts from the construction and operation phases, including from potential changes to land and water resources, amenity, access, and population.</p>
Construction haulage route	<p>This area comprises villages and settlements along the Kiunga-Tabubil Highway between Ok Tedi Mine and Kiunga, including Alice Pit.</p> <p>People in these villages may experience impacts during the construction phase, including from changes in amenity, access, and road safety.</p>

Sub-area	Communities
River communities	<p>This area comprises settlements and villages located along the Ok Tedi downstream of Ok Tedi Mine, including:</p> <ul style="list-style-type: none"> • Between Ok Tedi Mine and the proposed TSF site. • Between the proposed TSF site and the Fly River. <p>People in these villages may experience impacts during the operations phase due to changes in the riverine environment of the Ok Tedi.</p>
Regional centres	<p>This area comprises the main urban centres of Kiunga, Ningerum and Tabubil.</p> <p>People in these communities may experience impacts during the construction and operations phases related to employment and business opportunities, and project-induced population changes.</p>

3.4 ASSUMPTIONS AND LIMITATIONS

The social characterisation was undertaken under the following assumptions and limitations.

- This assessment has been informed by a range of secondary data sources, including population and demographic information from the PNG NSO, population and housing surveys previously conducted by (or on behalf of) OTML, and social studies and reports relevant to potentially affected communities. Tetra Tech Coffey has presented the information in these reports as provided and has not verified the data in these sources.
- CMCA population data available from OTML provides information on total people and households within each CMCA village. This data is collected by OTML to determine CMCA household payments and does not distinguish between people that live permanently in the village and those that live elsewhere, either on a part-time or permanent basis. Consequently, while this data provides a guide to the number of people potentially affected by the project, it generally overstates the population that lives permanently in the study area communities west of the Ok Tedi. Conversely, the CMCA data may understate the population within the construction haulage route as it may not include people from villages west of the Ok Tedi that have settled along the highway.
- Mapping of natural resources for the TSF communities is mainly based on the analysis of available satellite imagery, supplemented with the review of project data, and community feedback provided during FGDs. Analysis of satellite imagery was limited by the quality of available imagery. The information collected is considered appropriate for the purposes of understanding existing community access and use of natural resources for this social characterisation report and subsequent impact assessments, although is not designed to be used for determining compensation.
- Household surveys for this social characterisation report were conducted for each of the TSF villages in July 2025. Survey participants comprised those people present in the village on the day of the survey, including people that live in the village on a permanent or part-time basis. Feedback from engagement with TSF villages reported that many families and youth live in communities east of the Ok Tedi for access to services and employment, while those living in the village were typically older. As such, this is likely to skew some results of the household surveys (e.g., age, employment).
- The Tetra Tech Coffey social field team was accompanied by OTML's CR&S team members, and for the visit in July/August, Royal Papua New Guinea Constabulary (RPNGC) officers. CR&S team members introduced the Tetra Tech Coffey team and did not participate in the discussions unless they were requested to answer questions outside of the ESIA scope. Further, while RPNGC officers were generally present (or nearby) during FGDs, they did not participate in discussions. The presence of OTML staff or RPNGC officers did not appear to limit the discussion or issues raised by community members, with consistent feedback and convergence of issues raised during the engagement period.



LEGEND

- Ok Tedi Mine
- Regional centre
- Study area village
- Road/track
- Watercourse
- Province boundary
- Proposed TSF footprint
- Proposed infrastructure corridor



0 5 10 km
SCALE 1:550,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from KSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

OK TEDI MINING LIMITED

OK BIRIM TAILINGS STORAGE FACILITY PROJECT

FIGURE 3.1

Social study area



TETRA TECH
COFFEY

DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TS12_F03.01.GIS

4. COMMUNITY AND STAKEHOLDER ENGAGEMENT

The social characterisation has been informed by engagement with potentially affected communities and other stakeholders. The following provides an overview of engagement conducted, including purpose, key engagement activities, and summary of feedback.

4.1 PURPOSE OF ENGAGEMENT

The purpose of engagement for the social studies was to gather feedback from potentially affected communities and stakeholders, including community leaders, men and women, service providers, and government representatives to:

- Inform the understanding of the existing social characteristics, values and features of potentially affected communities and groups, including their demographics, vulnerable groups, culture, livelihoods, land and resource use, infrastructure and services, community safety, health and education.
- Understand existing issues and concerns about the project and its potential impacts to support the identification and assessment of potential social, ecosystem services and human rights impacts due to changes to the existing social environment.

4.2 ENGAGEMENT ACTIVITIES

This social characterisation has been informed by engagement with potentially affected communities and other stakeholders conducted over three visits in 2025, including in May-June, July-August and October. Engagement activities were conducted by Tetra Tech Coffey environmental and social team members from PNG and Australia, with support from OTML's CR&S team members.

Engagement was conducted from 26 May to 13 June 2025 as part of a roadshow with six TSF villages (i.e., Karandimok, Birimkamba, Ambaga, Kungembit, Putmambin, and Kungim), and other stakeholders in Ningerum and Kiunga. The purpose of the roadshow was to inform communities and other stakeholders about the project, the ESIA process and upcoming ESIA fieldwork and engagement activities. Engagement activities included:

- Pre-awareness engagement conducted by staff from OTML's CR&S Department.
- FGDs with affected landowners and communities from TSF villages.
- KIIs with government representatives from the North Fly District, and Ningerum Rural Local Level Government (LLG), and non-governmental organisations (NGOs) such as the Ok Tedi Development Foundation and Montfort Catholic Diocese.

Engagement was undertaken from 17 July to 8 August 2025 as part of social fieldwork for this social characterisation report and included engagement with villages near the project, including TSF and infrastructure corridor, and other stakeholders in Ningerum and Tabubil. Engagement activities included:

- Pre-awareness engagement conducted by staff from OTML's CR&S Department.
- FGDs with affected landowners and communities from TSF villages, and villages along the construction haulage route between Tabubil and Alice Pit.
- Household and village surveys with each of the TSF villages (see Section 4.2.2).
- KIIs with government representatives from Mountain Star LLG, staff from Ningerum High School, and Ningerum Police Station.

Engagement was undertaken from 17 to 28 October 2025 as part of the social fieldwork for the proposed tailings pipeline and pipeline access road on the western side of the Ok Tedi. Engagement activities included:

- Pre-awareness engagement conducted by staff from OTML's CR&S Department.
- FGDs with affected landowners and communities of villages situated along the infrastructure corridor.

This social characterisation has also been informed by engagement with potentially affected communities conducted for the ESIA in April-May 2026. Further details on this engagement is provided in Chapter 5 of the ESIA.

The following provides further information on each of the engagement activities.

4.2.1 Pre-awareness engagement

Pre-awareness engagement with potentially affected communities and stakeholders was conducted by staff from OTML's CR&S Department prior to each round of engagement. This involved meeting with village leaders to share information on the project and upcoming field investigations and obtain their consent to conduct the surveys. Written information (e.g., Komuniti Nuis, Tok Save) was also provided for village leaders to share with community members.

Confirmation that the relevant community and village leaders were aware and agreed to the field investigations was provided by OTML prior to conducting the surveys.

4.2.2 Focus group discussions

Three rounds of FGDs were held with potentially affected communities, including:

- Community FGDs with community members (both men and women), and community leaders (e.g., teachers).
- Separate FGDs with men and women, which provided the opportunity to understand differences between men and women in the use of resources, existing social conditions (e.g., health, safety, livelihoods), and issues and concerns about the project.

Participatory mapping exercises were conducted in conjunction with the FGDs to identify land and water resources used for livelihood and cultural activities (e.g., gardens, hunting grounds, water sources).

The FGDs were conducted in Tok Pisin (with some English where agreed with community members), and were facilitated by Tetra Tech Coffey social team members, including male and female team members from Papua New Guinea and Australia. Females from OTML's CR&S team provided translation support for some of the women's FGDs held in May and June.

Table 4.1 provides details of the FGDs held with potentially affected communities between May and October 2025.

Table 4.1 Details of focus group discussions

Village	Date	FGDs	Approximate number of participants
TSF communities			
Ambaga	12 June 2025	Community FGD	49 people (38 males, 11 females)
	28 July 2025	Community FGD, Men's FGD, Women's FGD	30 people (18 males, 12 females)

Village	Date	FGDs	Approximate number of participants
Birimkamba	9 June 2025	Community FGD	42 people*
	25 July 2025	Community FGD, Men's FGD, Women's FGD	21 people (15 males, 6 females)
Karandimok	3 June 2025	Community FGD	41 people (28 males, 13 females)
	24 July 2025	Men's FGD, Women's FGD	12 people (6 males, 6 females)
Komokpin	4 August 2025	Community FGD	29 people (10 males, 19 females)
Kungembit	29 May 2025	Community FGD, Men's FGD, Women's FGD	65 people (45 males, 20 females)
	30 July 2025	Men's FGD, Women's FGD	34 people (22 males, 12 females)
Kungim	11 June 2025	Community FGD	61 people (40 males, 21 females)
	26 July 2025	Men's FGD, Women's FGD	37 people (22 males, 15 females)
Putmambin	2 June 2025	Community FGD, Men's FGD, Women's FGD	66 people (44 males, 22 females)
	31 July 2025	Men's FGD, Women's FGD	27 people (11 males, 16 females)
Buseki people of Lake Murray	1 August 2025	Community FGD	84 people (50 males, 34 females)
Infrastructure corridor			
Kumkit and Ankit	17 October 2025	Community FGD	29 people (15 males, 14 females)
Ok Teditau, Bounkim, Nioksikwi (at Ok Ma settlement)	20 October 2025	Community FGD, Women's FGD	Approximately 110 people (plus children)
Kolebon	23 October 2025	Community FGD	31 people (20 males, 11 females)
Wombon, Ningerum-Tamaro, and Digam (at Ningerum)	25 October 2025	Community FGDs, Women's FGD	41 people (20 males, 21 females) (Wombon)
			8 males (Ningerum-Tamaro)
			23 people (13 males, 10 females) (Digam)
Bolewogam	26 October 2025	Community FGD, Women's FGD	41 people (27 males, 14 females)
Wogam	27 October 2025	Community FGD	93 people (57 males, 36 females)
Construction haulage corridor			
Alice Pit	2 August 2025	Community FGD	52 people (30 males, 22 females)
Construction haulage corridor (Ningerum) [†]	5 August 2025	Community FGD	27 people (22 males, 5 females)
Construction haulage corridor (Wirimkanatko and Walawam)	7 August 2025	Community FGD	16 people (11 males, 5 females)
Construction haulage corridor (Haidauwagam and Sisimakam)	7 August 2025	Community FGD	33 people (21 males, 12 females)

* Breakdown of the number of males and females is not available.

† Villages represented at the Ningerum FGD for the infrastructure corridor included Bumbin, Horinkian, Hosokumgu, Hosonae, Pampenai, Tapko, Wangenai.

4.2.3 Key informant interviews

The purpose of the KIIs was to collect information from community leaders, service providers and other stakeholders on governance, community services, land use, livelihoods; existing social and economic issues, and perceptions about potential impacts of the TSF project. Table 4.2 provides a summary of KIIs conducted between May and August 2025 that have informed this social characterisation.

Table 4.2 Details of key informant interviews

Stakeholder organisation	Date
North Fly District administration	26 May 2025
Montfort Catholic Diocese	26 May 2025
Kungim school	26 July 2025
Ok Tedi Development Foundation (OTDF)	27 May 2025
Ningerum Rural LLG	28 May 2025
Ningerum High School	5 August 2025
Ningerum Police Station	5 August 2025
Star Mountain LLG	6 August 2025

4.2.4 Village and household surveys

Village and household surveys were conducted for each of the seven TSF villages in July and August 2025. These villages were selected as the focus for the village and household surveys due to their proximity to the TSF site.

The purpose of the household survey was to collect socio-economic data from individual households to understand the village population and the capacity of the communities to adapt to potential changes from the project. The survey was conducted by OTML's CR&S team members and collected data on household population and demographics, housing and assets, income and expenditure, health and education, resource use, and food consumption. The survey was undertaken over one day in each village.

Table 4.3 summarises the data collected through the household surveys.

Table 4.3 Data collected through the household surveys

Social value	Attribute	Survey data indicator
People, community identity and place	Demographics	<ul style="list-style-type: none"> • Age and sex. • Relationship to head of household. • Migration. • Visitor/resident.
	Cultural identity	<ul style="list-style-type: none"> • Clan and language groups. • Languages spoken. • Cultural practices.
	Social capital	<ul style="list-style-type: none"> • Availability of social support.
	Social cohesion and community safety	<ul style="list-style-type: none"> • Perception of safety. • Level of conflict and violence. • Perceived social disorder issues.

Social value	Attribute	Survey data indicator
Economy and livelihoods	Natural resource use	<ul style="list-style-type: none"> • Availability, accessibility, and quality of land resources (e.g., gardens, sago stands, bush resource collection area, hunting grounds). • Availability, accessibility, and quality of water supplies and river resources that supports livelihoods (e.g., rivers, creeks, fishing grounds). • Sources of food.
	Employment, income and expenditure	<ul style="list-style-type: none"> • Type of employment and occupation. • Household income levels and sources. • Household expenditure on standardised goods. • Household asset ownership.
	Housing	<ul style="list-style-type: none"> • Housing materials. • Main household sources of energy sources and cooking fuel.
Infrastructure and services	Health infrastructure	<ul style="list-style-type: none"> • Access to community health facilities, including health centres and aid posts. • Maternal health services
	Education infrastructure	<ul style="list-style-type: none"> • Access to education facilities, such as primary and secondary schools.
	Support infrastructure	<ul style="list-style-type: none"> • Access to community facilities (e.g., health and education), including type, travel distance, cost.
	Sanitation	<ul style="list-style-type: none"> • Village sanitation conditions.
People's productive capacities	Health	<ul style="list-style-type: none"> • Access to and use of health services. • Self-reported illnesses. • Vector borne disease control.
	Education status	<ul style="list-style-type: none"> • Current school attendance. • Highest level of education. • Self-reported adult literacy.
	Food security	<ul style="list-style-type: none"> • Household food security. • Perceived malnutrition. • Food insecurity coping strategies.
	Water security	<ul style="list-style-type: none"> • Availability, accessibility, and quality of water supplies and water that supports domestic use (e.g., drinking, cooking, bathing).

Surveys were conducted over one day for each village, with data captured on tablets using KoboCollect. The survey sought to collect data from a random sample of households from each village, with a target of 20 households identified for each village. However, the size of some villages, and the availability of households that do not live permanently in the village (i.e., those that live at Alice Pit or Ningerum), meant that this number was not achieved for each village.

Household surveys were typically conducted by the household head, or another person with a good understanding of the household. Surveys were conducted for individual households where multiple households were living in a single dwelling. Table 4.4 provides information on the household surveys conducted in each village.

Table 4.4 Details of household surveys for each village

Village	Number of households	Number of dwellings	Number of people
Ambaga	19	19	70
Birimkamba	17	15	67
Karandimok	15	12	57
Komokpin	12	11	59
Kungembit	17	15	66
Kungim	17	15	60
Putmambin	23	22	79
Total	120	110	458

The village surveys were designed to collect information on matters such as demographics, community services (e.g., health and education), community cohesion, and resource use. The surveys were conducted by the Tetra Tech Coffey social field team with village leaders and/or other village stakeholders with an understanding of the population and socio-economic characteristics of the village (e.g., ward recorder). Table 4.5 outlines the data collected through the village surveys.

Table 4.5 Data collected through the village surveys

Social value	Attribute	Survey indicator
People, community identity and place	Demographic profile	<ul style="list-style-type: none"> Population, including permanent and part-time population. Migration (in-migration and out-migration).
	Cultural identity	<ul style="list-style-type: none"> Language groups.
	Social capital, social cohesion and community safety	<ul style="list-style-type: none"> Community organisations. Social support. Perceived social disorder issues.
Economy and livelihoods	Natural resource use	<ul style="list-style-type: none"> Availability and accessibility of land, bush and riverine resources. Main staple foods. Natural disasters, pests and disease.
	Employment, income and expenditure	<ul style="list-style-type: none"> Employment levels. Main sources of income. Business activities, including trade stores and markets. Economic sectors. Village financial services (banks).
	Housing	<ul style="list-style-type: none"> Energy sources. Main source of cooking fuel.
Infrastructure and services	Health	<ul style="list-style-type: none"> Access to community health facilities, including health centres and aid posts.
	Education	<ul style="list-style-type: none"> Access to education facilities, such as primary and secondary schools.
	Support infrastructure	<ul style="list-style-type: none"> Community assets (type, condition) Primary village transport routes to service centres. Communication services
	Sanitation	<ul style="list-style-type: none"> Village sanitation conditions.

Social value	Attribute	Survey indicator
People's productive capacities	Health	<ul style="list-style-type: none"> • Access to and use of health services. • Self-reported illnesses. • Water-borne diseases.
	Education status	<ul style="list-style-type: none"> • Current school attendance.
	Food security	<ul style="list-style-type: none"> • Availability of food. • Malnutrition. • Main sources of food. • Food insecurity coping strategies.
	Water security	<ul style="list-style-type: none"> • Main community water sources

4.2.5 Informed consent process

Informed consent processes were incorporated into the social characterisation investigations based on the following criteria:

- Voluntary: the process was free from coercion. Participation was voluntary, and participants were informed that they could withdraw their participation at any time.
- Prior: through the pre-awareness campaign, communities were made aware of the project and ESIA studies before the social characterisation investigations were undertaken.
- Informed: the pre-awareness campaign and project engagement activities raised awareness of the project, ESIA and the social characterisation investigations.

At the commencement of each engagement, an informed consent declaration was completed by Tetra Tech Coffey's facilitator (or OTML for household surveys), which provided information to community members and stakeholders on the social fieldwork investigations, purpose of the meeting, recording and use of feedback received, and release of the results.

4.3 FEEDBACK FROM STAKEHOLDER ENGAGEMENT

This section provides a summary of key topics raised during FGDs and KIIs with potentially affected communities and other stakeholders relevant to the social characterisation. Further details on community feedback is in Chapter 5 of the ESIA. Key feedback from FGDs and KIIs including existing concerns:

- Apart from Kungim, the number of people that live full-time within the TSF communities is relatively small, with many people having moved to communities east of the Ok Tedi (e.g., Alice Pit, Kiunga, Ningerum, Tabubil) for access to services, including health and education, or for work (e.g., *'People have migrated from the TSF area to Alice Pit for access to services that are not available in their village'*).
- Cultural practices and traditional knowledge remain important, although cultural traditions and practices are changing and diminishing across the villages due to influence of the church, education, introduction of the cash economy, and younger generation not upholding practices (e.g., *'Nowadays – it's like when the missionaries came in, our ancestors lost a lot of their traditions. So now we're following the modern system lifestyle. Current generations are not upholding or practicing their cultural traditions'*).
- Garden productivity can be affected by drought and flood conditions. During periods of food shortage, households rely more heavily on sago as a staple food. Water sources identified by TSF communities include creeks, rainwater tanks, and wells. The quality and availability of these sources were noted to be good with feedback from FGDs reporting that water from creeks and wells is *'better than the tank'* water.

- Households mainly rely on subsistence-based livelihoods, including sago, gardening, hunting, and fishing (e.g., *A limited number of people are working, with most living a subsistence life, Karandimok community live a subsistence lifestyle...they live off the land by growing food, making sago, hunting from the wild and fish...from the nearby rivers and creeks*).
- Women in all the communities expressed that due to distance to and from school and school fee difficulties, most women could not continue their education and therefore they do not have the necessary qualifications and skills to be employed in formal employment.
- TSF communities' access to basic services such as healthcare and education is restricted due to limited availability of services and geographic isolation of villages. Elementary, primary and secondary schools are present in the area. The primary health facilities that serve study area communities are village aid posts, the Kungim health centre, operated by the Catholic Church, the government run Ningerum health centre, and Tabubil Hospital, which is operated by OTML.
- During FGDs and KIIs community members reported several concerns regarding potential impacts of the project on social values. These included:
 - o Potential for law and order issues to increase, and increased social issues due to more people coming into the area.
 - o Loss of cultural practices and traditions due to increased use of cash, changing values in younger generations, and people moving into project communities for the project.
 - o Livelihood changes, and reduced food security due to loss of land used for subsistence activities (e.g., hunting, fishing, gardening and sourcing bush materials) and potential environmental impacts of the project on water, forest areas, wildlife and overall biodiversity.
 - o Concerns about compensation. Communities expressed the importance of transparent negotiations and equitable distribution of compensation and benefits, reflecting a desire for fair outcomes, equitable distribution and clear and transparent communication from OTML and the government.
- Feedback from FGDs and KIIs also included potential opportunities from the project such as equal employment for locals, and improved road access to markets, essential health and education services, and employment.

5. REGIONAL CONTEXT

This section presents information on the regional social context for the project, including project location, existing Ok Tedi Mine operations, including community development programs, and regional governance.

5.1 PROJECT CONTEXT

The project is located within the Ningerum Rural and Star Mountain LLGs, North Fly District (North Fly), and Western Province of PNG.

5.1.1 Western Province

The Western Province forms part of the Southern Region of PNG and is the largest province by area in PNG, covering approximately 98,000 km². The province covers the southwestern part of PNG, sharing international borders with Indonesia to the west and Australia to the south, and provincial borders with West Sepik Province to the north, and Hela, Southern Highlands, and Gulf Provinces to the east (Western Provincial Government n.d.). An official border crossing post between PNG and Indonesia, the Pos Lintas Batas Negara Yetetkun (Yetetkun PLBN), has been established on the Indonesian side, with the Infrastructure Tax Credit Scheme (ITCS) Road, or Alice Pit to Border Post Road, currently under construction, connecting the border to TSF villages at Ambaga and Birimkamba.

The population of Western Province was approximately 300,019 people in 2024 and is the most sparsely populated province in PNG (NSO 2024). Most the population in the Western Province live along or near the Fly River and its tributaries. Though it is sparsely populated, the province has relatively high levels of urbanisation, with population, services and markets concentrated in the provincial capital of Daru and centres such as Kiunga and Tabubil (OTDF n.d.).

The province was one of the fastest growing provinces in PNG, growing at an average of 3.1% annually between 2011 and 2024, compared to 2.6% for PNG (NSO 2024). Information on population movement from the 2011 Census noted that approximately 80% of in-migration by people born in PNG were from other PNG provinces, with the largest number from West Sepik Province to the north. At the same time, the Western Province was home to approximately 13% of people born overseas, with these mostly from Indonesia (NSO 2011). In 2024, the province had more males than females, with a sex ratio of 109 males for every 100 females, similar to PNG as a whole (NSO 2024).

The Ok Tedi Mine contributed to 3.5% of PNG's gross domestic product in 2024 (OTML 2024a). Outside of the mine, livelihoods in the Western Province are largely subsistence-based, supplemented by cash cropping, hunting and gathering (Fly River Provincial Government and PNGAus Partnership 2022). Local populations live primarily on small-scale gardening, fishing, sago production and informal trade.

5.1.2 North Fly District

North Fly is one of three districts within the Western Province, the others being Middle Fly and South Fly. The North Fly District comprises five LLG areas, including Star Mountain Rural and Ningerum Rural LLGs, within which the TSF and infrastructure corridor are located, Kiunga Urban and Kiunga Rural LLGs, which include facilities that support transport activities for construction, and Olsobip Rural. The district is overseen by the North Fly District Development Authority, which is responsible for coordinating and implementing development plans and projects across the North Fly District, working in collaboration with local communities, government agencies and private sector partners. Local governance functions are carried out through ward councillors and LLG offices, while traditional governance structures such as clan leaders and elders continue to play a central role in community decision-making, land matters and conflict resolution.

The North Fly District is the largest district by population in the Western Province. The population of the district was 102,633 people in 2024, accounting for about one third of the total provincial population (NSO 2024). The district includes four larger regional towns – Kiunga, Tabubil, Ningerum, and Olsobip, with other communities mostly comprising small rural villages and settlements situated near rivers, forest margins or bushland to support subsistence livelihoods such as gardening, hunting, fishing, and sago production (NFDDA n.d.). These smaller settlements vary in size and are generally isolated and dependent on bush tracks or waterways for access.

5.2 EXISTING OK TEDI MINE OPERATIONS

Ok Tedi Mine is located at Mt Fubilan in the Star Mountains of the Western Province of PNG. The mine commenced operations in 1984, and is the longest running open-pit copper, gold and silver mine in PNG. The mine is wholly PNG owned, of which 33% is owned by entities representing the people of the Western Province collectively (OTML 2024b).

Ok Tedi Mine is a mature operation and consists of several key operational areas. Tabubil is the main service centre and headquarters for the mine, with other operational areas including:

- Mine area, which contains the active open-pit mining operations at Mt Fubilan.
- Mill area, which contains the Tailings Processing Plant at the Ok Tedi Mine site.
- Mine staff accommodation and services at Tabubil.
- Dredging operations to recover a portion of the sand-sized mine derived sediment for land stockpiling and disposal at Bige.
- Port and shipping terminal at Kiunga on the Fly River for transporting goods and copper concentrate.
- Ok Menga hydroelectric dam, which supplies power to the Ok Tedi Mine site.

Copper concentrate is transported from the mine via a 156 km pipeline to port facilities at Kiunga, where it is dried in a filter plant and shipped via the Fly River to Port Moresby for export.

Since the commencement of operations, the mine has generated PGK13.9 billion in dividends for PNG shareholders, PGK1.7 billion in compensation payments, and PGK 1.6 billion in royalties (OTML 2024a). In 2024, total mine production was 111.2 Mt, with copper production being 103 kt, and gold production 265,830 ounces. The mine generated a total of PGK 5.7 billion in gross revenue in 2024, and paid over PGK3,542 million to local communities, PNG businesses and the PNG State (OTML 2024a). Ok Tedi Mine is also a significant employer in the Western Province and PNG more broadly, directly employing 2,886 people in 2024, with PNG citizens representing 98.7% of the workforce, and 35% originating from the Western Province. Approximately 18% of the total workforce is female, 14% under 30 years, and 65% are aged 30-50 years (OTML 2024a).

The OTML Apprenticeship Training Program offers apprenticeships across a range of disciplines including heavy equipment fitting, auto electrical, instrumentation, maintenance fitting and machining, plumbing, electrical, refrigeration and air conditioning, metal fabrication and welding, carpentry and joinery, and plumbing. The program had 108 apprentices in 2024. A total of 41 apprentices joined the program in 2024, of which 16 were female (39%) and 46% from the Western Province (OTML 2024a).

5.2.1 Community Mine Continuation Agreement

Operation of Ok Tedi Mine continues with the consent of 158 mine-affected villages, formalised through the CMCA, which was enacted by the PNG parliament through the Ninth Supplemental Agreement scheduled to the *Mining (Ok Tedi Mine Continuation (Ninth Supplemental) Agreement) Act 2001* (OTML 2025a). Established with the signing of the first agreement in 2001, the CMCA provides an integrated compensation and development package to mining communities for their economic and social benefit (OTML 2025a). Specifically, the agreement identifies the annual compensation, investment funding for future generations, and community development for the mine-affected villages (OTML 2025a).

The 158 mine-affected villages are grouped into nine regions (including the six mine villages), representing more than 147,000 people. The regions extend from the mine to the southern reaches of the Fly River system, with each CMCA region representing communities within specific sections of the mine's area of influence. The project falls within four CMCA regions. The proposed TSF site is within the Lower Ok Tedi CMCA region, the infrastructure corridor is within areas covered by the six Mine Villages and the North Ok Tedi CMCA regions, and the construction haulage corridor within the Highways CMCA region.

CMCA payments are determined based on the population of each region, with the population of each CMCA village counted every two years in the CMCA regions and annually in the six mine villages. In 2024, a total of PGK49.9 million was paid to CMCA beneficiaries, with a total of PGK1.1 billion paid between 2001 and 2024 (OTML 2024a).

The new compensation package and CMCA agreement was signed in October 2025 for the Life of Mine up until 2033 (OTML 2025a).

5.2.2 Ok Tedi Development Foundation

The OTDF was formed in 2002 under the *Mining (Ok Tedi Mine Continuation (Ninth Supplemental) Agreement) Act 2001* (OTML n.d.). The vision of the OTDF is to 'improve self-sustainability and quality of life of Western Province communities' (OTDF 2024).

OTDF delivers programs to mine affected villages across five key development sectors, being (OTDF 2024):

- Local and regional development.
- Education.
- Health.
- Infrastructure.
- Community and social development.

OTDF also has responsibility for the delivery of initiatives under the Women and Children's Action Plan (OTDF n.d.); management of scholarship programs, food security initiatives and water, sanitation and hygiene (WASH) projects; and administration of investment and development funds.

In 2024, OTDF received PGK47 million in program funding, of which 57% was from OTML, 33% from CMCA Trusts, and 6% from Mine Villages Development Funds. Other funding sources include the Alice River Trust, OTML Tax Credit Scheme (TCS), and the Western Province Peoples Dividend Trust Fund (OTML 2024c). In 2024, CMCA trust funds spent on programs and projects totalled PGK14.8 million, while Mine Village Development Funds spent totalled PGK2.6 million (OTDF 2024).

6. LOCAL CONTEXT

This section provides an overview of existing social characteristics, values and features of potentially affected communities and groups. It presents information on population, culture, livelihoods, land and resource use, infrastructure and services, social cohesion and community safety, health and education for each of the study area sub-areas. Social data and information is also presented for the Western Province and/or North Fly District as a comparison, where relevant.

Unless otherwise stated, data presented for TSF and infrastructure communities is from engagement conducted for the social studies and ESIA in 2025 and 2026, including FGDs and KIIs, and household and village surveys conducted with TSF communities in July and August 2025 (see Section 4).

6.1 TSF COMMUNITIES

Seven villages are located near to the proposed TSF site and associated infrastructure (Figure 6.1) key social characteristics are described below with additional data included in Appendix A.

6.1.1 Overview of TSF communities

The TSF development area is in a sparsely populated area of the North Fly District. Villages surrounding the TSF site are generally isolated, with most comprising relatively small permanent populations that rely mainly on subsistence livelihood activities. Kungembit and Birimkamba are the closest villages to the TSF development area. TSF communities mainly comprise people from the Yonggom tribe and are connected through family ties. Feedback from community consultation reported that people within the TSF communities have strong family connections to Indonesian communities, with community feedback indicating that frequent cross-border movement occurs for marketing, informal trade and visiting family (*'they are our family, our own people'*).

Kungembit

Kungembit is located approximately 600 m west of cell 1 of the TSF site and is situated in an elevated location along a narrow ridge, surrounded by areas of dense forest vegetation in lower lying areas (see Plate 6.1). The village was established at its current location in 1957. Traditional land ownership is distributed amongst nine clans; with small creeks, hill slope features and ancestral sago gardens forming traditional clan boundary markers (IHM 2025). The total estimated population of Kungembit was 1,610 people in 2023 (OTML 2023), although community feedback reported that *'only some people live permanently in the village'*. This was estimated by community members to be about 15 households, with other households living in Alice Pit, regional centres, other PNG provinces, or Indonesia returning to Kungembit occasionally for family and social reasons, and livelihood activities.

Housing in Kungembit comprises mainly permanent or semi-permanent dwellings, although about one in three dwellings are made from traditional materials (e.g., hardwood trees, black palm, sago leaves) sourced from surrounding bush areas. Traditional materials are also used for other structures such as shelters and meeting areas (see Plate 6.2).

Many households in Kungembit rely on subsistence farming, hunting and fishing for their main food sources, with staple foods including sago, yam, banana, casava, taro and kaukau, however store food such as rice, was also identified as a staple food for some households. Nearby creeks, rivers and springs are the main water sources for drinking, cooking and washing, with wells also reported to be used during periods of prolonged drought. Sale of gold from ASM within the Ok Tedi, and the sale of betel nut and garden produce are the main income sources for community members. Rubber was previously a key economic activity, although issues with access to market has seen a decline in this activity.

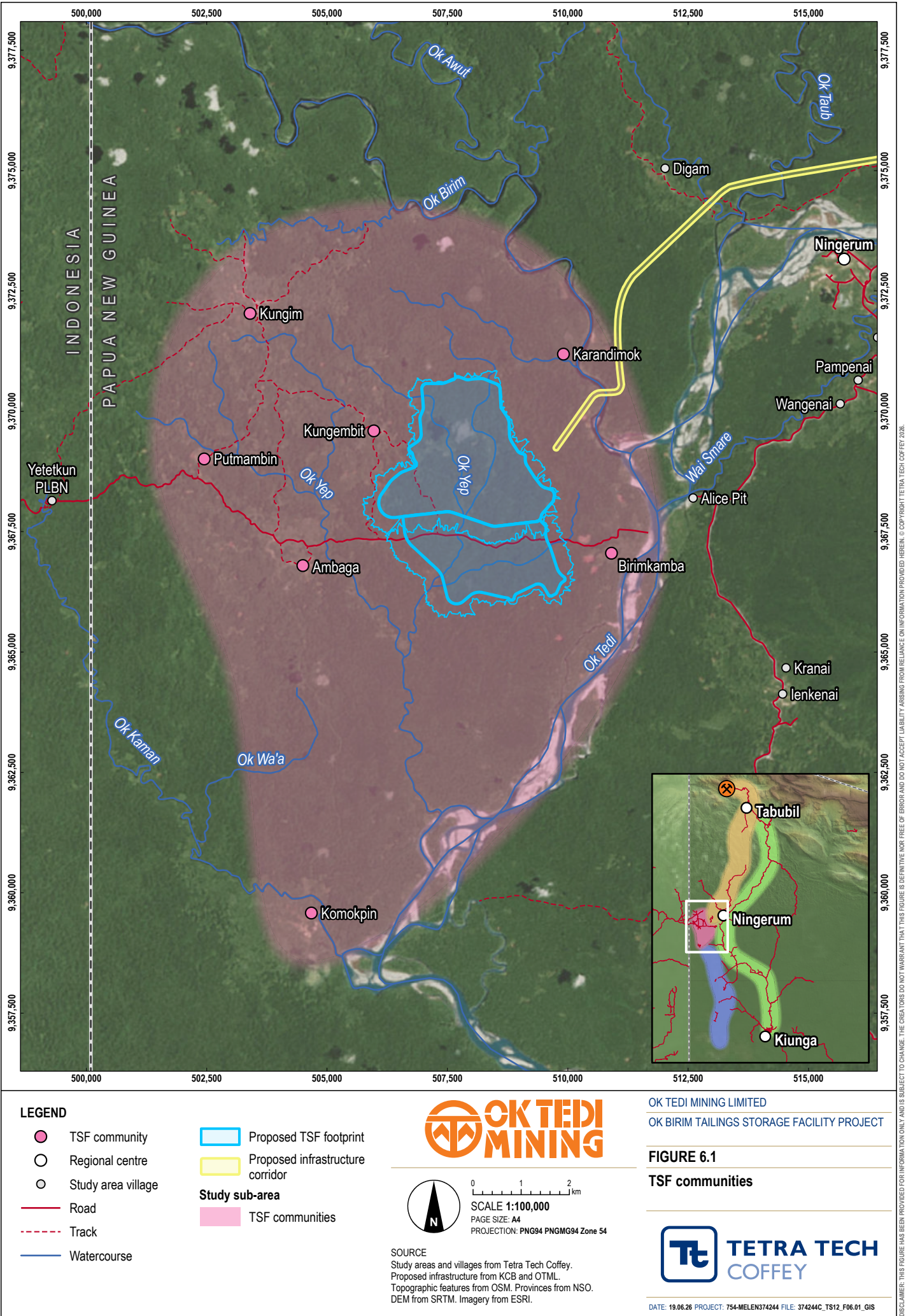




Photo credit: Tetra Tech Coffey, 2025

Plate 6.1
Aerial view of Kungembit



Photo credit: Tetra Tech Coffey, 2025

Plate 6.2
Community meeting area, Kungembit

There are no schools or health care within Kungembit, with these services accessed from Kungim or Ningerum. Access to these facilities is by bush track to Kungim (about an hour walk), or for Ningerum, bush track or road to Karandimok or Birimkamba, followed by a boat to Alice Pit and bus to Ningerum. Law and order issues within the community are mainly resolved with the support of village leaders, with issues not able to be addressed at a village level reported to the police station at Ningerum.

Birimkamba

Birimkamba is located approximately 850 m east of the TSF site and around 100 m south of the ITCS Road, currently under construction as part of the ITCS. The village lies on undulating terrain that rises from the Ok Tedi to a small rise that is the site of the village, before falling away to lower lying areas towards the west. The village is surrounded by gardens and forested areas that generally limit views beyond the immediate settlement area. Plate 6.3 and Plate 6.4 show views of Birimkamba. Birimkamba was originally settled in the mid-1960s closer to the Ok Tedi, relocating to a nearby ridge, and then to the current village location in 1991. Traditional land ownership in Birimkamba is shared between several main clans and sub-clans, the main clans being Namago and Kimki clans (IHM 2025). In 2023, the CMCA census identified the village had an estimated population of 743 people (OTML 2023), although it was reported during consultation that the village population was estimated to be about 200 people, with most of the population living elsewhere for school or work reasons. Community feedback indicated that most people return to the village '*once in a while*' (e.g., school holidays, Christmas, funerals and '*haus krai*'), although those living in places such as Ningerum or Alice Pit generally return to the village on weekends to gather food from their gardens.

Birimkamba has about 20 dwellings, of which about half are permanent houses, one in 10 are semi-permanent houses (i.e., mix of traditional and modern materials), and two in five are '*village houses*' that are made from traditional materials (see Plate 6.5 and Plate 6.6). Traditional bush materials are also used for other structures in the village, such as shelters and seating. Solar power and solar lighting are used by many households in Birimkamba for their energy and lighting needs, with firewood also important for cooking.

Households in Birimkamba mainly rely on food grown in household gardens, the bush or swamp areas for their main food sources (i.e., banana, sago, taro). Areas used for gardening and cultivation are mainly located on the banks of the Ok Tedi, along the ITCS Road, and around the village. Most households harvest or collect food from gardens, the bush or swamp areas that are in or near to the village, or within about a half day travel (return) from the village. Garden areas for some households are '*far from home*', with about one in four households travelling up to one day (return) to harvest and collect food. Water for drinking, cooking and washing is mainly sourced from small creeks and streams close to the village (see Plate 6.7). Other water sources include wells and communal water tanks. Earnings from the sale of betel nut, sale of garden produce at Ningerum markets, alluvial mining, and mine-related compensation are the main income sources for households in Birimkamba. Other income generating activities identified through consultation included income from business operations (e.g., trade store, poultry).

There are no schools or health facilities in Birimkamba. Schooling is mainly provided at Ningerum, although some children go to school at Kungim. People generally go to Kungim or Ningerum to access health care services, as well as Matkomnai Sub-Health Centre, Rumginae Rural Hospital, or Tabubil Hospital for '*major illness*'.



Plate 6.3
View of Birimkamba village



Plate 6.4
Birimkamba village community area



Photo credit: Tetra Tech Coffey, 2025

Plate 6.5
Permanent housing, Birimkamba village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.6
Traditional housing, Birimkamba village

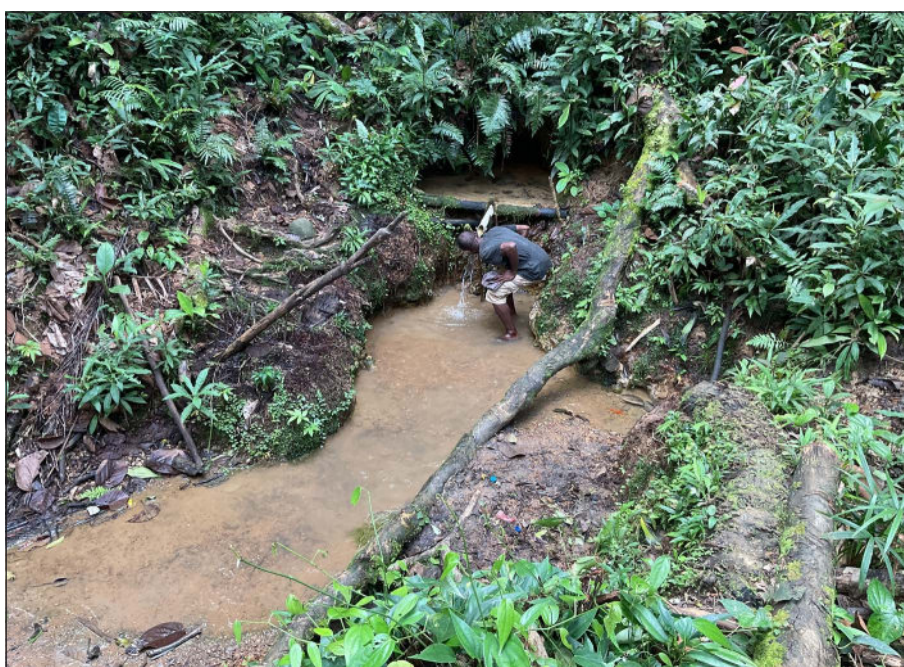


Photo credit: Tetra Tech Coffey, 2025

Plate 6.7
Community water source, Birimkamba village

Access to services at Kungim takes about three to four hours to walk via road and bush track. Access to services in other centres generally involves a dinghy to Alice Pit and public motor vehicle (PMV) from Alice Pit. Birimkamba is considered to be a 'safe village' by most community members. Social issues mainly relate to the use of alcohol, violence towards women, and land disputes. Law and order issues such as theft and domestic violence are generally resolved at a village level or reported to police in Ningerum, where they are unable to be resolved at a village level. Travel from Birimkamba to Ambaga, Kungembit, Putmambin and Kungim is by foot using the road and/or bush tracks. Access to Karandimok is mainly by dinghy along the Ok Tedi and Ok Birim, with feedback from community members indicating that the Ok Tedi was also occasionally used to access downstream communities such as Komokpin and Yogi/Dome.

Karandimok

Karandimok is located on the western bank of the Ok Birim, approximately 1.6 km northeast of the TSF site. The village sits on a ridgeline surrounded by forested slopes and gardens. Plate 6.8 shows Karandimok village. Karandimok was originally established in 1953 on the northern side of the Ok Birim, with the community relocating to the current village location in 1987. Karandimok is the only TSF village that is not a CMCA village. The community comprises three major common clans and six sub-clans. Community leaders estimate that the total population of Karandimok is 216 people, with feedback from consultation suggesting that a small number of people live permanently in the village. Younger people particularly are reported to live elsewhere (e.g., Ningerum, Tabubil, Kiunga, Port Moresby), returning occasionally to garden for their own consumption or marketing, hunt, gather timber for housing, or to look after children.

Traditional houses are the main house type in Karandimok, with approximately two-thirds of houses built from traditional bush materials (see Plate 6.9). The remaining houses comprise semi-permanent houses that are built from a mix of traditional and modern materials. People in Karandimok generally live a subsistence lifestyle, living off the land by growing food, making sago, hunting from the wild, and fishing from the Ok Birim and nearby creeks. The main staple foods for households include sago and banana grown in household gardens located in or near to the village, or in gardens located in areas within about a half day walk (return). Gardening and cultivation areas are mainly situated within or near to the village and along the banks of the Ok Birim and smaller creeks. Drinking water is mainly sourced from four communal water tanks connected to the roof of the community meeting area (see Plate 6.10), with other household water sources including dug wells, springs (see Plate 6.11), and surface water sources (e.g., river, creek, streams).

The main income sources for households in Karandimok include earnings from the sale of betel nut, sale of gold from alluvial mining, wages from working with Ok Tedi Mine, mine-related compensation payments, and income from a business operation. Betelnut was the main cash crop for households in Karandimok, although community members also noted that new cash crops had been introduced such as vanilla, balsa and eaglewood. The village has a sheltered community meeting area. There are no schools or health facilities in Karandimok, although an aid post is under construction (see Plate 6.12). Most people access education and health services in Ningerum. Other health facilities used by community members include Rumginae Rural Hospital, Tabubil Hospital, and Matkomnai Sub-Health Centre. Travel to Ningerum is mainly by canoe or dinghy to Alice Pit and by PMV from Alice Pit. Ningerum is also accessed using bush tracks and canoe across the Ok Birim, with this taking about two hours. Travel to Birimkamba is generally by motorised dinghy, while travel to other TSF villages is by bush tracks.

Karandimok is described by community members as peaceful and safe. Issues regarding community safety are reported to be rare and mainly relate to the use of alcohol. Conflicts around use of land were also noted to occur occasionally (e.g., when people cross boundaries to other communities and hunt or fish without permission). Peace and order in the community is maintained through the village committee.



Photo credit: Tetra Tech Coffey, 2025

Plate 6.8
View of Karandimok village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.9
Traditional housing, Karandimok



Photo credit: Tetra Tech Coffey, 2025

Plate 6.10
Community meeting place with rainwater tanks,
Karandimok village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.11
Water supply spring, Karandimok village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.12
Aid post (under construction),
Karandimok village

Ambaga

Ambaga is located immediately south of the ITCS Road approximately 1.6 km southwest of cell 1 and 2 km west of cell 2 of the TSF. The village occupies a small series of clearings or hamlets, surrounded by dense forest. Ambaga village was established at its current location in 1995 and is the third site for Ambaga village. Population increase was identified by community members as the main reason for relocation of the village from the previous locations. Land in Ambaga is held by five clans, including the Buseki people who migrated to Lake Murray within the Kiunga Rural LLG, approximately 150 km southeast of Ambaga (IHM 2025).

The total estimated population of the village was about 1,233 people in 2023 (OTML 2023), although feedback from consultation suggested that the population of Ambaga was currently about 500 people, of which about 200 people reside permanently in the village. Those living elsewhere are reported to mainly reside in Alice Pit, Ningerum, Kiunga, Tabubil, and Port Moresby, returning to Ambaga for special occasions (e.g., celebrations, funerals), school holiday periods, or other times of need (e.g., for community issues).

Community members describe Ambaga as a safe community, where women can walk around safely. This was mainly attributed to community leaders who *'are strict and maintain the peace'*. Law and order issues were reported to occur occasionally, such as during big events (e.g., Independence, Christmas) and mainly relate to youths drinking alcohol and disturbing the peace. Fear of sorcery was raised as a safety concern by one person during consultation. Law and order issues are generally resolved by village leaders.

Nearly half of houses in Ambaga comprise semi-permanent dwellings, and about a third permanent dwellings. The remaining houses are dwellings made from traditional materials sourced from bush areas surrounding the village or within about a half day walk (return) from the village.

Sago and banana are the key staple foods for households, with these generally grown in household gardens and bush and swamp areas further from the village. Households also rely on other garden foods such as taro, cassava, yam, kumu, kongkong, beans, and corn. Areas used for gardening or cultivation are mainly located around Ambaga village and along the border track (which will form part of the ITCS Road currently under construction), along the Ok Yep, and bush areas west of the village. Community members also exchange food with family members across the border or purchase food such as rice, noodles, and flour from markets and stores at the Yetetkun PLBN. The main water sources for Ambaga include wells and rivers and streams, including the Ok Yep ('big river') during periods of drought. Springs, household tanks/drums, or communal water tanks are also used by some households.

The main income sources for households in Ambaga are the sale of cash crops, mainly betel nut but also rubber, and mine-related compensation. Other income generating activities for households included wages from work with Ok Tedi Mine, sale of timber (e.g., eagle wood), and income from business operations (e.g., trade store (Plate 6.13)). Several rubber plantations were planted by community members, but these have mainly been abandoned due to challenges with access to market.

Ambaga has an elementary school and sub-health centre, although these are not currently operating. Access to health and education services is mainly at Kungim. Some students attend primary and high school at Komokpin or Ningerum, while some also go to primary schools across the border. The border track (which will form part of the ITCS Road currently under construction) runs north of the village and is used by residents for access surrounding communities, Ok Tedi River at Birimkamba, and the border crossing at Yetetkun PLBN.

Kungim

Kungim is located approximately about 3 km northwest of the TSF site and 2 to 3 km from the PNG border with Indonesia. Kungim was established in 1935 by the Montfort Catholic Missionaries who moved into the area in 1933. Plate 6.14 shows an aerial view of Kungim looking towards the southeast. Kungim is the main centre for education and health care for villages in the western part of the TSF communities' sub-area. OTML CMCA household data estimates that the total population of Kungim was approximately 1,808 people in 2023 (OTML 2023), although information received during consultation estimated the population of Kungim at 1,658 people, based on the 2024 PNG Census patrol. Consultation feedback also estimated that approximately 600 people lived outside of Kungim, including in Alice Pit, Ningerum, Kiunga, Tabubil, other parts of PNG (e.g., East New Britain, Port Moresby, Lake Madang, Manus and Goroka), and Indonesia (i.e., West Papua).

Gardening and cultivation areas for community members include areas surrounding the village, and bush areas west of the village, along the north branch of the Ok Yep and bush tracks northwest towards the Ok Birim, and along bush tracks and creeks south and southeast of the village. Access from Kungim to communities such as Alice Pit and Ningerum is by walking (via bush tracks) or by boat via the Ok Birim (Plate 6.15).

Putmambin

Putmambin is located approximately 500 m north of the ITCS Road. Putmambin village was established at its current location in 2000. Plate 6.16 shows an aerial view of Putmambin village. Prior to 2000, community members were at Ambaga, having moved to Ambaga from Opka village in about 1972, due to improved access to services. Feedback from community members during consultation indicated that the community relocated to the current village site after being '*chased from Ambaga*' when the Ambaga community removed them from their land. Putmambin has the second highest estimated population of the TSF villages, with the 2023 CMCA household census reported a total population of approximately 1,690 people (OTML 2023). Estimates provided by community members during consultation of the number of people who live permanently in the village varied, with feedback from FGDs indicating that about 1,000 people reside in the village, while other community members suggesting that only about 15 households lived permanently in the village, with an average of seven people in each household (i.e., 105 people).

Kungim is the main location for education and health services for Putmambin community with walking via bush track taking about one hour. Land used for gardening and cultivation is mainly located in bush areas north and west of the village towards the border, and east of Putmambin on either side of the west branch of the Ok Yep. Access to communities such as Ningerum and Alice Pit is either via boat from Kungim, or via the border track to Birimkamba.

Komokpin

Komokpin is located approximately 6 km south of the TSF site. The village is located on the southwest bank of the Ok Kamam, approximately 1 km upstream from its confluence with the Ok Tedi. Plate 6.17 shows a view of Komokpin village. The village was established in the late 1950s, with community members relocating to the current village site from Kurumbiran due to social issues. Feedback from consultation indicated that missionaries from the Catholic Church and Evangelical Church of PNG came to Komokpin around 1961. Data from the CMCA census estimating the total population of Komokpin at approximately 422 people (OTML 2023). Feedback from the village survey identified that some people from Komokpin live elsewhere, including Kiunga, Ningerum, Tabubil, Indonesia (i.e., West Papua) or other parts of PNG (e.g., Lae, Goroka, Madang, Mt Hagen, Rabaul), returning during school holidays, Christmas, work leave periods, funerals and 'haus krai', and elections. Komokpin has an elementary school and a primary school, which is attended by students from other TSF villages. Access to communities such as Alice Pit and Ningerum is by boat via the Ok Tedi. A bush track also connects to Ambaga.

Plate 6.13
Trade store, Ambaga



Photo credit: Tetra Tech Coffey, 2025

Plate 6.14
Kungim village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.15
Boat ramp, Kungim



Photo credit: Tetra Tech Coffey, 2025



Photo credit: Tetra Tech Coffey, 2025

Plate 6.16
Putmambin village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.17
Komokpin village

6.1.2 People, community identity and place

This section describes the setting of the TSF communities, including a demographic profile of the people who live in the area, where they live and why.

6.1.2.1 Demographics

Table 6.1 presents the demographic profile for the TSF communities based on information from the household survey conducted for the project.

TSF communities generally comprise older populations, likely due to the movement of young families and working aged people out of the TSF villages to larger communities such as Alice Pit and Ningerum, for access to services and employment opportunities. This is reflected in the outcomes of the household survey that found median ages for each of the TSF villages was above that for the Western Province. The household survey also found that:

- Most villages have more males than females, with Kungim and Karandimok the only villages with a sex ratio (i.e., the number of males per 100 females) less than 100. Komokpin and Kungembit had sex ratios well above the Western Province, while the populations of Ambaga and Putmambin have a gender balance similar to Western Province.
- All TSF villages, apart from Karandimok, have a dependency ratio¹ lower than that for the Western Province, reflecting more people aged 15 to 64 years supporting fewer dependents aged under 15 years or over 65 years.
- Karandimok has a higher proportion of households that have a dependency ratio above the Western Province, which is likely reflective of the village's higher number of older people.

Table 6.1 Demographic profile – TSF communities

Indicator	Median age (years)	Sex ratio: males per 100 females	Dependency ratio: dependents per 100 working-age people	Percentage of households with dependency ratio higher than Province
Ambaga	26	106	53%	26%
Birimkamba	23	100	48%	47%
Karandimok	28	81	77%	57%
Komokpin	25	127	44%	33%
Kungembit	25	124	44%	29%
Kungim	29	76	31%	25%
Putmambin	26	108	52%	39%
Western Province*	21	109	62%	NA [†]

* Source: NSO (2019).

† NA = not available.

¹ Dependency ratio measures the number of dependents (those aged under 15 years old and over 65 years old) against the population aged 15 to 64 years old.

6.1.2.2 Vulnerable groups

Several groups within the TSF communities may be more vulnerable to impacts of the project due to factors such as access to economic resources, age, need for assistance, or cultural traditions. Several groups were identified through engagement as being potentially vulnerable including ‘single mothers’, women and children, people with disabilities, elderly people, migrants and refugees.

Female-headed households are those with no adult male present that contributes to household income. This may be due to factors such as divorce, separation, migration, widowhood, or females with male partners who are ill, disabled, or elderly (UNESCWA 2022). The TSF communities have a lower proportion of female-headed households compared to rural PNG (NSO 2019) (see Appendix A); however community feedback suggests that the number of ‘single mothers’ may be higher in some communities and include widows and older women (*‘most are grandmothers who look after the village’*).

PNG ranked among the most unequal for women and girls in 2023, ranking 156 out of 170 countries in the UNDP (2025) Gender Inequality Index. Women are active in the economy; however their role is primarily within the informal economy (e.g., subsistence and marketing activities) due to factors such as cultural obligations, inability to access finance (e.g., credit), and women’s secondary right to land (MDF 2018; Overfield 1995). Compared to men, women within the TSF communities generally have lower levels of education, with higher proportions of women and girls who had never attended school, and lower proportions who had completed high school education (e.g., Grade 9 to 12) or tertiary level education. Women and girls in the TSF communities also had lower levels of literacy, and lower levels of participation in the formal work. Women also reported having less participation in decision making about community issues. Malnutrition, lack of access to health care, reproductive responsibilities, excessive workloads, and gender-based violence also contribute to the vulnerability of women and girls in PNG (MDF 2018).

Consultation for this social characterisation found that permanent residents within the TSF villages are typically older people, with some communities reporting that *‘only old people are in the village’*. Consultation feedback also reported that there are individuals within the TSF communities that have a disability, including those with vision and hearing impairment, physical disabilities and intellectual disabilities. Support services for people living with disabilities is limited in TSF communities and generally people rely on family or extended community support. Disability was also given as a reason for some children not attending school.

6.1.2.3 Migration

The TSF villages mainly comprise local people, with community feedback indicating low levels of in-migration from outsiders. This was supported by the results of the household survey with most respondents indicating they were originally from their village (see Table 6.2). Birimkamba had the highest proportion of people from elsewhere, although these were generally from another TSF villages (e.g., Kungim, Putmambin, Ambaga) or another village within the North Fly District (e.g., Yogi located on the western bank of the Ok Tedi downstream of the TSF site). Marriage was the main reason for in-migration, particularly in Karandimok, Komokpin, and Putmambin. This was consistent with feedback from FGDs, which noted that:

- People had married into the village from within the Western Province (i.e., South Fly and Middle Fly), as well as from other places in PNG (e.g., Simbu, Hagen, Sepik) (Women’s FGD, Kungembit).
- Most women from Kungembit married into Putmambin (Women’s FGD, Putmambin).
- There are about two or three people from elsewhere that live in Karandimok village (e.g., Highlands, East Sepik, Madang provinces and West Papua), including people who have settled permanently through marriage, or customs (Karandimok FGD).
- Feedback from FGDs with people from Ambaga noted that only a few people have married outside of the village (e.g., ‘there are instances of in-migration due to marriage of people from other provinces’, ‘most of the community have married here’).

Other drivers of in-migration included people moving for family (e.g., marriage of parents or grandparents, or to stay with family), particularly in Birimkamba and Kungim, and employment and education in Ambaga and Kungembit. A small number of in-migrants across the TSF communities also comprise refugees from Indonesia (i.e., West Papua).

Table 6.2 In-migrant population

Indicator	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Proportion of people not from this village	20.0%	35.8%	19.0%	8.5%	10.3%	14.8%	13.3%
Reason for moving to current village							
Marriage	92.9%	50.0%	100.0%	100.0%	85.7%	55.6%	100.0%
Family (e.g., parents/ grandparents' marriage, moved to stay with family)	0.0%	50.0%	0.0%	0.0%	0.0%	44.4%	0.0%
Other reasons (e.g., employment, education)	7.1%	0.0%	0.0%	0.0%	14.3%	0.0%	0.0%

6.1.2.4 Cultural identity

Communities within and surrounding the TSF site are part of the Yonggom tribe. Traditional ownership of land across the TSF communities is distributed amongst numerous clans and sub-clans, which share the same language, and similar cultural norms and traditional practices. The social organisation of the tribe is patrilineal, where land ownership and decision-making powers are male dominated and land is passed from father to son (IHM 2025).

Language

Tok Pisin was generally commonly spoken alongside Yonggom, a local dialect, across the TSF communities. Other traditional languages are also spoken by small numbers of people across the TSF communities. Household surveys identified the main languages spoken by people in the TSF communities included Ningerum, Yonngomdee, Wongom and Bahasa. English was reported as the main language spoken by a small number of survey respondents from Birimkamba.

Language is still the same. Most people speak Yonggom. Now we translate, mostly to Tok Pisin.

Cultural practices

Cultural traditions and practices continue to be upheld and exercised within the TSF communities, particularly by older people. Community feedback noted examples of language, use of traditional medicines, traditional dancing and costumes, and traditional methods for cooking, hunting and fishing as some of the customs that continue to be maintained. Specifically, feedback included:

When we are sick, the mothers, especially the elderly mothers, know the traditional medicine so they provide for us.

Our traditional dancing and customs we still practice.

For hunting wild pig, we set traps or use traditional bows and arrows.

Consultation for the Cultural Heritage Assessment also noted that cultural traditions around arranged marriages, monogamous and polygamous marriage practices, bride price payments, and ceremonial feasts continue to be practiced by community members (Appendix L of the ESIA).

During consultation, community members reported that cultural traditions and practices were changing and diminishing across the villages. These changes were reported to have commenced when the missionaries came into villages (e.g., *'when the missionaries came in, our ancestors lost a lot of their traditions'*). Other factors contributing to the loss of cultural traditions noted by community members included the influence of the church, education providing new perspectives and ways of doing things, the introduction of the cash economy and modern lifestyles, and younger generations not upholding practices. Some of the cultural traditions and practices reported to be no longer practiced or declining, included:

- Use of traditional medicines (e.g., *'traditional herbs changed to medicine at the hospital', 'younger women are not cooperating with elderly mothers (to learn traditional medicines) ...some of them they know (traditional medicine plants), maybe 20-30%'*).
- Traditional dances and clothing (e.g., *'Our traditional dances are no longer practiced. Some dances are lost...they (young people) have other interests'; younger generations are no longer wearing traditional clothing'*).
- Before we had 'men's house' for initiation to become manhood but to date we have not maintained that'.

Land

Access to, and use of, customary land is highly valued in Papua New Guinean culture (Ballard 1997; Anderson 2006), for its subsistence activities and food provision, and cultural activities and identity (Anderson 2006). The importance of this connection to land is a feature common to Indigenous peoples.

Similarly to other areas of PNG, people from the TSF communities have a strong connection and attachment to their land, with feedback including that land is viewed as being *'vital to survival and identity'* and referred to as *'my mother land, which I feed on'*. One participant of the FGDs in Ambaga also noted that *'in the past and currently – I know that this lifestyle, this my land – I can go visit other villages or places, but when I come back I know that I have my land where I can go visit my gardens or the bush for hunting, I can go fishing and diving and swimming'*.

6.1.2.5 Social capital

Social capital refers to the value of social networks, which bonds and bridges diverse people with the norms of reciprocity (Claridge 2004). In PNG, the social system (*wantok* system), in addition to clan lineage support, religious groups, and aid organisations can provide a financial and social safety net for households faced with health, financial or other social challenges (MDF 2018).

TSF communities have access to a range of groups that support participation of community members in village activities (e.g., women's groups, youth groups, religious groups, village planning committees, sports groups). Clan groups are also important sources of support for people in the TSF communities.

Feedback from the village survey indicated that all villages have a women's group that supports activities such as marketing, sewing, rearing livestock (e.g., chickens) for selling at markets, and baking, although women in Kungembit noted that the women's group was not active, although feedback noted that:

Mothers that have gardens in Kungim usually nominate one or two women to take their produce to Ningerum to sell. This involves paying for carriers to take their crops to the boat ramp and also fuel cost for the dinghy to transport. Not much is made due to these additional expenses, thus they work as a group to try to make a profit.

Most villages have a religious group and a youth group, while Birimkamba, Ambaga and Kungim also have a sports group that are often a focus for youth activities. Kungim, Ambaga and Putmambin have a Village Planning Committee, that work with OTDF to identify and support delivery of community and infrastructure development projects for their communities. Other groups that operate within the TSF communities include school committees (Kungim, Ambaga, Komokpin), law and order committees (Kungim, Ambaga), and a political group (Birimkamba).

Table 6.3 presents the findings from the household survey on whether households had sought any emotional, economic or in-kind help in the previous year. Households in all TSF communities, apart from Karandimok, reported seeking support from a community group or clan. In particular:

- Households in Ambaga and Komokpin readily seek emotional, economic or in-kind support with approximately 40% of households reporting that they sought help from either a community association, religious group, women's group or clan in the last year.
- About 30% of households in Kungembit and Putmambin have sought support from a clan group and a community association or religious group.
- Households in Birimkamba and Kungim are generally unlikely to seek support from a community group or clan.

Feedback from the household survey also found a reliance of households on family and friends, and to a lesser extent charities, during times of financial difficulties (i.e., when a household suddenly needs to find a large amount of money) (see Appendix A).

Table 6.3 Social capital – support from social groups

Village	Community association	Religious group	Women's group	Clan	Did not seek support
Ambaga	27.8%	16.7%	16.7%	5.6%	61.1%
Birimkamba	0.0%	6.3%	0.0%	0.0%	87.5%
Karandimok	0.0%	0.0%	0.0%	0.0%	100.0%
Komokpin	16.7%	16.7%	0.0%	16.7%	58.3%
Kungembit	0.0%	5.9%	0.0%	5.9%	70.6%
Kungim	11.8%	0.0%	0.0%	0.0%	82.4%
Putmambin	4.5%	0.0%	0.0%	9.1%	68.2%

Note: This table presents the outcomes derived from multiple-choice responses where participants could select more than one option. As a result, the percentages across all categories may exceed 100%.

6.1.2.6 Social cohesion and community safety

People in the TSF communities generally perceive their villages to be safe and peaceful, with most households reporting that their community was a 'safe' or 'very safe' place (Figure 6.2). Community feedback from FGDs with men and women included comments that their village was 'a safe village', that women feel safe to move around freely, and that while drug and alcohol related problems do occur, these are not common (e.g., 'drug and alcohol abuse is present but containable').

Community members generally attributed this to village leaders who 'are strict' and who maintain peace within the community, although the relative remoteness of the TSF villages and existing access challenges are also likely to contribute to perceptions of community safety.

The women can walk around safely – rape doesn't usually happen. Our leaders are strict and maintain the peace.

Figure 6.2 also shows peoples' perceptions about changes in the level of violence over the last five years. Overall, peoples consider that levels of violence within the TSF communities have 'stayed about the same' or had decreased over recent years, although households in Birimkamba, Karandimok and Kungim felt that violence had 'increased a little' compared to previous years. This was also reflected in community feedback during FGDs, for example:

Before, law and order was tough, so people abide by the rules. If you disobey or break the law, you will be dealt with accordingly. Today, there is so much freedom and people get away with even if they break the laws within the community' (Birimkamba FGD).

Stakeholder consultation for this social characterisation noted that the traditional belief of sorcery (*sanguma*) remains strong within the area. Feedback from FGDs also noted fear of sorcery and sorcery accusation related violence as a concern for community members from most TSF villages (e.g., '*safety is not an issue, the only issue is sorcery-related issues*'). Other issues reported by community members during the FGDs included:

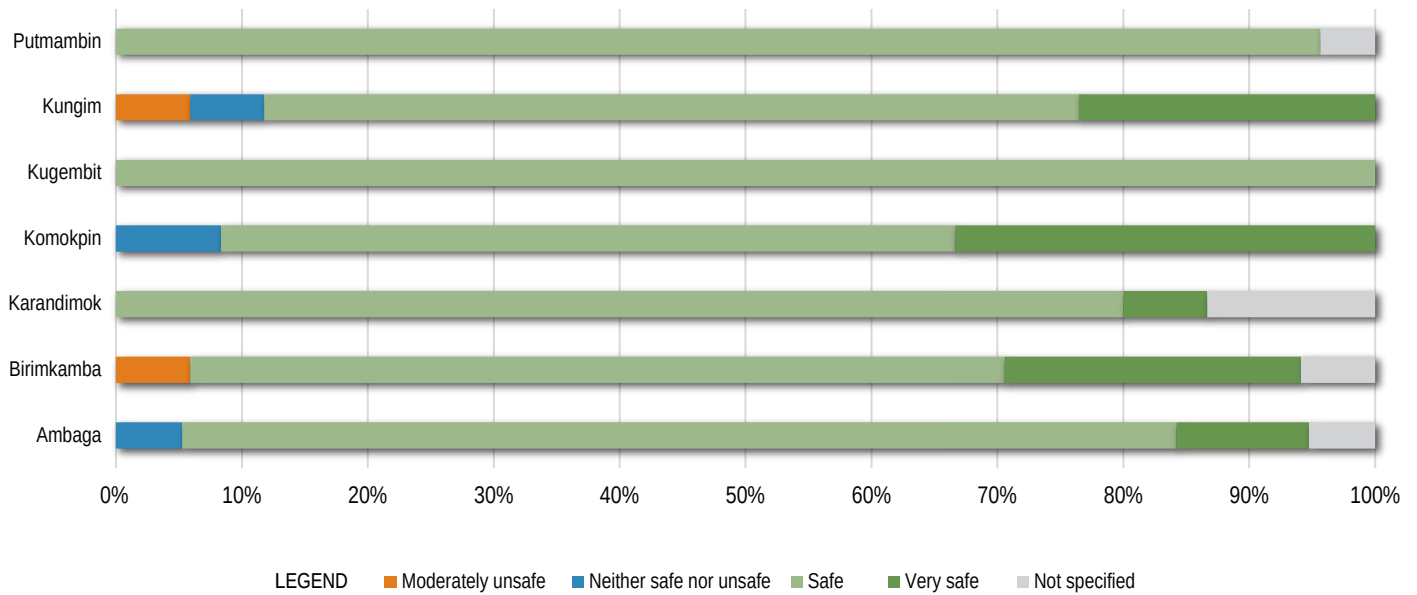
- Occasional disturbances related to the consumption of alcohol and drugs, particularly during 'big events' or celebrations (e.g., independence, Christmas), with this largely attributed to youth and outsiders.
- Land disputes when people cross boundaries to other communities and hunt or fish without permission.

Across the TSF villages, women generally reported feeling safe to move around, garden and complete chores alone, although some women noted feeling '*not safe*' or '*in between safe and not safe*' when asked whether they felt safe or not safe from a law-and-order perspective. Fear of sorcery was the main concern raised by women during FGDs, with women noting that '*when sorcery is heard (being practiced) in the village' they (women) go out with partners*', although when '*not many sorcery-related activities are heard being practiced, they feel okay going alone*'.

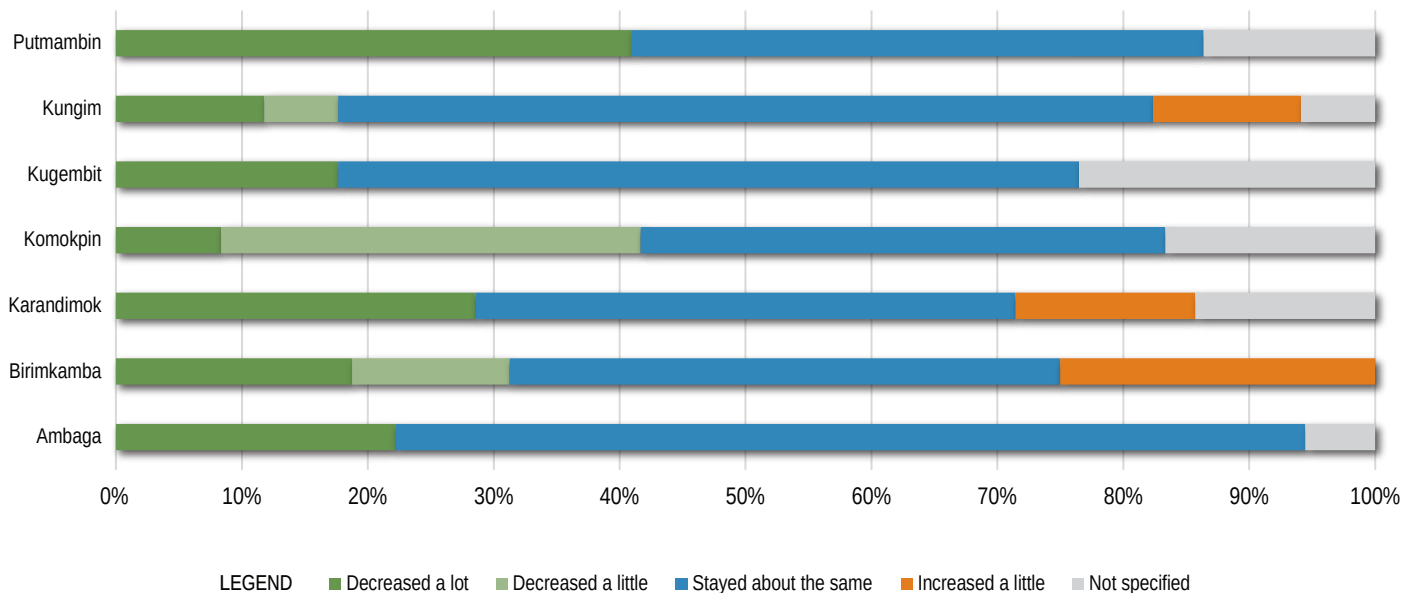
Concerns were raised by community members about the potential for law-and-order issues to increase with the project and following completion of the ITCS Road. In particular, people noted that:

- A lot of people will be coming because of this project. There will be more men from other places that will change the safety levels.
- Social issues will increase once the TSF is established as the road access will provide easy access for outsiders to come into Putmambin.
- They had concerns with safety of girls.
- Law and order issues associated with alcohol consumption might increase.

Perceived community safety



Perceived violence in community compared to the past five years



SOURCE
Tetra Tech Coffey, 2026



OK TEDI MINING LIMITED
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FIGURE 6.2
Household survey responses –
community safety



DATE: 19.06.26 PROJECT: 754-MELEN374244 FILE: 374244C_TS12_F06.02_GRA

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6.1.2.7 Landscape character and amenity

The TSF development area and its surrounding villages are located within a predominantly natural landscape characterised by dense tropical forest, river valleys, and gently undulating ridges. The visual character and natural serenity of the landscape contribute to the quality of life for people within the TSF village and reinforce their connection to the land. The forested environment provides essential resources for subsistence activities such as gardening, hunting, gathering, and fishing and contributes significantly to community wellbeing, cultural identity, and social cohesion.

Landscape character and visual amenity

Across the TSF villages, the visual landscape is dominated by continuous forest canopies, shaded clearings, garden plots, and small, dispersed settlements. The landscape retains a natural and cohesive character, defined by forested slopes, and enclosed clearings. Elevations across the area typically range from 40 to 110 m above mean sea level (AMSL) and long-distance views are generally limited by vegetation and terrain, with broader outlooks only available from local high points.

Kungembit is situated on a narrow ridgeline between approximately 70 and 85 m AMSL. Dense forest extends down the eastern slopes into the valley below, creating a visually enclosed setting for most areas of the village. Dwellings are oriented toward nearby gardens, adjacent ridgelines, and surrounding vegetation. Houses in the eastern parts of the village (approximately 200 m from the proposed TSF site) experience restricted outward views due to the combination of forest cover and terrain. The helipad, located on one of the higher ridges, provides the most open vantage point, although views towards the TSF site remain dominated by uninterrupted forest canopy (see Plate 6.18).

Birimkamba lies on gently undulating terrain on the western bank of the Ok Tedi, within a low-lying riverine landscape characterised by dense lowland forest, flat to mildly sloping ground, and broad gravel bars. The surrounding vegetation encloses the village, limiting long-distance views. A more open vantage point occurs near the village entry, where the ITCS Road is under construction, with views extending along the road towards the west (see Plate 6.19).

Karandimok is positioned on a ridgeline, with the highest parts of the settlement reaching around 80 m AMSL. Forested slopes and shallow depressions separate the village from the lower-lying valley to the south-west. The village helipad, located on an elevated ridge, offers a clear illustration of baseline visibility: only the upper forest canopy and distant treetops are visible (see Plate 6.20). Aerial imagery confirms that broader views of the surrounding landscape, including the Ok Birim, only emerge once above tree-top height.

Ambaga, located between approximately 50 and 70 m AMSL, occupies a series of small clearings and hamlets within dense forest. The visual environment is highly enclosed, with short-range views oriented toward vegetation and nearby houses. Elevated points offer slightly wider visibility across the surrounding landscape, while lower parts of the settlement remain visually contained (see Plate 6.21).

Kungim is located on an upland plateau between roughly 80 and 110 m AMSL. The village is dispersed across low ridges and rises surrounded by dense forest. Views within the settlement are mostly short-range and directed toward vegetation, palms, and small garden clearings. Elevated points on the western side provide broader views across the forest canopy toward distant ridgelines and nearby villages such as Kungembit and Putmambin, though these wider views remain framed by thick vegetation. Putmambin is situated on an upland ridge between approximately 80 and 100 m AMSL, with dwellings located along the ridge crest and upper slopes. Dense forest and tall canopy trees enclose the village, producing mostly short- to mid-range views.

Plate 6.18
View towards the east from the helipad,
Kungembit village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.19
View towards the west along the ITCS Road,
from Birimkamba village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.20
View towards the south from the helipad,
Karandimok village



Photo credit: Tetra Tech Coffey, 2025



Plate 6.21
View towards the southeast from Ambaga village

Community amenity

The TSF communities are located within a remote and undisturbed part of the Western Province, away from any major industrial activities or major roads. Except for sections of the ITCS Road currently under construction, there is no large-scale development, and the overall amenity environment remains consistent with remote forest and riverine settlements in the North Fly District.

Local air quality is mainly influenced by village activities such as fire smoke, and farming, burning of vegetation, and dust from cleared or cultivated areas. Air quality in Birimkamba, Ambaga and Putmambin is influenced by dust generated from the use of existing established walking tracks by occasional motorbike traffic, while Birimkamba is affected by dust generated by construction activities for the ITCS Road, particularly in areas of the village close to the road. Areas of Ambaga and Putmambin located along the ITCS Road are also expected to be affected by dust generated by road construction, as construction activities extend west (Plate 6.22).

The main noise sources within the TSF communities are natural sources, such as wind, rustling vegetation, rainfall, flowing water, and wildlife (e.g., insects, bird calls). Local village activities including livestock, wood chopping, talking and domestic work also contribute to noise levels. Other noise sources observed during social fieldwork within the TSF communities included:

- Noise from construction vehicles and construction activities for the ITCS Road in Birimkamba, with this also likely to affect Ambaga and Putmambin as construction progresses westward (Plate 6.23).
- Noise from gravel mining operations in the Ok Tedi, for areas of Birimkamba village close to the river.
- Occasional, intermittent transport noise from:
 - o Motorised dinghies on the Ok Tedi and Ok Birim, in Birimkamba and Karandimok.
 - o Motorbikes using existing local tracks and the road between the Ok Tedi and PNG border with Indonesia, in Birimkamba, Ambaga and Putmambin.
 - o OTML helicopter when travelling to nearby villages or passing overhead.

These noise sources are generally occasional and intermittent and do not significantly alter the otherwise quiet acoustic environment, which is dominated by natural sounds.



Photo credit: Tetra Tech Coffey, 2025

Plate 6.22
ITCS Road construction dust



Photo credit: Tetra Tech Coffey, 2025

Plate 6.23
ITCS Road construction vehicle

6.1.3 Economy and livelihoods

This section describes how people make a living and the economic composition of the TSF communities, including natural resource use (i.e., terrestrial and riverine resources used to support livelihoods), employment and income sources, and housing characteristics.

6.1.3.1 Natural resource use

Livelihoods in the TSF communities are primarily derived from natural resources. The primary livelihood activity for households in the TSF communities is subsistence gardening, with formal employment, sale of produce (e.g., marketing), casual labour, and ASM also important livelihood activities.

The following sections provide an overview of natural resource use across the seven TSF communities. The information presented is based on the review and analysis of satellite imagery, results of the household survey with TSF communities, and community feedback provided during FGDs, including participatory mapping of resource use areas.

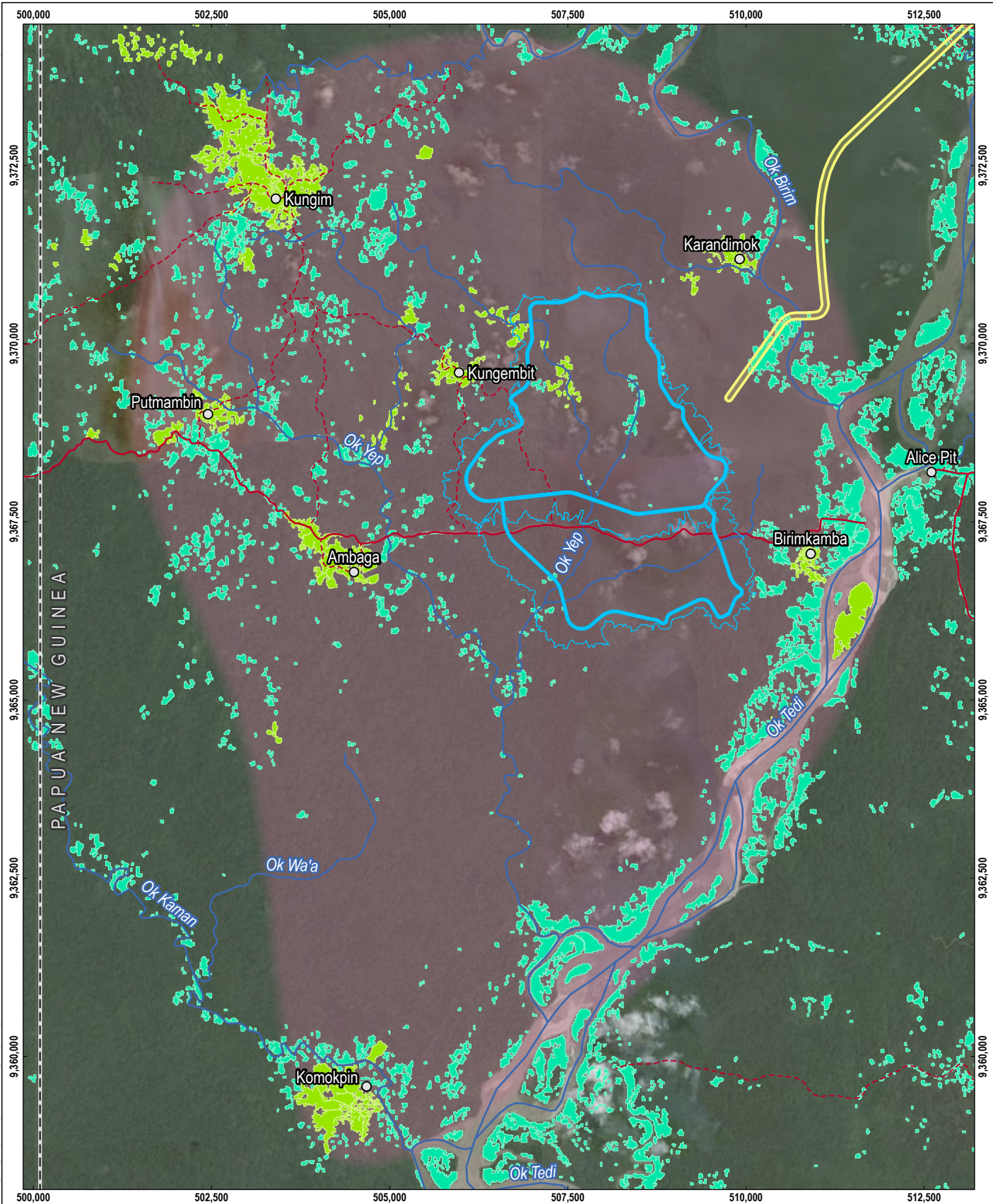
Gardening

Subsistence gardening is the primary food source for households within TSF communities with household gardens the main source of staple foods in all TSF communities, apart from Putmambin and Birimkamba. This is consistent with other regions in the North Fly District where the main source of food for households were gardens, local markets, bush and riverine resources, followed by communal sharing (PSO Department 2023).

Land used for gardening by TSF communities is mostly located within or around the villages and along rivers and smaller creeks, including the Ok Tedi, Ok Birim, Ok Yep and Ok Indok (Figure 6.3), although some communities noted that their gardens were located further from the village (e.g., up to half a day travel). Some of the areas used for gardening identified by communities during consultation for this assessment included:

- Kungembit, the banks of the Ok Yep (east and north branches), and along bush tracks south of the village.
- Birimkamba, along the western bank of the Ok Tedi and in bush areas west of the village.
- Karandimok, west of the village, including along small creeks, along the banks of the Ok Birim, and across the Ok Birim on the western bank of the Ok Tedi.
- Ambaga, along the border track towards the east and west of the village, bush areas southwest of the village and north of the border track, and along the Ok Yep (west branch) to the east.
- Kungim, in areas surrounding the village, in bush areas west of the village towards the border, along the Ok Yep (north branch), along the bush track that heads northwest towards the Ok Birim, and bush tracks and creeks south and southeast of the village.
- Putmambin, in bush areas north and west of the village towards the border, and east of Putmambin on either side of the Ok Yep (west branch).
- Komokpin, on the eastern banks of the Ok Tedi and in bush areas north of the village, including west of the Ok Yep and areas north of the Ok Wa'a.

Examples of garden areas are shown in Plates 6.24 to 6.26.



LEGEND

- Study area village
- Road
- - - Track
- Watercourse
- - - International border
- Proposed TSF footprint
- Proposed infrastructure corridor
- Study sub-area**
 - TSF community
- Landcover classification**
 - Gardening area
 - Cultivated area



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SCALE 1:75,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Landcover mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.3

Landcover classification –
Gardening land



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DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TS12_F06.03_GIS

Plate 6.24
Garden area (with sago palm in background),
Ambaga village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.25
Small garden plot, Putmambin village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.26
Banana plants, Putmambin village



Photo credit: Tetra Tech Coffey, 2025

Within each community, gardening land is restricted to clan boundaries, although community feedback from FGDs in Ambaga reported that land is shared between villages and is not limited to village boundaries due to clan lineage, ancestral connections, and intermarriages, which 'expand clan boundaries'. During consultation it was reported that most people in Birimkamba are from other TSF villages which means they are required to request land near Birimkamba to make gardens, and if this is not granted, they need to return to their own land.

Sago is the main staple crop for households in the TSF communities. Sago palms are generally found in low lying swamp areas and along small streams and creeks. Community feedback indicates that sago was generally widespread rather than confined to particular sago swamp areas, and that while their ancestors had grown larger sago plantations, people now plant sago where new gardens are established. Feedback included:

Our ancestors had grown sago plantations all over the Ambaga area and around small streams within our clan boundaries. Our recent generations have not planted sago closer to our villages and nearby bushes. Sago is now everywhere.

Most sago are planted where there is a garden. If people have gardens, they plant one or two.

A review of satellite imagery shows that larger areas of sago generally exist in low lying areas and along small creeks near to villages, with more scattered, individual palms in forested areas (Figure 6.4)².

Other staple garden crops grown by people within TSF communities include banana (see Plate 6.26), cassava, taro, yam, kumu (leafy greens), kau kau (sweet potato), aibika, pitpit, sugar cane and corn.

A higher proportion of households in Birimkamba, Komokpin and Putmambin reported that sourcing food was harder compared to previous years. Table 6.4 summarises the main reasons provided as to why food source was more difficult to source. In summary:

- Population pressure was not commonly reported as an issue in the TSF communities, except for Kungim. This indicates that the perceived resource scarcity is driven more by the poor condition of resources than by population size.
- A higher proportion of households in Birimkamba reported a loss of resources due to rising water compared to other TSF communities.
- In Kungim, a larger proportion of households reported difficulty related to population pressure and longer travel times to access resources.

Conversely, some households reported that sourcing food was easier compared to previous years. These households attributed this to the introduction of modern gardening tools and due to gardens being located closer to home.

² While community feedback indicates that there is sago everywhere around Ambaga, satellite imagery covering this village was not at a quality that allowed for the identification of sago areas.

Table 6.4 Key food resource collection and reasons for difficulty in resource collection

Indicator	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putnambin
Resource collected compared to previous years							
Easier	5.3%	35.7%	11.1%	0.0%	0.0%	6.3%	0.0%
Harder	31.6%	64.3%	33.3%	66.7%	12.5%	18.8%	52.6%
About the same	63.2%	0.0%	55.6%	33.3%	87.5%	68.8%	47.4%
Reason for difficulty							
Population pressure	0.0%	22.2%	0.0%	0.0%	0.0%	66.7%	0.0%
Loss of resource due to rising water	0.0%	55.6%	33.3%	37.5%	0.0%	0.0%	10.0%
Longer travel time to resource	16.7%	0.0%	0.0%	37.5%	0.0%	66.7%	20.0%
Scarcity of resource	83.3%	44.4%	66.7%	12.5%	100.0%	66.7%	80.0%
Poor condition of resource	66.7%	55.6%	66.7%	50.0%	100.0%	0.0%	70.0%
Resource died	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%

Note: Multiple choice question. Responses may be greater than 100%.

The most common barrier to gardening reported by households in the TSF communities was trespassing animals, except for households in Birimkamba (see Table 6.5). The other common barriers reported by households included pest animals and insects damaging crops. Community members reported that the main pest species that affected garden crops were grasshoppers, beetles, rats, wild and domesticated pigs and bats.

Poor soil fertility was raised by households in all the TSF communities, except Kungembit, with around half of the households in Birimkamba and Komokpin raising this as a barrier to gardening. This issue and its effect on crops was also raised during FGDs with feedback noting:

Banana, taro and kau kau [are] affected by pests and diseases. Low yield due to decline in soil fertility or other associated factors.

Crops produced bearing signs of decease or being infected. Crops are not productive due to soil fertility.

Concerns relating to environmental events, such as flooding or drought, and the effect on the productivity of gardens was also raised by community members from Ambaga, Birimkamba, Kungembit and Komokpin:

Last time in 2015 there was an El Nino drought. All the wells dried up and there was no food and water. There was no garden food – the gardens all dried up.

Before it was easy find food, whereas now it is becoming scarce, and they reckon it is because of climate change. The fallow period has reduced quite drastically, gardens made along the riverbanks would return after few years but now after six months in the current site, but low yield.

Flooding has affected most gardens. Flooding normally takes three days before it is safe.

Fallow periods across TSF communities, ranging from 1 year to 2.5 years, were substantially lower than those reported by Allen *et al.*, (2002) of over 15 years, indicating that there has been an intensification of gardening. As insufficient land was not commonly reported as an issue by TSF communities, shorter fallow periods may reflect a pattern of land-use convenience, e.g., preference for gardening in areas close to villages or areas known to be fertile, rather than a shortage of land.

Table 6.5 Barriers to gardening

Barrier	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
No issue	26.3%	40.0%	27.3%	8.3%	37.5%	37.5%	35.0%
Animal trespass	68.4%	6.7%	72.7%	91.7%	62.5%	50.0%	60.0%
Poor soil fertility	21.1%	46.7%	27.3%	58.3%	0.0%	31.3%	30.0%
Insufficient land	0.0%	0.0%	9.1%	0.0%	0.0%	0.0%	15.0%
Other	21.1%	6.7%	9.1%	33.3%	25.0%	12.5%	25.0%

Note: Multiple choice question. Responses may be greater than 100%

Cash crops

Cash cropping is an important source of income for households in the TSF communities with approximately 50% or more of households in each TSF village selling cash crops in the last year. The main cash crop grown by households in the TSF communities is betel nut, which is also one of the most commonly grown cash crops in rural PNG (Schmidt *et al.* 2024). Other cash crops grown by TSF communities include rubber, balsa wood, eagle wood and coconuts.

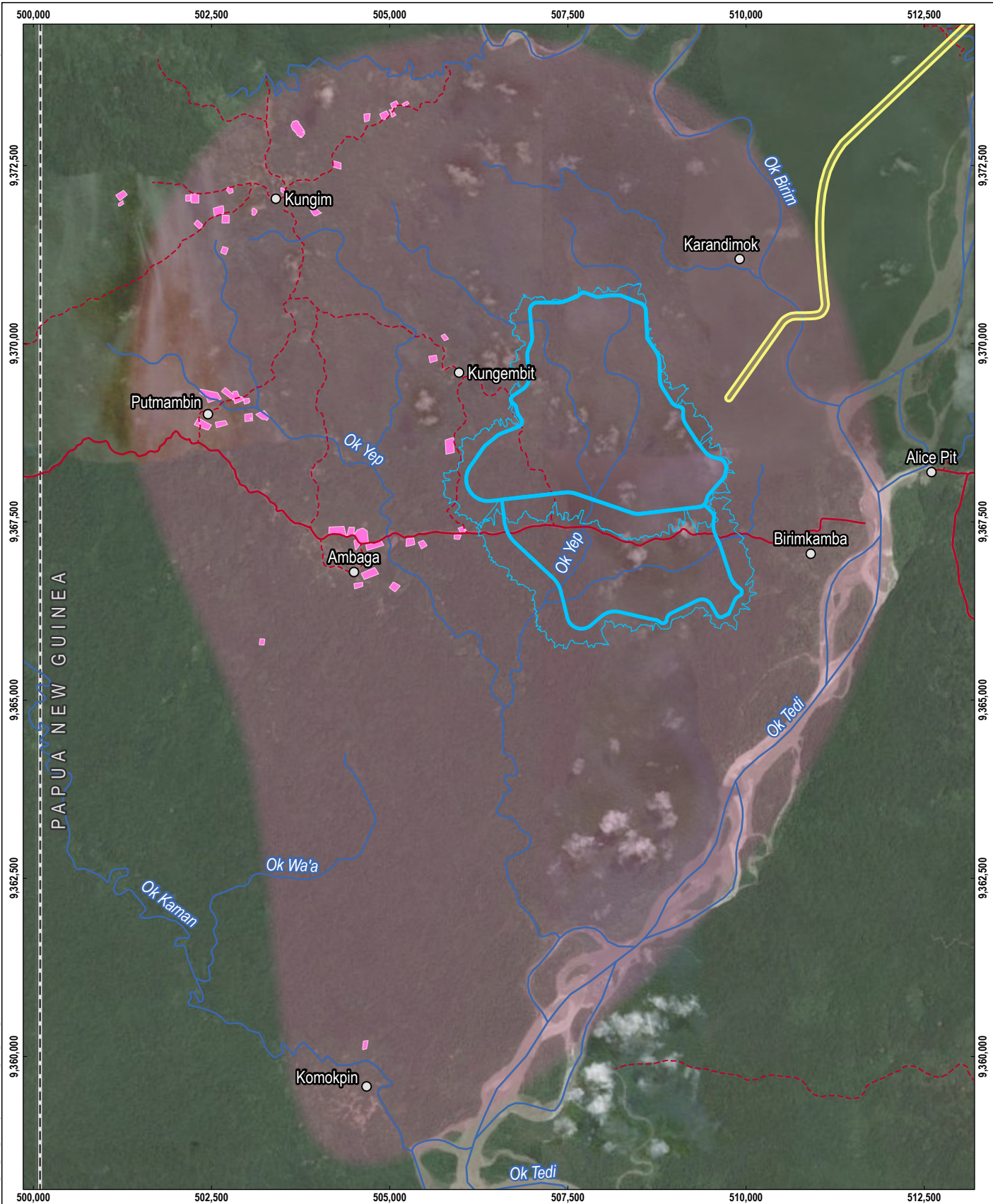
The majority of households within each TSF village have access to land to grow cash crops. In particular, more than 80% of households in Kungembit, Putmambin, Komokpin, Kungim and Ambaga have access to land for cash cropping. Plantation areas used for cash crops are shown in Figure 6.5, although garden and forested areas are also used for growing cash crops.

Community members reported that the success of sale of other cash crops, such as rubber, eagle wood and balsa wood, had been limited by the remoteness of communities and challenges with access to markets. The sale of betel nut is preferred by community members as it is '*light weight and easy to carry to the markets for sale*'.

Now selling betel nut is the main source of income. The gardens are longer distances and its difficult carrying heavy loads. We take betel nut to Ningerum, sell them and buy goods for our needs for like soap, salt and such things.

Prior to introduction of cash crops, livestock especially domesticated pigs, was the main source of income until rubber was introduced. Rubber plots have been planted but no access to market so have been abandoned for some time.

Most respondents stated that they believed that they had the same amount of land for growing cash crops as previous generations. However, in Birimkamba, half of respondents reported they believed they had access to less land, and in Karandimok, opinions were split with half of respondents saying they had the same amount, 25% stating they had less land and 25% stating they had more land. Respondents attributed the reduction in land to population growth, land disputes and not having access to land due to migrating to the area for marriage.



LEGEND

- Study area village
- Road
- - - Track
- Watercourse
- - - International border
- Proposed TSF footprint
- Proposed infrastructure corridor
- Study sub-area**
- TSF community
- Landcover classification**
- Cash crop



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SCALE 1:75,000
PAGE SIZE: A4
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SOURCE
Landcover mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.5

Landcover classification –
Cash crops



DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TS12_F06.05_GIS

Hunting and bush resource collection

Bush resources are collected from forested areas across the study area to provide food, traditional medicines, building materials and materials for household use. Community members noted that each TSF community had distinct clan boundaries, and community members did not harvest resources that were not within their boundaries. Some respondents noted that people from TSF communities who are currently living in Ningerum, Kiunga and Alice Pit, often return to their home communities to collect bush foods and materials, such as timber for house construction, for example:

People don't come back often, but when they do come back to Karandimok they come for gardening for own consumption and marketing, hunting, timber to make houses and to look after children.

Most households in the TSF communities reported that they engaged in hunting. Households mostly go hunting weekly, or less frequently, with only three respondents reported that they went hunting every day, these respondents were in Ambaga and Kungim. Hunting is reported to mainly be undertaken by men, however in Ambaga some women also hunt.

Hunting areas were reported to be located further from the villages and respondents reported travelling up to a day (return) to access the hunting areas within their respective clan boundaries.

The main animals that were reported to be hunted were wild pigs, birds, bandicoots, cus cus and flying foxes. There was some variation in the animals that were reported to be hunted across the TSF communities. For example, people in Birimkamba reported hunting flying foxes, birds and cus cus, while people in Komokpin, reported hunting cassowary and pigs. Hunting methods include setting traps and using traditional bow and arrows.

Most surveyed households also reported collecting bush resources. The collection of bush resources was reported to occur mostly on a weekly basis. Bush resource collection sites were generally located with half a day's travel from communities, however some sites in Komokpin and Putmambin were reported to be up to a one day's travel. Firewood was universally collected, followed by building materials and materials for household use (see Table 6.6).

Table 6.6 Bush resources collected

Resources collected	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Firewood	100.0%	100.0%	90.9%	100.0%	100.0%	100.0%	100.0%
Building material	94.1%	93.8%	81.8%	75.0%	76.5%	93.3%	100.0%
Materials for household use	70.6%	56.3%	81.8%	58.3%	64.7%	80.0%	88.9%
Medicines	47.1%	50.0%	54.5%	0.0%	88.2%	53.3%	88.9%
Fruits	52.9%	50.0%	72.7%	41.7%	64.7%	66.7%	61.1%
Vegetables	41.2%	43.8%	45.5%	41.7%	58.8%	66.7%	55.6%

Note: Multiple choice question. Responses may be greater than 100%.

Community members noted that different timbers were harvested for different uses, such as soft wood for canoes, and hardwood trees for building houses. Other bush resources, such as black palm and sago leaves, are also used for walls and roofing thatch.

Collection of bush resources for medicinal purposes was commonly reported by households in the TSF communities, excluding Komokpin. Community members reported that different plant species were used to treat different illnesses, and these resources grew throughout their clan boundaries. Community feedback from FGDs reported that salat (*Laportea decumana*) was the most commonly used medicinal plant. Salat is used for pain relief and is widely used across PNG to alleviate body pain, fatigue, headaches, stomach ache, and muscle and joint pain (WHO 2009). Other traditional medicines noted during FGDs included barks from special trees used to treat diarrhea and bush rope to cure sore throats. In Ambaga, women reported that the knowledge and use of traditional medicine was predominately practiced by older women, and that this was being practiced less by younger women.

A higher proportion of households in Kungembit and Putmambin reported collecting bush resources for medicinal purposes compared to other communities. This is consistent with community feedback which noted that households rely more on traditional medicine due to challenges accessing healthcare, such as distance or cost, for example:

Resort to traditional medicine first thinking hospital is quite far to reach. When close to town or if when accessible, they [use] medicine from the hospital.

Over 60% of surveyed households in the TSF communities thought that the availability and abundance of hunting grounds and bush resources were about the same compared to previous years. A larger proportion of households in Komokpin (67%), Birimkamba (63%) and Karandimok (56%) thought that the availability and abundance of resources had decreased. Concerns raised in Putmambin relating to population increase and scarcity of bush resources included:

It was okay in the past, but the growing population at present is putting pressure on the available resources.

Currently, the resources are scarce so [we] had to travel far to look for the wild animals for meat.

Fishing and riverine resource collection

Fishing and collection of resources from the river was undertaken by most households in the TSF communities. This is reported to occur on a weekly or monthly basis. No households reported undertaking these activities daily. This is consistent with other regions in the North Fly District where fishing and collection of other riverine resources are used to supplement food from gardens (PSO Department 2023).

Households generally fish or collect riverine resources from rivers, and smaller channels and creeks closest to their village, including the Ok Tedi, Ok Birim and Ok Yep. Specifically, it was reported during the household survey and FGDs that:

- Kungembit community fish in the Ok Birim and its tributaries, including Ok Yep.
- Birimkamba community fish in the Ok Tedi and its tributaries, and smaller channels and creeks in the forest surrounding the village, or up to about a half day walk.
- Ambaga and Putmambin communities mostly fish in rivers and creeks around the village or up to about a half day walk, including the Ok Yep.
- Karandimok community mostly fish in the Ok Birim and creeks (Plate 6.27 and Plate 6.28).

All households generally catch enough for their own consumption. This is consistent with trends in other regions of the North Fly District where fishing and riverine resources supplement garden food. The main food resources collected from waterways are fish such as snakefish, catfish, tilapia, and prawns, shrimp, eels, and turtles. Creeks are mainly used for collecting prawns, crayfish, small and large fish, and eels, while larger fish are mainly collected from larger creeks and the Ok Birim.

Fishing is conducted by a range of methods, including hook and line, gill netting, diving, spearing, hoop nets, and bush rope. Feedback from consultation also noted that people block water in smaller channels and scoop out the water to harvest fish and prawns. Derris root, which is a locally growth natural fish toxicant, is also used in smaller creeks.

We go diving in small river channels – we dive for fish. We use the poison rope method. When the water levels are low enough, we block the water (in a small channel) and scoop out all the water to harvest fish/prawns.

In Ambaga, Kungembit, Kungim and Putmambin, over half of households surveyed thought that the availability and abundance of fishing grounds and river resources were about the same or better compared to previous years. Most surveyed households in Karandimok (70%), Komokpin (73%) and Birimkamba (100%), who are located along the Ok Tedi and Ok Birim, indicated that they thought that the availability and abundance of resources had decreased compared to previous years.

Community members in Birimkamba, Kungim and Karandimok raised concerns relating to contamination from the Ok Tedi Mine and the potential impact on the abundance of riverine resources, for example:

The number of fish has gone down. Before there was plenty, now there is less.

Mine waste that feeds into Ok Birim [is] affecting the river. Increased stream velocity resulting in channel erosions.

Fishing and diving, [they] use Ok Birim river and go up as far as their land borders with the other neighbouring communities. Previously, their forefathers used the Alice River [Ok Tedi] for fishing as well prior to mining but not anymore.

Artisanal and small-scale mining

ASM for gold is an important economic activity for individuals and communities across PNG (Bainton et al. 2020). In the Ok Tedi context, ASM largely involves reworking mine derived tailings and tailings-laden river sediments that have been discharged into the Ok Tedi under the mine's riverine disposal regime; these materials are rewashed/panned by residents of tailings affected communities along the river (Jenkins, 2016). Although advice from OTML suggests that most gold in the Ok Tedi that is targeted by ASM is from both historic and current waste rock disposal, and historical accumulation of tailings.

ASM was identified as a key driver of in-migration into project communities, with feedback from consultation reporting that ASM had attracted people from all over PNG to settle in the area. ASM occurs within the Ok Tedi mainly occurs between Tabubil in the north and Bige in the south and is important source of income for households in TSF communities and the wider project area. Within TSF communities, households in Birimkamba, Karandimok, Kungembit, and Komokpin reported that ASM/sale of gold had contributed to household incomes over the previous year. Community feedback from FGDs also noted the importance and prevalence of ASM for TSF communities. Specifically, it was noted that ASM is a main source of income, particularly for communities closest to the Ok Tedi. ASM activities by people from TSF communities is mainly conducted along the Ok Tedi between Komokpin and Ningerum, with men and women participating in ASM. Feedback from FGDs in Birimkamba noted that ASM activities were mainly limited to people who have rights to clan land located along the banks of the Ok Tedi.

Gold from ASM is generally taken to Ningerum to sell with community feedback noting that there were several local buyers. It was reported that some people can earn up to about PGK 7,000 in less than two weeks from the sale of gold.

Plate 6.27
Ok Birim, near Karandimok village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.28
Creek, Karandimok village



Photo credit: Tetra Tech Coffey, 2025

6.1.3.2 Employment, income and expenditure

This section describes the primary indicators of economic activity in the study area, including employment (both formal and informal), household income sources and expenditure categories across the TSF communities.

Employment

Informal employment is defined by the International Labour Organization (ILO) (2023) as '*working arrangements that are in practice or by law not subject to national labour legislation, income taxation, or entitlement to social protection or other employment guarantees*'. In the PNG context, the informal economy is primarily related to cash crop production, managing small stalls, selling cooked food in markets, sewing and house cleaning (NRI 2017). Formal employment is characterised as jobs legally formalised with companies or businesses where people earn a wage.

Table 6.7 provides an overview of the types of employment for females and males aged 15 to 49 across the TSF communities, compared to the Western Province 2011 Census data (NSO 2011). Across all TSF communities, most people are employed in informal employment, which was generally consistent with the broader data for the Western Province (64.6%), although informal employment participation varies considerably across the TSF communities. Komokpin has the lowest level of people engaged in informal employment (51.4%) and was the only TSF village with proportions of people in this sector below the Western Province. Putmambin had the highest proportion of people engaged in informal employment (85.4%), followed by Ambaga (76.5%), ranging from 51.4% of people in Komokpin to 85.4% of people in Putmambin.

Half of those engaged in informal employment, were participating primarily in subsistence gardening activities followed by ASM, hunting and marketing to a lesser extent. Across the study area, a higher proportion of females were engaged in informal employment compared to males. A higher proportion of males were engaged in formal employment compared to female respondents; however informal employment remained the most common employment type. This is consistent with a broader formal employment trend across Western Province where 17.2% of males participate in formal employment compared to only 5.3% of women. This was supported by women during FGDs, who reported that most women were housewives and remained in the village. According to women in the TSF communities, women do not engage in formal employment due to a lack of education.

Table 6.7 TSF communities – formal and informal employment levels – people aged 15 to 49

Village	Formal employment			Informal employment			Not employed		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Ambaga	0.0%	5.3%	2.9%	80.0%	73.7%	76.5%	20.0%	21.1%	20.6%
Birimkamba	0.0%	11.8%	5.6%	57.9%	58.8%	58.3%	26.3%	29.4%	27.8%
Karandimok	0.0%	10.0%	4.2%	71.4%	60.0%	66.7%	21.4%	10.0%	16.7%
Komokpin	0.0%	5.6%	2.7%	63.2%	38.9%	51.4%	31.6%	22.2%	27.0%
Kungembit	0.0%	11.1%	5.6%	77.8%	50.0%	63.9%	16.7%	38.9%	27.8%
Kungim	9.1%	29.4%	17.9%	63.6%	58.8%	61.5%	22.7%	11.8%	17.9%
Putmambin	0.0%	0.0%	0.0%	94.7%	77.3%	85.4%	5.3%	22.7%	14.6%
Western Province*	5.3%	17.2%	11.5%	73.0%	56.8%	64.6%	NA	NA	NA

NA = not available. Table uses subsistence employment data from the 2011 Census, which may exclude some informal employment sources captured in the household survey data. Table uses wage employment (% of employed population) from the 2011 Census for formal employment.

* Source: NSO 2011.

Income

The household survey asked participants questions regarding levels and sources of household income. Observations should be regarded as indicative only, as some participants may have not disclosed income sources or levels due to sensitivity. To enhance accuracy, participants were asked to report their income sources from the previous fortnight. As a result, there is a limitation to the data as it does not consider seasonal variation in income sources (e.g., cash crops may change seasonally).

Cash cropping is essential for household income across the TSF communities. While surveyed households reported earning income from a range of sources, the most common source being the sale of cash crops (Table 6.8). Betel nut was the main cash crop reported to be sold by households, ranging from 73.9% (Putmambin) to 46.7% (Karandimok) of households. A small proportion of households reported selling rubber in Ambaga (5.3%) and Putmambin (4.3%). Households of CMCA villages within the TSF communities receive CMCA benefit payments direct to each household in the third quarter of each year (i.e., September). In addition, OTML pay general compensation for environmental impacts to 826 clans annually, with distribution of the compensation payment determined by individual clans. Approximately half of households across all TSF communities that participated in the household survey reported that they received income from compensation, with the proportion of households within individual villages ranging from about 53.1% in Birimkamba and Kungim to 60.5% in Putmambin.

Life is hard to earn income in the community. Main source of income is through the sale of betel nut and produce at the market.

Approximately half of surveyed households reported earning income in the previous fortnight (Table 6.8). Kungembit had the highest proportion of surveyed households with no income (52.9%), while Komokpin had the lowest (16.7%). Consistently, Kungembit had the lowest median income (PGK0), while Komokpin had the highest median income (PGK525).

Income inequality is evident between the TSF communities and within some TSF communities. The median fortnightly household income across the TSF communities ranged from PGK0 (Kungembit) to PGK525 (Komokpin). Ambaga had the second lowest median (PGK50), however its income range (PGK0 to 2,600) indicates that there is income inequality within the community. Ambaga households primarily earn wages through sale of cash crops and compensation. This suggests that these sources provide a higher income than other sources.

Table 6.8 Household income levels and sources

Indicator	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Median income (PGK)*	50	150	400	525	0	150	100
Income range (PGK)	0-2,600	0-2,560	0-2,400	0-2,840	0-600	0-3,700	0-300
Proportion of households with no income earned	44.4%	46.7%	40.0%	16.7%	52.9%	47.1%	34.8%
Percentage of households earning income from[†]:							
Sale of cash crops	63.2%	58.8%	46.7%	66.7%	58.8%	47.1%	78.3%
Compensation (royalties and other)	55.9%	53.1%	53.3%	59.3%	59.4%	53.1%	60.5%
Land rentals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sale of gold (ASM)	0.0%	17.6%	33.3%	25.0%	5.9%	0.0%	0.0%
Wage income	15.8%	5.9%	20.0%	0.0%	0.0%	23.5%	0.0%

Indicator	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Profit from business operation	10.5%	11.8%	13.3%	16.7%	5.9%	11.8%	0.0%
Sale of subsistence surplus	0.0%	17.6%	0.0%	8.3%	0.0%	5.9%	0.0%
Other	5.3%	11.8%	0.0%	0.0%	11.8%	0.0%	4.3%

* Median household incomes have been calculated based on the self-reported income for each of the overarching income sources and excludes households who did not provide a response to the survey question.

† Multiple choice question. Responses may not equal 100%.

Household expenditure

Table 6.9 outlines reported fortnightly household expenditure. The expenditure range across the TSF communities varies. For example, Karandimok and Kungim had substantially higher expenditure ranges when compared to other villages. Across the TSF communities, the total median fortnightly expenditure was less than the median household income. This excludes Ambaga, Komokpin, and Putmambin who reported spending more during the fortnight than what they earned, indicating that households in these communities have a lower savings capacity and may be more vulnerable.

Surveyed households in the TSF communities reported that food and transportation costs were the primary household expense fortnightly. Most households spent money on transport, such as boats or PMV travel. All households in Komokpin spent money on transportation, which is likely due to the village being located the furthest of all TSF communities from Tabubil and Ningerum where services and infrastructure is concentrated. In comparison, expenditure spent on transportation was less common in villages located near access tracks, like Ambaga.

Household survey data indicates expenditure on purchased food is uneven across the communities, and generally higher when compared to the Western Province and rural PNG more broadly. Purchasing food was less common in Ambaga and Putmambin. In comparison, in Birimkamba, Karandimok, Kungembit and Kungim up to half of the households purchased food in the previous fortnight. In Komokpin all households reported purchasing food. The 2023 PNG Rural Household Survey report (Schmidt et al., 2024), found that more than half (54%) of the food consumed by households comes from their own garden, foraging or hunting activities. By contrast, the proportion of households eating own-produced food in the Western Province South Fly District was even higher at 80% (Schmidt et al., 2024).

Several factors may play a role in the TSF communities' expenditure on purchased food:

- **Disposable income.** Households with a higher median income may be more able to spend income on food that they did not grow. For example, Komokpin households earned the highest median income (PGK525), which may explain the high reliance on purchased food (100%). In comparison, households in Kungembit had the lowest median income and less than half (42.9%) of households spent income on food. This indicates that households earning less income, such as households in Kungembit, may not be able to spend income on food they did not grow as readily when compared to Komokpin households.
- **Barriers to gardening.** Households may be unable to rely on consuming own-produced food if they face barriers to gardening. During household surveys, households in Birimkamba and Karandimok indicated the distance to their gardens was a barrier, while almost all of the households surveyed in Komokpin (91.7%) reported animal trespasses as a barrier to gardening.
- **Food shortages.** As discussed in Section 6.1.5.3, food insecurity is prevalent across the TSF communities. Responses to the household survey indicated that two-thirds of households in Komokpin experienced severe food insecurity, potentially explaining their expenditure on purchased food (100%).

Other annual expenses included education fees and expenses, health care such as purchasing medicines, and purchasing of capital items (e.g., generator and mobile phone) (Appendix A).

Table 6.9 Fortnightly household expenditure

Statistic	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Total median fortnightly expenditure (PGK)	66	110	209	250	100	186	55
Fortnightly expenditure range (PGK)	20-470	50-520	40-520	10-1,570	50-1,555	150-319	25-1,085
Percentage of households spending money in the last fortnight*:							
Food	25.0%	50.0%	40.0%	100.0%	42.9%	45.5%	11.1%
Transportation	16.7%	50.0%	40.0%	100.0%	42.9%	45.5%	44.4%
Tobacco / betel nut / alcohol	15.8%	11.8%	20.0%	0.0%	11.8%	23.5%	8.7%
Other household consumption (non-food)	0.0%	0.0%	0.0%	0.0%	0.0%	5.9%	0.0%
Clothing or shoes	5.3%	5.9%	20.0%	8.3%	11.8%	23.5%	4.3%
Mobile phone top up card or recharge	0.0%	23.5%	33.3%	16.7%	17.6%	29.4%	0.0%
Health services	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%

* Multiple choice question. Responses may not equal 100%.

Household asset ownership

Asset ownership is an important component of individual and household wellbeing. In addition to income, asset ownership plays a key role in reducing poverty by generating income, serving as collateral for credit, and helping households overcome financial challenges during emergencies (Doss et al. 2020). Table 6.10 presents a summary of household ownership of a standardised list of assets. In the TSF communities, asset ownership is limited. Commonly owned assets are mobile phones, livestock, and solar panels, which can support income generation and household improvements such as access to electricity.

A substantially higher proportion of households in Komokpin, Karandimok and Birimkamba own motorised boats compared to the other TSF communities and to rural PNG households (NSO 2019). Lower proportions of households in the TSF communities own other assets, such as radio, motorcycles and motorboats, compared to rural PNG households (NSO 2019). No households reported owning a television, refrigerator or car.

Table 6.10 Summary of household asset ownership

Household asset	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin	Rural PNG*
Mobile phone	81.3%	100.0%	100.0%	81.8%	100.0%	100.0%	100.0%	53.0%
Livestock	37.5%	25.0%	11.1%	8.3%	16.7%	14.3%	41.2%	49.5%
Solar panel	25.0%	33.3%	10.0%	36.4%	0.0%	25.0%	10.0%	33.9%
Radio	0.0%	0.0%	0.0%	9.1%	6.7%	16.7%	0.0%	21.0%
Motorboat	0.0%	8.3%	10.0%	36.4%	0.0%	0.0%	0.0%	1.8%
Motorcycle	18.8%	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	40.0%

* Source: NSO (2019)

6.1.3.3 Housing

Table 6.11 characterises housing in the TSF communities. Permanent housing refers to dwellings constructed from finished materials (e.g., metal, wood, tiles) (Plate 6.29), while semi-permanent housing is constructed from a mixture of finished and bush materials (e.g., thatched walls with metal roof) (Plate 6.30). Traditional housing refers to dwellings mainly constructed from bush materials (e.g., natural ground, thatch and palm leaf) (Plate 6.31). Most surveyed houses in the TSF communities were constructed from traditional materials, except in Ambaga, Birimkamba and Kungembit, where houses were constructed from permanent or semi-permanent materials.

No households in the TSF communities were connected to mains electricity (Table 6.11). The most common household energy/lighting sources are battery powered lanterns, solar power kits and open fire.

All households in the TSF communities reported that wood was their main source of cooking fuel, which is consistent with the data for rural PNG (95%) (NSO 2019). In Ambaga, Birimkamba and Kungembit cooking is done in a separate building (*haus kuk*).

Table 6.11 Summary of housing characteristics

Housing characteristics	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin	PNG rural *
Housing material								
Permanent	31.6%	50.0%	0.0%	0.0%	17.6%	5.9%	14.3%	NA
Semi-permanent	47.4%	12.5%	38.5%	41.7%	52.9%	17.6%	33.3%	NA
Traditional	21.1%	37.5%	61.5%	58.3%	29.4%	76.5%	52.4%	NA
Energy/lighting source								
Lantern	36.8%	0.0%	30.8%	0.0%	52.9%	43.8%	36.4%	37.7%
Solar lighting	21.1%	43.8%	30.8%	50.0%	5.9%	37.5%	27.3%	33.9%
Solar power kit	21.1%	37.5%	7.7%	41.7%	11.8%	6.3%	27.3%	0.0%
Open fire	5.3%	0.0%	30.8%	8.3%	23.5%	12.5%	0.0%	14.3%
Other	15.8%	18.8%	0.0%	0.0%	5.9%	0.0%	4.5%	0.0%

* Source: NSO (2019)

Plate 6.29
Example of a permanent house,
Birimkamba village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.30
Example of a semi-permanent house



Photo credit: Tetra Tech Coffey, 2025

Plate 6.31
Example of a traditional house,
Karandimok village



Photo credit: Tetra Tech Coffey, 2025

6.1.4 Infrastructure and services

Community access to functioning health and education facilities and services across the TSF communities is limited. This section provides an overview of the location and accessibility of infrastructure and services in the TSF communities.

6.1.4.1 Health infrastructure

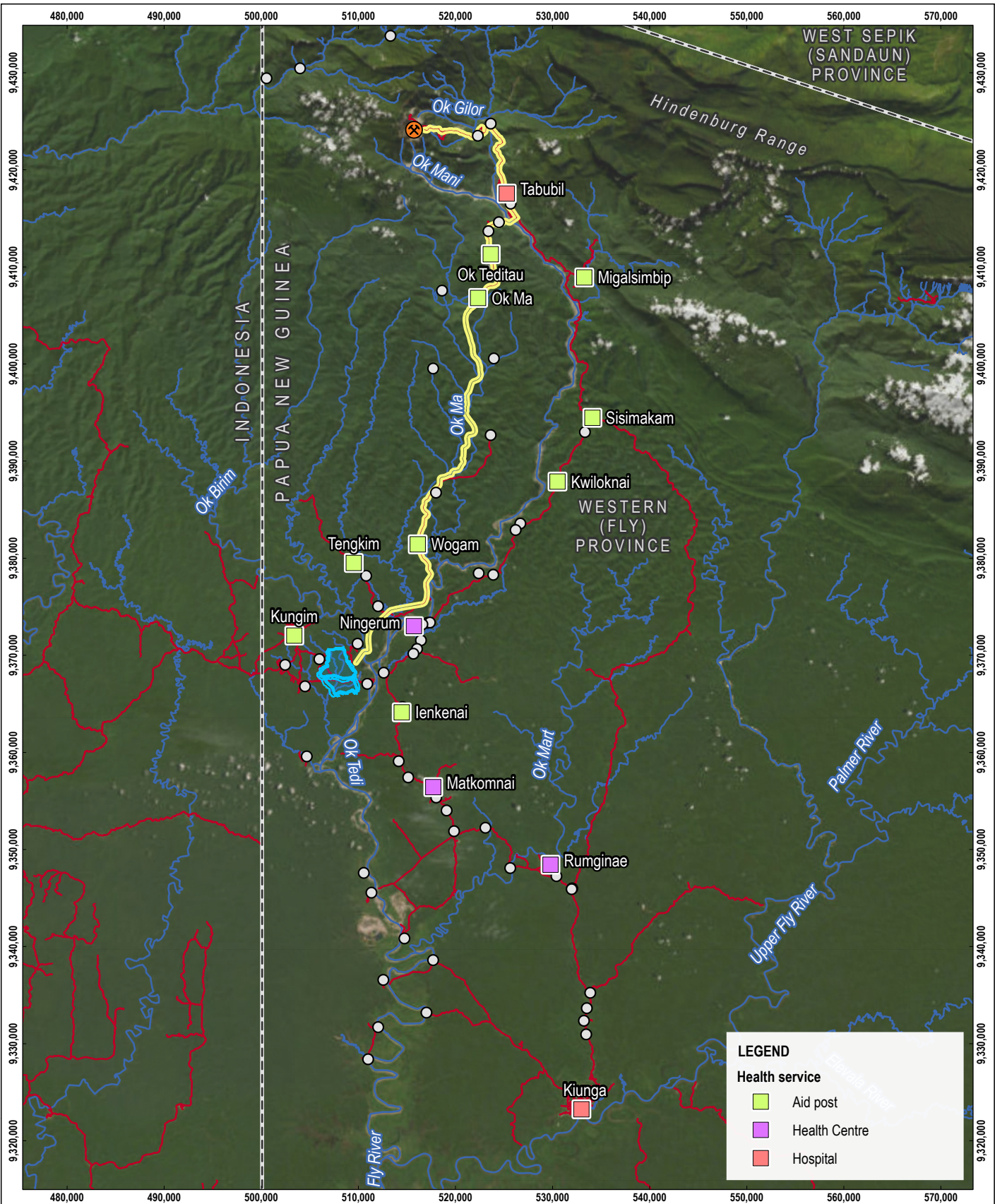
Four healthcare facilities were recorded within the TSF communities (Figure 6.6). During FGDs and the village survey, respondents noted that only the Kungim aid post which is run by the Catholic mission was currently functional. A new aid post was under construction in Karandimok at the time of engagement for this social characterisation in July and August 2025. Community feedback noted that people mainly access health services in Kungim (aid post), or travel outside the TSF communities to Matkomnai (health centre), Yenkenai (aid post), Rumginae (health centre) and Ningerum (health centre). In cases of serious illness people travel to Kiunga or Tabubil to access hospitals.

Community members noted that some health care facilities were well-stocked, such as Tabubil and Kungim, however other facilities often lack staff and supplies (i.e., medicine and refrigerators). These issues are not specific to the study area and characterise the Western Province and the PNG health system broadly. The health system in the Western Province is challenged by remoteness. Broadly, there are '*significant operational deficits*' with the system relying on the effort of individuals to keep facilities functioning (Fly River Provincial Government 2022).

Table 6.12 outlines the reported barriers to accessing health care services. The most cited barrier is distance to a health facility and lack of transportation, or the lack of a facility. Notably, in Kungim, where an aid post is located, 64.7% of households stated there were no issues in accessing health care.

Table 6.12 Barriers to accessing health care services

Barriers	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putnambin
No problem	5.3%	5.9%	0.0%	0.0%	0.0%	64.7%	0.0%
Cost of services	36.8%	47.1%	33.3%	25.0%	64.7%	17.6%	47.8%
Distance to health facility / no transportation	73.7%	52.9%	40.0%	41.7%	58.8%	17.6%	65.2%
Lack of health facility	15.8%	35.3%	53.3%	33.3%	17.6%	5.9%	34.8%
Poor infrastructure	26.3%	29.4%	33.3%	41.7%	11.8%	0.0%	26.1%
Other	0.0%	11.8%	0.0%	8.3%	0.0%	0.0%	8.6%



LEGEND

- Ok Tedi Mine
- Regional centre
- Study area village
- Road/track
- Watercourse
- Province boundary
- Proposed TSF footprint
- Proposed infrastructure corridor



0 5 10 km
SCALE 1:550,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

OK TEDI MINING LIMITED

OK BIRIM TAILINGS STORAGE FACILITY PROJECT

FIGURE 6.6

Health services used by the study area communities



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Maternal health services

Maternal and infant mortality is a concern across PNG. Maternal mortality in PNG is exacerbated by delays in seeking health care, delays in reaching health facilities, and poor-quality health services (NSO 2019).

Childbirth was commonly stated as a healthcare issue faced by women within TSF communities. In some communities, it was reported that women who give birth in villages are supported by village nurses or traditional nurses. When they do not give birth in the village, they must travel to health services in other villages, sometimes walking up to three to four hours to seek assistance. Women in Ambaga and Kungembit reported instances of women giving birth alongside the road while travelling to access hospitals. The challenge of accessing services is further exacerbated by women having to pay hospital fees (e.g., PGK10) when seeking support to give birth or post-partum treatment.

Examples of responses from women during the FGDs when asked if women give birth in the villages are provided below:

Yes too many. Since before until now, because of the lack of hospitals and the distance, the mothers use village nurses. Traditional nurses that assist with birth. But sometimes when they deliver, the babies still die.

Sometimes we walk to Kungim, and babies die on the road from mothers delivering.

Some gave birth along the road while on the way to the hospital.

6.1.4.2 Education infrastructure

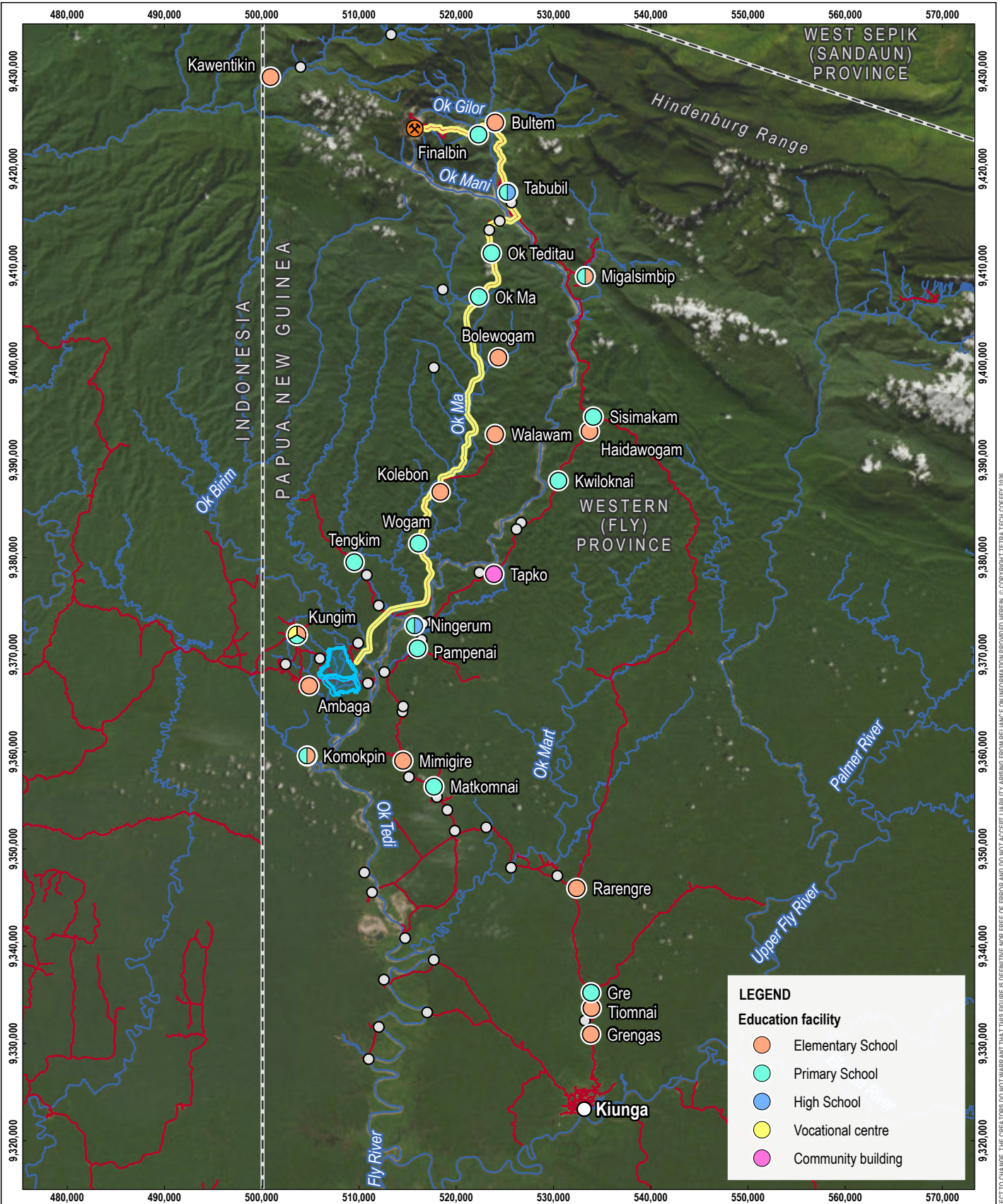
Table 6.13 presents a summary of education facilities within the TSF community study sub-area, including information provided during field investigations for this report. There is uneven access to education facilities across the TSF communities (Figure 6.7). There are five schools across the TSF communities, although only schools at Komokpin and Kungim are operational.

Community feedback noted that a lack of services has resulted in families having to move to larger villages such as Alice Pit, or urban centres such as Ningerum. The closest secondary school to the TSF communities is in Ningerum. Feedback from engagement with Ningerum High School noted that most students who board at the school were students who lived in the TSF communities. There is one tertiary training facility (TVET) within the TSF communities, located at Kungim. Other villages must travel to the regional centres to attend training institutions following school.

Table 6.13 TSF communities – summary of education facilities

Village	Grades taught	Number of classrooms	Number of teachers	Village survey comments	FGD comments
Ambaga	Elementary (currently not operational)	4	1	Semi-permanent building, with rainwater tank and pit latrine.	The elementary school is not operational. It has capacity for Grades 1 and 2 with two teacher houses and four classrooms. Most children go to either Kungim, Komokpin or Ningerum for primary school.
Birimkamba	None	-	-	Nearest school is in Ningerum.	Previously had an elementary school. Students currently go to school at Ningerum and Kungim.

Village	Grades taught	Number of classrooms	Number of teachers	Village survey comments	FGD comments
Karandimok	None	-	-	Nearest school is in Ningerum.	Multi-purpose use hall for community meetings, church, and elementary school.
Komokpin	Elementary	2	2	Semi-permanent building (Plate 6.32), with rainwater tank (Plate 6.33), pit latrine, and teacher accommodation	One teacher's house. Maintenance of teacher's houses is an ongoing issue as they are semi-permanent. No library.
	Primary	6	9	-	Six teachers' houses.
Kungim	Elementary	2	2	Traditional building, rainwater tank, pit latrine, and teacher accommodation.	Early childhood, primary and junior high school. Facilities currently rundown, no proper teachers' houses.
	Primary	6	9	Library.	
Kungembit	None	-	-	Nearest school is in Kungim.	Previously had elementary school but not anymore. Children go to school at Kungim or Ningerum.
Putmambin	None	-	-	Nearest schools are in Kungim and Komokpin.	Before had elementary school but not anymore. Some children go to school in Kungim while others go to Ningerum. This has forced the people move out of the village and settle at Alice Pit, Ningerum and Kiunga for services.



LEGEND

- Ok Tedi Mine
- Regional centre
- Study area village
- Road/track
- Watercourse
- Province boundary

- Proposed TSF footprint
- Proposed infrastructure corridor



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SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

LEGEND

Education facility

- Elementary School
- Primary School
- High School
- Vocational centre
- Community building

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FIGURE 6.7

Education facilities used by the study area communities



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Photo credit: Tetra Tech Coffey, 2025

Plate 6.32
Komokpin Primary School

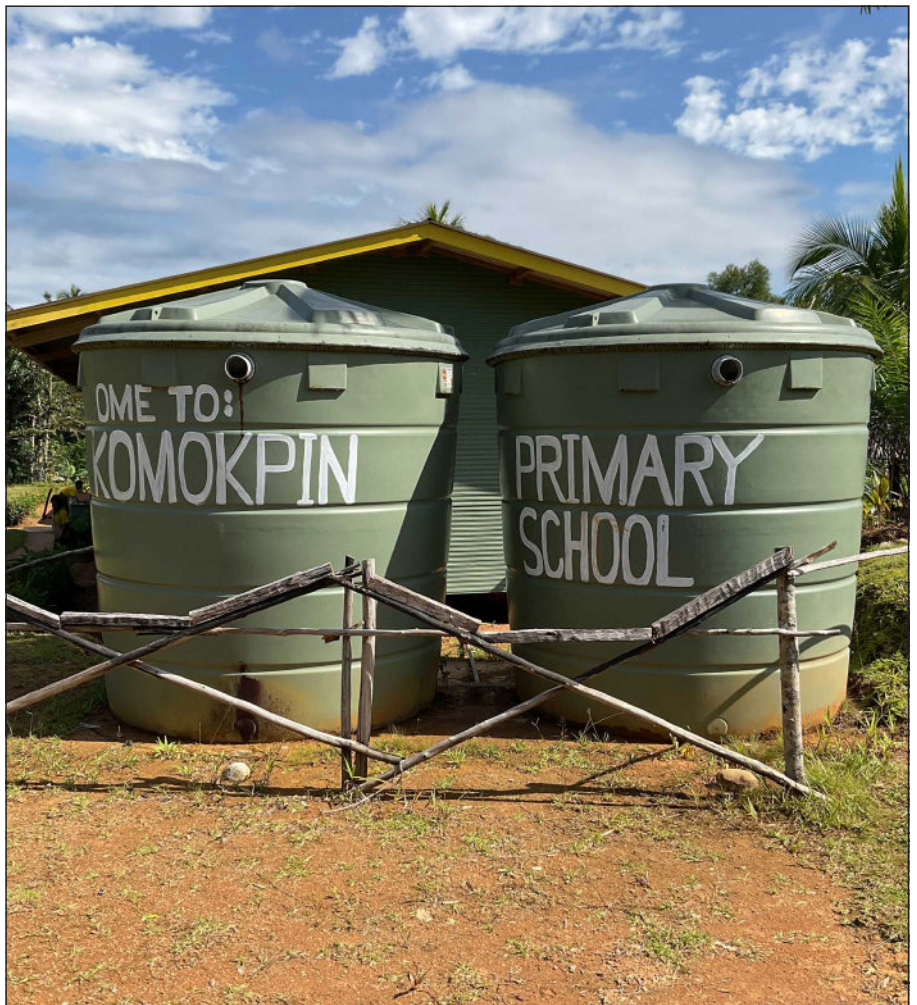


Photo credit: Tetra Tech Coffey, 2025

Plate 6.33
Komokpin Primary School rainwater tanks

6.1.4.3 Support infrastructure

This section provides an overview of infrastructure that supports the societal and economic function of the TSF communities. Support infrastructure is defined as access and connectivity including transport routes, power and communications services, and law and order services.

Access and connectivity

The Kiunga–Tabubil Highway is the main road in the region and connects the service centres from Tabubil in the north, to Kiunga in the south. The study area borders Indonesia to the west, with a formal border crossing point on the Indonesian side at Yetetkun PLBN. The ITCS Road, which is currently under construction, will connect the PNG border with Indonesia to the Kiunga-Tabubil Highway at Alice Pit with a bridge crossing of the Ok Tedi at Birimkamba (Plate 6.34). Construction of the road was announced by OTML in 2024 with the aim of providing local communities with *'better access to cheaper goods and services that foster social and economic growth'* (OTML 2024). The road currently provides access for pedestrians to villages of Putmambin, Ambaga and Birimkamba and is described by communities as being in a fair to good condition.

Travel between TSF communities, to areas used for livelihood activities, and other locations such as the Indonesian border, and Alice Pit mainly occurs on foot using bush tracks (Plate 6.33), or by dinghy or canoe along creeks and rivers (Plate 6.36). Access routes mapped during the field investigations in 2025 are shown in Figure 6.8. The village survey asked participants to identify the main type of road into the village and its condition. Karandimok, Kungim, Kungembit, Putmambin and Komokpin are all accessed by bush track. These bush tracks were described as being in fair to good condition, except for Komokpin with feedback indicating that this track has worsened as the result of people neglecting the track and instead opting to use motorised boats or PMV from Alice Pit.

During consultation, community members noted that people regularly travelled to the Indonesian border to purchase items and to trade. Travel time to the border takes about one and a half hours from Komokpin, two hours from Kungim, and two to three hours from Putmambin. The construction of the ITCS Road will improve these connections. Community members stated that when travelling along roads and bush tracks, they primarily travel by foot, with travel time varying between villages. Feedback from FGDs on travel time between TSF communities indicated that travel:

- To Kungim from either Kungembit or Putmambin takes about one to two hours each way by walking, while travel from Birimkamba or Ambaga takes about three to four hours.
- Between Kungembit and Karandimok takes about one and a half hours, while travel from Birimkamba to Kungembit can take three to four hours each way.
- Between Ambaga and Birimkamba travel takes about two hours by walking, and between Ambaga and Komokpin between two to three hours.

People across the study area commonly reported travelling by a combination of walking, canoe/boat and public motor vehicle (PMV) when visiting centres such as Kiunga and Ningerum. Community members reported that travel to Ningerum costs between PGK15 from Karandimok, including PGK10 for the boat to Alice Pit and PGK5 for the PMV to Ningerum. From Kungim, the cost of travel is between PGK30 and PGK40, which includes costs for boat travel to Alice Pit of about PGK25 to PGK30.

When travelling by river, people from Birimkamba, Karandimok, Komokpin, Kungembit, Kungim and Putmambin use a dinghy or canoe. Feedback from participants of the FGD in Putmambin reported that travel via boat/dinghy from Putmambin to Komokpin was PGK20. Canoes are used to travel via river in Ambaga, though walking is the preference. Similarly, use of canoes was noted by the men from Komokpin during FGDs.

Markets in PNG are important spaces for the generation of income, purchasing food and for informal meetings and socialisation (Kopel 2021). Key markets accessed by TSF communities are at Ningerum, Kungim and Alice Pit, as shown in Figure 6.9, although people from Kungim, Putmambin and Ambaga also reported accessing markets at Yetetkun PLBN. The livelihoods of people in the region are dependent on accessibility to markets to sell cash crops (OTDF 2018). TSF communities face barriers in accessing markets due to limited transport access, long distances, and high travel costs. Women in the TSF communities reported that they generally travelled to the market at least once a week.

TSF communities, except for Komokpin, reported that they had mobile phone coverage through Digicel PNG. The TSF communities reported the quality of their communication services to be fair to good, and improving compared to previous years.

Law and order

Law and order services are limited in the TSF communities. There are no police stations in the villages, with the nearest station at Ningerum. The Ningerum police station currently has one permanent officer, with support from around 20 auxiliary police personnel who are mostly volunteers. Courthouses are in Kiunga and Tabubil. Community feedback reported that village leaders were commonly the first option for resolving community safety issues or disputes, followed by ward councillors in some instances, with more serious issues being taken to the police in Ningerum.

6.1.4.4 Sanitation

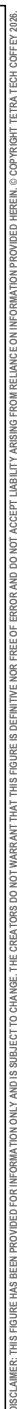
Inadequate sanitation and hygiene facilities are a common health concern across PNG, with most households lacking access to improved sanitation facilities (PNG IMR 2021). Improved sanitation includes the use of pit toilets with a concrete slab, flushing toilets and composting toilets. These facilities prevent contact with human waste and reduce transmission of diseases such as typhoid and cholera (PNG IMR 2021). Unimproved sanitation involves the use of pit toilets without a concrete slab or open defecation (e.g., bush or river). Consistent with rural PNG, most households within the TSF communities indicated that they either shared or owned an unimproved sanitation facility, ranging from 57.9% (Ambaga) to 94.1% (Birimkamba and Kungembit) (see Table 6.14). Ambaga has the highest proportion of households with improved sanitation facilities (36.8%) and Kungim has the highest proportion of households with no sanitation facility (17.6%).

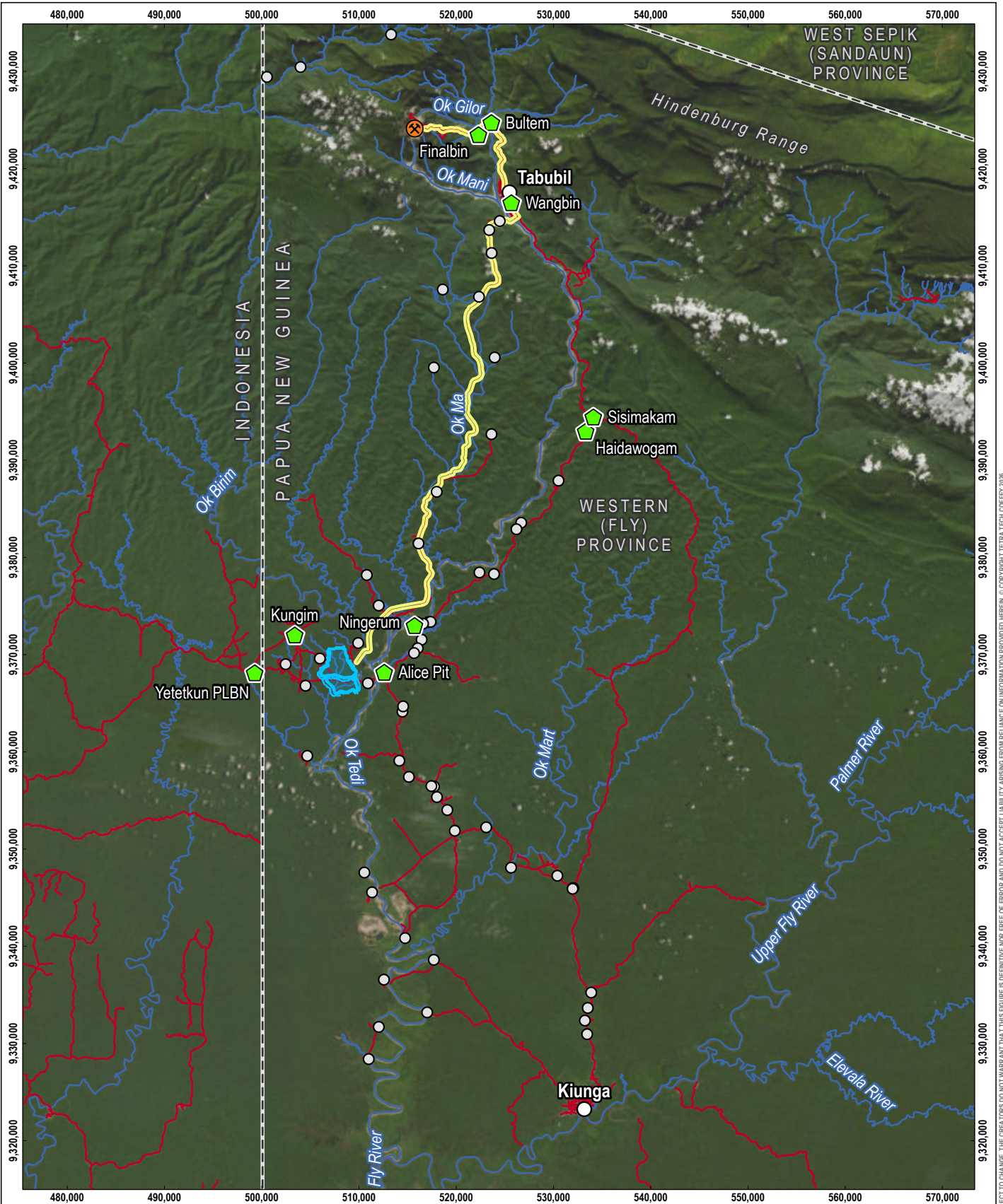
Table 6.14 Household sanitation facilities

Sanitation facilities	Unimproved sanitation		Improved sanitation
	No facility – use neighbour's toilet	Own pit toilet – open pit/pit without a slab	Own pit toilet – with septic tank or piped sewer system or pit with slab
Ambaga	5.3%	57.9%	36.8%
Birimkamba	0.0%	100.0%	0.0%
Karandimok	0.0%	92.3%	7.7%
Komokpin	8.3%	91.7%	0.0%
Kungembit	0.0%	94.1%	5.9%
Kungim	17.6%	82.4%	0.0%
Putmambin	4.5%	90.9%	4.5%
Rural PNG*	NA [†]	67.3%	2.8%

* Source: PNG IMR 2021

† Note: NA: Not available.





LEGEND

- Market stall
- Ok Tedi Mine
- Regional centre
- Study area village
- Road/track
- Watercourse
- Province boundary
- Proposed TSF footprint
- Proposed infrastructure corridor



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Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.9

Locations of market stalls



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Plate 6.34
ITCS Road, looking west from the Ok Tedi



Photo credit: Tetra Tech Coffey, 2025

Plate 6.35
Bush track, Birikamba village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.36
Dinghies located on the bank of the Ok Kaman,
Komokpin village



Photo credit: Tetra Tech Coffey, 2025

6.1.5 People's productive capacity

This section summarises the wellbeing and environmental conditions conducive to survival and participation in society and its economy. It includes details on use of health services and health indicators; education; and food and water security.

6.1.5.1 Health

Household survey participants were asked to indicate when the last time anyone in their household used a health service. Household access to health services varied, with responses ranging from within the previous month to between one to six months prior to the survey (Appendix A).

Table 6.15 shows the main illnesses reported by households in the previous four weeks. Illnesses within TSF communities most often reported during the household survey included malaria, diarrhoea, stomach pains and respiratory diseases such as tuberculosis (TB). TB is a key public health issue for communities in the study area and wider North Fly District and Western Province. The Western Province has one of the highest rates of TB, including multi-drug-resistant TB, in PNG (OTML 2026), with feedback from OTML's Health Services noting migration as a key pathway for the disease.

These illnesses are consistent with health data across PNG more broadly, which indicate that illnesses in PNG are mostly communicable diseases such as pneumonia, TB and diarrhoea (WHO 2016). Incidence of sanitation related communicable diseases, such as dysentery and diarrhoea, were commonly reported by health facilities in the North Fly district (PSSD Department 2023). These conditions are often environmentally influenced: they are spread from living in close contact with others, and having poor housing, water and sanitation conditions. As discussed in Section 6.1.4.4, most households in the TSF communities own or share an unimproved toilet facility.

Table 6.15 Self-reported illnesses experienced in the past four weeks by households

Illness	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmabin
Malaria	15.8%	23.5%	33.3%	25.0%	17.6%	5.9%	17.4%
Diarrhoea	5.3%	17.6%	20.0%	16.7%	35.3%	5.9%	4.3%
Stomach pains / cramps	5.3%	23.5%	13.3%	0.0%	29.4%	11.8%	8.7%
Other respiratory diseases	5.3%	0.0%	26.7%	16.7%	29.4%	23.5%	30.4%
Tuberculosis	0.0%	0.0%	0.0%	8.3%	5.9%	0.0%	0.0%
Skin sores / infections	5.3%	0.0%	0.0%	16.7%	5.9%	0.0%	0.0%
Maternal and child health issues	5.3%	5.9%	6.7%	0.0%	5.9%	0.0%	0.0%
HIV/AIDS and STIs*	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Eye and vision problems	0.0%	0.0%	0.0%	0.0%	0.0%	5.9%	0.0%
Other	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	4.3%

Note: All data is self-reported, and no medically qualified personnel were involved in the collection of this data.

* HIV (human immunodeficiency virus), AIDS (acquired immunodeficiency syndrome), STIs (sexually transmitted infections).

Malaria prevention

Malaria is endemic in PNG, and in 2022 the malaria incidence rate was 163 infections per 1,000 persons (WHO 2024). In the North Fly District, the malaria incidence rate was higher, 194 infections per 1,000, 15% above the that for PNG and other districts in Western Province (GPNG 2021).

Ownership and use of mosquito nets is a key strategy in malaria prevention, particularly the use of insecticide-treated nets (NSO 2019). Table 6.16 shows ownership of nets and use by adults and children. Most households have mosquito nets; however, the ownership of nets was consistently lower across TSF communities than the broader data collected for Western Province (87.2%). All TSF communities, except Ambaga, reported a higher proportion of households with all members sleeping under treated nets compared to Western Province. The majority of households indicated they treated their nets between one to three years ago (Appendix A).

Table 6.16 Malaria control practices

Practice	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin	Western Province *
Households with mosquito nets	83.3%	68.8%	75.0%	66.7%	58.8%	62.5%	68.2%	87.2%
All household members sleeping under treated nets	85.7%	18.2%	62.5%	62.5%	62.5%	55.6%	66.7%	67.1%
All children under 5 years old sleeping under treated nets	0.0%	18.2%	12.5%	0.0%	12.5%	11.1%	0.0%	71.2%

* Source: NSO (2019)

6.1.5.2 Education status

Table 6.17 shows reported school attendance of individuals aged between 6 and 24 years old based on the household survey. Attendance of children at primary school was generally consistent with the attendance data for Western Province (54.1%). This excludes Putmambin, which had higher attendance rate (79.3%) and Komokpin which had a lower attendance rate (22.7%). Female attendance across the TSF communities was generally higher than male attendance.

Attendance of children at secondary school was generally lower than attendance data for the Western Province (17.1%). This excludes Kungim, which had a higher proportion of attendance for males and females when compared to the Western Province.

During FGDs, women noted the lack of education facilities in the villages and distance to school as a barrier to educational outcomes, in addition to women leaving school after year 10 to seek employment.

Because of a lack of education and the distance from school – makes women's give up on their education as they have to go live in different villages closer to schools. They give up in the middle of their education because they have to feed themselves and walk a long distance.

Table 6.17 Current school attendance

Attendance	Preparatory/elementary/primary school			Secondary school		
	Female	Male	Total	Female	Male	Total
Ambaga	10.5%	31.6%	42.1%	5.3%	5.3%	10.5%
Birimkamba	36.0%	12.0%	48.0%	8.0%	8.0%	16.0%
Karandimok	31.6%	26.3%	57.9%	10.5%	0.0%	10.5%
Komokpin	22.7%	0.0%	22.7%	4.5%	4.5%	9.1%
Kungembit	28.0%	28.0%	56.0%	4.0%	4.0%	8.0%
Kungim	36.8%	15.8%	52.6%	21.1%	5.3%	26.3%
Putmambin	34.5%	44.8%	79.3%	0.0%	0.0%	0.0%
Western Province*	54.6%	53.5%	54.1%	15.8%	18.1%	17.1%

* NSO (2019)

Table 6.18 shows the highest level of education reported by household survey participants aged 15 years and older in the study area. The most common level of education attainment across the TSF communities was reported to be preparatory, elementary or primary school, followed by secondary school. Feedback from engagement with Ningerum High School noted that most students who board at the school were students who lived in the TSF communities.

Students coming in from places like TSF communities tend to pay much more attention to education than students from within Ningerum or proximity to the station due to exposure and other social influences.

A higher proportion of males reported finishing secondary school and tertiary study compared to females across the TSF communities. This is consistent with FGDs, where women noted 'a lot of girls who are in school will get to an age where they stop going'. Community members and key informants noted that the main barriers to attending school were distance and school fees.

Table 6.18 Highest level of educational attainment

Education level	Gender	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin	Western province*
None	Female	6.7%	0.0%	0.0%	5.3%	5.6%	9.1%	0.0%	6.7%
	Male	5.3%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%
Preparatory/elementary/primary school	Female	53.3%	63.2%	57.1%	42.1%	50.0%	45.5%	63.2%	40.0%
	Male	47.4%	47.1%	30.0%	16.7%	61.1%	64.7%	54.5%	36.8%
Secondary school	Female	13.3%	21.1%	35.7%	15.8%	22.2%	40.9%	21.1%	13.3%
	Male	31.6%	35.3%	40.0%	38.9%	38.9%	47.1%	27.3%	31.6%
University/ Vocational/ technical college	Female	0.0%	0.0%	7.1%	5.3%	0.0%	4.5%	0.0%	6.7%
	Male	5.3%	11.8%	40.0%	11.1%	16.7%	11.8%	13.6%	15.8%

* NSO (2019)

Table 6.19 presents literacy rates across the TSF communities for adults (i.e., people over 15 years). All villages reported a similar level of literacy compared to Western Province. Literacy was the lowest for females in Ambaga, where distance to education facilities was stated by women as a barrier to education during FGDs. Literacy across the TSF communities was the lowest in Karandimok, with 59.1% literacy in females and 58.8% in males.

Table 6.19 Self-reported adult literacy rates

Literacy	Female	Male
Ambaga	39.1%	81.5%
Birimkamba	72.0%	87.0%
Karandimok	59.1%	58.8%
Komokpin	61.9%	72.7%
Kungembit	52.4%	76.9%
Kungim	69.2%	87.0%
Putmambin	53.6%	71.4%
Western Province*	67.4%	87.5%

* Source: NSO (2019)

6.1.5.3 Food security

Food insecurity is a common problem across PNG, with more than half of the population (57%) experiencing moderate to severe food insecurity (NSO 2019). Food security in the TSF communities was determined through several household survey questions that were used to assess the severity of food insecurity based on the Food and Agriculture Organisation food insecurity experience scale. Households with marginal or low food insecurity were identified as those who were concerned about having enough to eat in the last 12 months (FAO 2025). Skipping a meal in the last 12 months was used to identify households with moderate food insecurity, while households that ran out of food in the last 12 months were identified as experiencing severe food insecurity (FAO 2025).

Data from the household survey indicates that food insecurity is widespread across the TSF communities (Table 6.20), although TSF communities apart from Birimkamba and Komokpin experienced lower levels of food insecurity compared the North Fly District. Food security data for the North Fly District (Schneider 2021) indicates that 60% of households experienced severe food insecurity in the previous 12 months. Fewer households in all the TSF communities, except Birimkamba and Komokpin, experienced severe food insecurity compared to the North Fly District. Findings on food security for households in the TSF communities are summarised below:

- Birimkamba indicated instances of severe food insecurity, particularly during flood periods, with participants of FGDs reporting that gardens do not provide enough '*when it rains heavily*'.
- Feedback from Ambaga and Putmambin suggests moderate food insecurity with approximately half of households reporting concerns about having enough food, skipping meals, or food shortages.
- Putmambin households reported there have been some food shortages.
- Komokpin responses show more than about two-thirds of households reported instances of moderate and severe food insecurity.
- Remaining TSF communities (Karandimok, Kungembit and Kungim) indicate food insecurity is present but less widespread, with less households reporting concerns about having enough food, skipping meals, or food shortages. Karandimok and Kungim households reported that there have been some food shortages, while Kungembit households reported there has been sufficient food.

Concerns regarding the impact of the Ok Tedi Mine on natural resources and food security were raised during FGDs in Komokpin.

Table 6.20 Self-reported household food insecurity in TSF communities

Indicator	Households with no food security concerns	Households with marginal or low food insecurity	Households with moderate food insecurity	Households with severe food insecurity
Ambaga	47.1%	0.0%	5.9%	47.1%
Birimkamba	31.3%	0.0%	0.0%	68.8%
Karandimok	63.6%	0.0%	0.0%	36.4%
Komokpin	16.7%	8.3%	8.3%	66.7%
Kungembit	64.7%	0.0%	0.0%	35.3%
Kungim	70.6%	0.0%	0.0%	29.4%
Putmambin	45.5%	0.0%	0.0%	54.5%

Feedback from consultation noted that some staple foods are no longer available, including kau kau and taro in Kungembit, Birimkamba and Ambaga, and yam in Karandimok, Komokpin and Kungim. Households in Birimkamba also reported that sago was no longer available. No staple foods were reported to no longer be available by households in Putmambin.

The North Fly Food Security Survey Baseline Report (PSO Department 2023) noted that the diet of communities in the region was consistent with a traditional style diet, comprising a high consumption of sago, tubers, vegetables and fruits with moderate consumption of protein, and low consumption of dairy and sugar (PSO Department 2023).

Participants from all TSF communities self-reported that there was a mild level of malnutrition within their village. The North Fly Food Security Survey Baseline Report (PSO Department 2023) found that communities in the region generally ate two meals a day which mostly consisted of sago, tubers, vegetables and fruit. There was moderate to low consumption of tinned and fresh protein recorded by communities in the region. Without a balanced nutritional daily diet, communities in the North Fly District are more vulnerable to malnutrition and other health issues (PSO Department 2023).

Table 6.21 presents the coping strategies that households reported when they don't have enough food to eat. The most common coping strategies for households when they do not have enough food was to travel further to collect food, with households stating that they harvest sago and collect other traditional bush food sources.

All TSF communities, except Putmambin, indicated that trade stores were one of their primary food sources. In PNG, food sold in trade stores is often highly processed, low in nutritional value, and offers little variety (Schmidt and Fang 2021). A larger proportion of households in Komokpin (16.7%) reported not eating as a coping mechanism compared to the other TSF communities. This is consistent with the community experiencing widespread moderate to severe food insecurity.

Some households in the TSF communities, except Komokpin, reported that they did not experience food shortages. These households noted that they this was due to access to additional bush and riverine resourcing, including sago, fishing and hunting, and having money to buy food from trade stores.

Table 6.21 Food insecurity coping strategies

Coping strategy	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putnambin
Travel further to collect food	29.4%	50.0%	50.0%	41.7%	23.5%	41.2%	68.2%
Eat with others/relatives	17.6%	6.3%	8.3%	41.7%	23.5%	11.8%	4.5%
Do not eat	5.9%	12.5%	0.0%	16.7%	11.8%	11.8%	0.0%
Buy food from store	11.8%	0.0%	25.0%	0.0%	0.0%	5.9%	0.0%
Buy food on credit	0.0%	18.8%	0.0%	0.0%	5.9%	0.0%	0.0%
Never had food shortage	35.3%	12.5%	16.7%	0.0%	35.3%	29.4%	27.3%

Note: Multiple choice question. Responses may not equal 100%.

6.1.5.4 Water security

Drinking water sources

Basic drinking water services are defined as water from an improved source such as a household connection, public standpipe, borehole, protected dug well, protected spring and rainwater collection (e.g., tanks), within a collection time of not more than 30 minutes return trip (World Bank Group 2026; WHO 2023).

Drinking water sources used by households differed across the TSF communities depending on their location and whether it was wet or dry season Figure 6.10. The most common drinking water source reported by households are dug wells, followed by surface water, such as rivers, creeks and springs. This is consistent with drinking water sources reported in communities across North Fly District (PSSD Department 2023). A higher proportion of households in Komokpin reported the use of communal or household rainwater tanks during the wet season compared to the other TSF communities (Figure 6.10).

During the village survey, respondents from Karandimok and Ambaga noted that the community had rainwater tanks, however these required cleaning and maintenance, and as a result were not relied on by community members. Birimkamba also noted that a new rainwater tank had been installed in the community by the Rural Service Delivery Project.

Locations of drinking water sources across the TSF communities are shown in Figure 6.11. Examples of drinking water sources in the TSF communities are pictured in Plates 6.37 to 6.39.

Water security

Water security in the TSF communities was determined through several questions in the household survey and village survey, followed by FGDs. Responses to these questions were assessed using the availability, accessibility, acceptability and quality framework (Danish Institute for Human Rights 2014) to determine water security.

All communities had access to at least two different water sources that were used throughout the year. Communities reported that alternative water sources are used during different seasons to account for changes in water levels or quality, for example:

Sometimes when the small creeks we sourced water from dries up; they move on to the bigger streams and rivers.

During long drought when the tank water runs dry, community normally use the underground spring water for drinking and cooking.

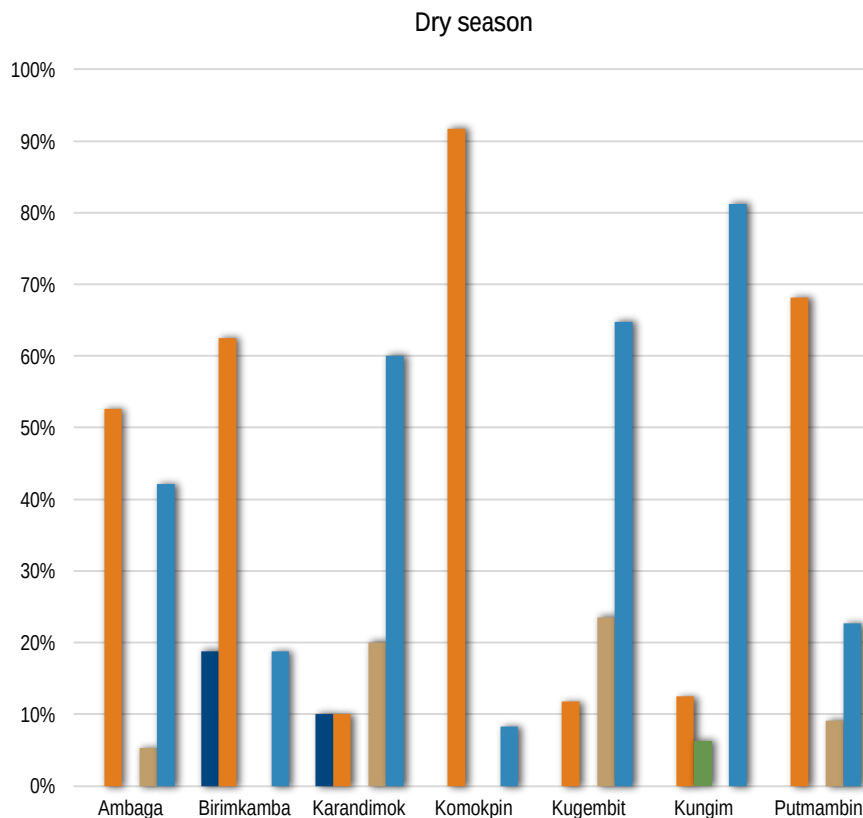
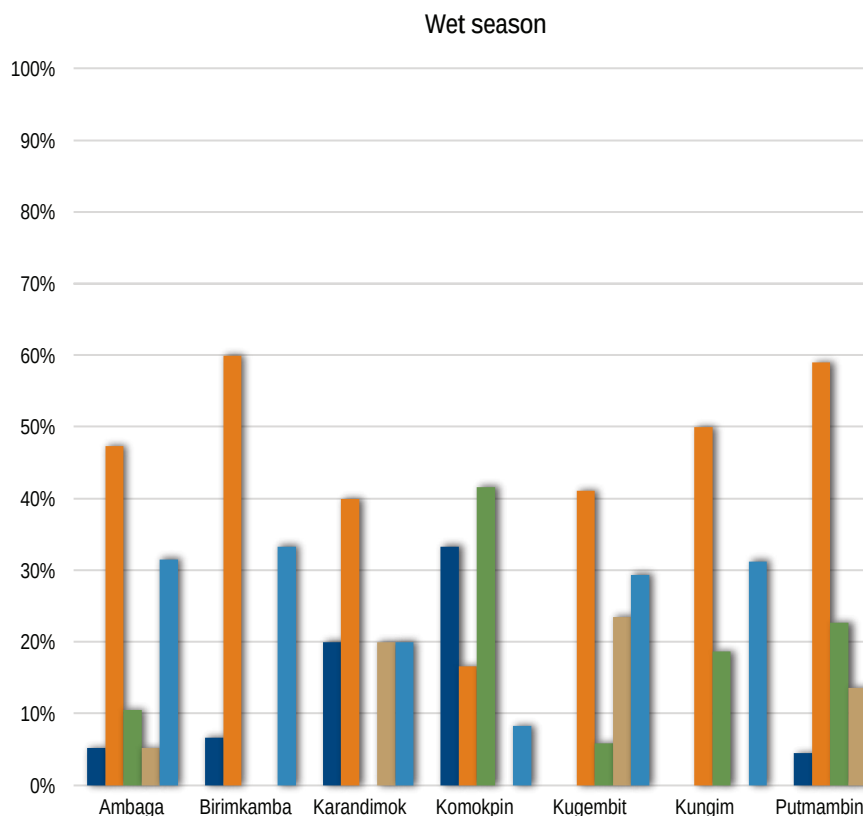
The self-reported availability of drinking water in all TSF communities, except for Komokpin, was sufficient. Komokpin reported some shortage of drinking water, however, it is unclear from the data collected why community members believe this is an issue.

All households reported that their water sources were within 30 minutes total collection time during both wet and dry seasons. Households did not report a change in total collection time between wet and dry seasons. This is consistently higher than the data for rural PNG which indicates that 84% of households have access to drinking water within 30 minutes or less (NSO 2019).

Most households surveyed reported that there were no issues with the quality of water from drinking water sources (Table 6.22). The most common water quality issue for households was sedimentation, particularly after rain. Some households reported that the water tasted bad or was 'tasteless', however these concerns were not expressed by all communities. For example, feedback from FGDs with community members from Putmambin reported that the spring water near their village tasted better than the rainwater collected in the water tanks.

Table 6.22 Reported drinking water quality issues

Issue	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
No issues	47.1%	46.7%	55.6%	58.3%	68.8%	92.9%	61.9%
Sediment	41.2%	33.3%	33.3%	0.0%	31.3%	0.0%	38.1%
Bad taste	5.9%	20.0%	11.1%	33.3%	0.0%	0.0%	0.0%
Discoloured	0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	0.0%
Odour	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%
Other	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%



LEGEND ■ Communal tank water ■ Surface water (e.g., river, stream creek, pond, etc) ■ Dug well ■ Household tank or drum ■ Spring

SOURCE
PSSD Department, 2023



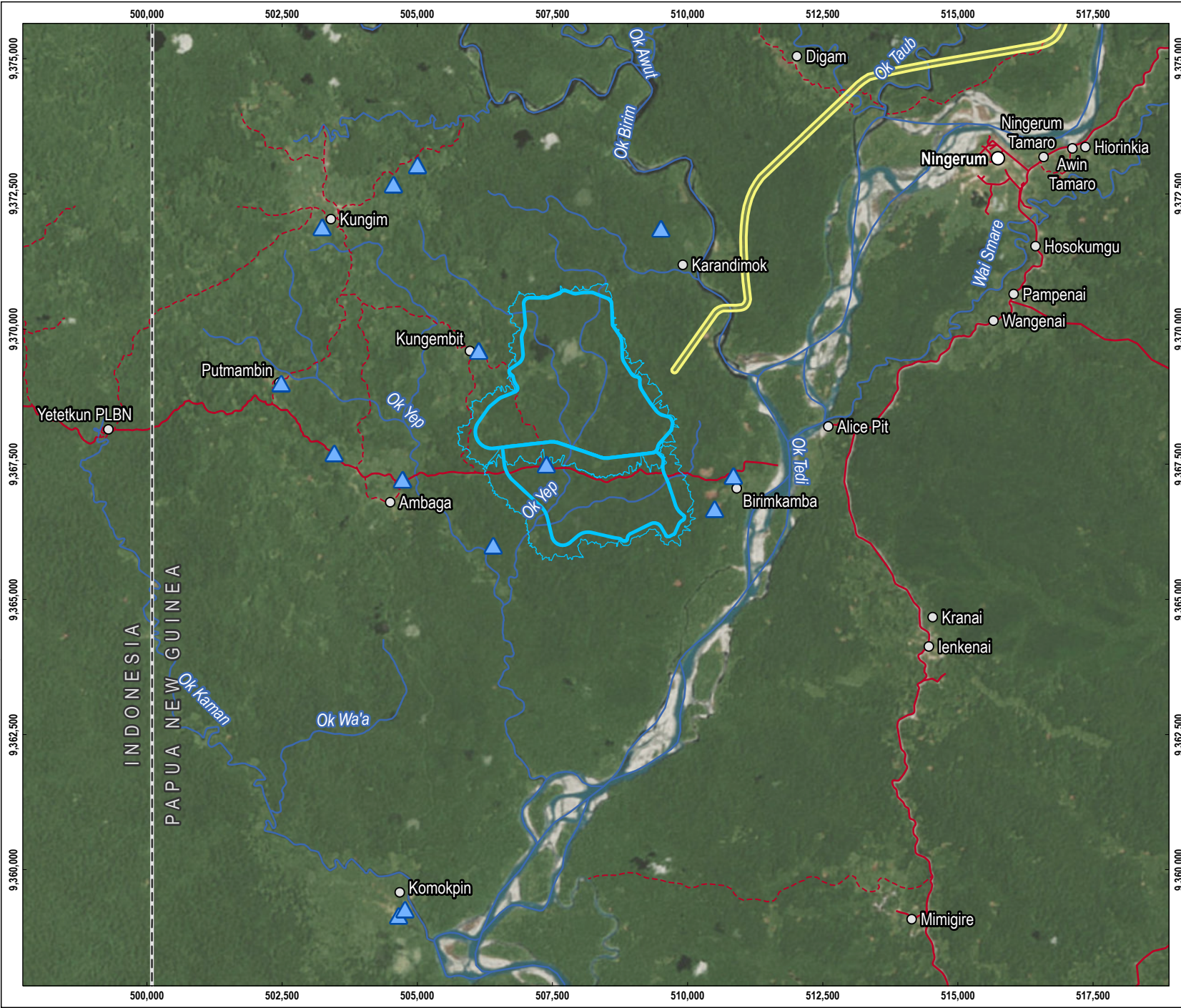
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FIGURE 6.10
Primary drinking water sources,
wet and dry season



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LEGEND

- ▲ Water source (drinking/cooking)
- Regional centre
- Study area village
- Road
- Track
- Watercourse
- International border
- Proposed TSF footprint
- Proposed infrastructure corridor

SOURCE

Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.



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FIGURE 6.11

Location of water sources



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Plate 6.37
Water source, Karandimok village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.38
Water sourced from spring, Birimkamba village



Photo credit: Tetra Tech Coffey, 2025

Plate 6.39
Rainwater tanks, Birimkamba village



Photo credit: Tetra Tech Coffey, 2025

6.2 INFRASTRUCTURE CORRIDOR

This section provides an overview of existing characteristics, values and features of villages and settlements along the infrastructure corridor on the western side of the Ok Tedi that may experience changes due to construction and operation of the project. Information presented in this section includes information collected through social fieldwork in October 2025, and secondary data sources, including CMCA population data held by OTML.

6.2.1 People, community identity and place

This section describes the setting of the infrastructure corridor communities, including a demographic profile of the people who live in the area, where they live and why.

6.2.1.1 Overview of infrastructure corridor communities

The infrastructure corridor (Figure 6.12) passes through land belonging to 21 communities, including:

- Mine communities of Antikink, Finalbin, Atemkit, Bultem, Kavorabip, and Wangbin.
- Kumkit and Ankit towards the northern section of the route.
- Ok Teditau, Nioksiwiki, Derongo, Bolewogam, and Bounkim, within and around the Ok Ma settlement.
- Walawan, Kolebon, Bumbin, Wurimkannatgo, Wogam, Wombom, Digam and Ningerum Tamaro towards the southern section of the route.

In addition, Seven Kona community is located on the western bank of the Ok Tedi (Plate 6.40 and Plate 6.41). The community was established in about 2008 and comprises a mix of settler communities (kona 1 to 4) and hamlets of Kumkit and Ankit (kona 5 to 7). Community members estimate that kona 1 to 3 have a total population of about 700 people, although it was suggested that this was over 1,000 people prior to the collapse of the Ok Tedi bridge. Feedback from consultation for the social characterisation noted that settlers came from across PNG including the Highland areas of Tari, Hela, Oksapmin from Sandaun Province, Awin peoples from Western Province, and people from Sepik and Wabag. The six mine communities have a total population of 4,672 people, of which about one third are in Bultem.

The Kumkit-Ankit community was established at its current location in 1992, by community members who migrated from their village west of the community. The agreement with landowners allows the community to live and conduct activities within certain locations and boundary extents. The main livelihood activities for people in Kumkit-Ankit include sale of betel nut, sago and garden produce and sale of gold from ASM. Land used for gardening and farming is generally within the boundary of the community agreed with landowners. The community reported restrictions on fishing and hunting within this area, with these activities conducted in their home villages, located approximately a day travel. Services such as health, markets and banking are mainly accessed in Tabubil, which is approximately 3.5 km by road/footbridge. Schooling is accessed in Tabubil and at Ok Ma, approximately 8 km south of Kumkit-Ankit by road.

The Ok Ma settlement is located approximately 10 km (direct line) southwest of Tabubil and approximately 12 km by road. The settlement was established in about 1985 on land of Ok Teditau, and comprises residents of Ok Teditau, Nioksiwi, Bounkim and Derongo. Plate 6.42 and Plate 6.43 show views of the community. Development of the settlement was mainly driven by better access to services (e.g., school, healthcare and markets). The CMCA population of the four communities was about 1,448 people in 2023 (OTML 2023), although community feedback reported that the population was approximately 1,000 people with other people living in their respective villages or elsewhere (e.g., Tabubil, Ningerum). It was reported that some people spend the weekends in their respective villages. The main livelihood activities of community members include sale of garden produce. Rivers and smaller waterways near the settlement are used for fishing, and water for drinking and washing. Overall, the community members describe the settlement as peaceful, with safety

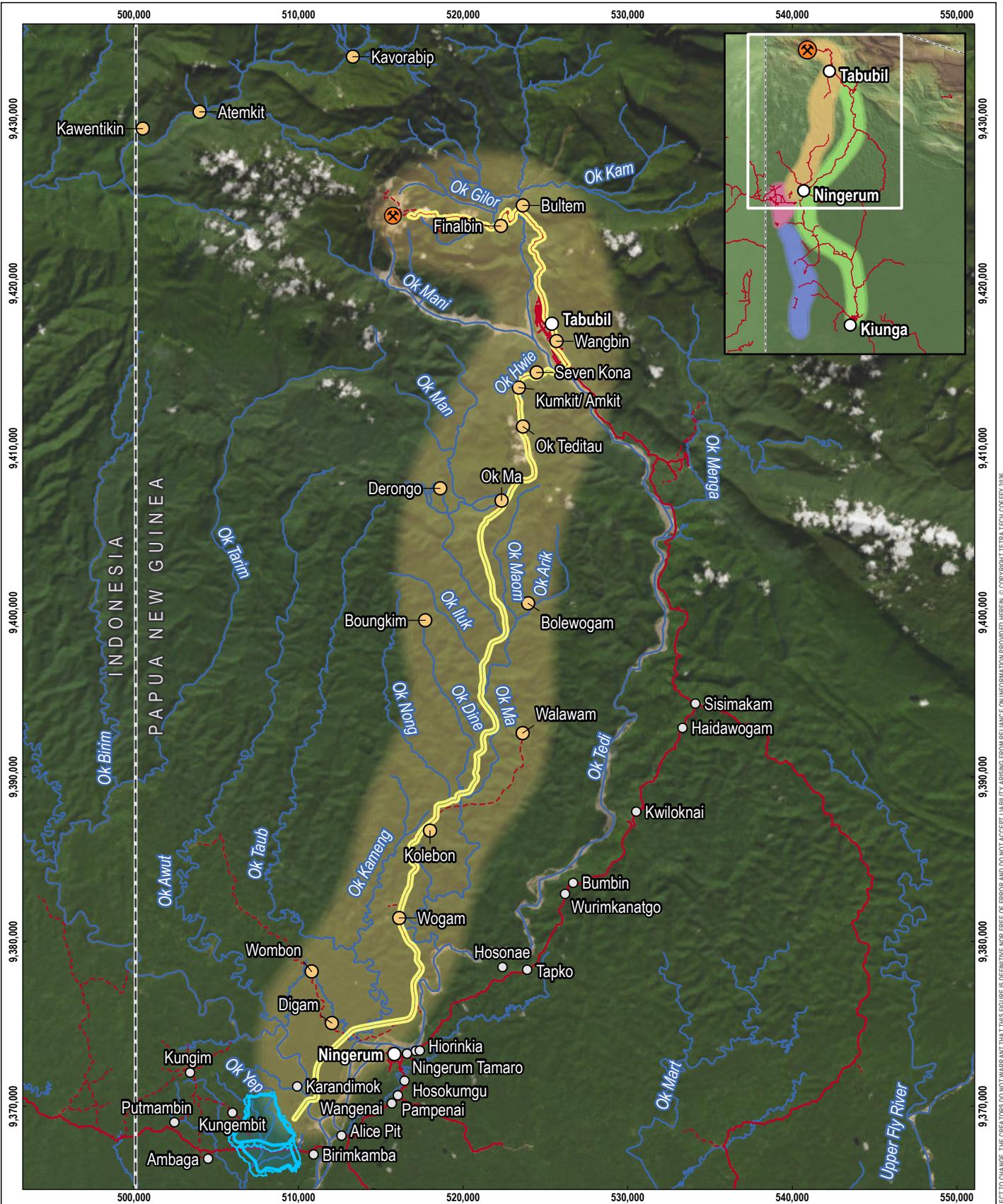
issues generally minor and manageable. An increase in drug and alcohol use has occurred over recent years, with this attributed to shifting perspectives and social changes introduced by younger generations. Access to Tabubil is by walking, which takes about three to four hours. Prior to the collapse of the Ok Tedi bridge in 2013, access to Tabubil would take about 45 minutes by road.

There are eight villages located south of Ok Ma settlement, including Kolebon, Walawam, Bolewogam, Bumbin, Digam, Ningerum Tamarao, Wogam and Wombon. People from each of the villages apart from Kolebon, Wogam, and Wombon have migrated to Ningerum or to settlements along the Kiunga-Tabubil Highway.

Kolebon was established at its current site in 1983 and includes clans from Kolebon and a previous village, Tingwi. Plate 6.44 shows an aerial view of Kolebon village looking northwest, while Plate 6.45 shows the hall at Kolebon village. The CMCA population of Kolebon was 376 people in 2023 (OTML 2023), although community feedback indicates that the population is about 319 people of which about 200 people live in the community. Other community members have migrated out (e.g., to Ningerum, Alice Pit) for school and work opportunities. Access to Ningerum takes about 4 or 5 hours walking via bush tracks. The village has a primary school and previously had an aid post, although this has not been operational since the early 2000s. Community feedback noted that some people conduct ASM activities in the Ok Tedi (Alice River), particularly young people, with income from ASM supporting daily expenses.

Bolewogam village is located south of Ok Tedi Mine. Most of the community have settled at four main locations: Ok Ma settlement, Bolewogam settlement on the Kiunga-Tabubil Highway (KM 117), settlement at KM 112 on the highway, and Guimdum. It is reported that people moved to the three settlements east of the Ok Tedi following the collapse of the Ok Tedi bridge in 2013. About 50 or 60 people continue to live at Ok Ma settlement, and about 10 people live in Bolewogam village. Community members return to the village weekly to carry out activities such as gardening due to restrictions on land available for gardening at the Bolewogam settlement. Access to the village involves crossing the Ok Tedi (by tube) and walking via bush track, with the trip taking between three and six hours. Sale of gold from ASM along the Ok Tedi is the main source of income for households, with community members reporting that people spend time daily at the river for 'panning purposes'. Other income generating activities including sale of garden produce at markets, and sale of groceries at stalls and roadside markets at Bolewogam settlement.

Many community members relocated from Wogam in about 1964, with about half of the 600 people living at Wogam settlement, and the remaining population spread across other locations including garden houses in the wider Wogam area, Tabubil and Ningerum, and other provincial towns. The village has a school and aid post with a voluntary community health worker. The main income generating activities for households in Wogam include sale of garden produce, and ASM. Alluvial mining is conducted by men and women (*'basically those that have the strength and energy to do so'*) with money from ASM used for school fees and purchase of essentials. Local creeks are used for catching fish and prawns to eat.



LEGEND

- Ok Tedi Mine
- Infrastructure corridor community
- Regional centre
- Study area village
- Road
- Track
- Watercourse
- Proposed TSF footprint
- Proposed infrastructure corridor
- Study sub-area**
 - Infrastructure corridor communities



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SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.12

Infrastructure corridor communities



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Photo credit: Tetra Tech Coffey, 2025

Plate 6.40
Aerial view of Seven Kona community



Photo credit: Tetra Tech Coffey, 2025

Plate 6.41
Seven Kona community



Plate 6.42
Housing, Ok Ma Community



Plate 6.43
Recreation area, Ok Ma community



Plate 6.44
Kolebon village, looking northwest



Plate 6.45
Hall, Kolebon village

Community members in Digam, Ningerum Tamarao, and Wombon mainly reside in Ningerum. The total CMCA population of these villages is 1,224 people, although feedback during consultation noted that the total population is about 850 people, which includes people living in the original Digam and Wombon villages. Feedback from community members about each of the villages included:

- Digam – most people from the village migrated to Ningerum in 1964 due to better access to schools and employment opportunities. Approximately five to seven families remain in the village, and many community members return daily or weekly for activities such as gardening, hunting, tending to graves, etc. Access to the village is by bush track. Key livelihood activities include selling of gold from ASM, marketing, and sale of garden produce.
- Ningerum Tamarao – the community relocated to Ningerum in the 1950s to have access to goods and services. No people live in the original Tamarao village, although there are a small number of garden houses at Brekonem village that people use when they return for hunting and gardening. Brekonem is the location of the village prior to the community's relocation to Ningerum.
- Wombon – many community members of Wombon relocated to Ningerum in 1999. About a third of the village's estimated population (400 people) live in the village. The main income generating activities for the community include sale of garden produce at the Ningerum market and in the community, and sale of gold from ASM. The village is located about two to three hours walk from Ningerum. Community members return to the village daily to carry out livelihood activities (e.g., gardening) as they do not have land available at Ningerum.

6.2.1.2 Demographics

Table 6.23 presents information on the CMCA population for villages along that section of the infrastructure corridor west of the Ok Tedi. The total population of villages in this section was 4,853 people in 2023, although this includes people that have relocated away from the village, for example to settlements along the highway, Ningerum, Tabubil or other PNG provinces. Most of the infrastructure corridor communities had more females than males, and apart from Kumkit, Boungkim and Wogam, sex ratios in the infrastructure corridor communities was below the Western Province.

Table 6.23 Infrastructure corridor population and housing, 2023

Village	CMCA population	Sex ratio: males per 100 females	Households
Ankit	209	97	64
Kumkit	251	111	76
Ok Teditau	265	91	73
Nioksikwi	315	101	75
Boungkim	248	114	43
Derongo	620	91	118
Bumbin	161	94	31
Kolebon	376	97	76
Bolewogam	281	95	54
Wogam	613	104	124
Ningerum Tamarao	232	88	61
Digam	417	100	88
Walawam	290	72	52
Wombon	575	103	122

Source: OTML 2023 CMCA data

Migration

Many communities within the infrastructure corridor have relocated to settlements along the corridor (e.g., Ok Ma, Seven Kona), along the Kiunga-Tabubil Highway, or regional centres such as Ningerum or Tabubil for better access to services such as schools, health and markets. Within the infrastructure corridor, land belonging to the customary landowners of Ok Teditau accommodates a number of settlements, including Seven Kona, Kumkit and Ankit community, and Ok Ma settlement. Settlement on the land has occurred with the agreement of landowners. Community feedback from Kumkit-Ankit noted that the agreement with the customary landowners allowed community members to live and conduct activities within certain locations and boundary extents, with restrictions on some activities such as hunting and fishing. As a government station, land within Ningerum is state land.

6.2.1.3 Social cohesion and community safety

People within the infrastructure corridor generally perceive their villages to be safe and free from major crime, although issues related to in-migration of outsiders and drug and alcohol use were raised across the communities during engagement. Social issues associated with drug and alcohol use and related nuisances were reported in Bolewogam, Kumkit-Amit and Ok Ma. Community members mainly attributed this to outside influence from in-migrants, social changes introduced by younger generations, and lack of formal employment opportunities. Examples of feedback included:

This generation has not been brought up or nurtured with strong cultural and moral practices at home.

The issue of drug and alcohol use began emerging around 2014. These challenges are linked to shifting perspectives and social changes introduced by the younger generation. Our time (grandfathers and up) since 1985, we are okay, we live and manage issues peaceful with respect.

The community lacks activities to keep people occupied and away from drug and alcohol use.

Many do not have formal employment where they can be guided by company policies and codes of conduct.

Concerns regarding women's safety were raised during consultation with community members in Seven Kona where it was reported women feel '*unsafe in their own community*' and when commuting to and from work. Other law and order issues raised by community members included sorcery, stealing, and domestic issues. Internal disputes and clan-related conflict was not widely reported, although it was noted that conflict can occur particularly when alcohol consumption is involved.

Communities mainly rely on local law and order mechanisms to manage disputes and maintain peace, with Kolebon, Ok Ma, and Wogam noting that village courts, peace committees and peace officer are used to resolve issues at the community level. More serious matters are referred to police stations at Ningerum or Tabubil.

Concerns from some infrastructure corridor communities about the potential for the project to increase law and order issues related to in-migration were noted during consultation, including that women will not be able to move around freely. Conversely, some people considered that law and order issues may reduce due to improved access that will allow greater police presence in communities. The deteriorating road and damaged bridge are currently reported to cause delays in law enforcement and emergency services responses.

6.2.1.4 Landscape and amenity

The infrastructure corridor extends from the Ok Tedi Mine to the TSF south of the Ok Birim, following a predominantly north-south alignment through the Star Mountains and Ningerum Rural LLGs. The landscape varies along the corridor from the rugged, steep-sided valleys and dissected ridgelines near the Ok Tedi Mine and Tabubil area, through mid-slope forested terrain along the Kumkit-Ankit and Ok Ma settlement sections, to more gently undulating landforms and alluvial floodplains surrounding the lower Ok Tedi and Ok Birim catchments near Ningerum and the proposed TSF site.

Seven Kona, Kumkit-Ankit, and Ok Ma communities located closer to Tabubil, are situated on low ridges and terraces between the Ok Ma in the west and the Ok Maun in the east. Settlements are dispersed, with traditional dwellings interspersed among gardens and secondary forest regrowth. These communities maintain active subsistence lifestyles.

Further south, Digam, Wombon, Wogam and Kolebon villages are located along tributaries of the lower Ok Tedi. These areas are defined by gently undulating landforms, extensive river corridors, and high forest cover. Residents rely heavily on gardening, alluvial mining, and fishing. Despite proximity to Ningerum and Kiunga–Tabubil Highway, the landscape retains a predominantly natural and undeveloped character, with forested hills providing a natural serenity setting.

Amenity values across the corridor communities are like the TSF communities which are closely connected to the quality, accessibility, and integrity of the natural environment. From the FGDs community members have expressed that the forest and rivers define their sense of place: they provide serenity, livelihood, and cultural grounding. Open areas within villages are used for gardening, recreation, and social gatherings such as funerals and '*haus krai*', which rely on the natural setting to uphold customary practices and social bonds. Seasonal and daily movements through the landscape to access gardens, fishing grounds, and hunting areas, reflect a relationship between residents and their surrounding environment.

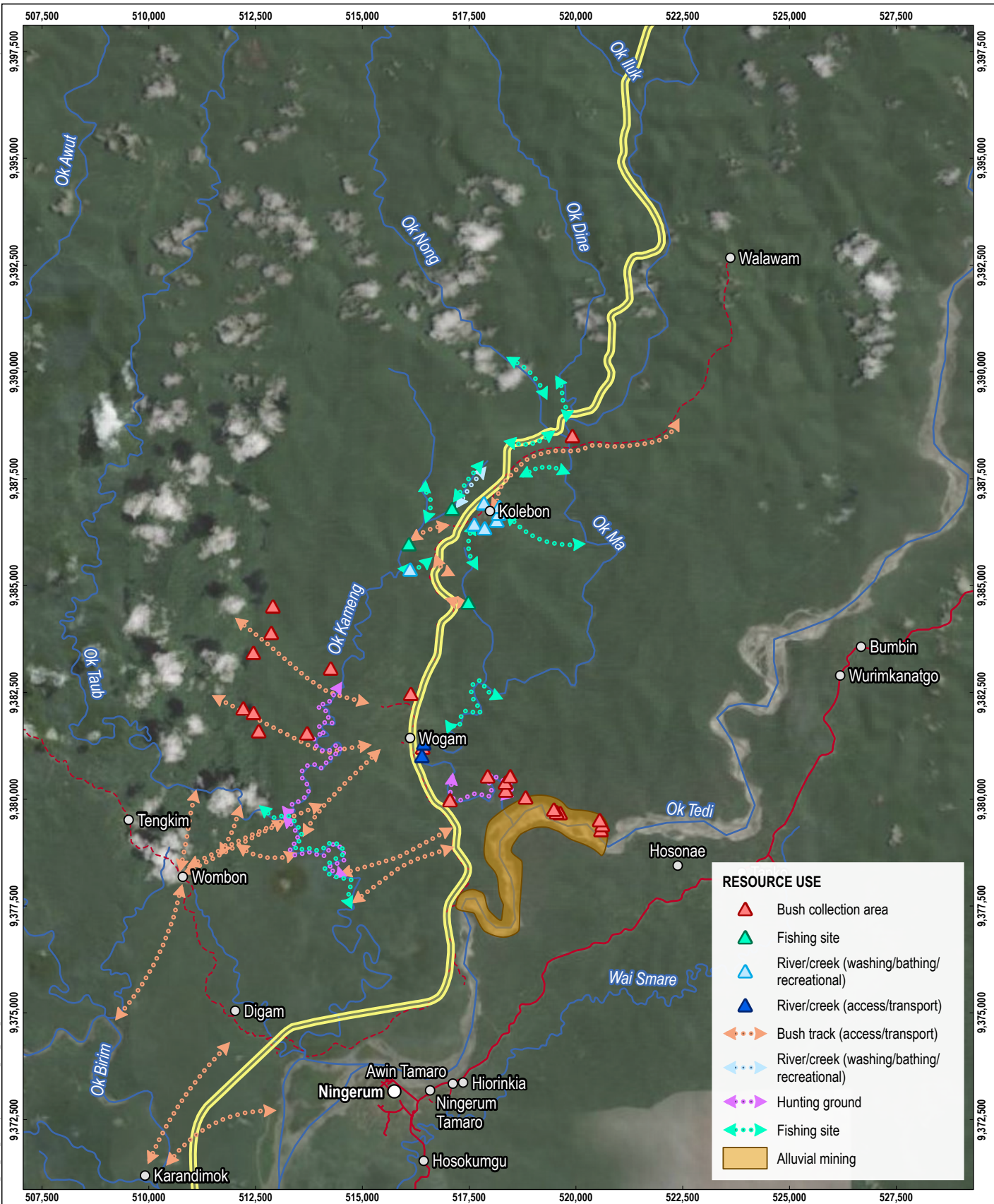
6.2.2 Economy and livelihoods

This section describes how people make a living and the economic composition of the infrastructure corridor communities, including natural resource use (i.e., terrestrial and riverine resources used to support livelihoods), employment and income sources, and housing characteristics.

6.2.2.1 Natural resource use

Livelihoods among the communities situated along the infrastructure corridor are primarily dependent on the use of natural resources. As in much of the North Fly District, the forest, rivers, and land provide the basis for food, shelter, and income generation. FGDs undertaken in Kumkit-Ankit, Ok Ma settlement (Ok Teditau, Nioksikwi, Derongo and Bounkim), Kolebon, Ningerum waterfront (Digam, Wombon and Ningerum Tameron), Bolewogam, and Wogam indicate that subsistence gardening, hunting, fishing, sago harvesting, and ASM are the principal livelihood activities. Small-scale marketing of produce and cash crops such as betel nut also provides a supplementary source of household income, with earnings from the sale of garden produce often used to purchase store-bought goods, such as rice, tinned fish, cooking oil, salt, and sugar, for resale within the communities. Other sources of income exist, with a small pool of people in the communities formally employed or engaged in casual labour.

Figures 6.13 to 6.16 provide an overview of natural resources use across the infrastructure corridor communities, including access routes.



LEGEND

- Regional centre
- Study area village
- Road
- Track
- Watercourse
- Proposed infrastructure corridor



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PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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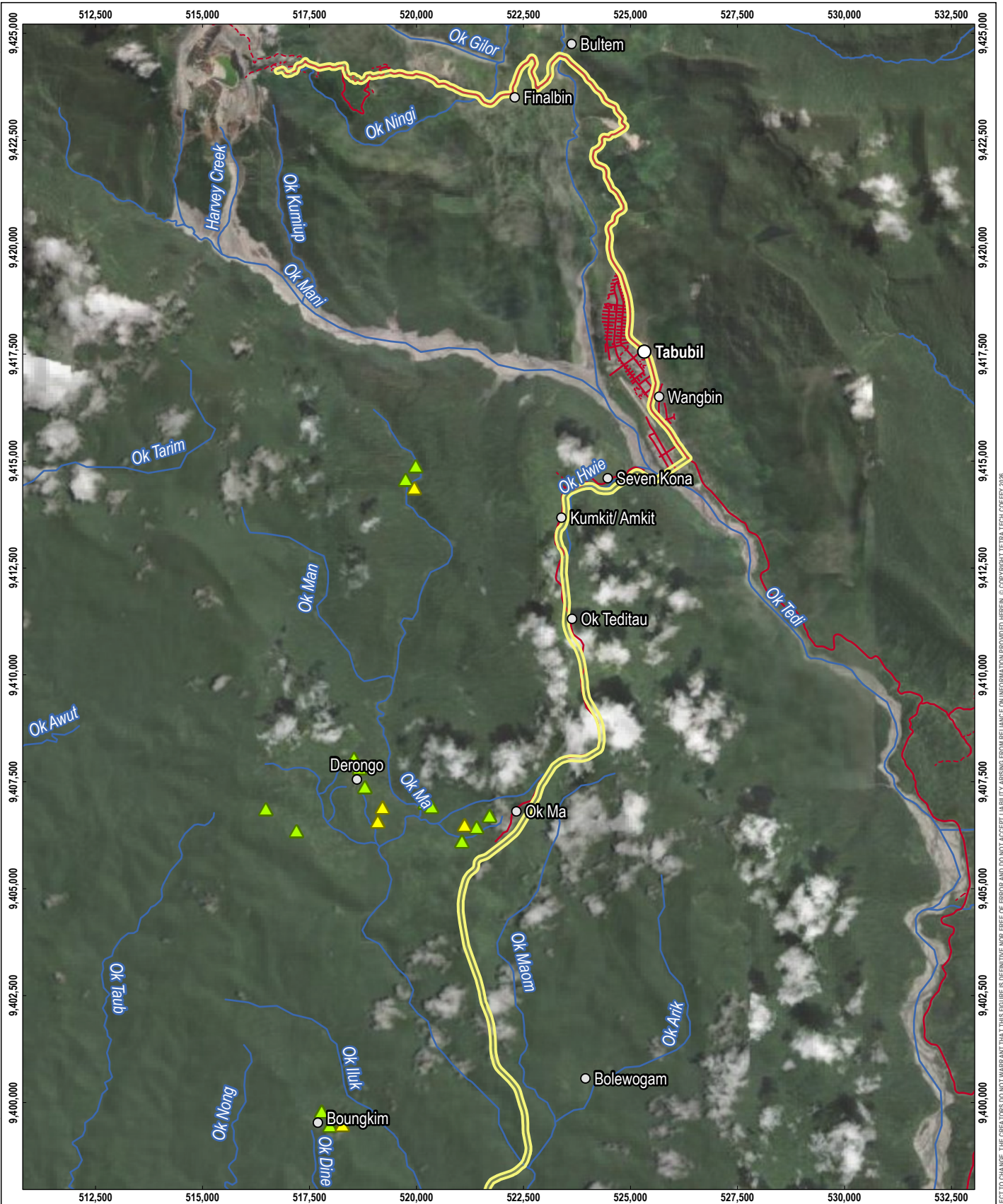
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FIGURE 6.14

Natural resource use mapping - southern portion of the infrastructure corridor



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LEGEND

- Regional centre
- Study area village
- Road
- - - Track
- Watercourse
- Proposed infrastructure corridor

Resource use

- ▲ Garden area
- ▲ Sago stand



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SCALE 1:125,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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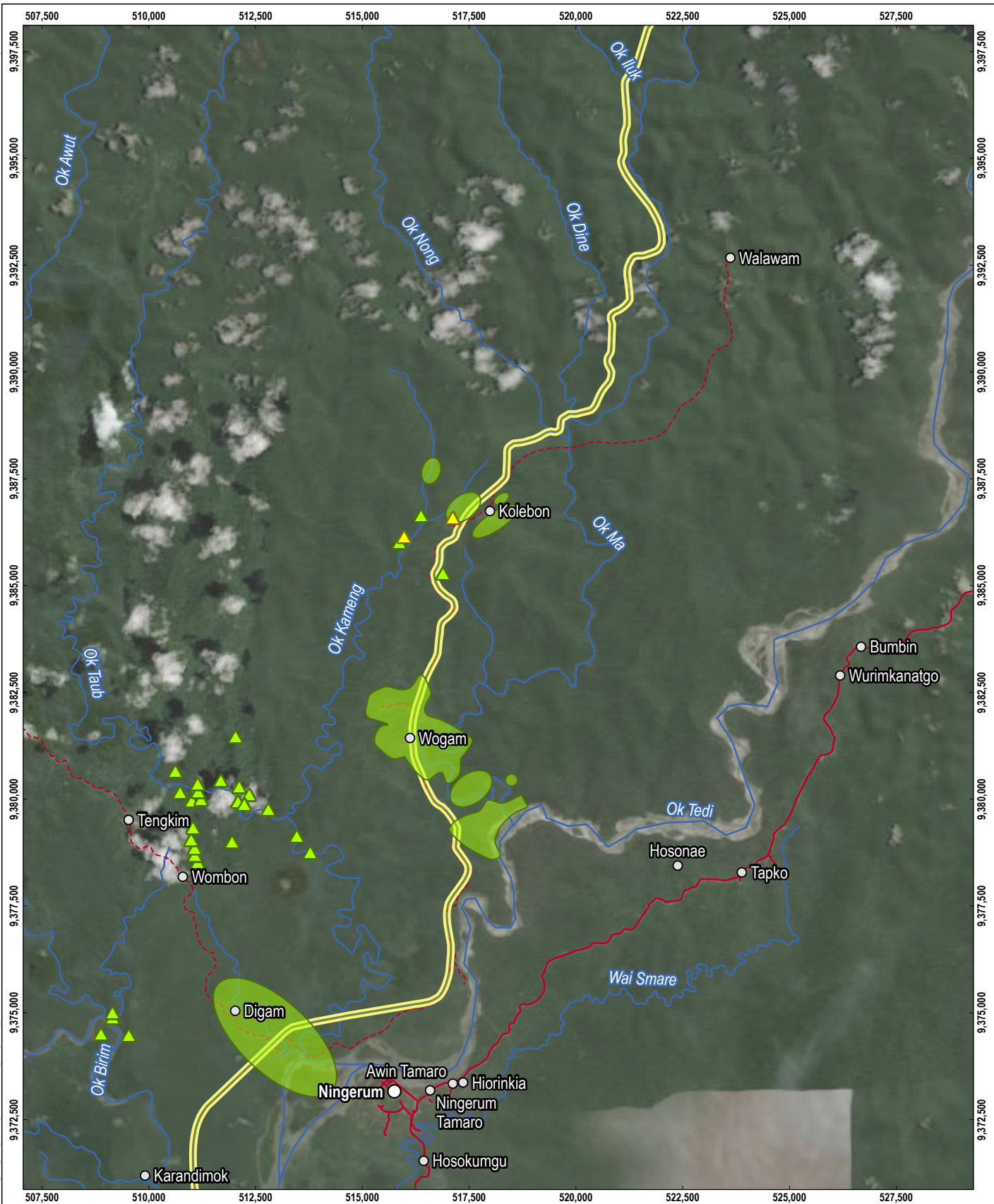
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FIGURE 6.15

Garden and sago stands - northern portion of the infrastructure corridor



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LEGEND

- Regional centre
- Study area village
- Road
- - - Track
- Watercourse
- Proposed infrastructure corridor

Resource use

- ▲ Garden area
- ▲ Sago stand
- Garden area



0 1 2 km
SCALE 1:125,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.16

Garden and sago stands - southern portion of the infrastructure corridor



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Gardening

Subsistence gardening is the dominant livelihood and primary source of staple foods for all corridor communities. Gardens are typically located adjacent to village clearings or along river terraces and low ridges where soil fertility and accessibility are favourable. The main crops cultivated include banana, cassava, taro, sago, sweet potato (*kau kau*), aibika, corn, and leafy greens. These gardens provide food for daily consumption and limited surplus for sale at nearby markets in Tabubil, Wangbin and Ningerum.

FGDs across the corridor communities indicated that households rely heavily on gardening for food security, often maintaining gardens in several locations such as near their homes and along rivers or ridges. Women were identified as primarily responsible for planting, weeding, and harvesting, although gardening is generally a shared household activity involving men and older children. Decline in soil fertility and pest damage, particularly from wild pigs, rats, and insects were commonly reported challenges, especially in Kumkit-Ankit and Bolewogam. Participants also noted that because families prefer to establish gardens close to their villages for convenience and security, the same plots are used repeatedly, reducing soil fertility and crop yields over time.

Seasonal weather events, including droughts and flooding, were identified as major factors influencing gardening success. Community members observed that changing rainfall patterns and periodic flooding along the Ok Tedi and Ok Ma frequently damage gardens established on alluvial flats.

Cash crops

Cash cropping and the sale of surplus produce represent an important, though secondary, component of livelihoods for infrastructure corridor communities. Betel nut was identified across all FGD sites as the most common cash crop, favoured because it is light, easily transportable, and can be sold in small quantities for regular income. Other cash crops cultivated in smaller quantities include peanuts, pineapples, and corn. Rubber, balsa, and eaglewood were mentioned in Wombon as potential cash crops; however, these are largely inactive due to the lack of road access and market connectivity. Garden produce and betel nut are sold at local roadside stalls or transported to Ningerum and Tabubil markets, often by boat or on foot. The income generated is typically used to purchase basic goods, school fees, and building materials. Participants in Bolewogam and Kumkit-Ankit emphasised that the remoteness of their original villages and poor road access limit marketing opportunities and increase transport costs, reducing the profitability of agricultural sales.

Hunting and bush resource collection

Hunting and the collection of forest resources are important livelihood activities for the corridor communities and form part of their traditional way of life. Hunting is mainly carried out by men, while women collect firewood, fruits, and materials for household use. The main animals hunted are wild pigs, cassowaries, birds, and lizards. Sago palms are also harvested as an important food source and for building materials.

Hunting areas are located within clan boundaries, and community members stated that they do not hunt or collect resources outside their customary land. Within their own territories, firewood, timber, sago leaves, and plants for traditional medicine are commonly collected for daily use. In Digam and Wombon, participants described the continued use of medicinal plants for treating sickness and pain, and noted that older women hold most of this knowledge. Community members also reported that wildlife is less abundant than in the past, and that hunters now travel further into the bush to find animals.

Fishing and riverine resource collection

Rivers and creeks, including the Ok Ma and other nearby waterways, are used by communities for daily activities including fishing. Rivers identified by community members during FGDs that are used for fishing included the Ok Maung, Ok Arok, Ok Tap, and Ok Am. Fishing was undertaken by both men and women, with local communities collecting prawns, crayfish, small and large fish including catfish, and eels from creeks and larger fish in the Ok Ma. Larger fish are generally caught using hook and line, and gill netting, and diving and spearing when water levels are low. In smaller creeks, small fish would be collected with hoop nets made from cane/sapling and bush rope/twine. Locally grown derris root is also used to capture fish (Appendix E of the ESIA). Feedback from some FGDs noted that pollution from the mine had resulted in a decline in fish and fish catches, with people moving away from areas affected by the mine to new fishing grounds in local creeks or further upstream. Fish catches were reported to vary.

Artisanal and small-scale mining

ASM is an important livelihood activity and key income source for communities along the infrastructure corridor, particularly for people living near the Ok Tedi. ASM is undertaken by men and women daily, with income earned used to pay school fees, buy food, and meet other household needs. Feedback noted that ASM was conducted 'anywhere allowed by landowners' downstream from Tabubil. It was also noted that settlements have been established along the Ok Tedi by people participating in ASM.

6.2.3 Infrastructure and services and peoples' productive capacities

This section provides an overview of the location and accessibility of infrastructure and services in the infrastructure corridor communities, and information on food and water security.

Access to functioning health and education facilities and services across the infrastructure corridor is limited but includes:

- Schools:
 - o Ok Ma settlement – elementary and primary school, which has operated since 1985 and provides schooling for students up to Grade 9.
 - o Kolebon – primary school at Kolebon, which was established in 1981 and provides for students up to Grade 6.
 - o Wogam – primary school providing schooling for Grades 1 to 6, and junior high school for students in Grades 7 to 10.
- Health care:
 - o Ok Ma settlement – non-functioning aid post.
 - o Wogam – aid post with volunteer community health worker.

Communities in the infrastructure corridor also access education and health services in Tabubil, Ningerum, Migalsimbip, and Sisimakam.

Transport access in the infrastructure corridor to villages and centres is by walking or boat. Footbridges are provided at Tabubil and north of Ningerum that provide access to communities west of the Ok Tedi (Plate 6.46 and Plate 6.47). A road previously connected Ok Ma settlement and Tabubil via a bridge over the Ok Tedi, however, the bridge collapsed in 2013 and has not been repaired to allow vehicle access, although it does provide pedestrian access. Plate 6.48 and Plate 6.49 show sections of the old Ok Ma Road at Ok Ma settlement. The lower sections of the Ok Ma are used by local communities for transport to and from Ningerum, although the rapids and flows in the upper reaches of the Ok Ma make these sections unsuitable for transport (Appendix E of the ESIA).



Photo credit: Tetra Tech Coffey, 2025

Plate 6.46
Aerial view of Ok Tedi bridge



Photo credit: Tetra Tech Coffey, 2025

Plate 6.47
Ok Tedi Bridge



Plate 6.48
Old Ok Ma Road looking south, Ok Ma



Plate 6.49
Old Ok Ma Road looking north, Ok Ma

Food security

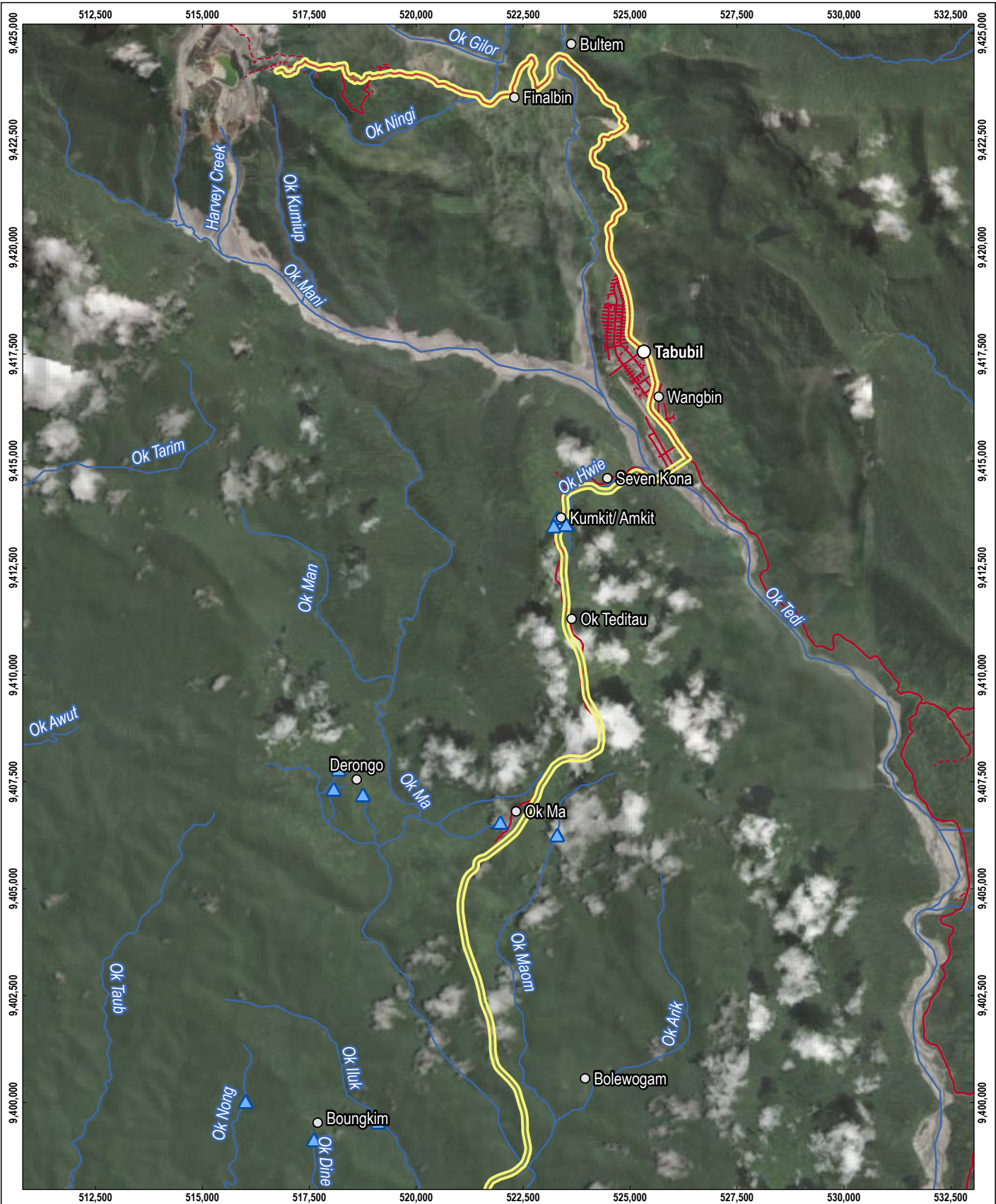
Staple foods across the villages primarily includes garden produce, particularly sago, banana, taro, kau kau and aibika. However, infrastructure corridor communities' diet have shifted from being primarily subsistence gardening to including store bought staples (e.g., rice and noodles). Communities also reported consuming fish and prawns caught in rivers and creeks. No food shortages were not reported during consultation; although communities reported several concerns related to food security:

- Destruction of gardens by wild boars in Bolewogam.
- Digam settlement participants were concerned that perceived mine-related contamination has led to a decline in soil fertility and a reduction in crop productivity, and a reduction in fish catches which has not improved over the last 5 years.
- Participants in Kumkit-Ankit noted that the price of garden produce is low, however the price is influenced by quality of the yield and availability of the produce.
- Participants in Kumkit-Ankit and Wogam, reported buying food staples from stores is expensive and prices continue to increase.

Drinking water

Infrastructure corridor communities mainly source water for drinking, cooking and washing from creeks, rivers and shallow springs (Figure 6.17 and Figure 6.18). Creeks and springs identified by community members during FGDs included Ok Vavo, Ok Gungu, Ok Omaka, Ok Arok, Ok Nanok and Ok Digam. Creeks and springs are generally close to villages. Tank usage is not common across the infrastructure corridor, although some villages have rainwater tanks that collect water from houses with iron roofs (Appendix E of the ESIA). In Digam, a few houses have been provided tanks by OTML. Community members in Kumkit-Ankit reported sourcing water from tanks, although these are no longer in good condition. There is no piped water infrastructure within the infrastructure corridor, though participants in Ok Ma stated that they previously had a piped water source in the village.

No water quality or availability issues were reported for these sources during consultation. Participants in Digam settlement reported that the water '*tastes good and healthy for us*' and '*runs all year even during the season of drought*'. However, in some communities, the water sources are used seasonally due to availability. For example, Kumkit-Ankit participants stated they use the spring during wet season, and Ok Hwie during dry season as the spring dries up.



LEGEND

- Regional centre
- Study area village
- Road
- - - Track
- Watercourse
- Proposed infrastructure corridor

Resource use

- ▲ Water source (drinking/cooking)



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SCALE 1:125,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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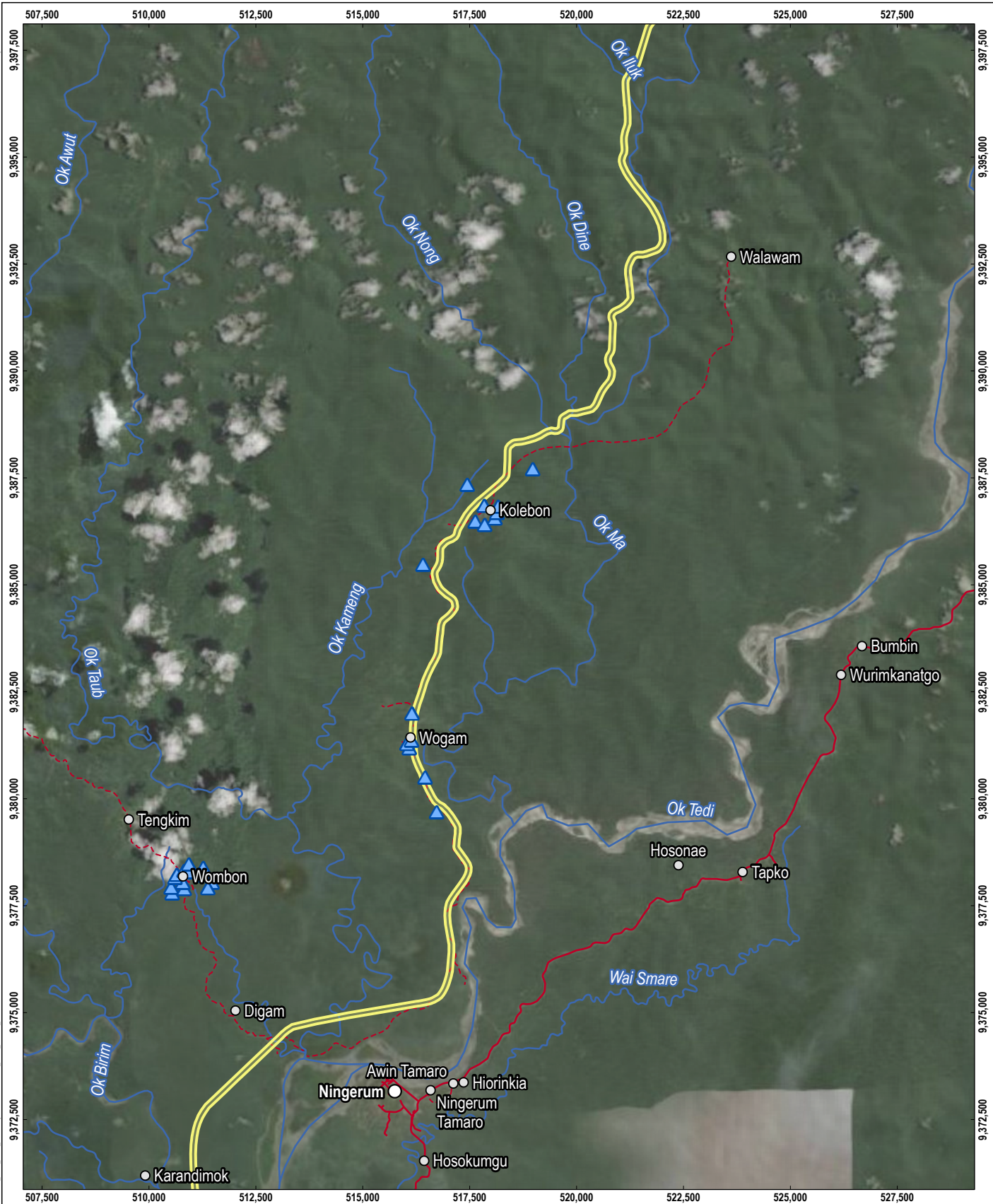
FIGURE 6.17

Water sources - northern portion
of the infrastructure corridor



TETRA TECH
COFFEY

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LEGEND

- Regional centre
- Study area village
- Road
- - - Track
- Watercourse
- ▭ Proposed infrastructure corridor

Resource use

- ▲ Water source (drinking/cooking)



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SCALE 1:125,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Resource use mapping and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Admin boundary from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.18

Water sources - southern portion
of the infrastructure corridor



TETRA TECH
COFFEY

DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TS12_F06.18_GIS

6.3 CONSTRUCTION HAULAGE ROUTE

This section provides an overview of existing characteristics, values and features of villages and settlements along the construction haulage route between Kiunga and Tabubil (Figure 6.19 and Figure 6.20). Information on the social characterisation of the larger centres of Kiunga, Ningerum and Tabubil are discussed in Section 6.5.

Information presented in this section is mainly from secondary data sources, including CMCA population data held by OTML, and the Livelihood Development and Basic Socio-economic Baseline Survey (OTDF 2018), supported by information collected through FGDs in Alice Pit and with villages between Ningerum and Tabubil.

6.3.1 People, community identity and place

There are 30 villages plus a number of smaller informal settlements along the Kiunga-Tabubil Highway, which is the main construction haulage route for materials, plant, equipment and supplies.

6.3.1.1 Population

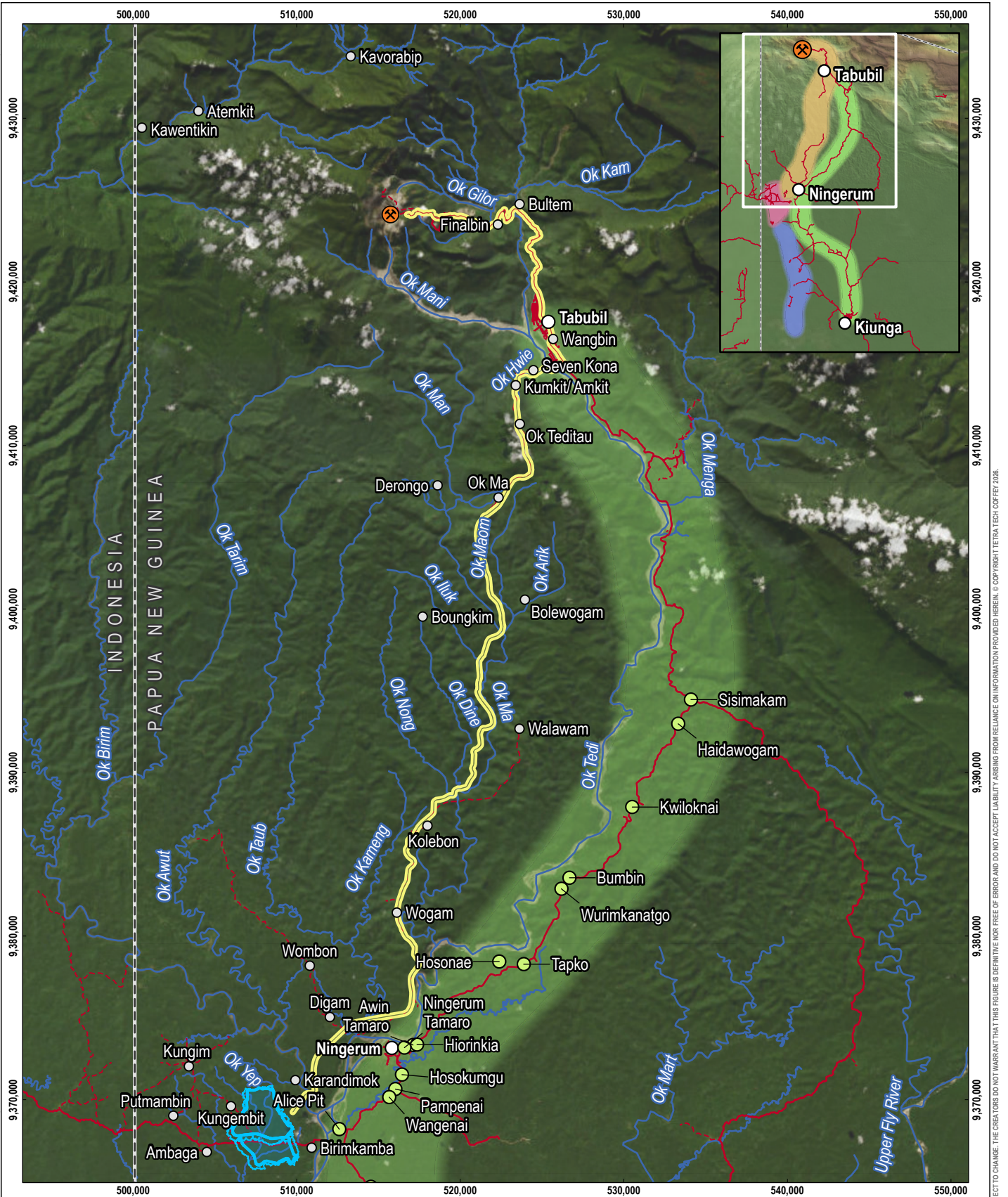
There were approximately 20,000 people living in CMCA villages located along the proposed haulage route. The populations of villages along the haulage route vary from less than 250 people across two villages to more than 1,000 people in six villages between Kiunga and Alice Pit (Table 6.24). The largest village between Kiunga and Alice Pit is Grengas, which had a population of 1,467 people, while the largest village along the route north of Alice Pit is Sisimakam, which had a population of 990 people. Further details on the population of individual villages is in Appendix B.

Table 6.24 Population estimates – construction haulage route

Population (2023)	Total villages	Kiunga to Alice Pit	North of Alice Pit to Tabubil
Less than 250 people	2	Tope, Rudmesuke	
250 to 500 people	10	Dande 1, Ipoknai, Dande 2, Mimigire, Menumsore, Grehosore, Hoponai	Hosonae, Wangenai, Hiorinkia
500 to 750 people	6	Briompenai, Rarengre, Alice Pit*	Awin Tamaro, Hosokumgu, Pampenai,
750 to 1,000 people	6	Kasrenai, Matkomnai, Miamsomnai	Kwiloknai, Tapko, Sisimakam,
More than 1,000 people	6	Timindemesuke, Gii, Tiomnai, Ienkenai, Gre, Grengas	

Sources: 2023 CMCA population data provided by OTML, *OTML, 2025c

During consultation for this social characterisation, community members reported migration of people into Alice Pit and highway villages. Several settlements have been established along the highway by communities west of the Ok Tedi, or by in-migrants from villages within the Western Province, other PNG provinces, and Indonesian communities close to the border. Feedback from engagement suggests that this is driven by factors such as improved access to services (e.g., health care and education facilities), access to markets, and ASM opportunities within the Ok Tedi.



LEGEND

- Ok Tedi Mine
- Construction haulage route community
- Regional centre
- Study area village
- Road
- Track
- Watercourse
- Proposed TSF footprint
- Proposed infrastructure corridor
- Study sub-area**
 - Construction haulage route communities



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SCALE 1:325,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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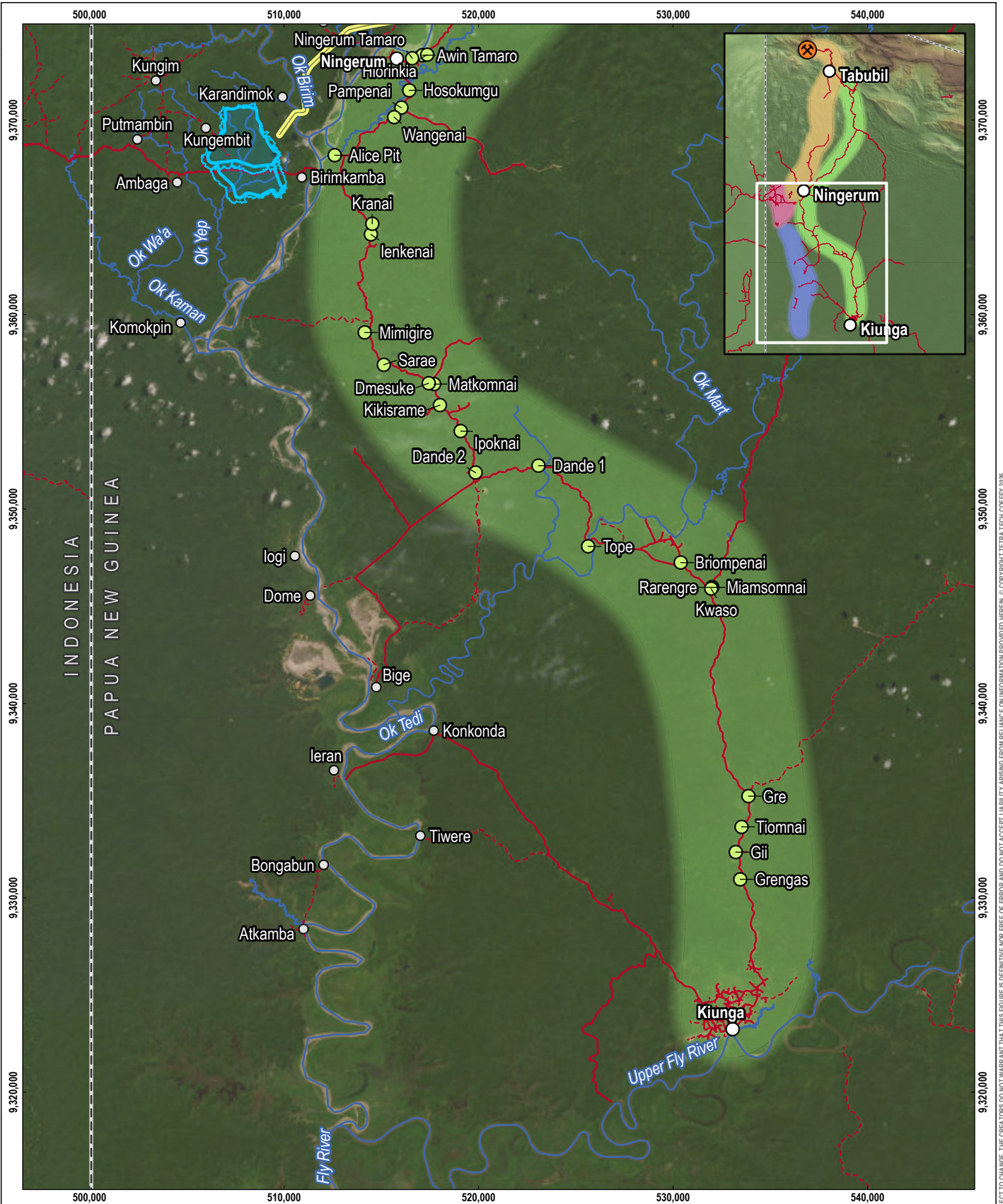
FIGURE 6.19

Construction haulage route communities - Tabubil to Alice Pit



TETRA TECH
COFFEY

DATE: 19.06.26 PROJECT: 754-MELN374244 FILE: 374244C_TSI2_F06_19_GIS



LEGEND

- Construction haulage route community
- Regional centre
- Study area village
- Road
- - - Track
- Watercourse
- Proposed TSF footprint
- Proposed infrastructure corridor
- Study sub-area**
- Construction haulage route communities



0 2.5 5 km
SCALE 1:275,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.20

Construction haulage route communities - Alice Pit to Kiunga



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Alice Pit, located on the Kiunga-Tabubil Highway south of Ningerum, is a rapidly expanding settlement (OTML 2025b). Alice Pit is on the customary land of the Awin people, with consultation for this assessment reporting that the community was established by the Beke-Ikramnai clan, who were previously living at Yankere (Kilometre 61). Feedback from consultation noted that landowners have given their agreement for people to settle in Alice Pit.

In 2025, Alice Pit (Mendua) had a population of about 426 people (OTML 2025b), which includes people from TSF villages who have relocated to Alice Pit for better living conditions and access to services in Ningerum, Tabubil and Kiunga. Family and traditional ties were also identified as reasons for people settling in Alice Pit. Alice Pit has more females than males, with a sex ratio in 2025 of 96 males for every 100 females (OTML 2025b). Alice Pit is a transit point for Yonggom communities west of Ok Tedi to access services at Ningerum, Tabubil and Kiunga, with community feedback from FGDs noting that in-migrants also come to Alice Pit for marketing purposes.

6.3.1.2 Social cohesion and community safety

The construction haulage route includes communities of the Awin peoples between Kiunga and Alice Pit, and Ningerum peoples to the north of Ningerum. Feedback from consultation reported that relationships between the communities was intact and strong.

Concerns about community safety raised during FGDs in Alice Pit and with villages along the Kiunga-Tabubil Highway, included incidences of anti-social behaviour associated with alcohol and drugs, sorcery and road accidents due to the movement of heavy vehicle traffic. During engagement, it was noted that some road accidents along the Kiunga-Tabubil Highway had resulted in fatalities.

Community members of villages along the construction haulage route reported that migration of people from across PNG was occurring into Alice Pit and highway villages. This included people transiting through the area, people who came for marketing purposes, and those that came to settle due to alluvial mining opportunities. In-migration of people into villages and settlements along the highway has impacted on perceptions of community safety, with some community members of highway villages reporting that they '*live in fear*' and '*get threatened*' when they raise issues with those that have settled into the area. Feedback from the Alice Pit FGD also noted that '*many illegal activities are happening*' (e.g., selling marijuana) because of in-migration.

Before it was ok in terms of safety and security in the village as it was only us, but now we have people who come from different parts of the country and have settled here...when we try to say something to them, we get threatened.

Sorcery was reported to impact on perceptions of safety for community members in Alice Pit with this identified as the '*main safety concern amongst the community*'.

Limited local police presence means that law and order issues in Alice Pit and highway villages are generally mediated by community leaders. Where issues are unable to be resolved by community leaders, these are reported to police.

6.3.1.3 Landscape and amenity

The Kiunga-Tabubil Highway passes through numerous villages and settlements. Land uses fronting the highway mainly comprise a mix of:

- Traditional housing (i.e., made of traditional bush materials), semi-permanent housing (i.e., comprise both traditional and modern materials), and permanent housing that comprise modern materials (e.g., iron sheeting).
- Retail uses, including trade stores, formal and informal markets, and trade stalls.
- Community uses, such as schools.
- Areas used for gardening and livelihood activities.

Plate 6.50 and Plate 6.51 show examples of land uses along the Kiunga-Tabubil Highway.

The amenity of communities along the highway is currently impacted by vehicles using the highway, including light vehicles, PMVs, and daily OTML heavy vehicle convoys that operate between Kiunga and Ok Tedi Mine (Plate 6.52 and Plate 6.53). Dust generated by existing vehicles using the Kiunga-Tabubil Highway was identified as a concern during FGDs with highway villages, with feedback including:

Dust is a major issue for rainwater collected in tanks in Alice Pit.

Concerns about contamination of food crops grown in gardens near the road in Haidawogam and Sisimakam.

Concerns about dust and the potential for gravel from the Ok Tedi used for the highway to contain chemicals.

Sealing of the Kiunga-Tabubil Highway from Kiunga commenced in 2024. As at May 2026, sealing was approaching Alice Pit and Ningerum. The timing of sealing of the highway north of Ningerum is still to be determined.



Plate 6.50
Kiunga-Tabubil Highway, Haidawogam



Plate 6.51
Trade stores, Kiunga-Tabubil Highway



Plate 6.52
Kiunga-Tabubil Highway, Alice Pit



Plate 6.53
Dust from heavy vehicle convoy, Alice Pit

6.3.2 Economy and livelihoods

Table 6.25 shows the main livelihood activities of people within the construction haulage route villages based on the results of a Baseline Survey Report conducted by OTDF in 2016 and 2017 (OTDF 2018). Further details on the socioeconomic data of individual villages is in Appendix B.

The livelihoods of people in villages along the construction haulage route rely on the gardening, sale of produce or goods, and availability of natural resources. Primary income sources included rubber production and trade stores for villages between Kiunga and Alice Pit, while communities north of Alice Pit relied on gardening, alluvial mining and rubber production (OTDF 2018). These results are consistent with feedback during FGDs at Alice Pit and with villages north of Ningerum, which noted:

- ASM is the main source of income for communities north of Bige.
- Communities depend on growing garden foods (e.g., banana, greens and sago) as a source of income, particularly for Wirimkanatko and Walawam villages as they do not have access to cash crops.
- Informal marketing and trade stalls along Kiunga-Tabubil Highway sell food to the local communities (e.g., rice, tinned fish, noodles, flour, biscuits, cooking oil, and assorted drinks), as well as fuel.

CMCA benefits, compensation from OTML, and employment opportunities provided by OTML to landowners were also identified as key income sources for participants of FGDs at Alice Pit and highway villages north of Ningerum.

Trade stores are situated within villages along the Kiunga-Tabubil Highway that sell a range of common food items that cater for the needs of local communities (e.g., rice, tinned fish, noodles, flour, biscuits, cooking oil, and assorted drinks). Small and medium enterprises, such as trade stores, are important contributors to the formal economy in PNG (NRI 2024). Feedback from engagement with store owners noted that competition between local traders was a challenge with some trade store owners diversifying their businesses by selling fuel or providing rental accommodation to supplement their income.

Table 6.25 Primary sources of income – construction haulage route communities

Primary income source	Kiunga to Alice Pit	North of Alice Pit to Tabubil	North Fly
Rubber	35.7%	16.7%	23%
Trade store	21.4%	-	17%
Alluvial mining	7.1%	16.7%	15%
Gardening	7.1%	66.7%	32%
Informal marketing	7.1%	-	NA
Animal rearing (poultry)	7.1%	-	NA
Retail	7.1%	-	NA
Sago production	7.1%	-	NA

Source: OTDF (2018).

6.3.3 Infrastructure and services

This section provides information on existing infrastructure and services within the construction haulage route communities.

6.3.3.1 Access and connectivity

The Kiunga-Tabubil Highway extends approximately 157 km from Kiunga in the south to Tabubil and Ok Tedi Mine in the north. Constructed by OTML in 1981, the Kiunga-Tabubil Highway is an important access route supporting access by mine haulage vehicles transporting mining equipment and supplies (e.g., fuel, food) between the river port of Kiunga, the township of Tabubil and Ok Tedi Mine (OTML 2018), and access for pedestrians, private vehicles, and PMVs to villages, regional centres such as Kiunga, Ningerum and Tabubil, and community services. A range of land uses front the highway, including houses, formal and informal trade stalls, markets and schools. The highway has a maximum speed limit of 65 km/h, with this reducing to 40 km/h through villages. The highway is mostly unsealed, although works to upgrade and seal the Kiunga-Tabubil Highway have been occurring over recent years. These works are progressing from Kiunga to Ningerum.

Data provided by OTML on the use of the Kiunga-Tabubil Highway at the highway checkpoint south of Tabubil shows that, on average approximately 200 OTML and private vehicles use the highway daily. This includes approximately:

- 15 OTML vehicles, including 10 light vehicles and 5 medium-rigid trucks.
- 46 vehicles, including light vehicles and trucks, associated with OTML and contractor convoys.
- 137 private vehicles, including 87 light vehicles, 25 medium rigid trucks, and 25 PMVs.

Currently, there are approximately 7 convoys per day (each way), which comprise between 4 and 10 vehicles including light vehicles and trucks.

Observations of travel along the highway during social fieldwork noted several safety concerns including blind corners and crests of hills, narrow sections of the road that made passing difficult, and a lack of separate pedestrian access meaning that pedestrians, including school children, were required to walk along the highway. Road accidents have occurred, resulting in fatalities. Over the past two years, there have been 23 accidents involving OTML and contractor vehicles, including three involving OTML light vehicles and 20 involving convoy trucks.

6.3.3.2 Health and education

This section describes access to health and education services for communities within the construction haulage route villages.

Health infrastructure

Local health services within communities along the Kiunga-Tabubil Highway are limited and include a health centre at Matkomnai, and aid posts at Ienkenai village between Kiunga and Alice Pit, and Kwiloknai and Sisimakam villages north of Alice Pit (see Figure 6.6). Communities of highway villages also access health services in Kiunga, Ningerum and Tabubil. Health facilities in highway villages are owned by either by government (i.e., Western Provincial Health Authority) or church agencies (e.g., Monfort Catholic Diocese, Evangelical Church of PNG). Development agencies play a role in supplying health workers, medicine and equipment throughout the area. Patients from villages along the Kiunga-Tabubil Highway mainly walk or travel by PMV to the nearest health facility (OTDF 2018).

Feedback from consultation with highway villages reported that communities in Alice Pit travel to Ningerum or Kiunga to access government health services, while communities north of Ningerum reported that they access health services from Ningerum and Tabubil. The aid post at Sisimakam is accessed by people from nearby villages (e.g., Bolewogam and Haidawogam). The aid post is supported by OTML through provision of medicine and other support services.

Education infrastructure

There are five elementary schools, five primary schools and two community schools within the construction haulage route communities. This includes seven schools (four elementary, two primary and one community school) in villages between Kiunga and Alice Pit, and five schools (one elementary, three primary, and one community school) in those villages north of Alice Pit (Figure 6.7). Access to secondary schooling and tertiary education facilities is provided in regional centres such as Kiunga, Ningerum and Tabubil. OTML offers sponsorships to support students to attend tertiary education facilities. Barriers to education raised during FGDs with infrastructure communities included increasing school fees. Consultation for this social characterisation noted that students attending schools in nearby villages generally travel by PMV or walk along the Kiunga-Tabubil Highway. Students walking along sections of the highway between the Tabubil and the mine were observed during the fieldwork for this social characterisation.

6.3.3.3 Utilities infrastructure

Villages along the construction haulage route have limited access to water, electricity and public services and facilities (OTML 2025b):

- Water supply. Communities rely on natural water sources (e.g., rivers, creeks, boreholes or tanks). The lack of formal and reliable water supply poses serious health, sanitation and livelihoods concerns.
- Electricity. Access to electricity is uneven across the settlements. A significant number of houses have unreliable or illegal electricity sources. Outages are frequent and power supply is limited.
- Public services and facilities. Challenges include limited job opportunities, and lack of police presence.

6.4 RIVER COMMUNITIES

Seven villages are directly located along the Ok Tedi River downstream of the Ok Tedi Mine, extending to the junction of the Ok Tedi and Fly River at D'Albertis Junction. The population of the villages ranges from 1,912 people at Atkamba to 181 people who reside in Dome. The river communities form part of the Lower Ok Tedi CMCA region (previously known as the Wai Tri Trust) (Figure 6.21).

The riverine communities are closely tied to the river system for transport, fishing, water access, and subsistence gardening. The Ok Tedi is currently impacted by existing mine operations and riverine disposal of tailings and waste rock continues to affect the Ok Tedi River system, including downstream communities, their livelihoods, and the environment (Appendix E of the ESIA).

Livelihoods across the river communities reflect a mix of informal and subsistence economic activities. Primary income sources of river communities include rubber farming, alluvial mining and fishing, with secondary income sources including subsistence gardening and trade stores (OTDF 2018). In 2018, the average annual income for rubber growers in the Lower Ok Tedi region was between PGK200 to 500 per month. This was also the range of average incomes received from ASM or the selling betel nut, although these sources were considered less sustainable (OTDF 2018). Villages involved in selling crops, fishing, and sago production earned approximately PGK100 to 200 per month (OTDF 2018). The livelihoods of people in the region are highly dependent on accessibility to markets, as well as the quality of the land and availability of natural resources (OTDF 2018).

Education and health facilities in the river communities are limited. Primary schools are located at Atkamba, Dome and logi, while health facilities include an aid post in Atkamba and a sub-health centre in Dome, both of which were reported to be in good condition in 2018 (OTDF 2018). Access to health and education services, and to markets and trade stores, in the region is generally challenged by a lack of infrastructure and the geographical setting. Communities travelling to neighbouring villages or towns mainly travel by river using dugout canoe, motorised canoe or dinghy, with road the primary means of travel for people in Bige and Kokonda (OTDF 2018; OTDF 2023).

The main sources of food for river communities include rivers, local markets, the bush and household gardens. The main type of foods grown include tree crops, particularly banana, sago and breadfruit; root or tuber crops such as taro and cassava; vegetables such as greens; and fruits, including pineapple and cucumber (OTDF 2023).

6.5 REGIONAL CENTRES

Regional centres within the North Fly District include Tabubil, Ningerum and Kiunga, located along the Kiunga-Tabubil Highway (Figure 6.21). The regional centres attract settlers from surrounding villages, rural provincial villages, and elsewhere to access to services, employment and business opportunities. This section provides an overview of the existing social environment of the regional centres.

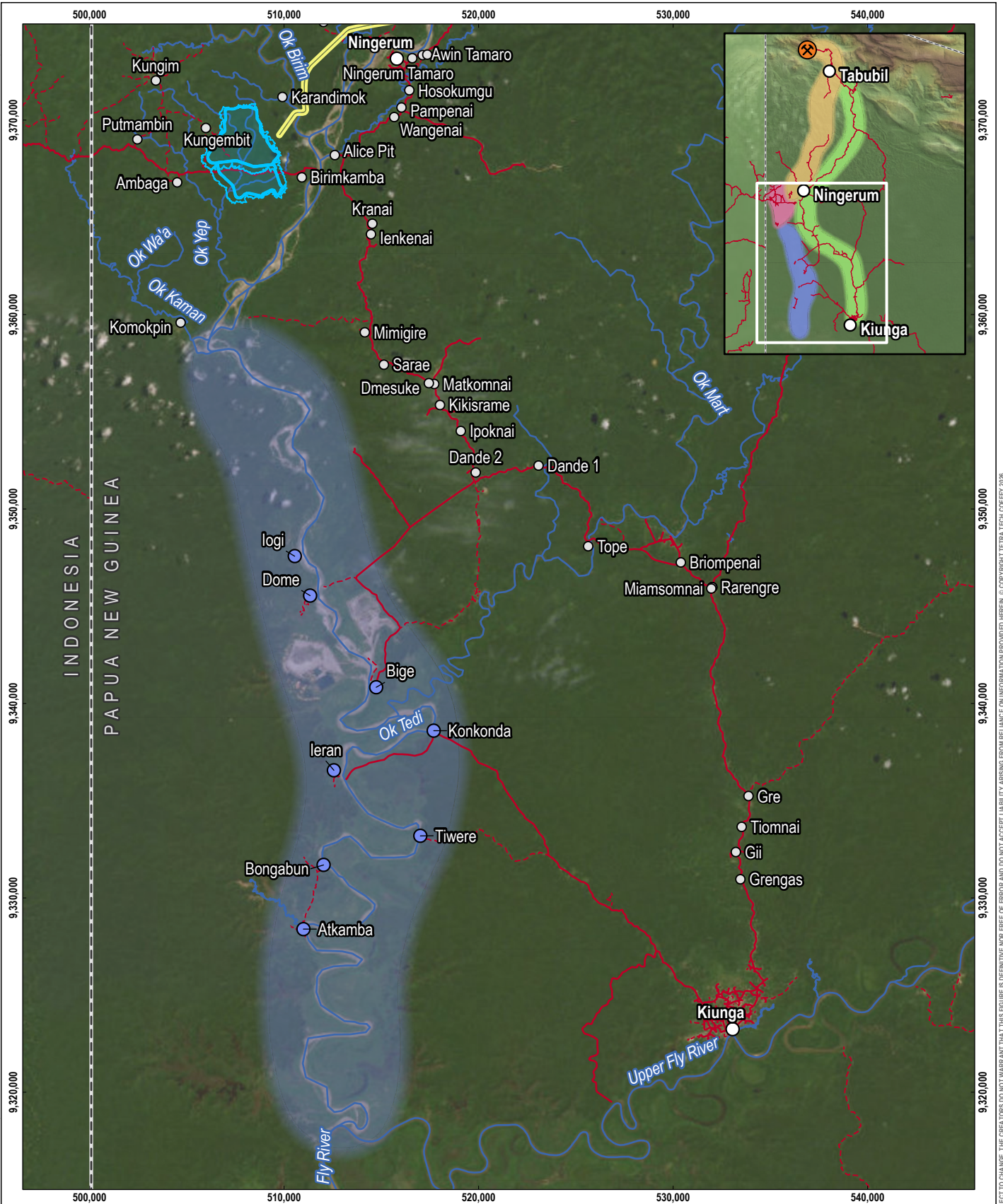
6.5.1 People, community identity and place

Tabubil is within the Star Mountains LLG and was purpose built as the operational hub for the Ok Tedi Mine, and as a result hosts key infrastructure and the headquarters of OTML. Tabubil had a population of approximately 10,270 people in 2011 (NSO 2011), although the population is estimated to be higher at about 15,000 people, including fly-in/fly-out mine workers, residents, and in-migrants (Gilberthorpe 2013). Tabubil has more males than females with a sex ratio of 109 males per 100 females (NSO 2011), which is likely to reflect the presence of the mine and its predominantly male workforce. Tabubil offers a range of district level services and facilities such as health care, schools, recreational uses, airport, business and commercial uses, which serve mine workers, Tabubil residents, and communities in the surrounding district. Many of these services and facilities are either provided directly or supported by OTML.

Ningerum is located at the mid-point of the Kiunga-Tabubil Highway, approximately 65 km south of Tabubil and north of Kiunga. Ningerum is the nearest township to the proposed TSF and is the administrative centre for the Ningerum Rural LLG. Plate 6.54 and Plate 6.55 show views of Ningerum centre. The town provides a range of health, education, and commercial services accessed by residents of Ningerum and surrounding communities. Population surveys carried out by OTML found that Ningerum had a population of about 4,031 people in 2025 (OTML 2025b). Ningerum had a relatively balanced number of males and females, with about 102 males for every 100 females (OTML 2025b).

Kiunga is located on the Upper Fly River and has a population of approximately 10,981 people in 2011. In 2011, Kiunga had more males than females with a sex ratio of 106 males per 100 females (NSO 2011). It is an administration centre for the North Fly District, Kiunga Urban LLG, and Kiunga Rural LLG. Kiunga has a port owned by OTML, and services the Ok Tedi Mine with fuel, equipment and goods, as well as the export of concentrate for sale on overseas markets.

The towns of Kiunga, Ningerum and Tabubil are densely populated, attracting high levels of in-migrants from rural villages within the North Fly District and wider Western Province, as well as other PNG provinces, and Indonesia for access to services, employment and business opportunities, and activities such as ASM within the Ok Tedi.



LEGEND

- River community
- Regional centre
- Study area village
- Road
- - - Track
- Watercourse

- Proposed TSF footprint
- Proposed infrastructure corridor

Study sub-area

- River communities



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SCALE 1:275,000
PAGE SIZE: A4
PROJECTION: PNG94 PNGMG94 Zone 54

SOURCE
Study areas and villages from Tetra Tech Coffey.
Proposed infrastructure from KCB and OTML.
Topographic features from OSM. Provinces from NSO.
DEM from SRTM. Imagery from ESRI.

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FIGURE 6.21

River communities and regional centres



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Photo credit: Tetra Tech Coffey, 2025

Plate 6.54
Ningerum township



Photo credit: Tetra Tech Coffey, 2025

Plate 6.55
Kiunga-Tabubil Highway, Ningerum township

Table 6.26 provides population and household information on Tabubil, Ningerum, and Kiunga.

Table 6.26 Population – regional centres

Location	Number of households	Population	Males	Females
Tabubil (2011)*	1,689	10,270	5,348	4,922
Ningerum (2025) †‡	658	4,031	2,059	2,012
Kiunga (2011)*	1,788	10,981	5,659	5,322

* Source: NSO 2011

† Source: OTML 2025b

‡ Ningerum population includes Ningerum Station, Ningerum Tamaro, Alice Kona, Hukim Kona, FO Kona, Menegrupe Kona, and Yare Kona

6.5.2 Economy and livelihoods

Tabubil, Ningerum and Kiunga play an important role for residents and people from surrounding villages. Livelihoods across the regional centres reflect a mix of formal, informal and subsistence economic activities. Formal sector wage employment in the regional centres includes five main industry categories:

- Services such as health and education, and business services (e.g., accommodation).
- Industry, including the processing of goods and construction.
- Retail uses such as supermarkets, hardware stores, and electronics.
- Public administration.
- Employment through OTML, or with mine contractors and suppliers.

Many people in Tabubil are OTML employees, including residents and fly-in fly-out workers, as well as people who work for mine related contracting and supplier businesses. Similarly, OTML employment is a significant livelihood source for residents in Ningerum, with between 10 to 15% of households in Ningerum communities deriving income from the company (OTML 2025). Local industry in Kiunga is centred on haulage and freight of goods and supplies, and concentrate export, through the port, which is owned by OTML. Income in the regional centres is also generated through informal wage employment, including trading or selling goods and crops at markets and ASM. Within the North Fly District, most markets are concentrated in Tabubil (Fly River Provincial Government 2022).

Key income sources for households in the wider Ningerum area include ASM (Plate 6.56), which contributes between about 30 and 40% of income for households in some Ningerum communities, and informal marketing (between 20 and 40%). Communities reported accessing markets at Ningerum during engagement in 2025 for this social characterisation. Government and administration employment is the second most common income source in Ningerum, followed by the informal market trade (OTML 2025b). In contrast limited amounts of food and animal products are taken to Kiunga to be sold or traded at markets. This is likely due to the high cost of outboard motor fuel resulting people having to walk long distances (Kanua and Bourke 2022).

Rubber historically was a successful cash crop in some areas of Western Province. North Fly Rubber Limited operates a factory out of Kiunga and employs local residents (Kanua and Bourke 2022). Rubber farmers in the region have received ongoing funding from the North Fly District Development Authority through North Fly Rubber Limited to enhance the industry and their livelihoods (Post-Courier 2023a). Feedback from consultation for this social characterisation noted that a decline in the price of rubber has resulted in people leaving rubber tapping.

6.5.3 Infrastructure and services

The regional centres contain a range of infrastructure and services that are accessed by residents and by people from smaller rural villages. These services consist of administration, health care, education, cultural facilities and emergency services. Table 6.27 provides a summary of these services.

Major health care services include Tabubil Hospital, which is operated by OTML, and the government-run Kiunga District Hospital. A health centre is also located at Ningerum. Medicine shortages are an ongoing issue which is affecting the delivery of clinical services in Kiunga (Post-Courier 2023b).

Although all regional centres have a police presence, law and order issues are reportedly increasing (Post-Courier 2023c). Key issues reported in media include high alcohol consumption, selling of illicit substances (e.g., marijuana) in Kiunga and in the Ningerum LLG along the Kiunga-Tabubil Highway, family violence, hijacking of PMVs near Tabubil and petty theft. According to the North Fly Command there is an insufficient number of police officers in the North Fly District to conduct effective policing, with only 78 officers in the district as of 2023, and the force is in 'dire' need of additional police barracks in Kiunga to support recruitment processes (Post-Courier 2023c). Similarly, communities report minimal police presence in the Ningerum area (OTML 2025b).

Table 6.27 Summary of services in regional centres

Service	Tabubil	Ningerum	Kiunga
Health care and emergency services	<ul style="list-style-type: none"> • Tabubil Hospital • Tabubil Urban Clinic • Tabubil Pharmacy • Tabubil Police Station 	<ul style="list-style-type: none"> • Ningerum Health Centre • Ningerum Police Station 	<ul style="list-style-type: none"> • Kiunga District Hospital • Kiunga Health Centre • Kiunga Police Station
Education facilities	<ul style="list-style-type: none"> • Tabubil International School • Tabubil Secondary School • Tabubil Primary School (Plate 6.57) 	<ul style="list-style-type: none"> • Ningerum Elementary and Primary School • Ningerum High School 	<ul style="list-style-type: none"> • Kiunga Secondary School • Kiunga International School • Kiunga Technical Vocational Training Centre
Other facilities	<ul style="list-style-type: none"> • Banks (Bank South Pacific, Papua New Guinea's First Bank) • Retail stores (supermarket, hardware, electronics) • Churches, recreational uses (e.g., oval) • Star Mountain LLG office 	<ul style="list-style-type: none"> • Markets • Retail stores (supermarkets, hardware) • Ningerum Rural LLG office 	<ul style="list-style-type: none"> • Bank (Bank of South Pacific) • Western Provincial Administration • District Court House

The regional centres are connected via the Kiunga-Tabubil Highway and the Fly River and Ok Tedi. People travel via road, mainly by PMV or walking. The OTML-owned Kiunga Port and Kiunga airport is used by commercial flights and OTML charter flights. In addition to supporting mine operations, the port is used for the export of rubber and lumber, and the import of goods and supplies. Transport infrastructure in Tabubil includes a local road network, and domestic and international airport, that has an all-weather airstrip and is used by commercial flights and OTML charter flights. The airstrip is currently being extended to service larger planes.

Formal water infrastructure is more common in the regional centres than the surrounding smaller villages. Rainwater tanks are common in Ningerum Station, while unimproved natural water sources (rivers and creeks) and bore water is more common in smaller surrounding villages. This lack of formal water infrastructure is reported to pose serious health and sanitation risks across the Ningerum area (OTML 2025b). In comparison, Tabubil has well developed infrastructure including reticulated water, sewage and waste management that are provided by OTML (OTML n.d.). Electricity supply in Ningerum, Tabubil and Kiunga is provided through Ok Tedi Power Limited. Power in Kiunga and Ningerum is supplied by diesel generator stations. Power in Tabubil is provided by diesel fuelled thermal power station and hydropower from the Ok Menga hydroelectric station (OTML 2025).



Plate 6.56
ASM activity near Ningerum



Plate 6.57
Tabubil school

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APPENDIX A TSF COMMUNITIES – SOCIOECONOMIC DATA

A.1 PEOPLE, COMMUNITY IDENTITY AND PLACE

Household head marital status by gender of household head

TSF community	Sex	Number of household heads	Never married	Married	Divorced	Widowed
Ambaga	Male	16	0.0%	86.7%	0.0%	13.3%
	Female	1	0.0%	0.0%	0.0%	100.0%
Birimkamba	Male	14	0.0%	100.0%	0.0%	0.0%
	Female	3	0.0%	100.0%	0.0%	0.0%
Karandimok	Male	13	0.0%	100.0%	0.0%	0.0%
	Female	2	0.0%	50.0%	50.0%	0.0%
Komokpin	Male	9	11.1%	88.9%	0.0%	0.0%
	Female	0	0.0%	0.0%	0.0%	0.0%
Kungembit	Male	15	7.1%	92.9%	0.0%	0.0%
	Female	1	0.0%	100.0%	0.0%	0.0%
Kungim	Male	14	0.0%	100.0%	0.0%	0.0%
	Female	1	0.0%	100.0%	0.0%	0.0%
Putmambin	Male	19	13.3%	86.7%	0.0%	0.0%
	Female	1	0.0%	100.0%	0.0%	0.0%

Summary of language spoken

Language	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Tok Pisin	28.6%	46.3%	50.0%	3.4%	63.2%	54.1%	39.8%
English	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	62.9%	41.8%	41.4%	89.8%	29.4%	41.0%	47.0%
Ningerum	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%
Yonggom	62.9%	40.3%	37.9%	89.8%	27.9%	41.0%	47.0%
Yonngomdee	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%
Wongom	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Bahasa	1.4%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%
Not specified	7.1%	10.4%	8.6%	5.1%	7.4%	3.3%	13.3%

A.2 ECONOMY AND LIVELIHOODS

Annual household expenditure

Statistic	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Putmambin
Total median annual expenditure (PGK)	350	900	850	300	880	430	825
Annual expenditure range (PGK)	50-500	700-1,000	150-2,494	150-1,110	420-1,950	150-2,050	250-1,950
Percentage of households spending money in the last 12 months*:							
Education fees and expenses	15.8%	17.6%	20.0%	25.0%	29.4%	41.2%	30.4%
Capital items (e.g., boats)	0.0%	0.0%	6.7%	0.0%	0.0%	5.9%	0.0%
Fishing gear (e.g. nets, lines, traps)	0.0%	0.0%	6.7%	0.0%	0.0%	0.0%	0.0%
Mobile phone	0.0%	11.8%	13.3%	0.0%	5.9%	5.9%	13.0%
Generator or solar panel	0.0%	0.0%	0.0%	0.0%	0.0%	11.8%	0.0%

* Multiple choice question. Responses may not equal 100%.

A.3 INFRASTRUCTURE AND SERVICES

Access to health services

Indicator	Within this month	Between 1 to 6 months ago	Between 6 to 12 months ago	More than 12 months ago
Ambaga	42.1%	15.8%	5.3%	0.0%
Birimkamba	29.4%	29.4%	11.8%	17.6%
Karandimok	26.7%	26.7%	0.0%	0.0%
Komokpin	8.3%	33.3%	8.3%	0.0%
Kungembit	17.6%	23.5%	0.0%	11.8%
Kungim	5.9%	23.5%	11.8%	11.8%
Putmambin	13.0%	8.7%	0.0%	17.4%

Share household sanitation facilities

	No	Yes
Ambaga	89.5%	10.5%
Birimkamba	62.5%	37.5%
Karandimok	100.0%	0.0%
Komokpin	83.3%	16.7%
Kungembit	70.6%	29.4%
Kungim	81.3%	18.8%
Putmambin	68.2%	31.8%

A.4 PEOPLE'S PRODUCTIVE CAPACITY

Malaria control practices

Practice	Ambaga	Birimkamba	Karandimok	Komokpin	Kungembit	Kungim	Western Province *
Households with mosquito nets	78.9%	64.7%	60.0%	66.7%	58.8%	58.8%	87.2%
Households with treated mosquito nets	52.6%	47.1%	13.3%	50.0%	35.3%	41.2%	85.3%
When were the mosquito nets last treated?							
More than 3 years ago	0.0%	5.9%	6.7%	41.7%	0.0%	5.9%	NA
Between 1 and 3 years ago	68.4%	47.1%	40.0%	16.7%	41.2%	47.1%	NA
Less than a year ago	0.0%	5.9%	0.0%	8.3%	0.0%	0.0%	NA
Don't know	5.3%	5.9%	13.3%	0.0%	11.8%	5.9%	NA
Who in the household slept under a mosquito net last night?							
Yes, everyone	63.2%	11.8%	33.3%	41.7%	29.4%	29.4%	68.3%
Yes, some adults and children	10.5%	29.4%	6.7%	25.0%	11.8%	17.6%	NA
Yes, children only	0.0%	11.8%	6.7%	0.0%	5.9%	5.9%	NA
No one	0.0%	11.8%	6.7%	0.0%	0.0%	0.0%	NA
No response provided	26.3%	35.3%	46.7%	33.3%	52.9%	47.1%	NA

Note: NA – not available

* Source: NSO (2019).

APPENDIX B CONSTRUCTION HAULAGE ROUTE COMMUNITIES – SOCIOECONOMIC DATA

B.1 POPULATION DATA

Village	Population	Households	Sex ratio: males per 100 females
Briompenai	529	81	94
Dande 1	243	36	111
Dande 2	316	65	88
Dmesuke (near Matkomnai) (non-CMCA village)	-	-	-
Gii	1135	172	107
Gre	1216	136	104
Grengas	1415	160	105
Ienkenai	1168	197	95
Ipoknai	230	36	70
Kikisrame (near Grehsore) (non-CMCA village)	-	-	-
Kranai (near Ienkenai) (non-CMCA village)	-	-	-
Kwaso (near Rarengre/ Miamsomnai) (non-CMCA village)	-	-	-
Matkomnai	753	101	101
Miamsomnai (non-CMCA)	921	106	107
Mimigire	362	55	94
Rarengre	634	98	99
Sarae	164	28	89
Tiomnai	1117	138	105
Tope	190	30	86

Source: OTML, 2023

B.2 SOCIO-ECONOMIC CHARACTERISTICS

Village	Housing				Livelihoods		Health facilities		Education	
	Permanent	Semi-permanent	Traditional	Total	Primary income	Secondary income	Facility	Condition	Facility	Highest level of education
Kiunga to Alice Pit										
Briompenai	15	7	-	65	Trade store	Gardening	Nil	NA	Nil	Degree
Dande 1	2	27	-	65	Poultry	NA	Nil	NA	Nil	Degree
Dande 2	5	20	25	50	Informal marketing	Trade store	Nil	NA	Nil	Degree
Gii	4	7	25	50	Rubber	Trade store	Nil	NA	Nil	Degree
Gre	0	-	-	78	Rubber	Sago production	Nil	NA	Primary	Diploma
Grengas	2	7	-	165	Rubber	Sago production	Nil	NA	Elementary	Degree
Ienkenai	8	60	55	123	Sago production	Gardening	Nil	Permanent	Nil	Diploma
Ipoknai	1	34	0	35	Rubber	Gardening	Nil	NA	Nil	Formal training
Matkomnai	22	43	17	82	Retail	Sago production	Health centre	Permanent	Primary	Masters
Miamsomnai	11	4	NA	87	Retail	Sago production	Nil	NA	Community	Diploma
Mimigire	14	12	0	26	Alluvial mining	Gardening	Nil	NA	Elementary	Masters
Rarengre	3	8	-	47	Trade store	Sago production	Nil	NA	Elementary	Degree
Sarae	30	10	12	52	Trade store	Poultry	Nil	NA	Nil	Degree
Tiomnai	2	118	-	120	Rubber	Sago production	Nil	NA	Elementary	Masters
Tope	1	12	0	13	Gardening	NA	Nil	NA	Nil	Degree

Village	Housing				Livelihoods		Health facilities		Education	
	Permanent	Semi-permanent	Traditional	Total	Primary income	Secondary income	Facility	Condition	Facility	Highest level of education
North of Alice Pit to Tabubil										
Awin Tamaro	1	2	33	35	Gardening	Sago production	Nil	NA	Nil	Diploma
Bumbin	0	9	12	21	Gardening	NA	Nil	NA	Nil	Grade 10
Haidawogam	0	21	5	26	Gardening	NA	Nil	NA	Elementary	Degree
Hiorinkia	0	NA	NA	46	Gardening	Sago production	Nil	NA	Nil	NA
Hosokumgu	3	21	NA	23	Rubber	Gardening	Nil	NA	Nil	Formal training
Hosonae	2	9	8	19	Alluvial mining	NA	Nil	NA	Nil	Diploma
Kwiloknai	6	81	0	87	Gardening	Alluvial mining	Aid post	Permanent	Primary	Masters
Pampenai	8	20	32	60	Rubber	Gardening	Nil	NA	Primary	Degree
Sisimakam	5	23	0	28	Gardening	NA	Aid post	Permanent	Primary	Degree
Tapko	6	57	0	63	Gardening	Alluvial mining	Nil	NA	Community	Grade 10
Wangenai	0	32	5	37	Gardening	Sago production	Nil	NA	Nil	NA
Wurimkanatgo	3	8	11	22	Alluvial mining	NA	Nil	NA	Nil	Formal training

Source: OTDF (2018).

Note: OTDF (2018) data did not include Alice Pit. NA: not available.