Panguna Mine Legacy Impact Assessment

Phase 1 Assessment Report
Chapter 3 – Overarching Approach

Panguna Legacy Assessment Company Limited

Reference: 754-MELEN305719_R03

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3. OVERARCHING APPROACH

Phase 1 has been designed as per the Execution Framework to be focussed, science driven and rapid. It is focussed on the key areas and issues of concern to communities, particularly as described in the Complaint. A robust scientific approach to the collection and analysis and evaluation of the data is central to the approach of the Legacy Impact Assessment. It is rapid, in that it adopts a representative sampling approach, is based on a limited number and duration of field campaigns and avoids extensive and intrusive data gathering techniques. It has been designed this way to allow for the results and outcomes of Phase 1 to be reported back to the Oversight Committee and the impacted communities in a timely manner.

Many of the aspects of focus for Phase 1 investigations have had very little information gathered on them for at least 30 years, sometimes longer. The information that has been gathered during Phase 1 represents the first snapshot of the environmental and social conditions in the study area as they are today.

The Legacy Impact Assessment is a novel process and one without a ready-made handbook to guide it. Therefore, the impact assessment process has been diverse and complex, requiring a range of specialists to provide a specific contribution over its 20-month duration. A broad overview of the roles in the impact assessment process is:

- Technical studies were contracted to specialists in their respective field. The technical specialists were responsible for data planning, collection, and evaluation. Data gathered was compared to a set of regulations, guidelines or criteria as defined in the respective Detailed Investigation Plans. Technical specialists identified sources and pathways for the conceptual site model, identified end points where relevant and provided technical input to the impact assessment.
- Impact assessment was separate and subsequent to the data collection and evaluation process. Data from the technical studies that informed the conceptual site model allowed the specialist environmental, social and human rights impact assessment team to determine end points and assess impacts. The technical specialists had input to this process as required.
- Independent environmental, social and human rights peer reviewers validated and provided feedback to data planning, collection and evaluation from the technical studies and the conclusions of the impact assessment.

Within this context, this chapter sets out the overarching approach to the Legacy Impact Assessment to meet its objective to identify and assess the actual and potential environmental impacts caused by the Panguna Mine since the cessation of mining in 1989 and the social and human rights impacts that are directly connected to these environmental impacts and to develop recommendations for what needs to be remedied to address or mitigate these impacts. It provides a description of the:

- Overarching limitations
- Rights-respecting approach
- Health, safety and security
- Primary Contractor Scope of Work
- Execution framework
- Assurance processes.

3.1 OVERARCHING LIMITATIONS

There are a range of factors which have influenced the overarching approach to the completion and outcomes of Phase 1. These include:

- **Setting**: the historical, political, social and environmental context for the Legacy Impact Assessment is complex and challenging to navigate. Key factors in this include the history of the Panguna Mine, the post-conflict environment and the ongoing social and political impacts of this, poor road infrastructure and high rainfall environment.
- **Scope and schedule**: the scope and schedule for Phase 1 is outlined in the Primary Contractor Scope of Work (see Section 3.4) and contains limitations such as:
    - Focussing Phase 1 on the acute environmental impacts caused by the Panguna Mine since the cessation of mining in 1989 and the acute social and human rights impacts directly connected to them.
    - The overall schedule, including an approximate 12-month period for data collection and 20-month overall duration.
    - Limiting investigations to non-intrusive methods.
    - Taking a representative sampling approach to survey coverage for communities and the environment.
    - Providing for more extensive community engagement to occur in Phase 2.

  These limit the nature and volume of data that can be collected to inform the impact assessment.
- **Baseline data collection:** a typical or standard impact assessment process would involve the establishment of a baseline from which to predict and monitor impacts. The Legacy Impact Assessment process is a midpoint assessment, in that it assesses impacts that have occurred, are ongoing and that are reasonably credible to occur in future. The impact assessment described in this report uses the conceptual site model and data collected during Phase 1 to allow for an impact assessment process that identifies how the current conditions may be a result of the environmental impacts caused by the Panguna Mine since 1989. This process is limited by:
    - There was no detailed baseline established prior to the development of the mine and limited environmental data is available to the Primary Contractor regarding the environmental conditions at its cessation in 1989 from which to assess change over time. Additionally, the historic information which is available to the assessment is limited to that which has been directly provided by BCL for this process or that which is publicly available.
    - The field investigation process includes methods to engage with people to identify changes in the environment over time, and wherever possible this observational data has been incorporated into the analysis. This observational data may be fragmented and present a partial view of the complex and dynamic environmental changes over the past three decades. A number of other significant influences have occurred in the environment, including but not limited to a civil war and more recent substantial population growth. Delineating the direct causes of environmental, social and human rights conditions is therefore not always possible.
- **Environmental impacts:** in the context of this Legacy Impact Assessment ‘environmental impacts’ refers to the impacts to the biophysical and physical environment including natural and physical resources (land, water, soil, air) and the ecosystems they support. It also includes mine-related structures and landforms as part of the biophysical environment.
- **Other social and human rights impacts:** social and human rights issues that are not directly connected to the environmental impacts of the Panguna Mine since 1989 have been raised during fieldwork to inform the social and human rights characterisation process. These impacts have been noted in the social and human rights characterisation section where this has occurred; however, the scope of the social and human rights impact assessment can only assess those impacts that are directly connected to the environmental impacts of the Panguna Mine since 1989.

- **Phase 1:** the first of two stages of the Panguna Mine Legacy Impact Assessment. Phase 1 will comprise identifying, using a combination of field investigations and predictive assessment and modelling, acute actual and potential impacts, focused on what the Complainants have identified as the most serious known likely impact areas for local populations. Tetra Tech Coffey is the Primary Contractor for Phase 1.
- **Phase 2:** currently envisaged to follow Phase 1 and may involve a targeted review of any remaining areas of concern as required to assess any remaining actual or potential environmental impacts caused by the mine and any remaining actual or potential social and human rights impacts directly connected to the environmental impacts. The nature and scope of Phase 2 will be dependent on the outcomes of Phase 1 and further discussion with the Parties.

The respective technical appendices describe the limitations associated with each technical study and Volume II, Part B describes the limitations associated with the environmental, social and human rights impact assessment.

3.2 RIGHTS-RESPECTING APPROACH

The Legacy Impact Assessment process and the associated investigations have been conducted with a human rights-based and participatory approach, in a rights-respecting way. Table 3.1 outlines how this was done during Phase 1. Chapter 5 and Chapter 6 provide further information on how this was done for the environmental and social field investigations, respectively.

Table 3.1 Human rights-based processes in the social and human rights characterisation process

Principles	Adopted processes
Participation	• Potentially affected communities were involved during each phase of the process. The Phase 1 field investigation process engaged with potentially affected communities and their representatives (through the Oversight Committee) to identify communities most at risk and developed mechanisms to engage with them. • Participatory methods were used, including participatory mapping and participatory photography. • A pre-awareness program was conducted prior to any contact with communities to support raising awareness and knowledge of the process and how they could participate (see below). • Participation of communities and individuals in the investigation was contingent on informed consent prior to the commencement of any data or sample collection.
Non-discrimination and equality	• Identification of potentially vulnerable groups and those most at risk of discrimination and marginalisation and developing methods to support their inclusion and voice based on experience on previous projects in PNG. These included separate meetings with marginalised persons. • Engagement with affected people and their representatives in accordance with guidance on cultural protocols provided by the Secretariat and feedback from pre-awareness activities and initial site investigations.
Transparency and accountability	• The Secretariat's Community and Stakeholder Engagement Lead holds overall responsibility for approving and facilitating all engagement relating to the Legacy Impact Assessment process, which incorporates an understanding of the purpose and scope of the Legacy Impact Assessment process. The Community Engagement Project facilitated by the Secretariat has conducted three rounds of community dialogues to date in the communities (see Chapter 4) and will continue to engage with affected communities throughout the Legacy Impact Assessment process. The reports from the initial community dialogues provided information about the communities visited, number of people who were present during the dialogues and their concerns. • Pre-awareness activities were completed to support community awareness of the purpose and bounds of the environment, social and human rights field investigations, as well as make sure people are adequately informed of their rights, to support their full participation in the process. Chapter 4 provides further detail of the pre-awareness process.

3.2.1 Approach to including vulnerable groups

In this report vulnerability means those groups that are 'disadvantaged in the local context' (Owen and Kemp 2020). These groups are identified in an impact assessment process because this disadvantage may mean that these groups will experience greater or different impacts.

The following groups have been identified as potentially vulnerable based on the existing literature on poverty and vulnerability in PNG:

- Households or groups that have limited access to land, such as those who lack customary land rights within an area (e.g., settlers, in-migrants focused around ASM activities).
- Unemployed households or households completely reliant on subsistence agriculture with few avenues for cash income.
- Persons with a disability.
- Illiterate persons.
- Female-headed households.
- Households predominantly comprised of persons aged over 60 years.
- Households where one or more person has migrated to the province (World Bank Group 2018; FAO 2019; Bourke 2020).

Table 3.2 details the approach to including these potentially vulnerable groups within the Legacy Impact Assessment process.

Table 3.2 Approach to identifying and including potentially vulnerable groups

Instrument	Approach to identifying and including vulnerable groups
Village survey	The village survey aimed to assist in identifying the presence of potentially vulnerable and marginalised groups including: • Identification of community hazards (e.g., river crossings, road conditions). • Identification of the proportion of households that are socioeconomically vulnerable or have other indicators of vulnerability.
Household survey	The household survey included questions to identify households that are socioeconomically or otherwise vulnerable including the following measures: • Age, to identify households with high dependence levels. • Sex and household head. • Literacy rates. • Migration.
Focus group discussions and participatory mapping	Allowance for the following in each community: • Separate male and female focus group discussions. • Key informant interviews with persons in positions relevant to vulnerable groups, such as women's' groups representatives, teachers, and health professionals.
Key informant interviews	

3.2.2 Ethics and informed consent

Ethical considerations were incorporated into the Legacy Impact Assessment process. The approach included presenting and protecting personal data, potential risks to participants, and the informed consent process.

3.2.2.1 Presentation and protection of personal data and risk to participants

Table 3.3 summarises the level of personal data collected for each survey instrument and the associated approach to confidentiality.

Table 3.3 Survey instruments and confidentiality

Instrument	Approach to confidentiality
Village survey	The village survey collected village level data and negligible personal data. Although it was intended to collect locations of cultural heritage sites using the village survey, locations were not collected in the field as these sites were often remote from the village and there was reluctance to provide this information.
Household survey	The household surveys collected a range of personal data. Demographic and socioeconomic data collected through the household survey was de-identified through a process of pseudonymisation. All quantitative data collected during the household surveys is presented in aggregate form.
Key informant interview	The key informant interviews collected people's views on community issues and community functions. The information provided by key informants may mean that readers of the report can identify the participant. Participants were informed that the information they provided will be used to support the Legacy Impact Assessment's social and human rights components and that readers of this and associated reports may be able to identify that they have participated in this process.
Focus group discussions and participatory mapping	Limited personal information was collected during focus group discussions. As focus group discussions and participatory mapping were completed in communities, there is no practical way to provide for participant confidentiality during the process but participants are not named as part of the report.
Participatory photography	Limited personal information was collected during the participatory photography process. Participants were able to provide their responses anonymously if desired, although as the participatory photography process involved the use of community facilitators, there were limited practical ways to provide for participant confidentiality. Cultural heritage site locations were provided during this process. Due to the potential sensitivity of this information, Tetra Tech Coffey has elected not to publish the locations of these sites in publicly available reports.

3.2.2.2 Data storage, access, and protection

All data collected as part of the field investigation activities was stored on secured servers or data storage devices that include standard backup protection protocols. Access to raw data collected during the environment, social and human rights field investigation process is restricted to Tetra Tech Coffey personnel and sub-contractors.

3.2.2.3 Informed consent

Informed consent processes were incorporated into all investigations undertaken for Phase 1 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. Confirmation that communities wish to participate in the Legacy Impact Assessment investigations was gained through the Secretariat.
- Prior: through the pre-awareness campaign, communities were made aware of the Legacy Impact Assessment process before the environmental, social and human rights investigations were undertaken.
- Informed: the pre-awareness campaign and the initial site visit raised awareness of the Legacy Impact Assessment and the Phase 1 environmental, social and human rights investigations.

All survey instruments that collected personal data began with a formal confirmation of informed consent.

3.3 HEALTH, SAFETY AND SECURITY

Throughout the Legacy Impact Assessment process and the associated investigations there has been a strong effort centred on the health, safety, and security (HSS) management of all people involved, which integrated both a systematic and localised approach given the complexity of working in the Autonomous Region of Bougainville and Panguna.

This integrated approach was recognised in the initial planning stages before, during and after the Initial Site Visit in December 2022 was conducted in collaboration with the Oversight Committee and Secretariat, where it was agreed that upholding safety throughout Phase 1 was paramount for all stakeholders involved as real safety and security risks were identified and needed to be addressed accordingly. As part of this, Oversight Committee members regularly voiced their commitment to ensuring the safety of the Tetra Tech Coffey team in the field.

Table 3.4 summarises the HSS approaches and management controls adopted by Tetra Tech Coffey in Phase 1.

Central throughout Phase 1 was understanding the risks involved with HSS working in Bougainville and Panguna in particular. The landscape of the study area and its accessibility was key in understanding and planning the field operations for large multidisciplinary field teams working during the three field campaigns over the 10-month period. There were two HSS risk assessment workshops attended by a wide range of stakeholders in late-2022 and mid-2023 that informed planning and managing the perceived and realized risks involved with undertaking Phase 1 fieldwork, and a subsequent multistakeholder HSS risk assessment workshop in early 2024 specific to planning stakeholder engagement releasing the results of Phase 1 to local communities.

A PNG subcontractor was engaged to manage all daily logistics and in field HSS requirements in the Arawa field office, working in close collaboration with the project management team. Its role was mainly but not restricted to managing each field team's logistic requirements, engaging all local hires, completing vehicle prestart checks, daily reporting and tracking all field teams and managing each team's HSS requirements.

Table 3.4 Summary of HSS management controls and approaches for Phase 1

HSS Tools	Management controls	Additional approaches
Risk assessment	Establishment of Phase 1 HSS risk register, documenting agreed control measures and responsibility for implementing these.	Briefing of Oversight Committee on HSS risks and controls. Regular review and update to risk registers capturing local knowledge and experience gained on the ground.
ESWMS	Environment Safe Work Method Statements manage risks identified for each task carried out in the field. Each ESWMS was tailored to each field team that undertook specific tasks during the field campaigns.	Wearing of low-vis (non-reflector) and non-branded clothing, to maximise the positive reception of each field team member while in communities and minimise the potential for confusion with a 'mining project'.
Local Content Action Plan	Maximising Local Content for Bougainvilleans, where feasible and economically viable. This enabled Tetra Tech Coffey to build stronger relationships with communities, which in turn built the company's reputation and promoted the safety of all field teams whilst in respective communities.	Hiring vehicles from communities where field teams would be visiting for the day. This allowed for ease of community entry and for teams to utilise their respective driver's local knowledge. Each vehicle underwent a daily vehicle prestart check with all vehicle hires.

HSS Tools	Management controls	Additional approaches
Trip safety and security plan	High level detailed trip safety and security plan tailored for each field team's trip in detail.	Liaising with the Secretariat and Oversight Committee and their engaged community facilitators to conduct pre-awareness sessions in communities the day before a field team arrived (see Chapter 4). This enabled an open line of communication and transparency and allowed queries or concerns to be directly and immediately addressed. Additionally, vehicles hired for use by the Project were branded with magnetic Tetra Tech Coffey car labels to maximise visibility and a positive reception in communities and to differentiate the teams from a 'mining project'.
HSSE Plan	The Health, Safety, Security and Environment (HSSE) Plan was a live document throughout Phase 1. This document was regularly updated as required. This plan outlines the HSSE requirements that all Tetra Tech Coffey personnel and contractors are obliged to comply with when conducting work for the Legacy Impact Assessment.	Reinforcing approaches to safety throughout Phase 1 field campaigns: • Following advice from the Oversight Committee, Tetra Tech Coffey did not engage a security firm and/or local police, to maximise acceptance within local communities across the study area. • The completed daily reports and debriefs contributed to the regular updating of the HSSE Plan. • Field teams carried 2-way-radios for ease of communication between each field team as mobile network coverage is low in most of the study area. In the same sense, each vehicle had a radio on board for ease of communication while on the road. • Liaising with community facilitators engaged through the Secretariat to enable smooth community entry for all field teams. Community facilitators were always present with each field team, and usually more than one facilitator was present depending on the size of the field team. • Satellite trackers and mobile trackers were issued to each field team, with daily afternoon check-ins conducted via mobile or satellite phone to track team movements.
Emergency Response Plan	Defined as the minimum emergency response arrangements and responsibilities for managing potential emergency situations during the Phase 1 field surveys.	
Crisis Management Plan	The Crisis Management Plan outlines the procedures to be followed in the event of a crisis by the Tetra Tech Coffey Crisis Management Team set up for the Legacy Impact Assessment.	

Combined, these approaches and management controls allowed Phase 1 to be completed safely with no major HSS incidents reported. Close collaboration with the Oversight Committee and Secretariat was essential to maintaining the safety and security of the field teams and the appreciation of the effort put in by members of these groups to keep teams safe cannot be overstated.

3.4 PRIMARY CONTRACTOR SCOPE OF WORK

The Primary Contractor Scope of Work was prepared in July 2022 to define the consultancy services for Phase 1 only of the Legacy Impact Assessment. The Primary Contractor is responsible for undertaking the Legacy Impact Assessment, including:

- Undertaking all primary and secondary investigation and analysis.
- Providing interim reports and updates.
- Providing a final report of results (i.e., this report).

The Legacy Impact Assessment is required to identify and assess the actual and potential impacts caused by the Panguna Mine since the cessation of mining in 1989. In particular, the:

- Physical and chemical environmental impacts and their evolution through time.

- Social and human rights impacts directly connected to these environmental impacts. This includes, but is not limited to, community health and safety impacts and impacts on livelihoods.

Consideration of the impacts of the Panguna Mine is required to include assessment of any material intervening and/or contributory factors. Phase 1 is also required to clearly identify:

- Actual or potential impacts to communities or to the environment which are identified but which are found by the Primary Contractor not to be caused by the mine.
- Perceived risks reported in consultations for which, on conservative examination, no mitigation actions are required.

3.4.1 Study area

Figure 3.1 shows the study area and domains adopted for Phase 1. This comprises the Mine, River System, Delta and Port and Town Domains as follows:

- **Mine Domain** – Including open pit, concentrator plant, mine dewatering inlet and tunnel, tailings discharge point, waste rock dumps and processing infrastructure as well as other non-process infrastructure within the SML boundary. The Port to Mine Access Road and the Kawerong River system within the SML boundary are included in this domain.
- **River System Domain** – Kawerong-Jaba River system downstream of the mine below the SML boundary and including the Jaba Pump Station. This domain includes areas commonly referred to by communities as upper and lower tailings. The mine dewatering tunnel outlet is in this domain. It includes mine impacted inflows, the rivers themselves, tailings deposition areas on surrounding floodplains, tributary channels immediately above their confluence with the Kawerong-Jaba and areas impacted by distributary channels diverging from the main Kawerong-Jaba channel and floodplain and stream or river segments within adjacent catchments that have received or are receiving tailings sediment inputs from Kawerong-Jaba via distributary channels.
- **Delta Domain** – Jaba River Delta in Empress Augusta Bay including immediately offshore (within a kilometre) of the average mean sea level on the delta.
- **Port and Town Domain** – including mine-related infrastructure in the port area such as concentrate storage, hydrocarbon fuel storage,11 MW power station, dewatering facilities, and Arawa Bay. The Port to Mine Access Road north of the SML boundary, Pinei River and the Rorovana villages are also in this domain.

3.4.2 Exclusions

The Primary Contractor Scope of Work explicitly excludes the Primary Contractor providing the following services during Phase 1:

- Direct engagement with Clan Leaders, representatives of the ABG and the Government of PNG or technical advisers to HRLC, Rio Tinto Limited or BCL except as part of planned and agreed stakeholder engagement activities.
- Comprehensive social mapping and landowner identification study for the purposes of determining customary rights.
- Invasive data collection techniques such as drilling unless agreed to be included considering value of the information and ability to schedule without delaying other reporting.
- Option analysis to determine how identified impacts will be mitigated/remediated.
- Phase 2 of the Legacy Impact Assessment.

LEGEND

- Village
- Point of interest
- Road
- Watercourse
- Phase 1 study area

Domain area

- Domain A - Mine
- Domain B - River System
- Domain C - Delta
- Domain D - Port and Town

SOURCE
Villages, roads, watercourses, domains and study area from Tetra Tech Coffey.
Imagery from Woolpert (2023) and Google Earth (2020).

0 2.5 5 km

SCALE **1:325,000**
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PANGUNA LEGACY ASSESSMENT COMPANY

PANGUNA MINE LEGACY IMPACT ASSESSMENT PHASE 1

FIGURE 3.1

Phase 1 Legacy Impact Assessment study area

TETRA TECH COFFEY

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3.4.3 Schedule

Table 3.5 outlines the schedule for delivery of the Primary Contractor Scope of Work.

Table 3.5 Key milestones in Phase 1

Milestone	Completion date
Contract award and Primary Contractor mobilisation	Q4 2022
Field assessment program	Q4 2022 – Q4 2023
Initial screening results	Q2 2023
Evaluation and impact assessment	Q4 2023 – Q1 2024
Draft reports submitted to Oversight Committee	Q2 2024
Reports completed and distributed to stakeholders	Q4 2024

As noted in Section 3.1, this schedule provided an approximate 12-month period for data collection and 20-month overall duration. This is a relatively short period of time compared to what might usually be allowed for an environmental and social impact assessment for a mining project in PNG or elsewhere.

3.4.4 Technical investigations

The Primary Contractor Scope of Work required field assessments and data collection followed by analysis, interpretation and assessment to enable the objectives of Phase 1 to be met. The on-ground component of the Scope of Work was required to consist of:

- Direct engagement with stakeholders and community representatives identified as potentially affected communities, to identify and understand the social and human rights impacts directly connected to the environmental impacts and to assess the severity of the human rights impacts within the severity framework of the United Nations Guiding Principles.
- A site assessment of the study area that involved mapping, visual observation, surface measurements and non-intrusive characterisation, and the collection of surface samples for laboratory analysis, to assess as much of the scoped area as possible in a minimum time with limited disruption to community members.

Phase 1 field investigations were required to be focused, non-intrusive and performed by a relatively small team. Field investigations were required to take place over a 12-month period to allow for seasonal variations and consist of three campaigns with each campaign involving several weeks to a month of field time. Social survey coverage needed to capture a representative sample of the different types of impacts experienced by communities and identify the settlements most at risk of acute mine-related impacts and select representative areas/populations to investigate. Social surveys were not expected to represent full coverage of all communities named in the Preparatory Phase report. Severity of potential impact was to be considered when selecting which communities to engage with in Phase 1.

The Primary Contractor Scope of Work required the following technical studies:

- Population demographics
- Livelihood and resource security
- Human health
- Water quality
- Environmental geochemistry
- Geotechnical, hydrology, hydrogeology and fluvial geomorphology
- Structural assessment.

These technical studies are included as technical appendices to the Phase 1 Assessment Report. In some cases, topics have been combined or split as per the Detailed Investigation Plans (see Section 3.5.1.2).

3.4.5 Representative sampling

The Primary Contractor Scope of Work required a representative sampling approach to data collection. In practice, this meant a limited number and duration of field campaigns, sampling locations selected as examples to characterise a location or village, and the application of the characterisation results to surrounding areas of similar locations or villages. It recognises that it is not feasible nor necessary to cover the whole study area to meet the objectives of the scope of work and timeframe for Phase 1.

The overarching approach to representative sampling was to capture data from the most serious impact areas identified in the Complaint, provide geographic coverage across the domains and allow an assessment of impacts based on environmental and social characteristics.

Of particular interest for stakeholders has been how this representative sampling has been applied to social surveys. For this, communities were selected from each domain based on:

- A risk-based approach that targets effort on representative communities that are at highest risk of mine-related impacts.
- Areas identified by Complainants and local community.
- Initial conceptual site model, aerial imagery and results of the Preparatory Phase.
- Geographic coverage of communities across each domain, to provide representation of different geographic profiles and land uses.

Phase 1 therefore focussed on areas identified by Complainants and local communities as the most serious known likely impact areas for local populations. A subset of villages was selected from this. The overarching focus was on characterising villages experiencing different types of impact such as flooding, potentially polluted drinking water, and potentially contaminated gardens due to ageing mine infrastructure. This then allowed conclusions to be made regarding the conditions and nature of impacts that similar locations may be experiencing.

3.4.6 Imminent Severe Risks

The Parties to the Complaint developed an Imminent Severe Risk Process that provided a mechanism for escalation of imminent severe risks to human rights identified during Phase 1. This process exists outside the Legacy Impact Assessment reporting process and does not replace the coverage of human rights impacts as part of the assessment. However, the process is directed by the scope of the Legacy Impact Assessment, i.e., human rights risks and impacts directly connected to the actual and potential environmental impacts caused by the Panguna Mine since the cessation of mining in 1989.

The intent of the Imminent Severe Risk Process is:

- To protect people from imminent, severe harm to their human rights while the Legacy Impact Assessment is ongoing.
- To facilitate identification and escalation of imminent severe human rights risks by Tetra Tech Coffey.
- To keep focus on holistic assessment of issues within the Legacy Impact Assessment that do not meet the Imminent Severe Risk threshold.

In accordance with the escalation strategy and criteria that have been established by the Parties to the Complaint, Tetra Tech Coffey escalated human rights risks within the scope of the Legacy Impact Assessment based on its own data gathering and technical/social analysis that met all of the following criteria:

- **Severity**: the impact must be irremediable.

- **Likelihood**: likely or almost certain.
- **Imminence**: occurring in the near term and before the conclusion of Phase 1 of the Impact Assessment.
- **Within scope** of the Legacy Impact Assessment (i.e., human rights risks and impacts directly connected to the actual and potential environmental impacts caused by the Panguna Mine since the cessation of mining in 1989).

The data gathering for Phase 1 was conducted in accordance with the approved Detailed Investigation Plans for each technical aspect. These investigations were not designed to respond to or conduct detailed investigations into situations as they arose.

Tetra Tech Coffey assessed 11 potential Imminent Severe Risks during Phase 1. Of these, seven met the criteria and were reported to the Secretariat and Independent Facilitator who have a responsibility to inform the Oversight Committee and the ABG. These seven related to:

- Structural risks associated with unstable buildings at the Jaba River Pump Station, Momau River Bridge, milling area workshop and storage area, and Panguna Town concrete walls.
- Geotechnical risks associated with unstable landform areas for the Port to Mine Access Road and the Main/Pump Station Levee.

The notification and response process then proceeded as set out in the escalation strategy proposed by the Parties to the Complaint. These Imminent Severe Risks have been considered further as part of the human rights impact assessment reported in Chapter 12.

3.4.7 Recommendations

The Primary Contractor Scope of Work requires that where the conceptual site model and environmental, social and human rights impact assessment demonstrate the direct connection then recommendations will be made for what needs to be remedied. The recommendations must be focussed on *what* requires remedy; they are not to be focussed on *how* to remedy them. The Primary Contractor Scope of Work gave the following examples, which are important to understand as they directly relate to the recommendations that are able to be made in Volume II, Part B:

- If the impact assessment finds that there was an environmental impact caused by the mine since 1989, e.g. water has been polluted by the mine beyond relevant limits and certain communities need safe drinking water, the recommendation might be that options analysis for remediation of the drinking water source and/or alternate safe drinking water sources or systems be undertaken for x y z communities who use x y z sources of drinking water.
- If the impact assessment finds that an environmental impact caused by the mine since 1989 removed access to education or gardens creating social or human rights impacts, the recommendation might be that an access point be restored for x y z villages in x y z general locations and options analysis for the best access restoration solution should be undertaken.
- If the impact assessment finds that there have been livelihood impacts directly connected to environmental impacts caused by the mine since 1989, we would not expect the recommendations to set out a complex livelihood restoration plan and to pinpoint what other means of livelihood should be offered to the community. Instead, a recommendation might be to restore livelihoods for x communities in x locations and to conduct a livelihood restoration assessment to facilitate this occurring.
- If the impact assessment finds that infrastructure mine processing chemicals have been stored in is deteriorating or otherwise unsafe, causing environmental impacts or social and human rights impacts connected to those environmental impacts, the recommendation might be that options analysis for safe removal of the chemicals or make-safe of the infrastructure be undertaken.

This means that this Phase 1 Assessment Report cannot provide recommendations of how to remedy the legacy human rights impacts of the Panguna Mine.

3.4.8 Review

The Primary Contractor Scope of Work requires all contracted deliverables to be submitted to the Project Lead in accordance with the agreed project schedule. Draft reports were shared with the Oversight Committee and Technical Sub-Committee, via the Project Lead, for comments before being finalised. Given its role to provide technical advice to the Oversight Committee to support decision-making about the impact assessment, the Technical Sub-Committee undertook a comprehensive objective peer review. Tetra Tech Coffey had discretion as to whether or not to incorporate comments or suggested amendments made through the initial review and peer review process.

Tetra Tech Coffey presented quarterly to the Oversight Committee during Phase 1 to keep it informed of progress against the Primary Contractor Scope of Work. Most of these presentations were in person in Bougainville.

3.5 EXECUTION FRAMEWORK

The Primary Contractor Scope of Work sets out the Execution Framework to be followed for the Legacy Impact Assessment. The Execution Framework embeds the concept that the Legacy Impact Assessment adhere to the following steps to achieve an evidence-based and transparent process:

- A preliminary conceptual site model that identifies the material environmental and social aspects to be investigated, and is progressively revised as data is collected to verify the actual and potential pathways from sources of residual mining contaminates and/or hazards to the community and receiving environments.
- Systematic design of the investigation scopes for each of these aspects and confirmation of the methods and information to be collected during field campaigns before they begin.
- Completing sufficient field investigations and data gathering to collect the right information to refine the conceptual site model and allow the assessment of environmental, social and human rights impacts.
- Evaluation of investigation results to progressively revise the conceptual site model, adapt future field campaigns within the Phase 1 schedule, or inform the aspects and design for Phase 2, and complete the environmental, social and human rights impact assessment to prepare recommendations for what needs to be remedied.

The overarching approach to Phase 1 was developed so that these logical steps, driven by the conceptual site model, form the robust process to identify and describe the physical, social, and biological stressors as well as contamination stressors that may be connected to the environmental and social impacts to be assessed.

The execution framework sets out five key implementation strategies:

- Stage 1 – Preliminary works
- Stage 2A and B – Environmental (A) and social (B) characterisation
- Stage 3 – Evaluation
- Stage 4 – Impact assessment
- Stage 5 – Reporting

Figure 3.2 shows the execution framework steps that were undertaken during Phase 1 and they are described in the following sections.

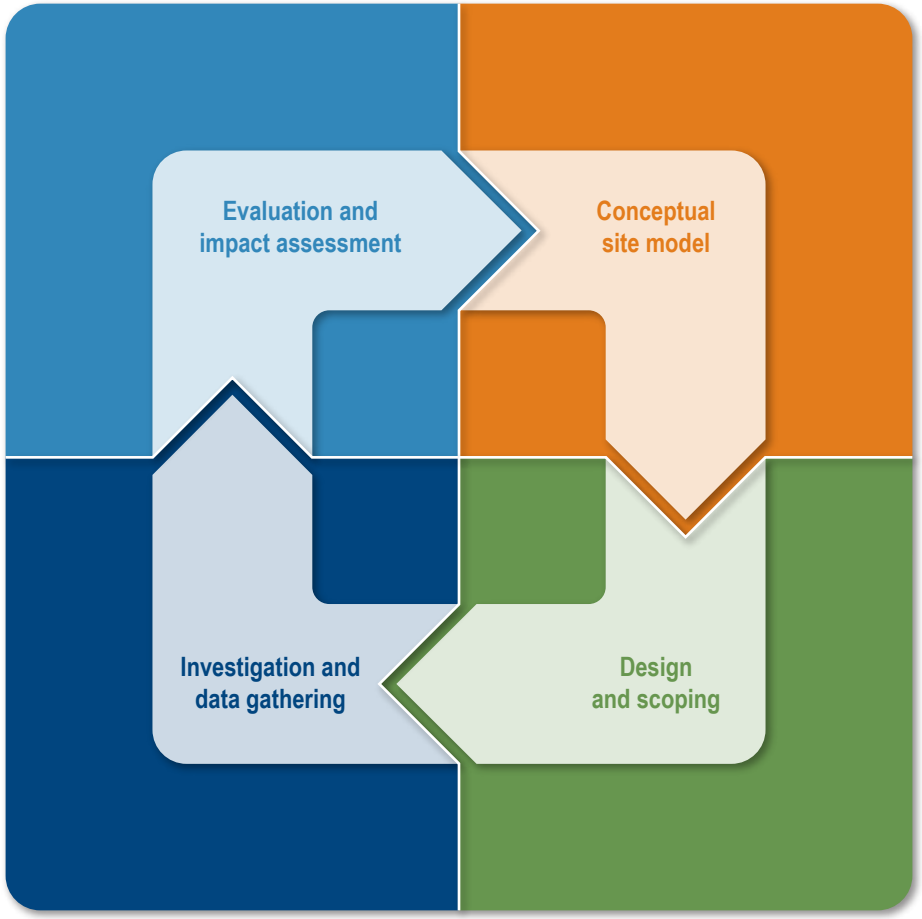

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FIGURE 3.2

The execution framework

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3.5.1 Stage 1 – Preliminary works

The first stage of execution of Phase 1 was the preliminary works. These preliminary works comprised:

- Preparation of the conceptual site model.
- Detailed Investigation Plans.

3.5.1.1 Conceptual site model

The use of a conceptual site model to assess contamination of sites is standard practice and is endorsed by and forms a key part of the Guideline on Site Characterisation under the Australian National Environment Protection (Assessment of Site Contamination) Measure 2013. This measure establishes the minimum requirements for completing site contamination assessments in Australia and is generally consistent with guidance from other jurisdictions such as the United States, Canada and the European Union. To maintain a consistent approach the conceptual site model has been adapted to incorporate all sources being assessed in the Legacy Impact Assessment, including physical hazards. This guideline on site characterisation describes the conceptual site model as a representation of site-related information that integrates hazard sources, end points, and exposure pathways between those sources and end points (Figure 3.3).

The conceptual site model identifies different end points as places or receiving environments where people and/or ecological receptors may be exposed to contaminants or hazards. The pathway that the contaminants take to reach these end points can themselves become sources of contamination (e.g., waterways, groundwater, or dust). In the social context, the conceptual site model identifies the source as a potential hazard (e.g., an unstable levee), the pathway may be an event, such as a heavy rainfall event that causes the failure of the levee, and the mass release of tailings down river, to end points. These events can cause human rights impacts, ranging from loss of life, injury, property loss causing displacement and loss of shelter and/or, restricting access to education. The conceptual site model indicates the circumstances where these pathways from source to end points may occur and highlights the need to collect data, to assess the exposure risk and impacts experienced by the places and people at these end points, and along the pathway.

During Stage 1, an initial digital platform for the conceptual site model was developed with the capability to maintain all conceptual site model parameters and incoming information over Phase 1. The initial conceptual site model identified the broad material environmental and social aspects for the Legacy Impact Assessment based upon existing data and remote observation. The initial conceptual site model was an interactive PDF, where feature layers on the legend could be toggled on and off. This first step of preparing the initial digital conceptual site model was followed by the design and detailed scoping for each aspect identified by the conceptual site model prior to the commencement of field investigations and data gathering, to optimise data collection.

Chapter 7 describes the method used to develop the conceptual site model.

3.5.1.2 Detailed investigations plans

Logical and robust Detailed Investigation Plans were developed for each of the technical aspects of focus for Phase 1 that outline why, where, what and how information is gathered. This allowed the Oversight Committee to understand and agree on the purpose of the investigation prior to commencing the next step of on ground data collection and engagement. Consultation and engagement with key local Bougainvillean stakeholders during this design process was critical, as it provided confidence in and transparency to the process and ultimately the results, informed the purpose and data gathering processes, and when the investigations were to be completed.

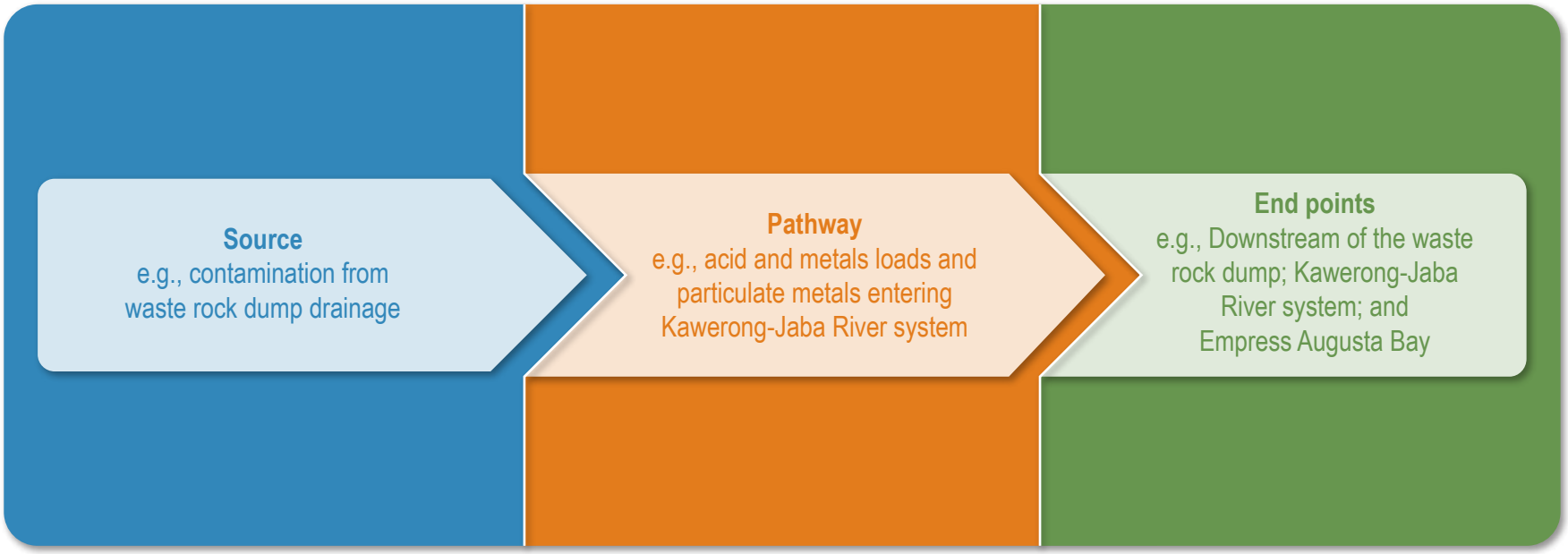

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FIGURE 3.3

Conceptual site model - exposure pathway diagram

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Agreement on the guidelines for the relevant methods/standards to be applied in the collection and evaluation of quantitative data increases transparency and confidence in the outcomes of the Legacy Impact Assessment. Consideration of and reaching agreement on how the environmental conditions or current experiences were to be measured within the study area and the standard or acceptable limits for each aspect to be evaluated against was critical to developing the indicators, criteria, and plan.

Figure 3.4 provides a brief description of the design steps to develop the detailed scopes for each aspect.

The following are more detailed definition of these steps:

- **Aspect** – the environmental or social (including human rights) themes of study or investigation, as identified from completing the conceptual site model for each domain.
- **Aim** – developed to focus investigations and developed for each aspect to define the study outcomes and meet Oversight Committee and local stakeholder expectations.
- **Guidelines** – the references to guide completion of investigation and collection of qualitative information, e.g., internationally recognised environmental and social (including human health and human rights) guidance, industry standards, and/or methods to establish analogue sites. The guidelines were used to define or benchmark a set of conditions for the criteria to be measured against; they reflect the agreed view of acceptable conditions or experiences. For example, there are drinking water and contaminated site guidelines that provide acceptable limits for potential contaminants of concern in water and soil. In some cases it was necessary to define analogue references or create benchmarks, to compare measured conditions against data from sites that are not impacted by the legacy of the Panguna Mine (noting that these may be outside the study area). Each aspect was allocated at least one guideline to establish the standard and/or methodology to measure and/or assess the information collected to understand the significance or magnitude of the results for each aspect.
- **Indicators** – specific parameters that are relevant to the aspect and guidelines; these can be categorical (present/absent), or quantitative (can be measured or compared against numerical guidelines or limits based on ecological and human health protection levels).
- **Criteria** – establishes an acceptable threshold that is time bound and specific to the indicators to demonstrate a complete pathway or further investigation, and/or trigger a response for potential acute impacts.
- **Plan** – detailed sampling plans indicating the spatial extent for the collection of the evidence base to measure attainment of the criteria or trigger a response.

Draft Detailed Investigation Plans were prepared for environmental and social aspects as part of the preliminary works stage of Phase 1. The Oversight Committee reviewed and endorsed the investigation plans prior to the implementation of the plans in the field.

The plans for each aspect are outlined within the corresponding technical study, as discussed below.

3.5.2 Stage 2 – Environmental and social characterisation

3.5.2.1 Stage 2A Environmental characterisation

Since 1989, the Panguna Mine has never re-opened and there has been no implementation of formal closure, maintenance of mining or process infrastructure or remediation work on the mine or downstream receiving environment. There have been no significant data collection activities or technical field inspections conducted on site since 1989.

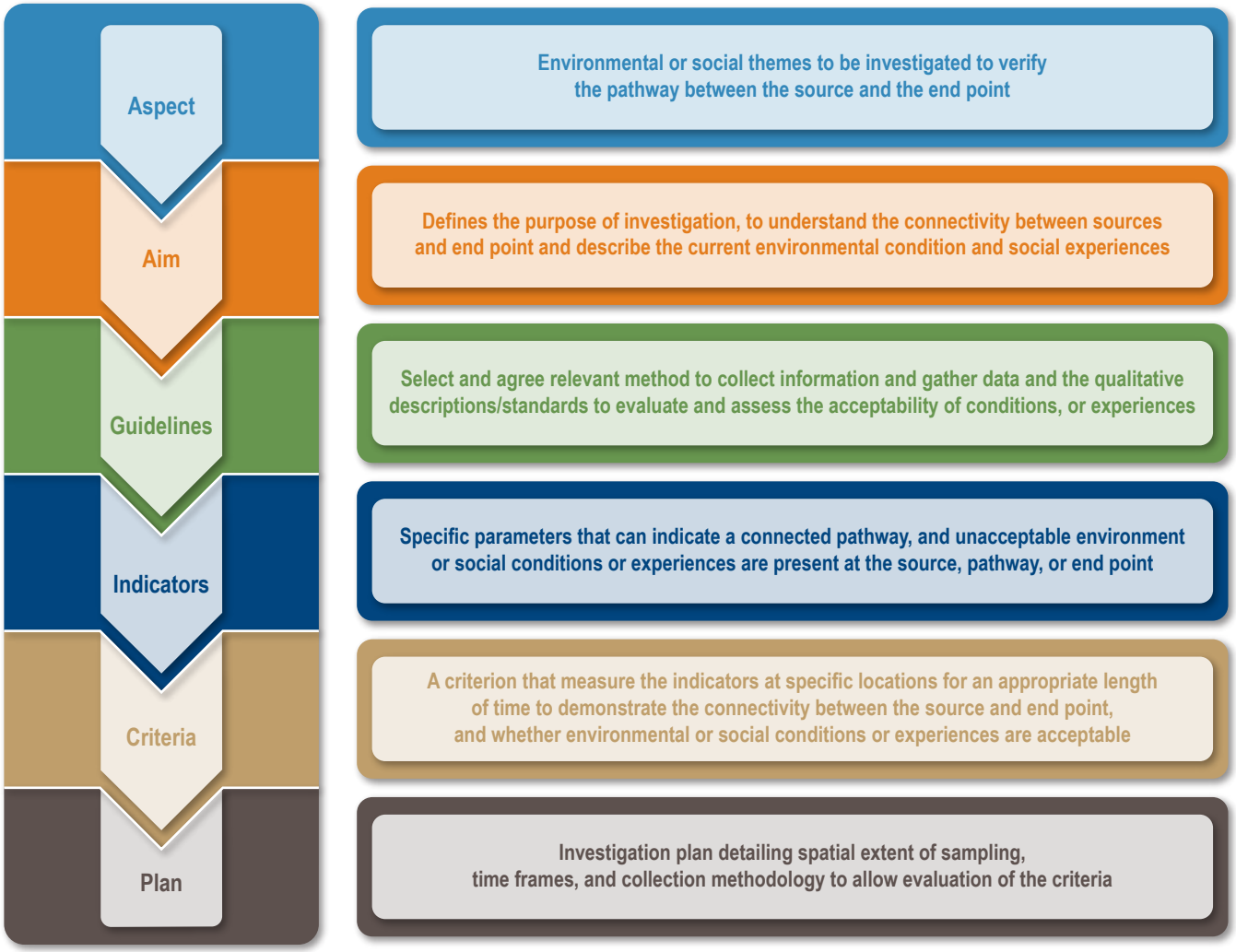

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FIGURE 3.4

Design steps to develop detailed scopes for investigations

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Remote sensing data analysed during the Preparatory Phase provided some information on the revegetation of the site, changes in tailings deposition patterns and changes in settlement and land use. However, almost nothing was known about how the surface water quality, geochemistry and geotechnical stability of the system had evolved over the past 30 years. Consequently, the level of risk these aspects pose to communities impacted by the mine was not well defined.

Detailed Investigation Plans were prepared for characterising the environment for the following aspects:

- Water quality (see Appendix A).
- Environmental geochemistry (see Appendix A).
- Site contamination (see Appendix B).
- Geotechnical (see Appendix C).
- Hydrology and geomorphology (see Appendix D).
- Hydrogeology (see Appendix E).
- Structural (see Appendix F).

Field data collection and investigation followed the approaches described in the respective Detailed Investigation Plans.

3.5.2.2 Stage 2B Social and human rights characterisation

Three social aspects (population demographics, livelihood and resource security, and human health) were examined to understand the way people live, the resources they rely on, and their potential contact with contaminants and hazards associated with the legacy of the Panguna Mine. This provided an integrated characterisation of social, health and human rights.

Detailed Investigations Plans were prepared for characterising the social and human health aspects and are detailed in:

- Human health (see Appendix G).
- Social and Human Rights (see Appendix H).

3.5.3 Stage 3 – Evaluation

The investigations carried out in Stage 1 and 2 generated a very large amount of data, all which required analysis, in some circumstances modelling, and evaluation. The focus of evaluation of information gathered was on acute actual and potential impacts; non-acute actual and potential impacts may be addressed in Phase 2. A key outcome of the evaluation stage was an update and refinement of the conceptual site model based on analysis and interpretation of the social and environmental data, models, and core social and environmental characteristic information.

3.5.3.1 Analysis and interpretation

The evaluation stage progressively occurred from the commencement of the field campaigns, to test the criteria for each aspect and identify connected pathways. The analysis and interpretation stage of the evaluation process focussed on:

- Confirming the sources of contamination or physical risks, their area of influence, and confirming their connection status (actual or potential) for those identified for each domain.
- Analysing indicators to test the criteria for each aspect to determine unacceptable conditions or experiences, based on the agreed guideline values or data from background or non-impacted sites.

- Defining the parameters for display in the conceptual site model from both environmental and social investigations.
- Preparing a short summary of the key results and knowledge gaps identified by not being able to confirm the connected pathway from each investigation.
- Identifying the most risk affected communities and sensitive receptors and assigning these a sensitivity rating in preparation for the next impact assessment process.
- Preparing a description of the social characterisation of Bougainville to identify the most at risk, marginalised and potentially vulnerable groups within the community for exposure to social and human rights impacts.

The data collected during the field campaigns was updated into the WebGIS live, allowing for verification of data, sharing of data between the environmental and social teams, and in-field evaluation of data. The data was progressively reviewed and reported to allow data trends to be tracked and reported to the Secretariat. The results were reviewed in relation to key concerns directly raised in the Complaint.

3.5.3.2 Revision of the conceptual site model

The improvement of the conceptual site model relied upon the completion of the evaluation steps after each data collection activity, where the environmental and social data was analysed to identify and refine actual and potential impacts, and knowledge gaps to instruct the next stage of work.

The conceptual site model was revised following the first two field campaigns for inclusion in the Interim Screening Paper and again after the third campaign to focus investigations for the remainder of Phase 1. To revise the conceptual site model, the specialist scientist(s) who collected the data and information, completed an analysis against agreed guideline values. This was then used to identify sources and exposure pathways, which also included assessment of risk and probability of exposure for certain hazards.

Chapter 7 describes how the environmental and social data was evaluated and classified thematically as a parameter within the digital conceptual site model for Phase 1.

3.5.3.3 Modelling

The analysis and interpretation of data was supported by modelling where data gaps were identified that would significantly impact the outcome of the assessment. The development of models by the technical specialists allowed for the identification of current conditions, short (i.e., less than five years), moderate (between five and 20 years) and prolonged impact trends. Where historical data was available this was used to indicate trends since the cessation of mining in 1989. Potential impacts were assessed based on modelling predictions where relevant.

3.5.3.4 Assessing results in the context of the Imminent Severe Risk process

Imminent severe human rights risks were identified and assessed during Phase 1 as outlined in Section 3.4.6.

While the focus of the Imminent Severe Risk process is on the most severe risks, i.e., those that are irremediable, risks classified as lower than irremediable were considered in Phase 1. As with potential Imminent Severe Risks, these risks were considered in the evaluation phase to:

- Confirm the sources of contamination or physical risks, their area of influence, and confirm their connection status (actual or potential).
- Analyse indicators to test the criteria for each aspect to determine unacceptable conditions or experiences, based on the agreed guideline values or data from background or non-impacted sites.
- Where there is a complete pathway, progress to Stage 4 Impact assessment.

3.5.3.5 Acknowledging uncertainty

An uncertainty ranking has been provided with impact assessment results based on the available information, level of assumptions, certainty of predictions and confidence in the accuracy of the inputs that produce the significance rating. This inclusion of uncertainty in outputs of the field inspection, data collection and/or modelling activities informs the level of confidence in the conclusions from the impact assessment.

In some instances, specific investigations formally tested the influence of uncertainty. Investigations that assessed uncertainty involved the evaluation of the adequacy of the data set to determine if the data was sufficient for each study area, where data gaps were present and where uncertainties in the risk evaluation could be refined through further data or information. Investigations which undertook this analysis included:

- The human health risk assessment, which involved the evaluation of the adequacy of the data set for each media and community.
- The site contamination investigation report, which involved the evaluation of the adequacy of the soil and surface water data was sufficient to quantify the potential health and ecological effects of contamination.
- The geotechnical investigation report, which involved the evaluation of the adequacy of the observations, semi-qualitative and quantitative data collected for each area.
- The hydrology and fluvial geomorphology investigation report, which involved the evaluation of the adequacy of historical and recently collected data and modelling efforts.
- The hydrogeological investigation report, which involved the evaluation of the adequacy of the hydrogeological data and modelling completed.

The level of uncertainty associated with each of the impacts assessed has been assigned as high, medium or low:

- High – additional relevant information is needed to adequately assess the impact.
- Medium – there is some information available but additional information is required to assess the impact.
- Low – there is adequate information and evidence to assess the impact.

3.5.4 Stage 4 – Impact assessment

A range of different methods were adopted for the impact assessment stage dependent on the aspect that was assessed, comprising:

- Environmental impacts
- Human health risks
- Social impacts
- Human rights impacts.

The integration of the environmental, social and human rights impacts was directed and co-ordinated by a team of multi-disciplinary impact assessment specialists. Collectively, the environmental, social and human rights impact assessments used a significance approach to provide consistency in method and outputs.

For an impact assessment to be completed:

- There must be a source directly caused by the mine, e.g., contamination or physical risk.
- There must be an end point, e.g., receiving environment demonstrating an environmental impact or at-risk communities.
- There must be a complete actual, potential, active or historic pathway between the source and the end point.

All three components had to be present to indicate an actual and/or potential impact.

Figure 3.5 outlines the approach for the Phase 1 impact assessment.

The results of the environmental impact assessment and hazard assessment inform the assessment of the significance of social impacts. For example, the extent and duration of social impacts are primarily driven by the results of environmental impact. The actual, potential, and possible impacts and possible human health risks assessed in the social and human rights impact assessments have been drawn from the environmental impact assessment.

Possible impacts are credible social and human rights impacts that could be directly connected to actual environmental impacts but there is insufficient information to determine if there is an actual impact or not. Given the preliminary nature of Phase 1 there are many impacts that have a high level of uncertainty, which is commensurate with the preliminary nature of the Phase 1 assessment and the Scope of Work.

Only social and human rights impacts directly connected to an environmental impact of the Panguna Mine since 1989 are within scope. Nevertheless, given the interest of and importance to local stakeholders, actual and potential impacts to communities which were identified or perceived, but which have been found not to be caused by the mine have been identified and reported in Chapter 8.

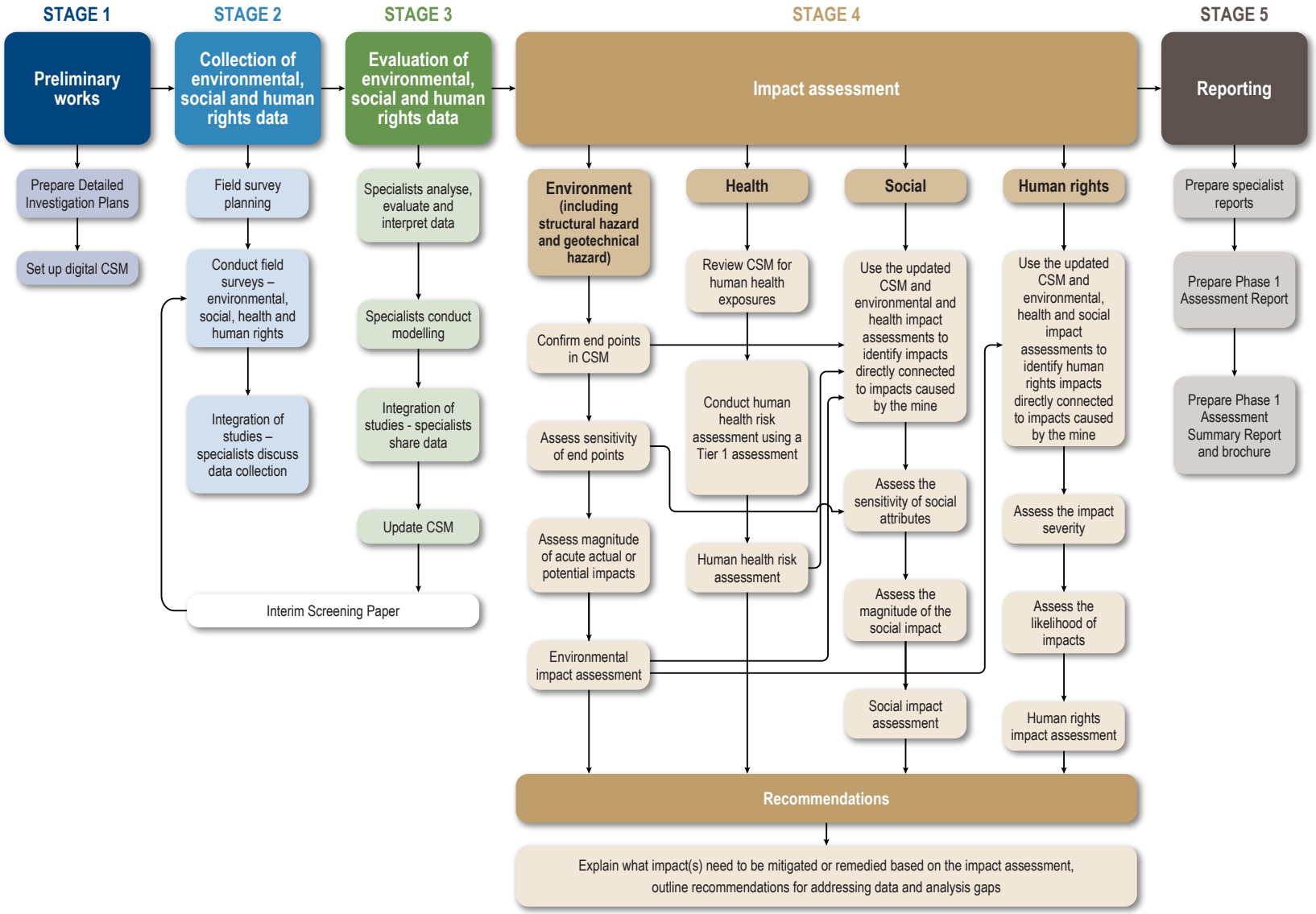
The assessment of human rights impacts followed the environmental and social impact assessment and was the final step in the integrated evaluation and impact assessment process. The assessment of human rights impacts considered the outcomes of the environmental and social impact assessment and examined what human rights have been impacted (and for what rights holders) by mine-related environmental impacts since 1989.

Impacts to each human right area were identified in the social and human rights framework to articulate the human rights impacts of the former Panguna Mine directly connected to environmental impacts that have persisted and/or occurred since mining ceased in 1989. Where appropriate, the assessment considered the availability, accessibility, acceptability, and quality of a resource (e.g., water) within the local context, to aid in assessing how the environmental impacts have resulted and/or are predicted to result in human rights impacts.

The human rights impacts were viewed through a number of lenses, with specific attention paid to those most vulnerable. The social and human rights characterisation process described in the Social and Human Rights characterisation investigations including associated stakeholder engagement supported the identification of vulnerable groups, with the assessment process taking impacts on these groups into account when rating the severity of impacts.

The United Nations' Guiding Principles (United Nations 2011) recommends that human rights impacts be assessed based on their severity, which is established through an assessment of an impact's scale, scope, and irremediability. The social and human rights characterisation program and the broader stakeholder engagement program provides a mechanism for rightsholders to inform and expand upon the understanding of the severity of human rights impacts.

Volume II, Part B provides further description of the impact assessment methods for each aspect.



NOTE
CSM = Conceptual Site Model

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FIGURE 3.5

Phase 1 Legacy Impact Assessment approach

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3.5.5 Stage 5 – Reporting

Stage 5 of the Execution Framework involves reporting and presenting the outcomes of Phase 1.

The reports that have been produced include:

- Phase 1 Summary Brochure – A short summary brochure of key results for a non-technical audience to be distributed to communities at the completion of Phase 1. This has been prepared in English and Tok Pisin.
- Phase 1 Summary Report – A high-level summary report setting out the results and recommendations from Phase 1 that will be made publicly available (once finalised and approved by the Oversight Committee), published online and distributed to relevant stakeholders and community representatives, including community members of the Panguna Mine Impact Area. This has been prepared in English and Tok Pisin.
- The Phase 1 Assessment Report (this report) – A complete technical report on the Phase 1 acute actual and potential impacts that will be publicly available (once finalised and approved by the Oversight Committee), published online and distributed on request.

As noted in Section 3.4.7, this Phase 1 Assessment Report cannot provide recommendations of how to remedy the legacy human rights impacts of the Panguna Mine.

3.6 ASSURANCE PROCESSES

There have been multiple levels of assurance (also known as quality assurance and quality control) throughout Phase 1 to provide confidence in the outcomes of the work so that they are fit for purpose within the context of the contracted scope of work. This assurance has been both within and outside Tetra Tech Coffey, as follows:

- Authorised review – internal assurance process within Tetra Tech Coffey before documents can be released.
- Project Review Group – comprises senior representatives from Tetra Tech, PLAC, Secretariat, the Parties to the Complaint and a member of the Oversight Committee from Bougainville. This group met quarterly during Phase 1 to check that PLAC and the Secretariat's expectations are being met and that the contracted scope of work is being delivered satisfactorily and to provide strategic advice and direction to the Secretariat Project Lead regarding project delivery, project risks and execution.
- Independent Peer Review team – external assurance process outside – but managed by – Tetra Tech Coffey established to confirm the technical quality of the output for Phase 1 and that the objectives of the work, including application of the Execution Framework, have been met. The Independent Peer Review team is made up of six independent technical experts not involved in the Legacy Impact Assessment and includes members who together have the following technical skillsets: human health, social and communities, human rights, environmental geochemistry and water quality, geomorphology and geotechnical.

  Peer review has been conducted for the following stages of Phase 1:

  - Stage 1 – Detailed Investigation Plans. Review of investigations plan to validate core elements of the plan design, as described in the Execution Framework.
  - Stage 3 – Identification of complete pathways. Review evaluation process for the identification of complete pathways and their representation within the conceptual site model; review Interim Screening Paper to confirm application of the agreed plan design; review quality assurance and quality controls to note anomalies.
  - Stage 4 – Impact assessment. Review of environmental, social and human rights impact assessment to confirm application of the agreed assessment methods.

- Technical Sub-Committee – external assurance process managed by the Secretariat which provides technical advice to the Oversight Committee to support decision-making about the impact assessment. The Technical Sub-Committee is made up of five independent technical experts (not the Primary Contractor) and includes members who together have the following technical skillsets: human health, social and communities, human rights, environmental, geomorphology and geotechnical.

Combined, these assurance processes have delivered focussed, science driven and rapid outcomes for Phase 1 of the Legacy Impact Assessment with strong independent assurance.