

**Health Baseline Assessment
Stage 2 Report**

Nautilus Minerals

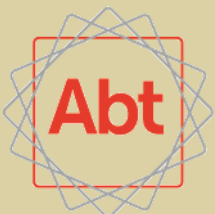
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ACRONYMS AND ABBREVIATIONS

ADI	Australian Doctors International
AMS	Area Medical Store
ASR	Annual Sector Review
CAB	Coastal Area of Benefit
CYP	Couple Years of Protection
HSC	Health Sub-Centre
LLG	Local level government
MDG	Millennium Development Goals
NDoH	National Department of Health
NHIS	National Health Information System
NIP	New Ireland Province
VHV	Village Health Volunteer
VBA	Village Birth Attendant
WFA	Weight for Age

EXECUTIVE SUMMARY

Nautilus Minerals contracted Abt JTA to undertake a Health Baseline Assessment in the Coastal Area of Benefit (CAB) as defined for the Solwara 1 Project. The CAB is made up of seven wards in the Namatanai district of New Ireland Province and covers parts of the Namatanai Rural and Sentral Niu Ailan Rural Local Level Governments. The goal of the Health Baseline Assessment was to develop an evidence base to inform the design of community health programs.

The Health Baseline Assessment employed a number of methods to create a comprehensive picture of health and health services in the CAB. A literature review and an analysis of the existing health data were undertaken. In addition, extensive field work involving assessment of health facilities, interviews with health workers and focus group discussions with community members were conducted.

The findings of the Health Baseline Assessment have been presented in two reports: the Stage 1 Report (dated 2 July 2015) which documented the data and analysis from the literature review and field based survey; and this Stage 2 Report that details the service gap analysis which compared the service operating levels against the National Health Service Standard (NHSS), and options for activities to reduce these gaps and improve health and health services in the CAB.

There are five open and three closed health facilities in the CAB. Despite reasonable performance in the health indicators for outreach clinics and immunization, maternal health indicators were below the national targets. None of the health services met the NHSS level for any core services. A majority of the health facilities require improvements to the infrastructure and lacked essential medical supplies. This analysis has informed the development of options for Nautilus to consider as part of the Company's planned investment in partnering with local health services to improve community health outcomes.

1. INTRODUCTION

Abt JTA has been contracted by Nautilus Minerals (the Company) to undertake a Health Baseline Assessment in New Ireland Province where they have identified the Coastal Area of Benefit (CAB) for the Solwara 1 Project. Nautilus plans to focus its Corporate Social Responsibility (CSR) activities, of which health is one of five key strategies, in the CAB. The CAB is made up of seven wards in the Namatanai district of New Ireland Province and covers parts of the Namatanai Rural and Sentral Niu Ailan Rural Local Level Governments. There are five open and three closed health facilities in the CAB.

The goal of the study was to conduct a Health Baseline Assessment to be used for informing the design of community-based health programs and assessing performance in the CAB. By establishing the status of the health services and the health of the population in the CAB, this baseline can be used to promote future initiatives to improve health service delivery. The study was completed through stakeholder consultations, review of existing National Health Information System (NHIS) data and literature, health facility assessments, health worker interviews, and focus group discussions with the communities. A separate Appendix contains the datasets from Stage 1.

The Stage 1 Report (dated 2 July 2015) for the Health Baseline Assessment detailed the findings from the review of literature and data and the field work. This is the Stage 2 Report, which documents the gaps in health services and proposes options for Nautilus to consider for contributing to the improvements of health and health services in the CAB.

2. SUMMARY OF STAGE 1

To provide background to the gap analysis, a summary of Stage 1 of the Health Baseline Assessment is provided below.

2.1. METHODS

Stage 1 of the Health Baseline Assessment employed a number of methods to create a comprehensive picture of health and health services in the CAB. A literature review and an analysis of the existing National Health Information System (NHIS) health data were undertaken. In addition extensive field work involving assessment of health facilities, interviews with health workers and focus group discussions with community members were undertaken. Ethical considerations were addressed through informed consent and approval of the PNG Medical Research Advisory Committee.

2.2. FINDINGS

2.2.1. HEALTH IN PNG

In recognizing healthcare as a fundamental component to economic and social development, the National Department of Health (NDoH) developed a National Health Plan 2011-2020 to sit in line with the PNG Vision 2050, the PNG Development Strategic Plan 2010-2030, and the Medium Term Development Plan 2011-2015. Despite this, progress in health strengthening has slowed, if not declined since the mid-1990s with the fragmentation of service delivery at the provincial level and transfer of the responsibility of rural health to local-level governments (1). As a result, there is inequitable and insufficient funding of health across provinces (2).

As with many developing nations, communicable disease and maternal and child health are the leading health priorities in PNG. Malaria is one of the leading causes of deaths and tuberculosis and filariasis are endemic (3; 4). There are large discrepancies in the maternal mortality rate based on the method of calculation, however it is consistently reported to be very high. A recent study estimated the maternal mortality rate to be 500 maternal deaths per 100,000 live births (5). Infant mortality still remains high and there has been an increase in incidence of diarrhoeal disease in children under 5 years since 2009, while immunization coverage in general has declined. In addition to communicable diseases, there is a rising burden of non-communicable diseases, specifically diabetes, hypertension, and tobacco and alcohol related illness.

2.2.2. HEALTH IN NEW IRELAND PROVINCE AND THE CAB

An analysis of the most updated NHIS data was conducted to provide an overview of the activity and health trends of the two health sub centres (HSC), Messi and Kabanut, and the referral hospital, Namatanai, in the CAB from 2010-2014. New Ireland Province has been shown historically to be a high performer in health sector performance and was amongst the top five provinces in 2013. Immunization coverage for both Measles and DTP-Hib-HepB has consistently been high, with decreases provincially and in the CAB facilities in 2014. Antenatal coverage and the proportion of births that are supervised have also been high, although these indicators were much lower at Kabanut HSC compared to the other facilities and provincial level.

Malaria rates remain high, and as a result, anaemia rates are high. Yaws is also endemic to the region. New Ireland Province has the highest rate of accident and injury in PNG, with increases in accident and injury seen in the CAB facilities between 2010 and 2014.

Australian Doctors International (ADI) reports on patrols to Messi and Kabanut HSCs consistently reported the top three health issues in their 2013 and 2014 patrols to be musculoskeletal complaints (back pain, knee pain, etc), anaemia secondary to recurrent malaria and splenomegaly, and lifestyle diseases, specifically diabetes and hypertension.

The top three causes of mortality across Messi HSC, Kabanut HSC and Namatanai Hospital were neonatal sepsis, malaria, and pneumonia, which made up 12.4%, 7.6% and 7.1% of all deaths, respectively between 2010 and 2014. Provincially, tuberculosis also posed a high burden, causing 7.7% of deaths.

2.2.3.HEALTH FACILITIES IN THE CAB

The five open health facilities (Kurumut Aid Post, Labur Aid Post, Tubuana Aid Post, Messi Health Sub-Centre, and Kabanut Health Sub-Centre) were assessed against the National Health Service Standards (NHSS). None of the facilities met the standards for all 23 core services in the NHSS: compliance with the NHSS ranged from 30% to 74% across core service areas.

Facilities also underwent infrastructure assessments to identify any major issues. Only two of the open aid posts (Kurumut and Labur) were found to be in sound condition, only Kabanut HSC and Labur Aid Post were reported to have sufficient lighting, and Kurumut Aid Post was the only facility with running water. Further, none of the facilities are purpose-built or organised to meet triaging of multiple and seriously ill patients. All facilities lacked adequate emergency response capacities.

The availability of basic medical equipment in working order was assessed. Of particular note is the unavailability of equipment for sterilization at all three open Aid Posts. Both HSCs were equipped with Primus stoves for this purpose. None of the facilities had the updated versions of the standard procedures and treatment protocols and only one of five open facilities had the complete set of the NDoH Standard treatment guidelines. Stock outs of thirteen selected medical supplies were recorded as well. Availability of these supplies varied greatly: Labur Aid Post had only one of the thirteen drugs where Messi HSC had eleven. Of importance is that none of the three open Aid Posts had stock of malaria medications.

All clinical staff have been provided with housing at Messi HSC, Kabanut HSC, Tubuana Aid Post and Kurumut Aid Post. The buildings were in good condition, however do not have proper kitchens, toilets or showers, and are unfurnished. The Community Health Worker (CHW) at Labur lives in their own home.

2.2.4.HEALTH WORKER INTERVIEWS

All open health facilities were staffed with the approved number of health workers and all were appropriately registered. Fifteen of the health workers participated in structured interviews covering their qualifications, training, supervision and barriers to providing quality health services.

A large concern of health workers was supervision. Ninety-five percent of the workers felt they received inadequate managerial supervision, with 80% claiming inadequate clinical supervision as well. This lack of supervision and support from supervisors was also expressed to be a common barrier to receiving additional training, where workers were not informed of opportunities for further training and career development.

When asked of the barriers they face to providing quality health services, the majority of workers listed a shortage of drugs and medical equipment to be the largest barrier. Many also listed inadequate infrastructure, including lack of space for expansion, inadequate water supply, inadequate lighting, and lack of private area for patient screening.

2.2.5.COMMUNITY DISCUSSIONS IN THE CAB

Focus groups were conducted in twelve villages across the CAB. When community members were asked what barriers they faced in accessing health services, the following were the most commonly mentioned across all focus groups:

- Lack of transportation
- Fees associated with medical services
- Low incomes; could not afford service fees or public motor vehicles for transportation
- Shortage of health workers
- Ill treatment by health workers
- Insufficient service provision; quality of services low, no family or dental health provided, no specialist services, and inadequate support to assist women in labour
- Inadequate and irregular supply of medicine and equipment

Focus groups were also asked what they consider to be the priority health issues for the community. The top priorities included:

- Lack of fresh, unpolluted water supply
- No toilet facilities
- Lack of waste management
- Lack of community awareness of health issues; specifically surrounding family planning and food security
- Inadequate health programs
- Inadequate health facility infrastructure; with no room for expansion of services
- Aid post closures; lack of accessible facilities

The use of traditional health workers in the community was also discussed. Half of the villages indicated that traditional health workers are used because of the inaccessibility of modern health services, or as a second option when modern medicine fails. Many also indicated the important role traditional health workers play in maternal health, specifically helping women through difficult births in the village setting.

3. GAP ANALYSIS

A comparison of the findings from Stage 1 of the Assessment against the NHSS and the National Health Plan has informed the development of the service gap analysis and development of improvement recommendations (Table 1). In general terms, the gaps are a reflection of many rural health services across Papua New Guinea. The recommendations form a priority list of improvement actions that the local health services may consider to narrow the gap between the services they are able to provide their communities and the NHSS, and actions local health services may consider collaboration with Nautilus on to facilitate achievement of improved services.

The gap analysis is presented in groupings under the eight Key Result Areas of the Papua New Guinea National Health Plan. The National Health Plan 2011-2020 is a 'back to basics' approach with the ultimate goal of strengthening primary health care for all, and improving service delivery for the rural majority and the urban disadvantaged. A strong focus is placed on improving maternal health and child survival, and reducing burden of communicable disease (6) which are also priority issues in the CAB, as the gap analysis shows.

Table 1. Analysis of gaps identified between Stage 1 findings and national standards and targets

Findings	Gap between study findings and national standards and targets	Recommendations
KRA 1: Improve Service Delivery		
Lack of transport to get to health facilities	Health facilities should be open and accessible to the community. Health facilities should provide outreach to villages.	Both Health Sub Centres should maintain an ambulance vehicle and 20ft boat equipped with lifesaving equipment to retrieve critical care patients and provide referral to the next level of care.
Long distances between facilities for general patient care and birthing	Health facilities should be open and accessible to the community.	Through consultation and collaboration, stakeholders to reach consensus on the level and number of health services or facilities required along the CAB for the medium to long term subject to an infrastructure improvement plan and when opening of closed facilities, to align development with the NHSS.
One facility has a radio on the national health radio network, however it is not functional; Four facilities rely on the health workers' personal mobile phone.	All health facilities require access to at least one form of communication technology.	All facilities to have radio communications on the national network for improved communication. Mobile phones to be provided to health facilities to remove the reliance on privately owned phones. A Closed User Group could be established to remove the cost to individual users.
One of the five facilities has running water.	The design and layout of all services allows for safe, effective and efficient practices and meet the special requirements of individual services.	All refurbishment or construction of new health infrastructure must comply with NHSS design standards for health facilities, including running water.
All facilities do not have adequate space for all core services; Two facilities were assessed as in sound condition	The design and layout of all services allows for safe, effective and efficient practices and meet the special requirements of individual services	All refurbishment or construction of new health infrastructure must comply with NHSS design standards for health facilities.
Solar lights are unreliable at Messi HSC	Lighting is required for safe deliveries.	Upgrade solar lights at health facilities to enable safe deliveries at night.
Perhaps due to low levels of worker incentivisation, supervision, training, conditions, and supplies and infrastructure, the work attitudes and ethics of some health workers was reported to be sub-optimal.	Ill treatment of patients or guardians is not helpful and presents ethical and safety risks that require due consideration to ensure risk management protocols are in place. Teaching and training as well as leadership management is found to be poor.	To maintain skill and standards of practice currency, the NHSS (NDOH V2, 2011) requires health staff to be provided with, and undertake regular (every 6-12months) in-service training and supervision.
Staff house at Labor is nearly collapsed and uninhabitable;	Sufficient staff housing enables a full complement of health workers to be placed at a facility.	All refurbishment or construction of new health infrastructure must comply with NHSS design and meet

Findings	Gap between study findings and national standards and targets	Recommendations
<p>Staff houses at four facilities do not have proper kitchens, toilets, bathrooms; are inadequate in size; and were not furnished; Staff house at Tubuana does not have power and water supply</p>	<p>Adequate staff housing boosts morale and contributes to positive health worker attitudes and attendance at work.</p>	<p>local needs.</p>
<p>Three Aid Posts in the CAB are closed</p>	<p>Health facilities should be open and accessible to the community.</p>	<p>Stakeholders to review and determine the location, service Level and distribution of health facilities in the CAB to plan equitable access to health services by all communities</p>
<p>KRA 2: Strengthen Partnerships and Coordination with Stakeholders</p>		
<p>Health facilities are managed by the United Church and Namatanai District Administration</p>	<p>Collaboration between health service organisations promotes coordinated and efficient health service delivery.</p>	<p>Stakeholders to maintain a forum for communication and collaboration through the Provincial Health Authority.</p>
<p>KRA 3: Strengthen Health Systems and Governance</p>		
<p>No facility had a complete set of Standard Treatment Guidelines</p>	<p>Every facility should have copies of the Standard Treatment Guidelines (Adults, Paediatric, Obstetrics, STI, Public Health Manual)</p>	<p>Ensure a complete library of NDOH standard protocols and procedures are held at each health facility.</p>
<p>No patient record systems were in evidence in facilities</p>	<p>The keeping and security of patient files is a clinical and medico-legal requirement of the NHSS, in addition to records maintenance as part of the NHIS reporting system. Outpatient records are an individual clinic book which travel with the person. There is poor custodianship of inpatient records in the 2 SHCs. All open facilities maintain regular NHIS reporting.</p>	<p>Ensure inpatient record system is established in facilities. Ensure availability of health record books for patients to purchase as their individual outpatient record.</p>
<p>One facility out of five had a complete set of essential medical equipment</p>	<p>There are nine pieces of equipment considered essential for a health facility. Essential equipment is required to diagnose and treat priority health issues such as malaria and diarrhoea. A facility will be unable to treat patients appropriately without this equipment.</p>	<p>Stakeholders to undertake an audit of all equipment available at facilities in accordance with the NHSS and procure missing items.</p>
<p>Stock-outs of 13 selected medical supplies were evident at all health facilities; None of the 3 open Aid Posts had antimalarial medicines</p>	<p>Availability of 13 essential medical supplies varied greatly across the 5 open health facilities. Essential supplies are required for treating priority health issues such as malaria and diarrhoea. A facility will be unable to treat patients</p>	<p>Stakeholders to conduct a stocktake of all essential medical supplies available at facilities in accordance with the NHSS. Strengthen ordering and stock management through informal and formal training for health workers.</p>

Findings	Gap between study findings and national standards and targets	Recommendations
	appropriately without these supplies.	
KRA 4: Improve Child Survival		
Increase in underweight children at Messi HSC to 54.3% from 2012-2014	The national target is 26% or less of children weighed are underweight; in 2014 the proportion at Messi was 54.3%.	Increase nutrition counselling for parents. Review options for community gardens through the Healthy Village approach.
Increase in diarrhoeal disease at Namatanai Hospital and Messi HSC from 2010-2014; Water and sanitation were identified by communities as priority health concerns	While Messi HSC and Kabanut HSC meet the national target of <230 cases per 1000 children <5 years, there has been an overall increase in the number of cases at Namatanai Hospital and Messi HSC from 2010 to 2014. This is against a provincial decrease.	Improve availability of clean drinking water and toilets in households and public personal hygiene education programs. Implement community based water and sanitation programs, particularly regular drinking water monitoring and treatment programs.
Decrease in measles immunisation coverage (<1 year) at Namatanai, Kabanut and New Ireland Province overall	All facilities are performing above the national target of 66% coverage, although there has been a decrease at Namatanai Hospital and Kabanut HSC.	Increase availability of immunization clinics. Health facilities to work with Village Health Volunteers to increase access to and acceptability of immunisation. Stakeholders to review availability of vaccines from National Department of Health and ordering processes to ensure maximum vaccine availability.
Decrease in 3 rd dose pentavalent immunization coverage(<1 year) at all facilities in the CAB from 2013-2014	While there is no national target for pentavalent coverage and New Ireland Province is performing above the national average, there has been a decrease at all facilities.	Increase availability of immunization clinics. Health facilities to work with Village Health Volunteers to increase access to and acceptability of immunisation. Stakeholders to review availability of vaccines from National Department of Health and ordering processes to ensure maximum vaccine availability.
KRA 5: Improve Maternal Health		
Decrease in antenatal care coverage at Kabanut HSC in 2014	The national target is 75% of women attend at least one antenatal visit. Kabanut recorded 31.6% in 2014	Increase availability of antenatal clinics. Health facilities to work with Village Health Volunteers to increase access to and acceptability of antenatal care. Stakeholders to consider the use of mother & baby packs to promote attendance at antenatal clinics and supervised deliveries.
Low rate of supervised deliveries at Kabanut HSC in 2014	The national target is 42%; Kabanut achieved 25.3% in 2014.	Health facilities to work with Village Health Volunteers to increase acceptability of antenatal care and supervised deliveries among community members; and to refer high risk women to higher level care. Stakeholders to consider the use of mother & baby packs to promote attendance at antenatal clinics and supervised deliveries.

Findings	Gap between study findings and national standards and targets	Recommendations
Three maternal deaths recorded at Namatanai Hospital	Given the small population this is likely to be a high mortality rate. It is also likely to be an underestimation of maternal mortality. Improvements in antenatal care and supervised deliveries can prevent maternal deaths.	Health facilities to work with Village Health Volunteers to increase acceptability of antenatal care and supervised deliveries among community members; and to refer high risk women to higher level care.
Decrease in family planning coverage at Namatanai Hospital; Low family planning coverage at Messi and Kabanut HSC.	The national target is 120 Couple Years of Protection per 1000 women of reproductive age. Coverage at Namatanai hospital decreased to 61.1 in 2013; and was below the target at Messi HSC (111) and Kabanut (72).	Increase availability of family planning clinics. Health facilities to work with Village Health Volunteers to increase access to and acceptability of family planning. Stakeholders to review availability of family planning methods from National Department of Health and ordering processes to ensure maximum stock availability. Stakeholders to review availability and acceptability of long-lasting contraceptive methods such as implants.
KRA 6: Reduce the Burden of Communicable Diseases		
High burden of malaria	Malaria and anaemia are in the top 5 causes of death. Antimalarial stock outs experienced in health facilities and closed aid posts contribute to intervention delays. However there is good coverage of communities with long lasting insecticide-treated nets.	Improve maximum access to prompt quality diagnosis and treatment for malaria. Review bed net use compliance and improve vector control strategies
Decreasing immunisation coverage	Reduced measles and pentavalent coverage over time can be linked to irregular outreach clinics.	Remove impediments to regular outreach by stakeholders committing to a whole-of-government approach or PPP to planning and support for outreach, including transportation assets.
Increasing incidence of suspected tuberculosis and prevalence of confirmed tuberculosis	The national goal is to reduce TB incidence to 10 per 100,000 population. Namatanai hospital reported 151 cases in 2013; and in 2014 Messi HSC reported 140 cases and Kabanut reported 50 cases per 100,000.	Increase supervision from district health services to improve management and follow up of patients.
Decreasing community outreach	The national target is 46 clinics per 1000 children <5 years; in 2014 Kabanut HSC conducted 29.6 clinics. Messi HSC, although above the national target at 52.4 clinics, has slightly decreased from 2013. Well-coordinated outreach programs lend to sustaining health promotion activities that support and empower community involvement in their own health.	Stakeholders to commit to determining why outreach is decreasing; and commit to increasing and coordinating the rollout of the Healthy Islands strategies to all villages and LLG Wards. Increase availability of transport and logistics support for outreach patrols.
KRA 7: Promote Healthy Lifestyles		

Findings	Gap between study findings and national standards and targets	Recommendations
Emerging issue of traumatic injuries	Injuries attributed to motor vehicle accidents are inevitably linked to alcohol consumption and road use behaviours. Differentiation with other causes for injury like domestic violence will be important to guide health awareness programs.	Road traffic accidents require in-depth investigations to ascertain contributory factors to injury, and to culminate in appropriate road use and safety strategic development. Surveillance on domestic and other forms of violence need targeting. Health facilities need to increase capacity in accident and emergency care
Poor accident and emergency services	Health facilities require purpose designed facilities and training for emergency response. Ambulances are specialised lifesaving equipment to maintain survivability of casualties and should be fit out accordingly. Ambulance staff do not have first aid/first responder training.	Emergency reception and care facilities to meet NHSS should be part of any health facility upgrade. Ambulances should be designated and maintained as life-saving equipment. The ambulance driver at Messi HSC requires training as a first responder.
Hypertension, diabetes and cancer	Mortality from hypertension, ischaemic heart disease, diabetes and cancer are emergent lifestyle issues in New Ireland.	Targeted advocacy for integrated surveillance and monitoring for non-communicable disease and population based preventive health awareness.
KRA 8: Improve Preparedness for Disease Outbreaks and Emerging Population Health Issues		
Infection control guidelines not available; No safety or major occurrence systems in place	Occupational Health and Safety practices are in accordance with health services policy and meet statutory requirements of the industrial safety, Health & Welfare Act and NHSS. Response to disease outbreaks in the community is a product of the NHIS. Outbreaks of waterborne diarrhoeal diseases, malaria, and respiratory illnesses pose significant threats.	Each health service should have a method of regularly identifying hazards (biological, chemical, etc) and plans are put in place for response and for their mitigation. A designated Safety and Major Incident officer needs to be appointed and appropriately trained. Regular major incident training to be conducted for planning and organization to improve the capacity of the provincial health services to identify, monitor, report and respond to disease out breaks and other health threats.
Inadequate waste disposal at two facilities	The use of appropriate procedures for the handling and safe disposal of general and medical wastes is an essential infection control standard within the NHSS.	Stakeholders to consider reviewing and upgrading policy and procedures related to waste management including disposal of expired drugs.
Effect of climate change	Climate change and sea level rise is an emergent issue discussed by the community	Stakeholders work collaboratively to improve capacity and preparedness of the health sector to address impacts of climate change.

4. ADDRESSING THE GAPS IN HEALTH IN THE CAB

Abt JTA understands that the Company plans to implement health related corporate social responsibility activities over a 4-5 year period, based on the findings and recommendations of this Health Baseline Assessment. Based on the gap analysis and health priorities, a number of options have been developed for the Company to consider as it determines its contributions to improving health status and health services in the CAB in New Ireland Province. The options outlined below are presented as short term and medium-long term priorities, recognising that the Company may choose to implement activities immediately while determining the investment and partnership approaches for the longer term. Given the visibility of the Baseline Assessment during Stage 1, for example the Nautilus Country Manager interviewed on local radio about the study, it will be important for the Company to capitalise on this greater awareness of the Company and follow through with investments in the community.

4.1. SHORT TERM OPTIONS (6-12 MONTHS)

Building on the goodwill generated during the stakeholder engagement and field work phases of Stage 1 with government representatives, health service organisations and communities, there are a number of activities that can be prioritised to demonstrate the Company's commitment to the community and health improvements in the CAB in the short term.

The challenge of balancing visible, short term change and long term health improvements can be addressed through a multi-stage approach. Visible changes such as provision of equipment and infrastructure improvements can be useful tools to continue community engagement while allowing time to develop longer term, sustainable responses. Short term activities are not wasted investment, and indeed provide a platform for longer term engagement.

Based on the gaps identified in the Stage 1 field work, a number of direct short term investments in areas that consolidate, maintain and build upon established Company community and stakeholder trust and good will are listed below:

- Through technical support / advice, immediately facilitate all facilities to order NHSS medical supplies, and review ordering and management systems to ensure ongoing supply adequacy.
- Through technical support with facility managers, develop an understanding of why essential equipment is not in place, facilitate all facilities to have in place essential equipment against the NHSS and develop asset registers for open Level 1 and Level 3 health facilities. Any equipment and resources supplied by Nautilus can be labelled for community recognition
- Supply solar lighting to patient care areas at each open facility
- Ensure all facilities have radio and / or mobile phone communications in place
- Obtain copies of standard treatment manuals and guidelines from NDoH and create a library at each facility
- Upgrade the emergency response and life support capability of both health sub-centres' land and sea ambulance assets including training of staff in First Aid
- Through collaboration with health and environment stakeholders, determine the feasibility introduce a drinking water monitoring and treatment program. The Company could assist through provision of technical advice, equipment and training

- Establish a partnership committee, or in the event a similar Provincial health committee already exists, to support scale up of that committee including its structures and membership, to include Nautilus and other stakeholders as members. A partnership committee can help formalise dialogue, provide guidance, encourage coordination and harmonization among partners with an interest in development of health in the CAB
- Review aspects of the Nautilus Company Charter, Community Policy and Standing Agreements with the New Ireland Provincial Government as to their overarching applications in promoting partnerships. If required, consider the development of a “health partnership and cooperation agreement” between Nautilus and the New Ireland Provincial Government and partners.
- Commission studies to further understand critically poor health outcomes in communities, such as childhood malnutrition.

4.2. MEDIUM-LONG TERM OPTIONS (1-5 YEARS)

A comprehensive program is the recommended approach to address the gaps identified by the Health Baseline Assessment. A longer term approach ensures that activities are sustainable and achieve health outcomes through partnership and integration with health service provider plans and other initiatives. A program could be designed according to the three main components of the National Health Plan, that is: strengthening health systems, improving service delivery and addressing priority health outcomes. This approach would ensure all Key Result Areas of the National Health Plan are addressed in a coordinated manner.

A critical factor in a comprehensive program is the partnership approach. Using a partnership approach to health improvements reflects the National Department of Health’s focus on developing and investing in Public Private Partnerships. New Ireland Province is in the process of adopting a Provincial Health Authority which will be the coordinating body for all health stakeholders active in the province. It will be essential for all health related activities undertaken or supported by Nautilus to be implemented collaboratively and with the endorsement of the Provincial Health Authority. By engaging with government services, it will ensure that health services in the CAB are aligned to provincial health service plans and the priorities of the Provincial Health Authority. It is critical that health public private partnerships are established by an experienced partnership facilitator to ensure they are sustainable and based on mutual reciprocity.

Addressing the enabling factors of the health system, such as health infrastructure, medical supplies and equipment, communications and workforce provides a basis to improve service delivery. A program of facility and communications maintenance, medical equipment or transport provision could be developed to rehabilitate existing services. Providing new equipment promotes service utilisation, which can be monitored through the NHIS and be used in the long term as an indication of improvements in the health and livelihoods of communities in the CAB. It is important to note that investments should focus on improving the services at open health facilities before moving on to activities aimed at reopening currently closed facilities.

Support to the workforce can be achieved through up-skilling health workers and promoting the use of current and evidence-based protocols. The preferred approach is for training programs to be coordinated with the National Department of Health to ensure that current issues and protocols are addressed. Sponsoring further study for health workers, such as upgrading qualifications, is another means to increasing the capacity of the workforce. In order to increase staffing levels at the open facilities, or in future to open the three closed Aid Posts, the Company could sponsor in-line positions and assume the costs of a health worker for 1 to 2 years with stakeholder

agreement that at the end of that time, the organisation managing that facility would take over the position and incorporate it as an ongoing position.

Finally, following a comprehensive approach would also ensure that activities are integrated rather than specific to a disease or health issue. Sustainability is the main reason for integrating program activities. An example to highlight the differences in health specific and integrated approaches is immunisation. A short term approach to increasing immunisation coverage would be to implement a catch-up or mass immunisation activity for all children who have missed out on scheduled immunisations. In considering sustainability however, an integrated approach would aim to leave a legacy of a strengthened cold chain with vaccine fridges in health facilities and cool boxes available for outreach clinics; staff trained in current immunisation schedules and new vaccines, and infection control procedures; and a strengthened vaccine ordering and stock management system at the facility and district level to ensure health workers can administer opportunistic immunisations as required.

Priority health issues in the CAB, such as tuberculosis, malaria, and immunization coverage, are also priority health issues highlighted in the National Health Plan. Support to clinics and outreach patrols, as well as to Village Health Volunteers are all ways to address improvements in both communicable and non-communicable diseases. Supporting communities to adopt the principles of a Healthy Village is another means of addressing issues of water and sanitation, and reducing outbreaks of food and water-borne diseases.

In summary, some medium-long term options for the Company to consider include:

- Assist in reviewing the location, Level and distribution of health facilities in the CAB in consultation with stakeholders to plan the equitable access to health by all communities
- During discussions with Provincial Health Agencies, confirm the service level each facility will operate in the medium to long term. Based on this decision, undertake infrastructure planning and development to ensure all health facilities in the CAB comply with the NHSS
- Improve services for pregnant women by upgrading infrastructure to include a delivery room for Level 2 facilities or above, provision of equipment for delivery, provision of antenatal care and identification of high risk pregnancy cards and improve referral pathways
- Support the New Ireland provincial and district health services to build their own capacity to achieve their development objectives and not create separate or parallel processes
- Support strengthening of governance systems to create efficiency, effectiveness and stakeholder participation with the Company.

5. CONCLUSION

Based on the field work and data analysis conducted through this Baseline Assessment, the gaps in health services have been identified against the National Health Services Standards and national targets. Recommendations for addressing these gaps are provided in relation to the Key Result Areas of the National Health Plan.

By adopting a partnership approach and implementing a comprehensive program, the Company could expect a number of outputs as a result of its investment. Greater community engagement and recognition of the Company's commitment to community improvements can be expected immediately from direct, short term investments. Contributions to health improvements, such as improved immunisation coverage, increased outreach services, and improved health status, can be expected with longer term investments, coordinated with existing health service providers and New Ireland Provincial government.

It is recommended that feedback on the Health Baseline Assessment is provided to all stakeholders and Abt JTA would be pleased to present the methods and findings to the Company and stakeholders. Additionally, Abt JTA will provide a summary of the Health Baseline Assessment to the Medical Research Advisory Committee to complete the ethics process through which this study was approved.

Abt JTA would be pleased to provide assistance to Nautilus in further health stakeholder engagement and developing a preferred approach to addressing the gaps in health services and health status in the CAB in New Ireland Province.

6. References

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ANNEX 1: SUMMARY OF STUDY IN TOK PISIN

Nautilus Minerals kisim Abt JTA kam long wokim wok painim aut lo helt insait long ol Coastal Area of Benefit (CAB) ananit long Solwara 1 Project. Ananit long CAB, igat sevenpela wods insait long Namatanai District bilong Niu Ailan Provins na tu karamapim Namatanai Rural na Sentral Niu Ailan Rural Local Level Government. As bilong dispela helt wok painim aut em bilong kamapim wanpela gutpela rot bilong soim olsem wok kamap gut.

Dispela helt wok painim aut kamapim sampela wei long kamapim trupela piksa bilong helt na sevises bilong helt insait long ol CAB. Olsem na long dispela wok painim aut, planti wok painim aut bin kamap long CAB namel long ol man na meri long komuniti, ol haus sik lain na ol haus sik bilong ol.

Dispela Stage 1 Ripot (2 July 2015) soim wok painim aut bilong dispel helt wok painim aut. Na long dispela Stage 2 Ripot, em soim olgeta liklik hap wok painim aut na wei we wok ken kamapim gutpela helt na sevises bilong helt insait long CAB.

Igat faifpela haus sik open na tripela pas aninit long CAB. Maski ol haus sik man meri wok hat stret long wokim wok bilong ol long klinik na bebi sut na ol helt bilong ol mama, ol no bungim mak we Helt Dipatment bin makim long em. Nogat wanpela helt sevises bungim mak bilong Nesinel Helt Sevis Standet. Planti long ol dispel haus sik bagarap pinis na nogat gutpela masin na marasin. Olsem na bai igat bikpela wok long stretim ol dispel samting.

Taim mipela bungim Stage 1 ripot wantaim Nesinel Helt Sevis Standet na Nesinal Helt Plan, mipela painim olsem igat asua. Olsem na mipela wokim wok painim aut na laik toksave olsem igat wei na rot bilong Nautilus ken halivim mipela long kamapim gutpela helt sevises.

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