

The following Chapter provides an overview of the socio-economic conditions of the Project area.

6.1 DATA COLLECTION

The information presented in this Chapter was gathered through a desktop review of publicly available sources and data collected through a visit to the Project area. A considerable amount of secondary information was sourced through the desktop review. Much of the information available was national level data – meaning that little, if any, local (i.e. village level) data was available. For this reason, a visit to Project area was conducted to collect information about the local area.

Primary data was collected through a variety of methods. This included:

- Key informant interviews with village leaders. Interviews were undertaken to better understand the profile of the population of each village (e.g. population size, leadership structure, ethnicity, religion, sources of income);
- Focus groups with key groups within each village. Six focus groups were conducted in each village with representatives from the following groups - farmers, women, youth, fishermen, healthcare providers and those involved in utilising ecosystem services. The types of information gathered included economic activities (e.g. industries of employment, income levels), provision of community infrastructure and services (e.g. access to education, water and sanitation services and healthcare, transportation), and health issues/ concerns. The focus groups also ensured that a cross-section of each village was engaged and had an opportunity to contribute to the data collection process (including women and youth); and
- Household surveys. A total of 300 household surveys were completed to better understand the demographic profile of the villages. To the extent possible, 10% of each village was surveyed. The focus was on gathering information on economic activities, land uses, access to community services and key challenges within each village. The questionnaires are included in **Annex D**.

The collection of secondary and primary data provided an opportunity to triangulate the data to confirm the accuracy of the information presented. It also ensured a more robust baseline against which the likely impacts associated with the Project could be assessed.

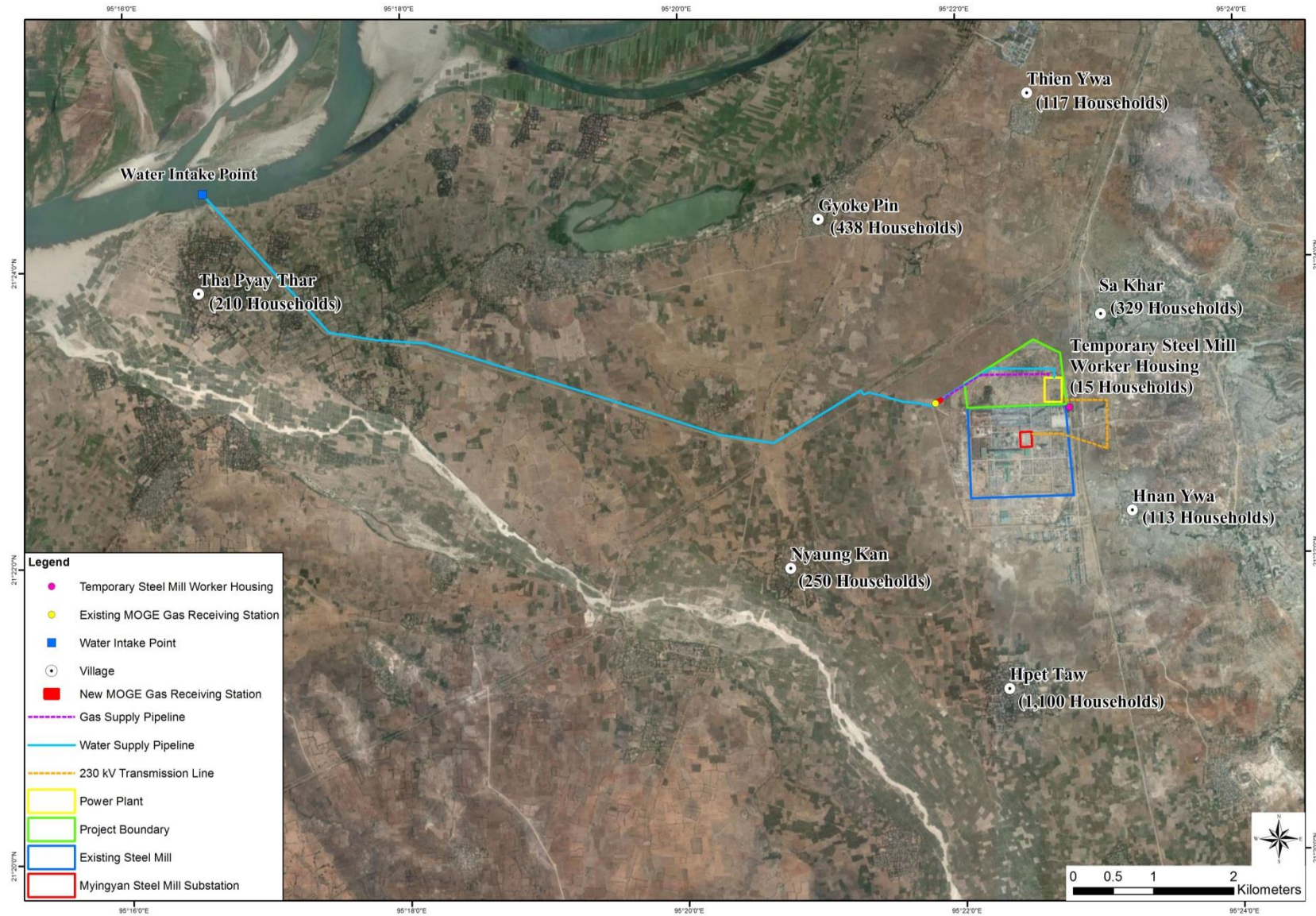
6.2 SOCIAL RECEPTORS

The baseline focuses on the receptors that may be impacted or influenced by the Project due to their proximity to the Project site and/ or Project associated infrastructure. This includes people living in:

- Sa Khar village. The village is located less than 1km north east of the Project site, and is the closest village to the Project site. The village is also located along the road that connects the Project site to Myingyah and Mandalay;
- Hnan Ywa village. The village is located approximately 1.5 km south east of the Project site;
- Hpet Taw village. The village is located approximately 3.2 km south of the Project site;
- Nyaung Kan village. The village is located approximately 2.7 km south west of the Project site;
- Gyoke Pin village. The village is located approximately 2.7 km north west of the Project site;
- Thien Ywa. The village is located approximately 2.7 km north of the Project site;
- Tha Pyay Thar village. The village is located near the water intake point not far from the Ayeyarwady River; and
- The temporary accommodation located adjacent to the Project site, which is home to approximately 30 people (**Figure 6.1**) (The accommodation has been constructed by the nearby steel mill to house a small portion of its workforce on a temporary basis. The aim is for the workers to be moved to the steel mill's permanent accommodation by 2018.)

There is also a government run school located in close proximity to the site. It services the nearby communities, including Sa Khar village and Hnan Ywa village. The students and staff are potential receptors.

Figure 6.1 Project Area



Source: Sembcorp, 2015 (modified by ERM)

Myanmar is located in Southeast Asia. The country is bordered to the east by Thailand and Laos, to the north by China and to the west by India. Myanmar has a lengthy coastline that extends for approximately 2,400 km along the Andaman Sea and Bay of Bengal (**Figure 6.2**).

There are a number of mountain ranges and river systems, which run north to south through the country – creating natural divisions. This includes the Ayeyarwady River, which is the largest river system in Myanmar. It starts in the Himalayas and empties into the Bay of Bengal, and accommodates about 70% of the country's population and transports 40% of its commerce.

There are three distinct seasons in Myanmar. The cold and dry season runs from November to February, while the hot season is March and April, and the rainy season extends from May to October. During the rainy season monsoons can occur, causing flooding and landslides.

Myanmar is split into number of States and Regions (sometimes also referred to as Divisions), which are further divided into Townships for administrative or governance purposes. The Project site is located in the Myingyan Township in the Mandalay Region near the Ayeyarwady River.

Figure 6.2 Map of Myanmar



Source: Cartographic Section, Department of Field Support, United Nations, June 2012

As of 2013, it was estimated that the population of Myanmar was approximately 53 million, with an annual growth rate of approximately 1% (CIA 2015). The population in the Mandalay Region is estimated to be 6.2 million, making it the second largest region in the country in terms of population, behind Yangon, which has a population of approximately 7.3 million.

Much of the population in Myanmar lives in rural areas. As of 2014, it was estimated that 65.7% of the population lives in rural areas, while 34.3% of the population resides in urban areas. Myingyan Township has a population of approximately 1 million people, most of whom (approximately 888,006 people) live in rural areas.

The population density in Myanmar is approximately 76.1 people per km². The Mandalay Region has the second highest density at 200 people per km², behind Yangon, which has the highest population density in the country at 716 people per km².

There are approximately 135 ethnic groups in Myanmar. The largest group is the Burmans, which make up more than half of the population (68%). This is followed by Shan (9%), Karen (7%), Rakhine (4%), Chinese (3%), Indian (2%), Mon (2%), and other (5%) (CIA 2015).

The official language is Myanmar. However, there are over 100 languages and dialects spoke within the country. These languages largely fall into one of four language families, namely, the Sino-Tibetan, Tai-Kadai, Austro-Asiatic and Indo-European, of which the Sino-Tibetan is the dominant group.

In terms of religion, the majority of the population is Buddhist (89%). However, other religions are represented. This includes Christian (4%), Muslim (4%), Baptist (3%), Catholic (1%), Animist (1%) and other (2%) (CIA 2015).

In terms of the villages located in the Project area, the largest village is Hpet Taw, with a population of approximately 5,600 people, while the smallest village is Hnan Ywa, with a population of approximately 598 people. The villages in terms of ethnicity, language and religion, reflect the broader Myanmar population – i.e. are Buddhist Burmans that speak Myanmar (**Table 6.1, Figure 6.3 and Figure 6.4**).

Table 6.1 Village Overview

Village	Households*	Estimated population	Ethnicity	Language	Religion
Sa Khar	329	1,722 (m: 783/ f:939)	Burmans	Myanmar	Buddhist
Hnan Ywa	113	598 (m: 267/ f: 337)	Burmans	Myanmar	Buddhist
Hpet Taw	1,100	5,600 (m: 2,670/ f: 2,930)	Burmans	Myanmar	Buddhist
Nyaung Kan	250	1,224 (m: 600/ f: 624)	Burmans	Myanmar	Buddhist
Gyoke Pin	438	1,820 (m: 750/ f: 1,070)	Burmans	Myanmar	Buddhist
Thien Ywa	117	747 (m: 353/f: 394)	Burmans	Myanmar	Buddhist
Tha Pyay Thar	210	1,270 (m: 570/ f: 700)	Burmans	Myanmar	Buddhist

* The average household size in Myanmar is five, with little difference between rural (5) and urban (4.9) households.

Source: Field surveys 2015

Figure 6.3 Buddha Statue and Monk



Monastery in Hpet Taw village

Figure 6.4 Local Population



The life expectancy in Myanmar is 64 years of age for men and 68 years of age for women (**Table 6.2**). Between 2000 and 2012, the life expectancy increased by 3 years for both males and females; however, during this same time the average increase in life expectancy in Myanmar's neighbouring countries was 5 years (WHO 2013).

Table 6.2 *Key Health Indicators*

Indicator	Myanmar	Thailand	Laos
Total population (2013)	53 million	67 million	6.7 million
Life expectancy at birth (2013)	64 males 68 females	71 males 79 females	65 males 68 females
Total expenditure on health per capita (2013)	37	658	95
Total expenditure on health as % of GDP (2013)	1.8	4.6	2.0
Total fertility rate (2014)	2.29	--	--
Infant mortality rate (deaths per 1,00 live births) (2014)	62	--	--
Under five mortality rate (deaths per 1,000 live births)	72	--	--

6.5.1

Morbidity

Morbidity is the state of being in poor health and encompasses both acute and chronic diseases. Many of the leading causes of morbidity in Myanmar are associated with communicable diseases and pregnancy/ child birth (**Table 6.3**).

Table 6.3 *Leading Causes of Morbidity in Myanmar (2012)*

No.	Causes	Percent
1.	Other injuries of specified, unspecified and multiple body regions	10.0
2.	Other complications of pregnancy and delivery	6.9
3.	Single spontaneous delivery	6.0
4.	Diarrhoea and gastroenteritis of presumed infectious origin	5.8
5.	Other viral diseases	3.8
6.	Other pregnancies with abortive outcome	2.6
7.	Gastritis and duodenitis	2.4
8.	Malaria	2.4
9.	Cataract and other disorders of lens	2.4
10.	Other acute upper respiratory infections	2.0
11.	Pneumonia	1.8
12.	Other conditions originating in the perinatal period	1.7
13.	Toxic effects of substances chiefly non-medicinal as to source	1.6
14.	Fractures of other limb bones	1.5
15.	Disease of appendix	1.5
	All other causes	47.6
	Total	100.0

Source: Ministry of Health 2014

Although not reflected in **Table 6.3** considerable focus has been given to tuberculosis (TB) over the past few years as it is considered a major public health problem in

Myanmar. In 2013, the estimated TB prevalence¹ and incidence was 473 and 373 per 100,000 people respectively (WHO 2015). Although rates of TB are lower in the Mandalay Region than many other parts of the country, TB is still an issue of concern (**Table 6.4**). To address the rates of TB, the Myanmar Government has established the National Tuberculosis Programme, which focuses largely on improving detection.

Table 6.4 Diseases under Myanmar National Surveillance (2012)

Regions / States	Diarrhoea		Malaria		TB: sputum +ve		TB: sputum -ve		TB: Extra pulmonary	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Kachin	916.3	0.4	2,374.2	3.8	44.	1.0	80.0	1.9	58.6	0.2
Kayah	1,388.0	6.7	1,858.6	0.7	12.0	0.0	26.2	0.7	5.6	0.0
Kayin	907.5	0.0	970.0	1.4	74.1	0.1	155.7	0.1	8.4	0.0
Chin	1,803.1	5.4	2,613.6	1.9	23.2	0.4	58.3	0.6	78.5	0.0
Sagaing	846.9	0.9	1,085.6	1.6	46.7	0.3	55.0	0.4	36.0	0.1
Tanintharyi	862.3	0.3	2,166.9	1.2	56.5	0.2	182.9	1.2	88.0	0.5
Bago	549.0	0.2	484.5	0.6	48.6	0.5	98.9	0.9	13.0	0.1
Magway	714.9	0.4	322.1	0.1	40.2	0.4	46.9	0.4	35.5	0.1
Mandalay	547.5	0.1	279.5	0.1	54.0	0.4	44.9	0.3	42.6	0.1
Mon	755.3	0.2	362.2	0.6	66.0	0.8	173.2	1.8	18.7	0.1
Rakhine	1,150.4	0.4	1,752.8	0.6	43.9	0.7	47.1	0.5	16.8	0.1
Yangon	255.0	0.4	25.4	0.0	109.4	0.6	114.6	0.6	36.4	0.1
Shan (S)	672.4	1.1	845.3	1.5	39.2	0.6	47.2	0.4	21.9	0.2
Shan (N)	697.0	1.4	934.6	1.1	63.1	0.1	58.5	0.3	70.1	0.0
Shan (E)	1,015.1	0.5	209.5	0.0	101.7	0.7	160.9	0.2	37.6	0.0
Ayeyarwady	523.8	0.3	361.3	0.6	49.1	0.4	61.4	0.6	28.5	0.1
Naypyitaw	476.4	0.2	250.3	0.1	59.6	0.0	38.6	0.2	36.9	0.1
Union	670.5	0.5	686.0	0.7	58.0	0.5	78.6	0.6	33.7	0.1

Source: Ministry of Health 2014

Note: (1) Number of cases per 100,000 populations. (2) Number of deaths per 100,000 populations.

Malaria is considered to be another health issue. The cities of Yangon and Mandalay and areas above 1000 metres in elevation are considered to be malaria-free, making malaria largely an issue in rural areas of the country, most notably in Bago, Kachin, Kayah, Kayin, Shan, and Tanintharyi. The issue is compounded by the increasing presence of the multi-drug resistant form of malaria, which is now widespread along much of the Myanmar-Thailand border.

Other vector borne diseases common in Myanmar include dengue fever and Chikungunya virus, which are spread by two species of day-time feeding mosquitoes - *Aedes aegypti* and *Aedes albopictus*. Unlike the mainly rural-dwelling mosquitoes that spread malaria, the *Aedes* mosquitoes thrive in cities as well as rural areas.

In terms of morbidity in the villages in the Project area, based on feedback from the field surveys, communicable and non-communicable diseases are present. Leading causes of morbidity appear to be hypertension, tuberculosis and gastroenteritis (**Table 6.7**).

¹ Prevalence is the proportion of cases in the population at a given time, while incidence is the rate of occurrence of new cases.

During the field surveys, there was no mention of health concerns associated with pregnancy and/ or child birth; however, these are issues of common within the wider Myanmar population. It was noted that most children are born at home with the support of a midwife.

Table 6.5 Village Health - Morbidity

Village	Leading causes of morbidity
Sa Khar	Fever, and hypertension
Hnan Ywa	Fever, hypertension, cardiac, tuberculosis, and gastroenteritis
Hpet Taw	Fever, hypertension, tuberculosis, diabetes, cholera, bronchitis, pneumonia, gastroenteritis, and haemorrhagic stroke
Nyaung Kan	Fever, hypertension, tuberculosis, disease of liver, diabetes, bronchitis, and gastroenteritis
Gyoke Pin	Fever, hypertension, cardiac, tuberculosis, and gastroenteritis
Thien Ywa	Fever, hypertension, diabetes, diarrhoea, dengue fever, and haemorrhagic stroke
Tha Pyay Thar	Fever, hypertension, tuberculosis, and gastroenteritis

Source: Field surveys 2015

6.5.2 Mortality

Mortality is the measure of deaths per population over time, and is a key indicator of population health. The leading cause of mortality in Myanmar is human immunodeficiency virus (HIV)/ acquired immune deficiency syndrome (AIDS) (a communicable disease) (**Table 6.6**).

Myanmar has one of the highest rates of HIV / AIDS infection in Southeast Asia. In 2013, the number of people living with HIV in Myanmar was estimated to be around 190,000; while an estimated 11,000 people died of AIDS in 2013 (UN AIDS 2015). (There is often a correlation between TB and HIV/ AIDS – as TB, worldwide, is the leading cause of death in people living with HIV.) This may change in the future, as recent data shows that rates of HIV/ AIDS have begun to decline.

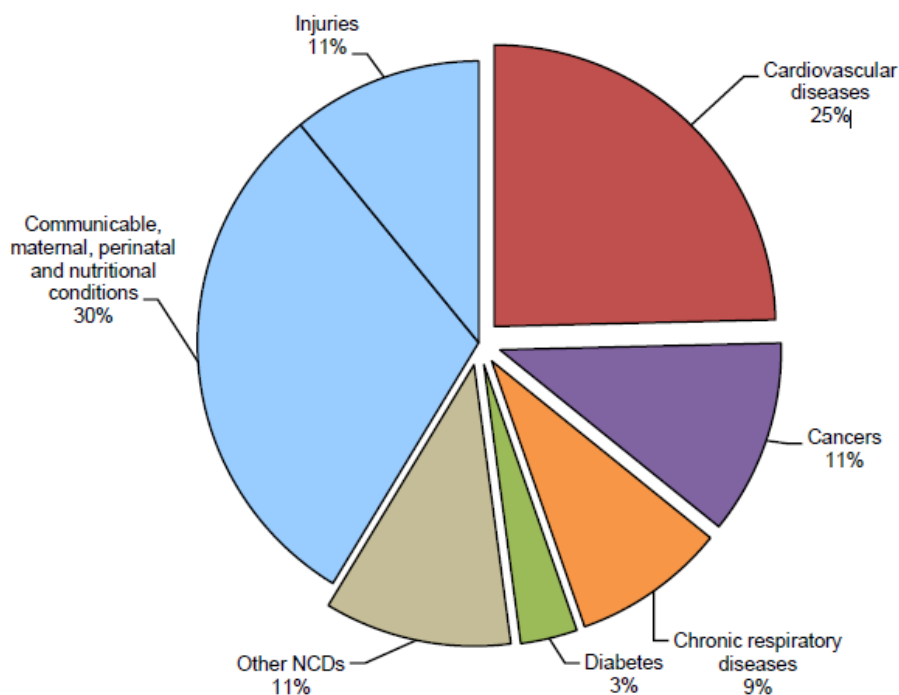
Table 6.6 Leading Causes of Mortality in Myanmar (2012)

No.	Causes	Percent
1.	Human immunodeficiency virus (HIV) / Acquired immune deficiency syndrome (AIDS)	6.6
2.	Septicaemia	6.1
3.	Other injuries of specified, unspecified and multiple body regions	5.4
4.	Slow foetal growth, foetal malnutrition and disorders related to short gestation and low birth weight	4.6
5.	Other diseases of the liver	4.0
6.	Other disease of respiratory system	3.7
7.	Intrauterine hypoxia and birth asphyxia	3.4
8.	Heart failure	3.3
9.	Respiratory tuberculosis	3.2
10.	Intracranial haemorrhage	2.9
11.	Other heart diseases	2.8
12.	Intracranial injury	2.7
13.	Malaria	2.6
14.	Pneumonia	2.6
15.	Stroke, not specified as a haemorrhage or infarction	2.5
	All other causes	43.6
	Total	100.0

Source: Ministry of Health 2014

Although communicable diseases top the list of causes of mortality, there are a number of non-communicable diseases that also contribute. The World Health Organisation estimated that in 2014 non-communicable diseases accounted for 59% of all deaths in Myanmar (**Figure 6.5**).

Figure 6.5 Proportional Mortality (2014)



Source: WHO 2014

The trends in mortality and fertility indicate that Myanmar is currently in demographic transition - while the current population is young, Myanmar is moving slowly towards an ageing population (WHO 2014). This reflects broader global trends, and will present new challenges for the health system.

In terms of the mortality in the villages in the Project area, hypertension appears to be a key issue. However, there was no discussion within the local villages regarding issues associated with sexually transmitted infections – such as HIV/ AIDS (**Table 6.7**). (Health practitioners were asked about the rates of sexually transmitted infections – however, no data was available. In addition, sexually transmitted infections were not raised as an issue of concern by villagers.)

Table 6.7 Village Health - Mortality

Village	Leading causes of mortality
Sa Khar	Hypertension
Hnan Ywa	Hypertension, cardiac, and tuberculosis
Hpet Taw	Hypertension, tuberculosis, pneumonia, and haemorrhagic stroke
Nyaung Kan	Hypertension, tuberculosis, and liver disease
Gyoke Pin	Hypertension, cardiac, and tuberculosis
Thien Ywa	Hypertension
Tha Pyay Thar	Hypertension

Source: Field surveys 2015

The prevalence of communicable diseases can be exacerbated by availability of and access to clean drinking water and sanitation facilities. This includes issues such as gastroenteritis, which was identified as an issue in the Project area villages.

In terms of water use, approximately, 89% of water withdrawn in Myanmar is used for agricultural purposes, while the remainder is used by municipalities (10%) and industry (1%). This is expected to change in the coming years as the industrial sector expands.

Approximately 91% of the total water withdrawn is from surface water, while 9% is from groundwater. The groundwater that is withdrawn is largely used for domestic purposes (FAO 2011).

Sanitary latrine coverage of the population in 2012 was 93% for urban areas and 76.8% for rural areas, and access to improved drinking water was available for 80% of the population in Myanmar.

In the Mandalay Region, there is better access to sanitary latrines when compared to the broader population, with coverage at 96.7% for urban areas and 78.9% for rural areas. Access to improved drinking water in the Mandalay Region was available to 87.7% of the population (Public Health Statistics 2012; Ministry of Health 2014).

Villages in the Project area largely rely on groundwater as a source of drinking water; however, it is not the only source. Some villagers collect rainwater for domestic purposes; while others take water from the Ayeyarwady River (**Table 6.8** and **Figure 6.6** and **Figure 6.7**). Waste is typically discharged directly back into the ground (**Figure 6.8**).

Table 6.8 Village Water Sources

Village	Description of Water Sources
Sa Khar	Water is piped into most households and accessed via a tap. Groundwater is the principle source of domestic water supply. Other water sources include groundwater accessed via hand dug wells and hand pumps and rain water.
Hnan Ywa	There is a community tap for water. Groundwater is the principle source of domestic water supply. Other water sources include groundwater accessed via tube wells and rain water.
Hpet Taw	Most people use water from a piped water supply system. Other water sources include groundwater accessed via hand dug wells and hand pumps and rain water.
Nyaung Kan	Most people use water from an existing piped system – which relies on groundwater. Other water sources include groundwater accessed via tube wells and pumps, rain water and river water. The distance to the Ayeyarwady River is approximately three miles.
Gyoke Pin	There is a central water supply in the village, which is drawn from groundwater. Although most people access the central piped system, some households have established their own systems. Other water sources include groundwater accessed through hand dug wells and hand pumps, rainwater and the river. The distance to the Ayeyarwady River is approximately one mile.
Thien Ywa	Most people use groundwater from hand dug wells during the dry season. During the rainy season, most of people draw water from a local pond. Other

Village	Description of Water Sources
	water sources include groundwater accessed via hand pumps and rain water.
Tha Pyay Thar	Most people use groundwater accessed via hand pumps. There are approximately 100 groundwater pumps shared within the village. Other water sources include groundwater accessed via hand dug wells, rainwater, and river water. The distance to the Ayeyarwady River is approximately 2 miles.

Source: Field surveys 2015

Figure 6.6 *Drinking Water*



Myanmar jar (Sa Khar village)



Myanmar jar (Hpet Taw village)

Figure 6.7 *Water Sources*



Well (Sa Khar village)



Water supply (Sa Khar village)



Rainspout (Sa Khar village)



Tube well hand pump (Tha Pyay Thar village)

Figure 6.8 **Wastewater Discharge**



Sa Khar village



Gyoke Pin village

6.5.4 *Behavioural Factors*

Behavioural factors, such as tobacco and alcohol use, diet and physical activity, are often seen as being key determinants of health.

In Myanmar, most of the population abstains from consuming alcohol. The World Health Organisation estimates that approximately 92.1 percent of the population (over 15 years of age) abstains from drinking alcohol. The rate of abstinence is considerably higher in Myanmar when compared to other nearby countries.

Table 6.9 **Alcohol Use**

Indicator	Population	Male	Female
Abstainers over past 12 months (15+)	92.1	87.6	96.2
Lifetime abstainers (15+)	84.1	91.1	76.5
Former drinks (15+)	8.0	11.1	5.2
Alcohol use disorders	1.5	2.7	0.5
Alcohol dependence	0.7	1.3	0.2

In terms of the Project area villages, based on the field surveys, appears to be consumed in most of the villages, but only in small quantities. However, consumption was not identified as an issue in most villages, with the exception of Hpet Taw, where it was indicated that consumption has led to issues, such as fighting amongst youth.

Similar to alcohol, most villages indicated that drug use was not an issue of concern. However, betel nut use is prevalent in most of the Project area villages. Chewing betel nut can have a number of health consequences, including discoloration of teeth and gums, mouth and stomach ulcers, gum disease, oral cancers, and heart disease.

Women in a number of the Project area villages indicated that they collect betel leaves and make cheroot to generate income. Cheroot is a cigar that is distinctive to Myanmar. It is made from a blend of tobacco and fragrant wood chips, and is consumed by women and men in the Project area villages.

6.5.5 *Healthcare Facilities*

According to the Ministry of Health, in 2012, Myanmar had 987 public hospitals with a total of 54,503 beds (**Table 6.10**). As of 2012, there were 28,077 doctors. This includes 11,460 doctors in the public sector and 16,617 doctors based in co-operatives/ private sector (**Table 6.11**).

In addition to existing health facilities, the use of traditional medicine exists, and often forms an integral part of the country's health services. However, the use of traditional medicine does not seem to be a common practice in the Project area villages.

Table 6.10 *Health Facilities in Myanmar*

Health Facilities	1988-1989	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Hospitals (Public Sector)	631	839	846	871	924	987
Total No. of Hospital Beds	25,309	36,949	38,249	39,060	43,789	54,503
No. of primary and Secondary Health Centres	64	86	86	86	86	87
No. of Maternal and Child Health Centres	348	348	348	348	348	348
No. of Rural Health Centres	1,337	1,473	1,481	1,504	1,558	1,556
No. of school Health Teams	80	80	80	80	80	80
No. of Traditional Medicine Hospitals	2	14	14	14	14	14
No. of Traditional Medicine Clinics	89	237	237	237	237	237

Source: Ministry of Health 2014

Table 6.11 *Health Personnel in Myanmar*

Health Manpower	1988-1989	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Total No. of Doctors	12,268	21,799	23,740	24,536	26,435	28,077
- Public	4,377	7,976	9,583	9,728	10,927	11,460
- Co-operative & private	7,891	13,823	14,808	14,808	15,508	16,617
Dental Surgeon	857	1,867	2,092	2,308	2,562	2,770
- Public	328	793	777	703	813	848

Health Manpower	1988-1989	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
- Co-operative & private	529	1,074	1,315	1,605	1,749	1,922
Nurses	8,349	22,027	22,885	24,242	25,644	26,928
Dental Nurses	96	177	244	262	287	316
Health Assistants	1,238	1,788	1,822	1,845	1,899	1,536
Lady Health Visitors	1,557	3,197	3,238	3,278	3,344	3,371
Midwives	8,121	18,098	18,543	19,051	19,556	20,044
Health Supervisor	1,161	1,973	2,013	2,174	2,621	2,330
Traditional Medicine Practitioners						
- Public	290	945	950	890	890	885
- Private	2,500	5,163	5,397	5,737	5,737	5,867

Source: Ministry of Health 2014

Most of the villages in the Project area do not have their own health care facility (**Table 6.12**). However, most villages are visited by a health care professional on a monthly basis. If an issue arises, villagers typically visit one of a number of nearby health facilities, including the hospital located in Myingyan.

Table 6.12 Village Healthcare Facilities

Village	Description of Healthcare Facilities
Sa Khar	<ul style="list-style-type: none"> The nearest health centre is a five-minute walk away. A midwife is the key health contact for the village. Most people have home births with support from the midwife. A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the village leader's home. In case of an incident or serious disease, most people go to Myingyan Hospital. It is approximately a 20 minute motorbike ride to the hospital.
Hnan Ywa	<ul style="list-style-type: none"> There is no health care facility in the village. Most people have home births with support from a midwife. A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the village leader's home. In case of an incident or serious disease, most people go to Myingyan Hospital. During the dry season, it is approximately a 30 minute motorbike ride to the hospital; however, during the wet season it is typically a 2 hour ride.
Hpet Taw	<ul style="list-style-type: none"> There is a rural health clinic located approximately 10-20 minute walk from the village. Five (5) people are employed in the rural clinic: one (1) medical supervisor, one (1) nurse, one (1) midwife, and two (2) health supervisors. All children are vaccinated at the clinic. Most people have home births with support from a midwife. In case of an incident or serious disease, most people go to Myingyan Hospital. It is approximately a 30 minute motorbike ride to the hospital. Some villages utilise traditional medicines.
Nyaung Kan	<ul style="list-style-type: none"> There is a rural health clinic located approximately 10-20 minute motorbike ride from the village. A nurse is the key health contact. Most people have home births with support from a midwife. A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the village leader's home. In case of an incident or serious disease, most people go to Myingyan Hospital. It is approximately a 30 minute motorbike ride to the hospital.
Gyoke Pin	<ul style="list-style-type: none"> There is public hospital located in Hla Nuang Tang village, which is approximately 20 minutes via motorbike away. Three (3) people are employed in the public hospital: one (1) doctor, one (1) nurse, and one (1) health assistant.

Village	Description of Healthcare Facilities
	<ul style="list-style-type: none"> • Most people have home births with support from a midwife. • A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the local midwife's house. • In case of an incident or serious disease, most people go to Myingyan Hospital. It is approximately a 30 minute motorbike ride to the hospital.
Thien Ywa	<ul style="list-style-type: none"> • There is government rural clinic located near the village. It is approximately a 5 minute walk to the rural clinic. • Most people have home births with support from a midwife. • A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the village leader's home. • In case of an incident or serious disease, most people go to Myingyan Hospital. It is approximately a 15 minute motorbike ride to the hospital.
Tha Pyay Thar	<ul style="list-style-type: none"> • There is government rural clinic located near the village. It is approximately a 20 minute trip to the clinic via motorbike. The rural clinic nurse is the key health contact for the village. • Most people have home births with support from a midwife. • A doctor visits the village monthly. The doctor administers vaccinations, which occurs at the village leader's home. • In case of an incident or serious disease, most people go to Myingyan Hospital. In the dry season, it is approximately a 45 minute motorbike ride to the hospital, but during the wet season it is approximately a 1.5 hour ride. • Some villagers utilise traditional medicine.

Source: Field surveys 2015

6.6

ECONOMY AND LIVELIHOODS

In 2013/2014, Myanmar's gross domestic product (GDP) was estimated to be \$56.8 billion. This means that the per capita GDP was approximately \$1,505 - one of the lowest in Southeast Asia (World Bank 2015). In fact, nearly one-third of the country's population lives in poverty.

Changes are underway in Myanmar to respond to the levels of poverty being experienced. Myanmar is in a transition from a centrally directed economy to a market-oriented economy. This has been supported by a reform program launched by the government in 2011.

As a result of the reforms, Myanmar's economy grew by an estimated rate of 8.3% in 2013/ 2014; however, the unemployment rate remained stagnant at around 5.1% (World Bank 2015). The growth seen in the economy was largely driven by the construction, manufacturing and service industries (World Bank 2015). (For example, as a result of foreign direct investment on average more than one new garment factor opened each week in 2014 (ADB 2015).) The economy is expected to grow by a further 8.5% in 2014/2015, due to investment from gas producers (World Bank 2015).

The following section provides a brief overview of key sectors in the economy – including agriculture, forestry and fishing. In terms of the Project area, the villagers are largely reliant on the agricultural sector for income.

6.6.1

Agriculture

Traditionally, Myanmar has been reliant on the agricultural sector (and to a lesser extent forestry and fishing). In fact, at one point, Myanmar was the world's largest exporter of rice.

Even with recent effort to diversify, the agricultural sector still accounts for approximately 37% of GDP (as of 2014), while the services sector accounts for 41.6% and the industrial sector accounts for 21.3% (CIA 2015).

It is estimated that, as of 2014, approximately 21.1 million people worked in the agricultural sector. This means that approximately 65.8% of the labour force is employed in the agricultural sector in Myanmar (FAO 2015). This includes a large number of people considered to be 'landless' - who work as seasonal farm labourers and migrate to urban areas during non-planting and /or harvesting times to find temporary employment. It also includes women – as women play a substantial role in crop production in farming households in Myanmar (in part because women are typically seen as responsible for meeting the food security needs of their families).

Approximately half of all agricultural land in Myanmar is devoted to cereal crops, such as rice. Other agricultural products include beans, sesame, groundnuts, sugarcane, and hardwood.

Crops in the central dry zone (i.e. the Project's location) typically require some level of irrigation. The most common form is surface (or flood) irrigation, associated with river diversions, dams or tanks and more recently wells and river pumps.

The Myanmar Government has 170 irrigation projects across the country - covering an area of approximately 928,599 ha. The Mandalay Region has the highest number of government irrigation projects (42) (**Table 6.13**).

Table 6.13 Government Irrigation Projects

State/Division	Government Irrigation Projects	Beneficial Area (ha)	Percentage of Beneficial Area
Kayah	2	1,275	0.14
Kayin	1	40	0.01
Chin	1	202	0.02
Sagaing	18	149,714	16.12
Thanintharyi	1	Water Supply	-
Bago	40	253,731	27.32
Magway	31	118,712	12.78
Mandalay	42	135,392	14.58
Mon	7	25,820	2.78
Rakhine	4	182	0.02
Yangon	14	90,449	9.74
Shan	2	44,858	4.83
Ayeyarwady	7	108,224	11.66
Total	170	928,599	100.00

Source: FAO AQUASTAT Survey 2011

The agricultural sector is the primary employer in the Project area (**Table 6.14**). Some people are self-employed (i.e. produce crops on their own land), while others earn money as day labourers.

Table 6.14 *Income from Agriculture*

Village	Average land holding	Households	Income*	Markets	Notes
Sa Khar	5 acres	183	500,000-2,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater and tube wells. People typically travel to market by bus, motorbike, and train.
Hnan Ywa	5 acres	30	500,000-2,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater and tube wells. People typically travel to market by bus, motorbike, and train.
Hpet Taw	4 acres	560	500,000-2,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater and tube wells. People typically travel to market by bus and motorbike.
Nyaung Kan	1 acres	200	500,000-1,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater, tube wells, and the river. The distance from the Ayeyarwady River is approximately 3 miles. People typically travel to market by bus and motorbike.
Gyoke Pin	5 acres	275	500,000-2,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater and the river. The distance from the Ayeyarwady River is approximately 1 mile. People typically travel to market by bus and motorbike.
Thien Ywa	5 acres	85	500,000-2,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> Rainwater is the key water source for agriculture. People typically travel to market by bus and motorbike.
Tha Pyay Thar	2 acres	140	500,000-1,500,000 Kyats/year	Myingyan Township	<ul style="list-style-type: none"> The key water sources for agriculture include rainwater, tube wells, and the river. The distance from the Ayeyarwady River is approximately 2 miles. People typically travel to market by bus and motorbike.

*Household income is dependent on size of total land holding.

Source: Field surveys 2015

The typical income ranges between 500,000 and 2,500,000 Kyats/year – and is largely dependent on the size of the land holding (**Table 6.15**). Crops are sold at the local market – i.e. Myingyan Township market. Crops are transported to market using a variety of methods including bus, motorbike, and train.

Table 6.15 Household Income

Village	25,000 - 50,000 kyats	50,000 – 100,000 kyats	100,000 – 200,00 kyats	200,000 – 300,000 kyats	300,000+ kyats
Sa Khar	20 (6%)	100 (30%)	180 (55%)	24 (7%)	5 (2%)
Hnan Ywa	30 (27%)	55 (49%)	28 (24%)	--	--
Hpet Taw	--	660 (60%)	330 (30%)	110 (10%)	--
Nyaung Kan*	--	87 (58%)	63 (42%)	--	--
Gyoke Pin	--	219 (50%)	148 (33%)	73 (17%)	--
Thien Ywa	--	82 (70%)	23 (20%)	12 (10%)	--
Tha Pyay Thar	--	160 (76%)	50 (24%)	--	--

*Not all households are accounted for in the figures presented.

Source: Field surveys 2015

In addition to selling crops, crops are grown for personal consumption. This is often the case in Hnan Ywa and Nyaung Kan, as villagers noted that much of their crops are used for personal consumption rather than for sale.

Both men and women are actively involved in crop production in the Project area villages – either running their household crop production activities or taking up roles as day laborers. (Crop production is led by women in some instances.) For day laborers, men tend to earn more (on average 1,000 kyats more) per day when compared to women.

Villagers noted that despite the reliance on agriculture, there has been a shift in recent years, with an increasing number of people seeking employment (e.g. as laborers) in other countries.

A range of crops are grown in the Project area on a rotational basis – typically three crops are grown each year. The crops grown are identified in **Table 6.16** and **Table 6.17** by season (

Figure 6.9). Cattle and tractors are used to help cultivate local crops.

Table 6.16 *Crops – Dry Season*

Crop	December	January	February	March	April	May	June
Pulses	X	X	X	X	X		
Onion	X	X	X	X	X		
Maize	X	X					
Sesame	X					X	X
Mung bean						X	X
Corn	X	X	X	X	X	X	X
Sweet Potato	X	X	X				
Tomato							
Cotton	X	X	X				
Monsoon paddy							
Oil seeds	X	X	X	X	X		
Betel nut	X	X	X	X	X	X	X
Betel leaf	X	X	X	X	X	X	X
Peas	X	X	X	X	X		
Fruits	X	X	X	X	X	X	X
Wheat	X	X	X				
Nipa palm	X	X	X	X	X	X	X
Chili	X	X	X	X	X		

Source: Field surveys 2015

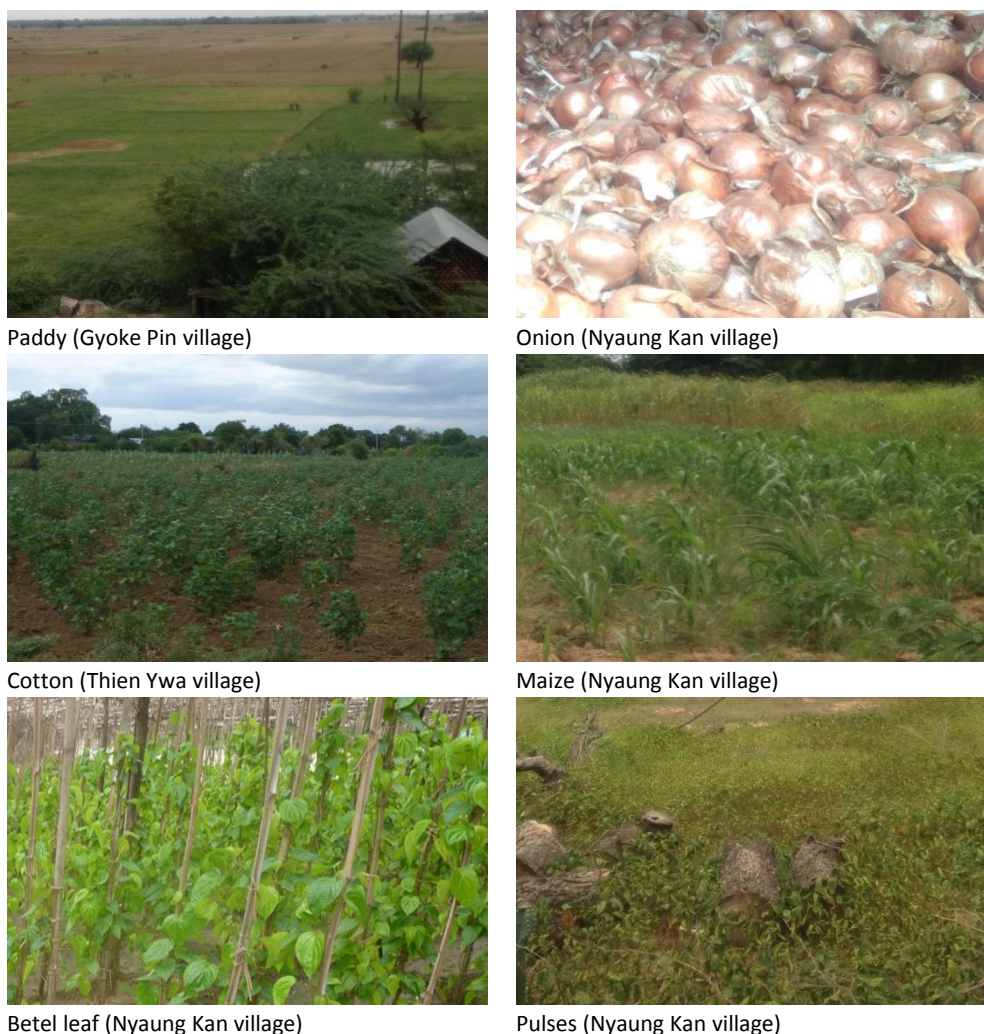
Table 6.17 *Crops – Wet Season*

Crop	July	August	September	October	November
Pulses	X	X	X	X	X
Onion					X
Maize	X	X	X	X	X
Sesame	X	X	X	X	X
Mung bean					
Corn	X	X	X	X	
Sweet Potato				X	X
Tomato	X	X	X	X	
Cotton	X	X	X	X	X
Monsoon paddy	X	X	X	X	X
Oil seeds					
Betel nut	X	X	X	X	X
Betel leaf	X	X	X	X	X
Peas	X	X	X	X	X
Fruits	X	X	X	X	X
Wheat					X
Nipa palm	X	X	X	X	X
Chili	X	X	X	X	X

Source: Field surveys 2015

Villages in the Project area largely rely on rainwater irrigate their crops. However, some of villages utilise the local irrigation channel, which diverts water from the Ayeyarwady River inland, and groundwater.

Figure 6.9 Village Agricultural Practices



6.6.2 Livestock

In addition to crops, livestock rearing is another source of income in Myanmar. A variety of animals are raised, including duck, cattle, water buffalo, goats, sheep, chickens, and pigs. In 2013/2014, duck was the most commonly raised livestock, with 18.3 million, followed by cattle and chicken.

In the Mandalay Region, the most commonly raised livestock is cattle, followed by pigs and chicken (**Table 6.18**).

Table 6.18 Livestock Population by State and Region (2013-2014)

No.	State /Region	Number of Animal Population in lakh (100,000 unit)							
		Buffalo	Cattle	Sheep/Goat	Pig	Chicken	Duck	Turkey/Geese/Muscovy	Quail
1	Nay Pyi Taw	0.68	2.29	-	0.14	2.32	0.86	0.05	-
2	Kachin	2.67	3.58	-	0.62	8.9	2.61	0.56	-
3	Kayah	0.34	0.9	-	0.03	1.24	0.2	0.08	-
4	Kayin	0.92	3.56	-	0.82	3.7	3.4	0.47	-
5	Chin	0.48	1.68	-	0.94	3.58	0.35	0.09	-
6	Sagaing	4.67	23.99	2.07	3.69	11.15	2.85	0.6	3.95
7	Thanintharyi	1.55	1.58	-	0.35	2.05	5.17	0.29	-

No.	State /Region	Number of Animal Population in lakh (100,000 unit)							
		Buffalo	Cattle	Sheep/Goat	Pig	Chicken	Duck	Turkey/Geese/Muscovy	Quail
8	Bago	3.12	14.91	-	0.64	9.68	71.75	1.36	-
	Bago (East)	2.59	7.42	-	0.3	6	63.03	0.81	-
	Bago (West)	0.53	7.49	-	0.34	3.68	8.72	0.55	-
9	Magway	1.49	26.07	5.73	24.43	25.64	2.96	0.15	-
10	Mandalay	0.7	21.86	2.36	10.9	6.74	4.45	0.57	3.97
11	Mon	0.91	4.9	-	1.05	3.88	14.4	0.8	-
12	Rakhine	3.88	11.02	-	3.11	3.13	3.64	1.27	-
13	Yangon	1.52	6.34	-	1.01	10.51	31.74	2.48	2.72
14	Shan	7.91	14.93	-	0.86	18.17	4	0.72	0.2
	Shan (South)	3.2	7.89	-	0.21	5.11	1.29	0.43	-
	Shan (East)	1.57	1.45	-	0.19	3.14	1.73	0.11	-
	Shan (North)	3.14	5.59	-	0.46	9.91	0.97	0.18	0.2
15	Ayeyarwady	2.34	12.33	-	1.05	14.98	34.94	3.79	0.18
16	Union	33.18	149.93	10.16	49.65	125.67	183.32	13.28	11.02

Source: Livestock Sector, Ministry of Livestock, Fisheries and Rural Development

In terms of the Project area, villages raise a variety of livestock, including poultry, cattle, sheep and pigs (**Table 6.19** and **Figure 6.10**). However, more households are involved in crop production, than livestock rearing.

In many instances the livestock are reared for personal consumption or to be sold at the market, with the exception of cattle. The milk from the cattle is often sold at the market, while the cattle themselves help around the farm (e.g. to till the land).

Both men and women are involved in the rearing of livestock. This includes fodder collection, dung cake preparation, milking and selling of milk or taking it to cooperatives, and vaccination and other veterinary services.

Table 6.19 Village Livestock Practices

Village	Income*	Households	Livestock	Markets	Notes
Sa Khar	84,000-500,000 Kyats/year	3	Cattle and poultry	Myingyan Township	People in Sa Khar do not consume pig, sheep and goat due to cultural beliefs. There are approximately 1,000 cattle and 1,000 poultry in the village. Cattle are used for agricultural purposes, whereas the poultry is sold for income.
Hnan Ywa	84,000-500,000 Kyats/year	61	Cattle, and poultry	Myingyan Township	There are approximately 210 cattle and 100 poultry in the village. Cattle are used for agricultural purposes. Poultry is for household consumption.
Hpet Taw	84,000-500,000 Kyats/year	100	Cattle, poultry, and pig	Myingyan Township	Approximately, 100 households have cattle that are used for agricultural purposes, while pigs are owned by approximately 50 households. Almost all (1,100) households have poultry. Milk from the cattle is sold for

Village	Income*	Households	Livestock	Markets	Notes
					income.
Nyaung Kan	84,000-500,000 Kyats/year	10	Cattle, poultry, pig, and sheep	Myingyan Township	There are approximately 300 cattle that are used for agricultural purposes within the village. There are approximately 100 poultry, which are consumed or sold – depending on the household needs. There are 50 pigs and 400 sheep which are reared for sale. Milk from the cattle is sold for income.
Gyoke Pin	150,000-1,200,000 Kyats/year	13	Cattle, poultry, pig, sheep, goat, and horse	Myingyan township	There are approximately 600 cattle that are used for agricultural purposes. There are approximately 1,100 poultry, which are consumed or sold – depending on the household needs. There are 200 pigs. There are 100 sheep/ goats which are sold or milked – depending on the household needs. Milk from the cattle is sold.
Thien Ywa	100,000-1,050,000 Kyats/year	8	Cattle, poultry, pig, sheep, goat, and horse	Myingyan township	There are approximately 1,000 cattle that are used for agricultural purposes. There are approximately 1,100 poultry, which are consumed or sold – depending on the household needs. There are 600 sheep/ goats which are sold or milked – depending on the household. A small number of households have their own pigs as well.
Tha Pyay Thar	100,000-1,200,000 Kyats/year	70	Cattle, poultry, pig, sheep, goat, and buffalo	Myingyan township	A small number of households (e.g. 5) have their own cattle and/ or buffalo that are used for agricultural purposes. Approximately, 20 households have their own sheep/goat, while 200 households have their own pigs and poultry. Milk from cattle is sold.

*Household income is dependent on the number of livestock

Source: Field surveys 2015

Figure 6.10 Village Livestock Practices



Cattle (Hnan Ywa village)



Sheep (Tha Pyay Thar village)

6.6.3 Forestry

Approximately 48% of Myanmar is covered by forest, which equates to an area of approximately 31,773,000 ha. In 2011, the forestry sector contributed approximately 0.5% to GDP, and employed approximately 36,000 people.

The Myanmar Timber Enterprise (MTE), a government-owned company, manages the timber industry within the country. The focus is largely on teak and other hardwoods.

The dragging of logs is done mainly by elephants and, to a lesser extent, water buffalo. This process is referred to as skidding. The use of animals in log extraction is considered to have a lower impact on the environment than other methods.

In addition to the timber industry, many people in rural areas of Myanmar are dependent on forest products, especially for fire wood and fodder for livestock. Often poorer farmers and agricultural labourers supplement their incomes by cutting wood for fuel.

None of the villages in the Project area are involved in the forestry sector. The only nearby forest is the Thaug Thar Mountain Reserve, which is a government owned reserve located near Hnan Ywa (and approximately 4.7 km from the Project site) (**Figure 6.11**). The Reserve is not used by Project area villages.

Figure 6.11 Thaug Thar Mountain Reserve



Thaug Thar Mountain Reserve

Villagers in the Project area use wood for cooking. The wood is collected from areas close to the villages – e.g. nearby agricultural properties. This includes the Project site, although the site is fenced on all sides to prevent access.

6.6.4 Fisheries

The fishing industry contributes approximately 8% to GDP. The industry is separated into three components – inland fisheries, marine fisheries and aquaculture. The marine sector makes up approximately 52% of the industry, followed by inland fisheries (28%) and aquaculture (20%).

Inland fisheries in Myanmar are mostly associated with open waters (e.g. riverine and estuarine systems) and flood plains. Inland water bodies, such as natural lakes, reservoirs, river systems and ponds, cover about 8.1 million hectares, of which 1.3 million hectares are permanent, while the remainder are seasonally inundated floodplains (**Figure 6.12**).

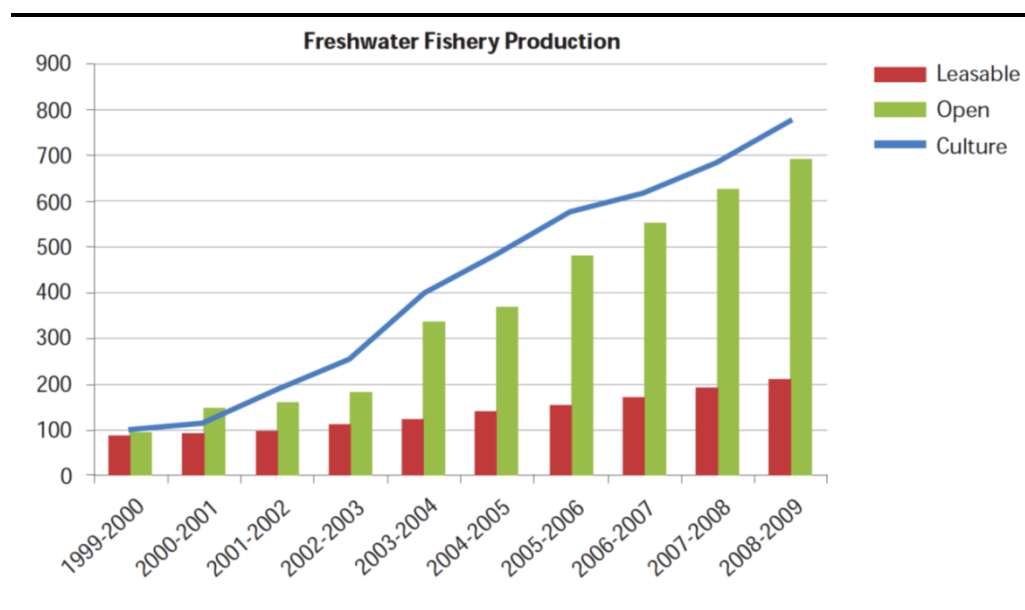
In 2008-2009, the total fish production in Myanmar was around 3,542,190 tons, of which 899,430 tons was from inland fisheries (**Figure 6.13**). Common fishing techniques include drift net, gillnet, traps and pots, pole-and-line, stationary traps, and bamboo stake traps in the near shore of rivers.

Figure 6.12 Rivers of Myanmar



Source: Maps of the World 2013

Figure 6.13 Inland Fisheries Production in Myanmar



Source: Ministry of Livestock and Fisheries 2014

The aquaculture industry is also prevalent in Myanmar and includes fin fish, crustaceans, and sea weed. At present, the aquaculture industry covers approximately 182,315 ha. This is broken down as follows:

- Freshwater fin fish: 89,138 ha;
- Freshwater prawn: 4,119 ha;
- Marine shrimp (in ponds): 88,308 ha; and
- Soft shell crab: 750 ha.

Fish constitutes approximately 75% of the animal protein consumed in Myanmar. It is anticipated that approximately 10-15% of monthly household expenditure for food is on fish or fish products.

In the Project area, only two villages indicated that they are actively involved in the fishing sector - Tha Pyay Thar (i.e. the village located closest to the Ayeyarwady River) and Gyoke Pin. (**Table 6.20**) Those involved in the fishing sector largely fish in the Ayeyarwady River, which can be done year round.

Table 6.20 Village Fisheries Practices

Village	Fish Species	Methods	Income	Notes
Sa Khar	-	-	-	There is no fishing.
Hnan Ywa	-	-	-	There is no fishing.
Hpet Taw	-	-	-	There is no fishing.
Nyaung Kan	-	-	-	There is no fishing.
Gyoke Pin	<i>Nga gyin, Tilapia, Nga yant</i>	Dip net	2,000-12,000 kyats per a peittha or viss*	There are 30 fishing households. Most of the households fish in the Ayeyarwady River year round and sell their catch at nearby markets. In some instances, buyers come directly to the village to purchase fish. A few villagers fish for personal consumption.

Village	Fish Species	Methods	Income	Notes
Thien Ywa	-	-	-	There is no fishing.
Tha Pyay Thar	<i>Nga gyin,</i> <i>Nga yant</i>	Dip net	2,000- 12,000 kyats per a peittha or viss*	There are 70 fishing households. Most of the households fish in the Ayeyarwady River year round and sell their catch at nearby markets. A few villagers fish for personal consumption.

*This is a unit of measurement in Myanmar. A peittha or viss is equivalent to 1.6 kilograms

Source: Field surveys 2015

Unlike other areas of Myanmar, there does not appear to be any aquaculture in the Project area. Most of villagers rear livestock instead of relying on fish as a source of protein, which differs from other areas of Myanmar.

6.6.5 Industry

With the economic reforms underway, industry is a growing sector in the Myanmar economy. The key industries are: agricultural processing; wood and wood products; copper, tin, tungsten, and iron; cement and construction materials; pharmaceuticals; fertilizer; oil and natural gas; garments; and gems (CIA 2015). Many of the industries that exist or are being developed in the Myanmar are directly related to the availability of Myanmar's natural resources, such as oil and gas, copper, and tin.

In terms of the Project area, although the majority of people are involved in the agricultural sector, a small number of people own and operate businesses. This includes a range of shops – from bakeries to food stalls to stores that make and sell cheroot (**Figure 6.14**). (Cheroot production is largely an activity limited to women.)

Three villages indicated that households earned involve through business. This included Sa Khar (46 households), Hnan Ywa (2 households) and Thien Ywa (5 households).

There is also a steel mill, which is located adjacent to the Project site. The workforce for the steel mill has largely been sourced from outside the local area – due to the skill sets required to operate the mill.

Figure 6.14 Local Businesses



Making cheroot (Sa Khar)



Local shop (Gyoke Pin)



Local bakery (Nyaung Kan)

6.7 COMMUNITY INFRASTRUCTURE AND PUBLIC SERVICES

The limited access to and the poor state of existing infrastructure and services have been identified as impediments to development in Myanmar. This includes the provision of basic health and education services, as well as other infrastructure such as roads, telecommunications, drinking water and waste management (World Bank 2015).

The following section provides an overview of key existing infrastructure and services. (Note that healthcare infrastructure and drinking water and sanitation are covered in the section on community health.)

6.7.1 Education and Schools

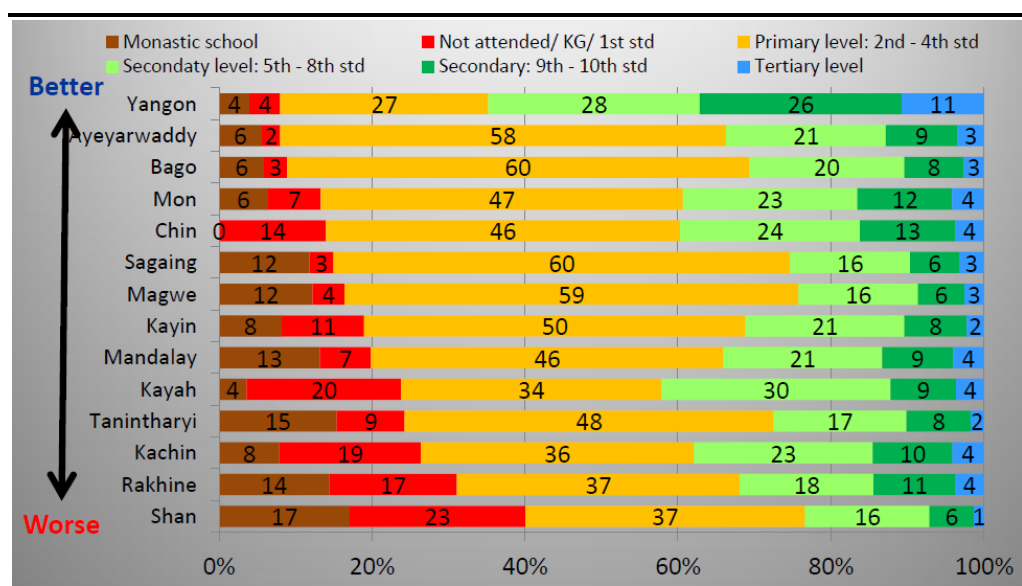
As of 2014, the adult literacy rate in Myanmar was 89.5%. However, the rate differs between men and women – with literacy being higher amongst males. The male literacy rate is 92.6%, while the literacy among females is 86.9%.

The literacy rate in the Mandalay Region was 93.8% as of 2014. Again the rate was higher amongst males (97.3%) when compared to females (90.9%). The rates in the Mandalay Region are lower than Yangon, which has a literacy rate of 96.6% - the highest in the country.

In terms of schools, it is common for children to attend primary school, but few move on to secondary school and even fewer complete years 9 and 10 or tertiary education.

In the Mandalay Region, approximately 46% of students attended primary school in 2011; however, less than 20% of these students reached high school (**Figure 6.15**). As of 2009, the Mandalay Region had 3,859 schools, of which 70 were high schools. There are a few colleges and universities in the Region, most of which are located in Mandalay.

Figure 6.15 Household Education Attainment Levels in Myanmar



Source: Poverty Profile, Integrated Household Living Conditions Survey (2011)

There are a host of educational facilities in the Project area (**Table 6.21** and **Figure 6.16**). Most villages have access to a primary, middle and high school, while two villages have technical education centres.

Table 6.21 Village Educational Facilities

Village	Description of Educational Facilities
Sa Khar	There is primary school near the village; it is approximately a 5 minute walk to the school. Most youth in the village obtain middle school level education. A few villagers have graduated from university in Yangon. There is a government technical high school located near the village - approximately a 15 minute motorbike ride away.
Hnan Ywa	There is primary school near the village; it is approximately a 5 minute walk to the school. Most of youth in the village complete primary school, but do not advance further. There is a government technical high school located nearby – approximately a 10 minute motorbike ride from the village.
Hpet Taw	There is a primary school and a high school located approximately a 5 minute walk from the village. Most youth in the village graduate from high school.
Nyaung Kan	There is primary school located approximately a 5 minute walk from the village. Nearly 70% of the youth in the village obtain primary school level education; while approximately 20% and 10% of them obtain middle school level and high school level education, respectively.
Gyoke Pin	There is a primary school located near the village; it is approximately a 5 minute walk to the school. Most youth in the village graduate from high school. A few villagers have graduated from university in Yangon.
Thien Ywa	There is a primary school located near the village; it is approximately a 5 minute walk to the school. Most youth in the village obtain a middle school level education.
Tha Pyay Thar	There is a primary school located near the village; it is approximately a 5 minute walk to the school. Most youth in the village obtain a middle school level education. A few villagers have graduated from university in Yangon.

Source: Field surveys 2015

Figure 6.16 *Village Schools*



A primary school (Nyaung Kan village)

A government technical high school

In most instances, villagers obtain a primary school education, while some continue on to middle school and/ or high school. A small number of villagers have obtained a university education. Villagers indicated that boys and girls both attended school – and there was no difference between the level of education achieved.

6.7.2 *Waste Management*

In Myanmar, it is anticipated that approximately 0.45 kilograms of waste is produced per capita per day (Glawe et al. n.d.). This includes organic waste, commercial waste and paper and plastic waste.

It is estimated that nearly 65% of the waste generated is organic waste. This is attributed to the size of the agricultural sector, as the agricultural sector largely generates organic waste.

In most major cities – such as Yangon – household waste is collected and disposed of for a small fee. However, outside major cities, waste disposal is typically the responsibility of the household. In both instances, solid waste is often disposed of at open dump sites, in other words uncontrolled sites. In a small number of cases, composting and recycling is carried out.

In terms of waste in the Project area, wastewater is largely directed back into the ground (**Figure 6.17**). Solid waste disposal is the responsibility of each household. Most households either burn their waste or dump their waste on nearby land, neither of which is regulated or controlled (**Figure 6.18**).

Figure 6.17 *Wastewater Discharge*



Sa Khar village

Figure 6.18 *Solid Waste Disposal*



Gyoke Pin village

6.7.3 *Electricity and Energy*

In Myanmar, most of the population is reliant on firewood for cooking (**Table 6.22**). This practice is contributing to the increasing rates of deforestation seen within the country.

Table 6.22 Access to Energy

Source	Cooking	Source	Lighting
Electricity	16.4%	Electricity	32.4%
LPG	0.4%	Kerosene	8.1%
Kerosene	0.2%	Candle	20.7%
Biogas	0.3%	Battery	17.0%
Firewood	69.2%	Generator	9.3%
Charcoal	11.8%	Water mill	1.6%
Coal	0.3%	Solar system	8.7%
Other	1.4%	Other	2.2%

In terms of lighting, a range of sources are available. The most commonly used are electricity, candle, and batteries. The access to electricity is likely to change in the future given the investment that the Myanmar government is making in the power sector; a number of new power plants are being developed in order to provide an increasing number of people with electricity.

The villages in the Project area largely use wood for cooking (**Table 6.23** and **Figure 6.19**); while a range of lighting sources exist including government supplied electricity. For those households that do not have access to electricity, batteries, candles, and generators are used for lighting.

Table 6.23 Village Energy Sources

Village	Description of Energy Sources
Sa Khar	Approximately 212 households are provided electricity by the government. Lighting is provided 24 hours per day by government. Most households use wood for cooking. Firewood is collected from farmland and along local roads. Some villagers purchase firewood.
Hnan Ywa	Approximately 50 households have access to electricity from a private/commercial generator. Lighting is provided for 3 hours per day. Most villagers use wood for cooking. Firewood is collected from farmland and along local roads. Some villagers purchase firewood.
Hpet Taw	Approximately 260 households are provided electricity by the government. Lighting is provided 24 hours per day by government. Most households use wood for cooking. Most villagers buy firewood from outside the village. A small number of villagers collect firewood from farmland and areas along local roads.
Nyaung Kan	Approximately 250 households have access to electricity. Local solar power infrastructure provides 3 hours of lighting per day. Most villagers use wood for cooking. Firewood is collected from farmland and along local roads. Some villagers purchase firewood.
Gyoke Pin	Approximately 268 households are provided electricity by the government. Lighting is provided 24 hours per day by government. Most households use wood for cooking. Firewood is collected from farmland and along local roads.
Thien Ywa	Approximately 60 households have access to electricity from a private/commercial generator. Lighting is provided for 3 hours per day. Most villagers use wood for cooking. Firewood is collected from farmland.
Tha Pyay Thar	Approximately 150 have access to electricity. Local solar power infrastructure provides 3 hours of lighting per day. Most villagers use wood for cooking. Firewood is collected from farmland and along local roads. Some villagers purchase firewood.

Source: Field surveys 2015

Figure 6.19 Village Energy Sources



Household access to electricity from the government (Sa Khar village)



Firewood used for cooking (Sa Khar village)

6.7.4 Transportation

A variety of transport methods are used in Myanmar, including roads, rail, air and water. In some areas the modes of transport are well developed, while in other areas they are quite limited (**Figure 6.20**).

Central Myanmar, where the Project is located, has a relatively well developed transport system compared to other parts of Myanmar. Due to its geography, central Myanmar, particularly Mandalay Region, acts as the central hub for transport. Existing infrastructure includes:

- Rail: The Yangon-Mandalay railway, which runs through eastern Mandalay, connects the region to Naypyidaw and Yangon;
- Water: The Ayeyarwady River plays a major role in transportation in the Mandalay Region. The River transports both goods and people through the Mandalay Region; and
- Air: There are three international airports in Myanmar - in Mandalay, Naypyidaw and Yangon.

Figure 6.20 Myanmar Transportation Network



Source: Cartographic Section, Department of Field Support, United Nations, June 2012

In terms of roads, most urban areas in Myanmar are accessible only by road. However, nearly half of all roads are not passable during the monsoon season (World Bank 2015) – limiting access to key areas within the country.

Myanmar has three main highways or corridors running north-south, as follows:

- Yangon-Mandalay Road – The road passes through major cities in central Myanmar such as Bago, Thungoo, Pynmana, Naypyidaw, and Meikhtila;
- Yangon-Pyay Road – This road runs west of the Pegu Range; and
- Western Union Highway – The road connects urban areas west of the Ayeyarwady River, but is still largely under construction.

There are 2 main roads that transect the Project area are:

- Myingyan to Mandalay - The road starts in Mandalay and ends in Lashio, from which another road extends up to Muse; and
- Myingyan to Bagan - The road runs along the east bank of Ayeyarwady River from Magway to Bagan, passing through Yenanchaung.

Traffic accidents in Myanmar increased between 2013 and 2014 (**Table 6.24**). The overall number of accidents, injuries and fatalities in 2014 were 10,818, 18,621 and 3,064, respectively. For the Mandalay Region, the statistics are 1,116, 1,960 and 354, respectively.

Table 6.24 Road Traffic Accidents by States and Regions in Myanmar (2013-2014)

No.	State/Region	2014 January to October			2013 January to October		
		Accident	Injury	Fatality	Accident	Injury	Fatality
1.	Naypyitaw	279	472	143	306	450	172
2.	Kachin	352	507	136	259	445	109
3.	Kayah	102	140	33	95	150	20
4.	Kayin	313	629	96	294	537	62
5.	Chin	69	146	30	57	109	24
6.	Sagaing	1,241	2,302	312	530	881	144
7.	Taninthayi	252	406	97	3,16	624	76
8.	Bago	1,163	2,193	340	1,208	2,108	288
9.	Magway	923	2,060	221	785	1,610	179
10.	Mandalay	1,116	1,960	354	988	1,603	300
11.	Mon	434	712	193	456	723	203
12.	Rakhine	263	465	76	215	334	69
13.	Yangon	2,295	3,231	425	2,177	3,210	324
14.	Shan	401	742	137	341	665	106
15.	Shan(Lashio)	307	402	169	235	396	84
16.	Shan(Kyaington)	137	287	73	139	257	65
17.	Ayeyarwady	1,171	1,967	229	875	1,627	190
	Total	10,818	18,621	3,064	9,276	15,729	2,415

Source: Road Transport and Administration Department 2014

In terms of modes of transport, the most commonly owned vehicles are motorcycles and bicycles, with higher levels of ownership in urban areas compared to rural areas (**Table 6.25**).

Table 6.25 Vehicle Ownership

Method	Total	Urban	Rural
Car/ truck/ van	3.1%	8.1%	1.2%
Motorcycle/ moped	38.7%	41.2%	37.7%
Bicycle	35.9%	46.9%	31.7%
4-Wheel tractor	2.5%	1.4%	2.9%
Canoe/boat	3.9%	0.6%	5.1%
Motor boat	2.25%	0.5%	2.8%
Cart	21.6%	2.5%	29.1%

Within the Project area, most of the roads are in considered to be of poor quality. They are largely due to the fact that the roads are made of dirt and experience heavy

rains during the wet season. Often during the rainy season, the roads become unusable.

In terms of modes of transport, some villagers own their own vehicles – such as two-wheelers and four-wheelers (**Table 6.26**). Those that do not have vehicles rely on public transport, including buses, trains and motor cycle taxis (**Figure 6.21**). There is one train station within the Project area – it is located not far from Sa khar and Hnan Ywa.

Table 6.26 Village Vehicle Ownership

Village	Households*	Motorcycle	Car/ truck/ van	Canoe/boat
Sa Khar	329	200	5	-
Hnan Ywa	113	40	5	-
Hpet Taw	1,100	875	110	-
Nyaung Kan	250	200	10	-
Gyoke Pin	438	438	3	7
Thien Ywa	117	100	4	-
Tha Pyay Thar	210	150	-	50

* Note: Some villagers own their own vehicles.

Source: Field surveys 2015

Figure 6.21 Village Vehicle Ownership



Motorcycle (Nyaung Kan village)

Bicycle (Hpet Taw)

6.8 CULTURAL HERITAGE

Cultural heritage study area consists of an area 3km from the Complex (Project site and existing Steel Mill) and 500m buffer of the water supply pipeline route presented in the Scoping Study undertaken by IFC in 2015⁽¹⁾ (see **Figure 6.22**). The principal types of tangible cultural heritage resources of concern are:

- Archaeological resources (e.g. sites, artefacts, ruins);
- Ancient above ground resources (e.g. monuments, buildings, structures, and facilities over 100 years old); and
- Living heritage sites (e.g. temples, cemeteries, shrines, and sacred sites).

⁽¹⁾ Myingyan IPP Project – Environmental & Social Consultancy Services in Support of Transaction Advisory Service’s for Private Sector Participation Scoping Report – Rev 4 – 18th May 2015.

Desktop study supplemented by field survey conducted between 7 and 16 July 2015 identified no known archaeological resources; three items of ancient above ground resources and 20 items of living heritage sites within the cultural heritage study area (**Table 6.27**). All the identified items are pagoda complexes and monasteries. Most of these items are located within or in close proximity to human settlements. The villages located within the cultural heritage study area include Tha Pyay Thar, Nyaung Kan, Hpet Taw, Hnan Ywa, Thein Ywa and Gyoke Pin. No tangible cultural heritage resources were identified within the project’s footprint (i.e. the CCGT plant site boundary and proposed water intake pipeline).

No significant intangible cultural heritage (e.g. tradition, ritual and religious practice, ceremonies) was identified through interview with villagers and stakeholder’s meeting. Examples of national festivals and ceremonies to be held are Water Festivals, Myanmar New Year, Full moon Day of Tabaung and Novitiation Ceremonies etc. Pagoda complexes and monasteries are the centre of traditional and religious life. Take Novitiation Ceremonies for instance, the ceremonies will take place at all villages on a certain day in March and April which the date is specific for each village, chosen by the abbots of the monasteries. Boys would shave their hair, wear the robe and start to learn Buddhism. On the other hand, worship to local spirit “Amay Shwe Khar” (golden mother Khar), aunt of famous sprit “Ko Gyi Kyaw”(drunken spirit is representing Ava period (1364-1555)) was found particularly popular at Sar Khar Village, which worshippers are restricted from livestock breeding of goat, pig and duck.

Table 6.27 *List of Key Tangible Cultural Heritage Resources Identified within the Cultural Heritage Study Area*

Item	Tangible Cultural Heritage Resources (Type)	Proximity to the Project’s Footprint (Figure Number)
TPT1	Pagoda complex (Living Heritage Sites)	Located in Tha Pyay Tha Village, about 60.7m from the proposed water intake pipeline (Figure 6.23)
TPT2	Pagoda complex (Living Heritage Sites)	Located in Tha Pyay Tha Village, about 491.7m from the proposed water intake pipeline (Figure 6.23)
TPT3	Pagoda complex (Living Heritage Sites)	Located in Tha Pyay Tha Village, about 47.2m from the proposed water intake pipeline (Figure 6.23)
TPT4	Kyun Oo pagoda (Living Heritage Sites)	Located in village opposite to Tha Pyay Tha Village, about 311m from the proposed water intake pipeline (Figure 6.23)
NK1	Pagoda complex (Living Heritage Sites)	Located in Nyaung Kan 2,102.5m from the CCGT plant site boundary and 379.9m from the proposed water intake pipeline (Figure 6.24)
NK2	Pagoda complex (Living Heritage Sites)	Located in Nyaung Kan, about 1,093.4m from the CCGT plant site boundary and 230.9m from the proposed water intake pipeline (Figure 6.24)
NK3	Pagoda complex (Living Heritage Sites)	Located in Nyaung Kan, about 2,313.5m from the CCGT plant site boundary and 479.9m from the proposed water intake pipeline (Figure 6.24)

Item	Tangible Cultural Heritage Resources (Type)	Proximity to the Project's Footprint (Figure Number)
HT1	Shinbin Dawne' Ancient Pagoda (Ancient Above Ground Resources)	Located between Myingyan steel mill and Hpet Taw, 640.2m to the southwest of the CCGT plant site boundary (Figure 6.25)
HT2	Pagoda complex (Living Heritage Sites)	Located in Hpet Taw, about 1,937m from the CCGT plant site boundary and 1,480.8m from the proposed water intake pipeline (Figure 6.25)
HT3	Pagoda complex (Living Heritage Sites)	Located in Hpet Taw, about 1,986.8m from the CCGT plant site boundary and 1,897.2m from the proposed water intake pipeline (Figure 6.25)
HY1	Pagoda complex and Buddhist monastery for young monks (Living Heritage Sites)	Located in Hnan Ywa village, 631.5m to the southeast of the CCGT plant site boundary (Figure 6.26)
HY2	Pagoda complex (Living Heritage Sites)	Located in Hnan Ywa village, 1,323m from of the CCGT plant site boundary (Figure 6.26)
HY3	Pagoda complexes (Living Heritage Sites)	Located in Hnan Ywa village, 1,364.3m from of the CCGT plant site boundary (Figure 6.26)
HY4	Huan Ywa Pagoda	Located in Hnan Ywa village, 887.5m from of the CCGT plant site boundary (Figure 6.26)
SK1	Uttarathiri monastery pagoda complex (Ancient Above Ground Resources)	Located near Sar Khar village, about 892.5m to the north of the CCGT plant site boundary and 741m from the proposed water intake pipeline (Figure 6.27)
SK2	Pagoda complexes (Living Heritage Sites)	Located in Sar Khar village, about 1022.4m from the CCGT plant site boundary (Figure 6.27)
SK3	Su Taung Pyae Pagoda, Thein Taw Shin Pagoda (Thein Taung pagoda complex) (Ancient Above Ground Resources)	Located in Sar Khar village, about 767.7m from the CCGT plant site boundary (Figure 6.27)
SK4	Amay Shwe Khar's Abode and worshipers (Living Heritage Sites)	Located in Sar Khar village, about 695.4m from the CCGT plant site boundary (Figure 6.27)
TY1	Pagoda complex (Living Heritage Sites)	Located in Thein Ywa Village, about 1,840.5m from the CCGT plant site boundary (Figure 6.28)
TY2	Pagoda complex (Living Heritage Sites)	Located in Thein Ywa Village, about 2,287.1m from the CCGT plant site boundary (Figure 6.28)
GP1	Pagoda complexes (Living Heritage Sites)	Located in Gyoke Pin village, about 1,647.6m from CCGT plant site boundary and 1,058.2m from the proposed water intake pipeline (Figure 6.29)
GP2	Pagoda complex (Living Heritage Sites)	Located in Gyoke Pin village, about 2869.6m from the CCGT plant site boundary and 2,272.3m from the proposed water intake pipeline (Figure 6.29)
GP3	Pagoda complex (Living Heritage Sites)	Located in Gyoke Pin village, about 2,957.8m from the CCGT plant site boundary and 2,343m from the proposed water intake pipeline

Item	Tangible Cultural Heritage Resources (Type)	Proximity to the Project's Footprint (Figure Number)
		<i>(Figure 6.29)</i>

Source: Field surveys 2015

Figure 6.23 Cultural and Social Heritage Resources Identified at/ near Tha Pyay Tha

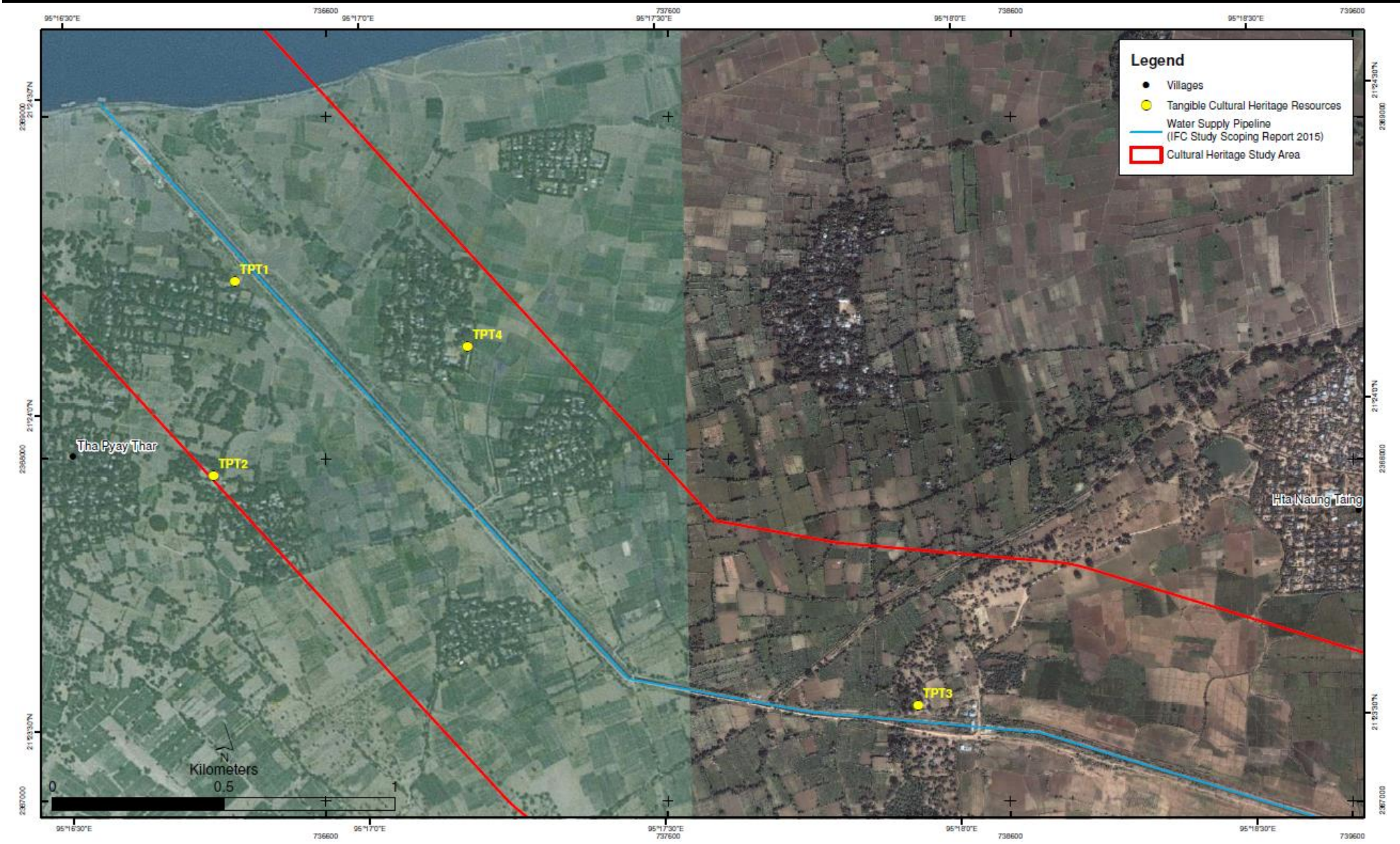


Figure 6.24 Cultural and Social Heritage Resources Identified at/ near Nyaung Kan

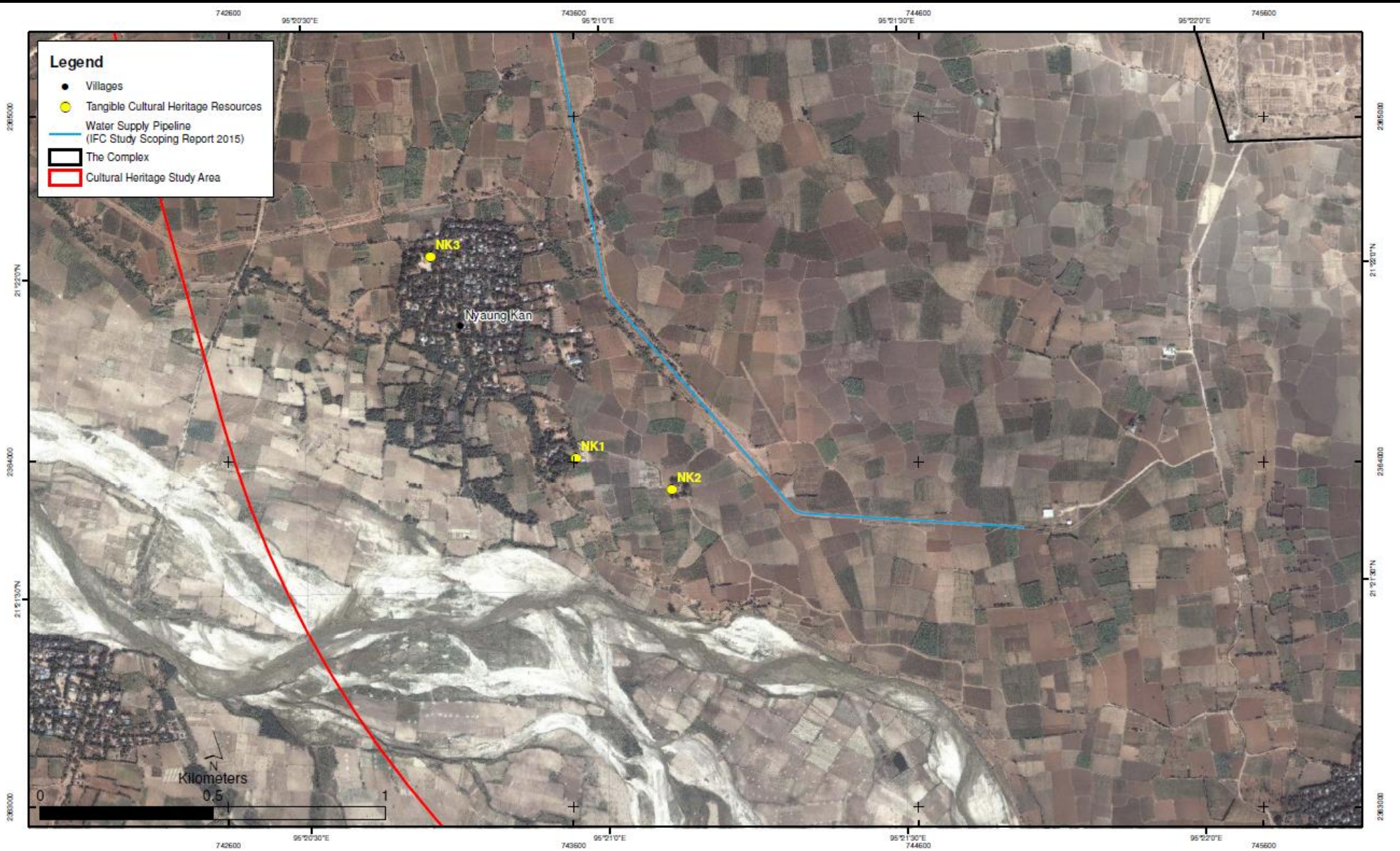


Figure 6.25 Cultural and Social Heritage Resources Identified at/ near Hpet Taw

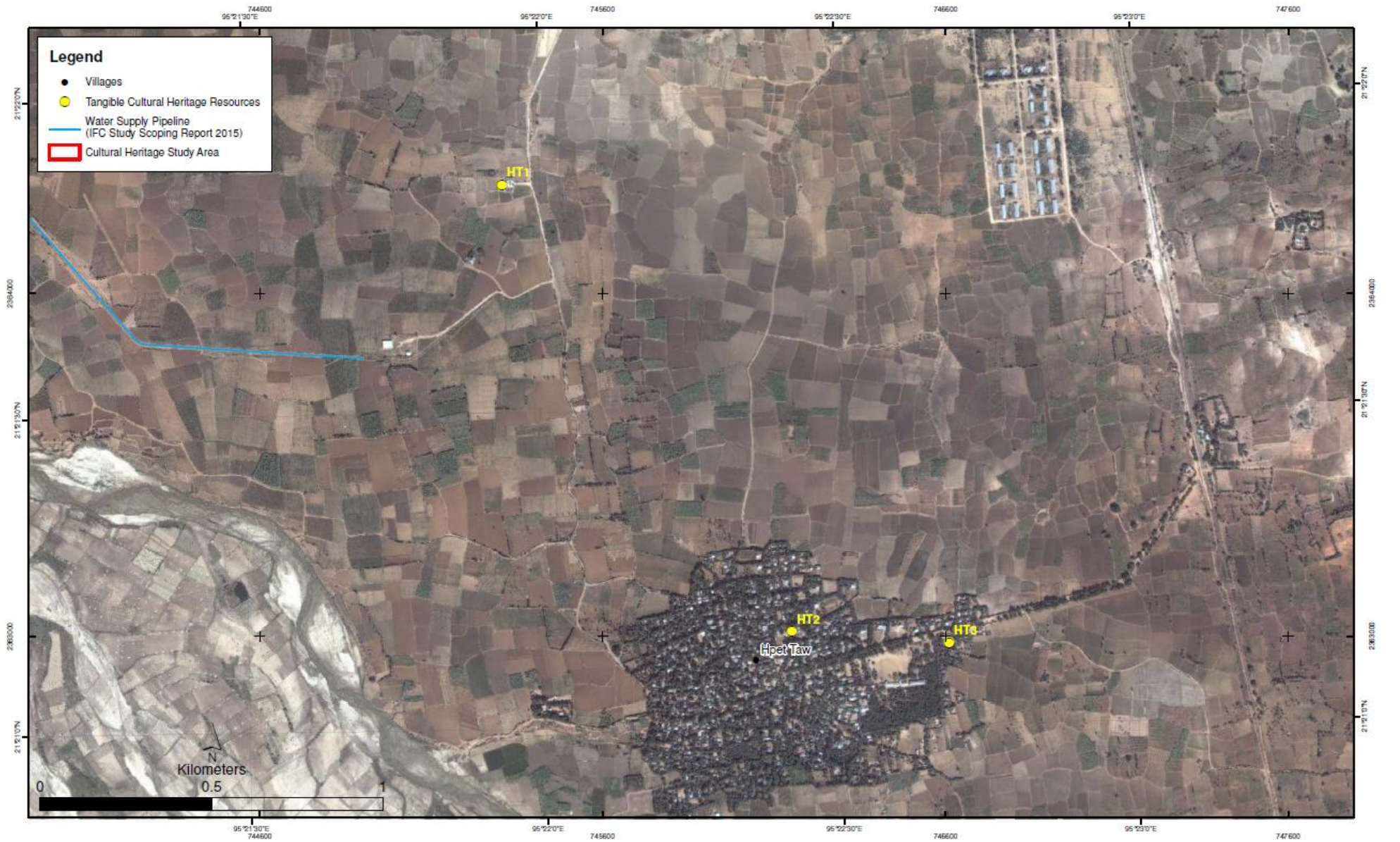


Figure 6.26 Cultural and Social Heritage Resources Identified at/ near Hnan Ywar

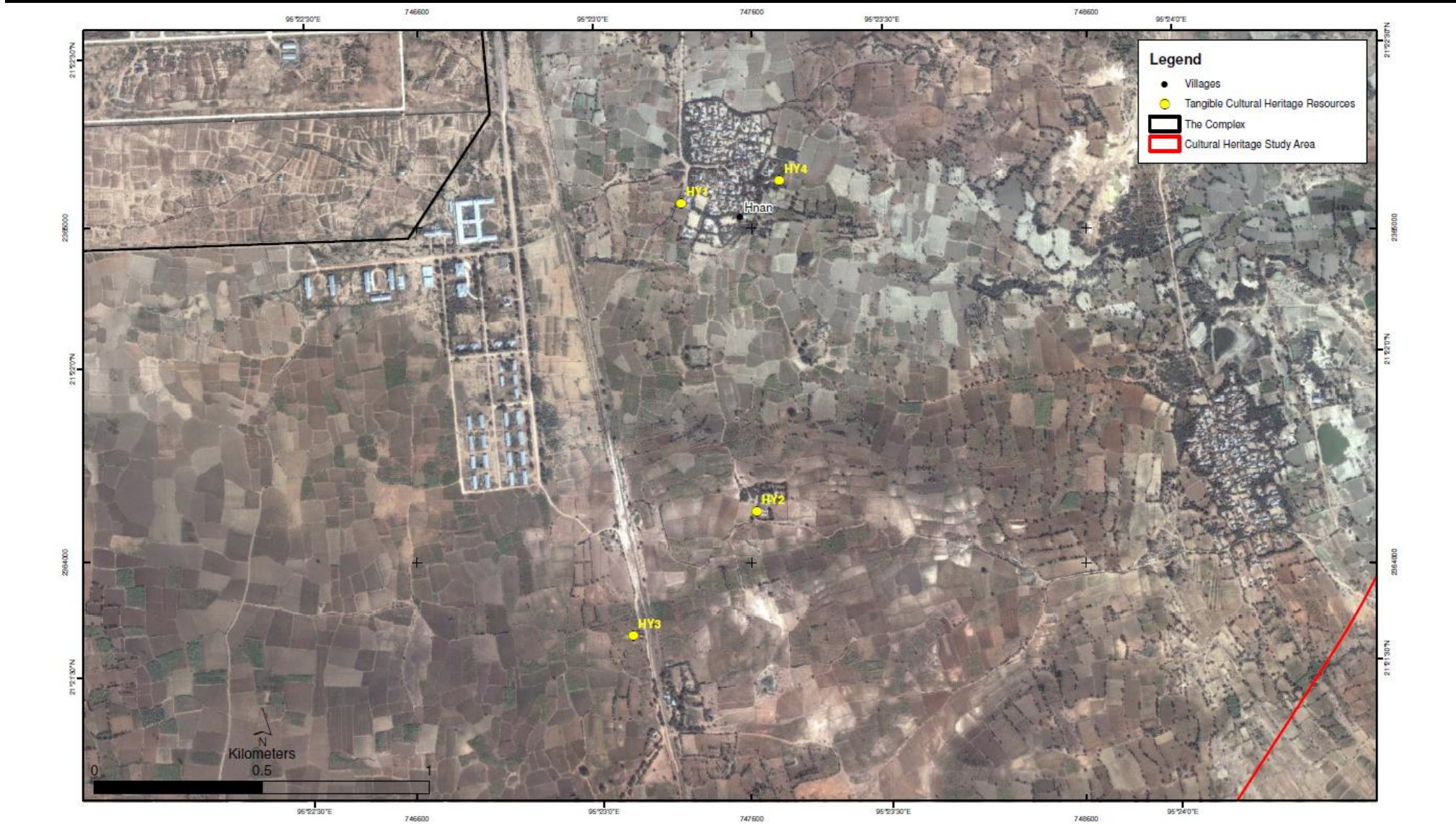


Figure 6.27 Cultural and Social Heritage Resources Identified at/ near Sa Khar

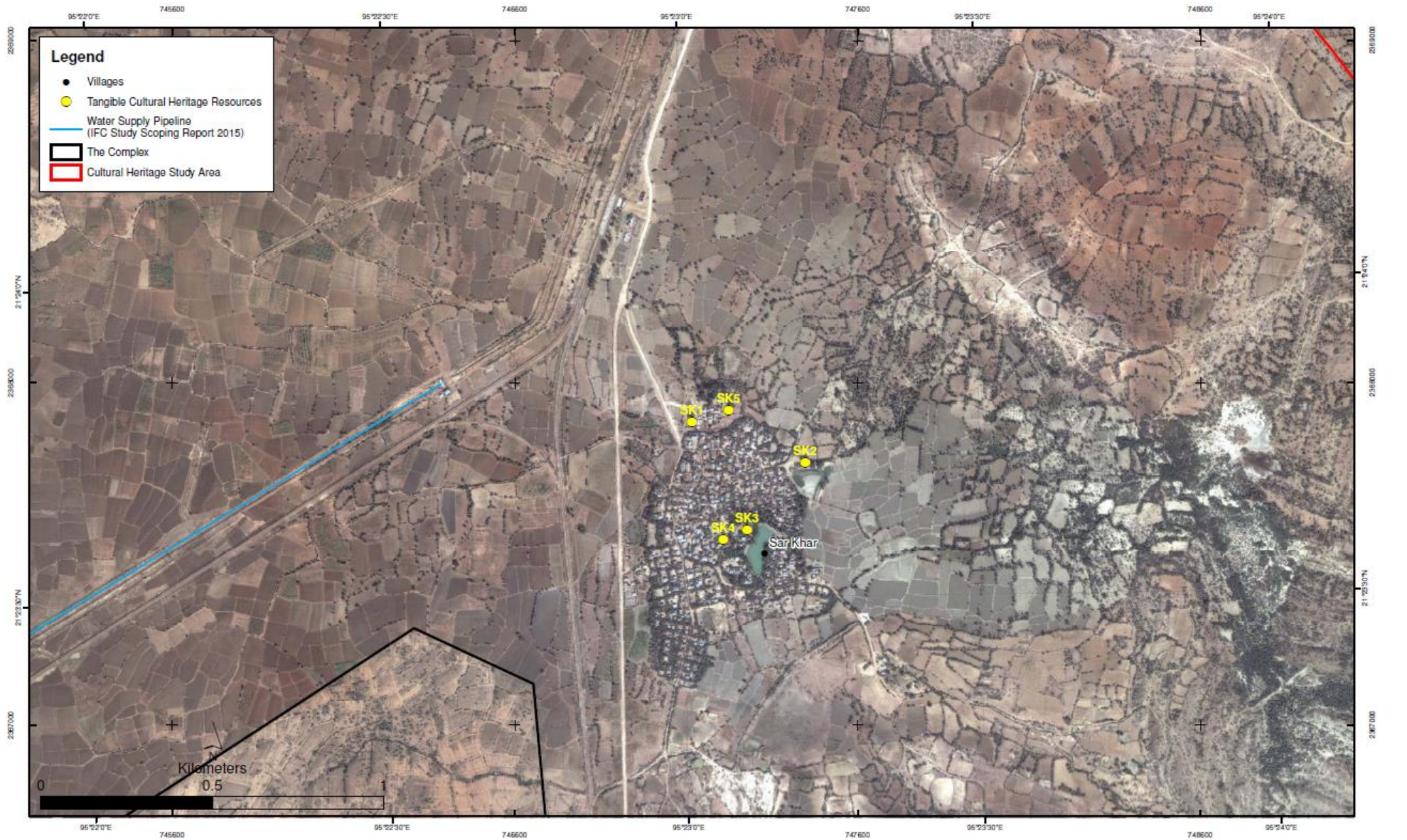


Figure 6.28 Cultural and Social Heritage Resources Identified at/ near Their Ywa

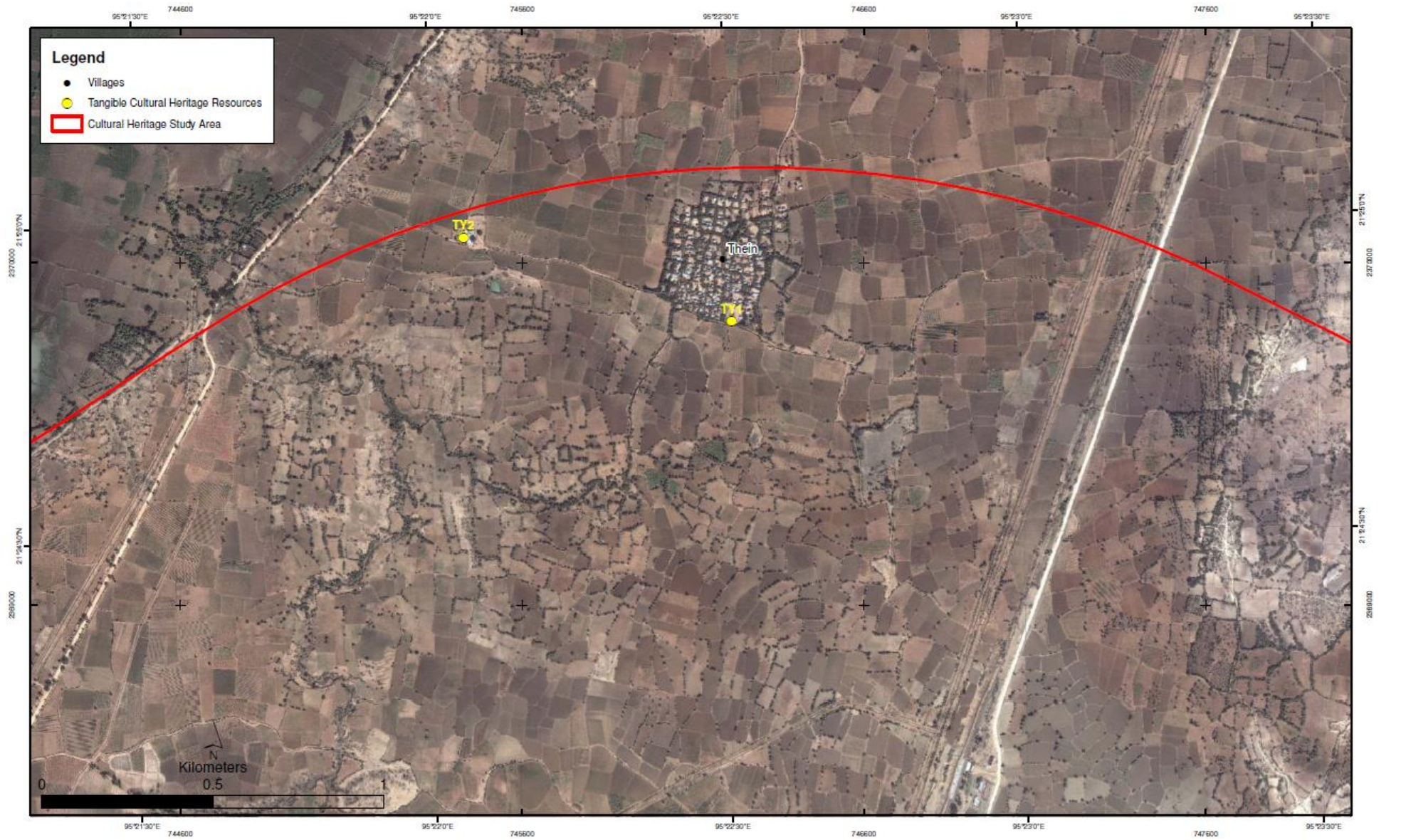


Figure 6.29 Cultural and Social Heritage Resources Identified at/ near Gyoke Pin

