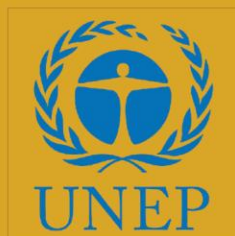




National Action Plan for Artisanal and Small-Scale Gold Mining in Zambia, in accordance with the Minamata Convention on Mercury



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EXECUTIVE SUMMARY

The development of a National Action Plan (NAP) to reduce, and where feasible, eliminate the use of mercury and mercury compounds in Artisanal and Small-Scale Gold mining (ASGM) sector in Zambia affirms the Zambian government's effort towards accomplishing the obligations under Article 7 of the Minamata Convention.

The “Minamata Convention on Mercury” is a framework that provides various interventions to mitigate and control anthropogenic emissions of mercury and mercury compounds in ASGM. Among the many interventions under the Convention is the “Regional project on the development of national action plans for the artisanal and small-scale gold mining in Africa” (the Project) which focuses on four components. (Detailed in section II of this document)

As a party to the Minamata Convention, Zambia has the responsibility to fulfil the obligations stipulated Under Article 7 and Annex C. Consequently, in the bid to assert compliance, Zambia has carried out a number of activities. For instance, in implementing Component 3 of ‘the project’, the Zambia Environmental Management Agency (ZEMA) commissioned the study to provide a national overview of the ASGM sector, including baseline estimates of mercury use and practices.

The outcomes of the baseline study confirmed the existence of ASGM activities in Zambia and provided valuable insights relating to mining, processing, mercury use and emissions to the environment, impact of mercury on human health and the environment, economic, social and demographic aspects, the organisation of the sector including the legal and regulatory framework available to support formalisation etc. (detailed in section III of this document).

Of particular concern, is the fact that according to the statistics from the baseline estimate approximately 30,000 miners were involved in ASGM (comprising 77 percent male, 18 percent female and 5 percent children) concentrated mainly along the Mwembeshi Shear Zone (MSZ).

The MSZ spreads across Central, Eastern, Lusaka and North -Western Provinces of Zambia. The primary ASGM areas are distributed in Central Province (Luano Valley and Mumbwa), Eastern Province (Lundazi, Petauke and Vubwi) and Lusaka Province (Rufunsa). Other ASGM areas include Chisamba, Kabwe, Mkushi and Serenje (in the Central Province); Chadiza, Chipata, Lumezi and Lusangazi (in the Eastern Province); Chirundu, Chilanga and

Kafue (in the Lusaka province); Mpika (in Muchinga Province); Kasempa, Mwinilunga and Solwezi (in the North Western Province); Senga (in the Northern Province); and Kazungula in the Southern Province. The ASGM sites visited during the baseline study were in Chongwe, Luano, Lundazi, Mumbwa, Petauke, Rufunsa and Vubwi.

However, formalisation of the ASGM sector in Zambia still remains a challenge with only 2 percent representing the formal sector, while the informal sector accounts for the remaining 98 percent of the ASGM population.

The study also established the presence of mercury use in the processing of gold in both the formal and informal ASGM sectors. However, data to quantify mercury use in the ASGM sector was challenging as it was not readily available due to the clandestine nature of the practice.

The outcomes of the study therefore formed the basis for developing a NAP for Zambia focusing on the following priority areas:

- i. Formalisation of the ASGM Sector;
- ii. Implementation of a communication strategy and strategies for the management of the ASGM sector;
- iii. Development and mainstreaming of a public health strategy on the exposure of ASGM miners and their communities;
- iv. Development and implementation of strategies to reduce emissions and releases of mercury; and
- v. Comprehensive review of baseline estimates reports on mercury use and gold.

The goal of NAP for the ASGM in Zambia is to reduce, and where feasible, eliminate the use of mercury and mercury compounds in the sector. This is against the backdrop of the ASGM sector that is largely informal and unlicensed with the propensity to perpetuate secrecy about the use of mercury in ASGM activities, unavailability of accurate information and lack of accountability. This impedes efforts to encourage the use of appropriate, affordable and safe-technologies in the sector aimed at reducing and eventually eliminating the use of mercury and mercury compounds in ASGM.

According to our estimates, reducing, and where feasible, eliminating the use of mercury and mercury compounds in the ASGM sector in Zambia will ensure sustainability in the sector,

safeguard human health and the environment and subsequently support ASGM contribution to national development.

To accomplish the goal of the NAP, we propose four objectives targeting the key elements of the NAP as outlined in the guidance document to be implement between 2023 and 2030.

Objective 1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030.

Objective 2: To increase the percentage of formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030.

Objective 3: To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030.

Objective 4: To achieve 40% provision of health care services to ASGM players by implementing public health and Social Protection strategies aimed at improving health by 2030.

The above objectives will be achieved through the implementation of 23 strategies with respective measures/activities as elaborated under section V of this document.

Zambia relies on the expertise of professionals from various government ministries, private institutions and cooperating partners to execute the project. These will work under the valuable stewardship of the Ministry of Mines and Minerals Development and ZEMA. Ministry of Mines and Minerals Development and ZEMA have worked on various projects addressing issues of human health and environmental sustainability through prudent environmental management strategies.

Zambia, as a party to the Minamata Convention is enthusiastic about the provisions and ambitious targets set out to guide the work on mercury. To this effect, the development of a NAP for the Zambian ASGM is an indication of our commitment to address risks that mercury poses to human health and the environment. Therefore, through the support of Cooperating partners we are confident that this important millstone will be actualized.

To complete this project successfully within the stipulated period, we propose a total budget of \$ **30,655,921.77** (detailed in budget in Annex 7).

1.0 Introduction and Background

The Minamata Convention on Mercury (the Minamata Convention) is a Multilateral Environmental Agreement adopted by the global community in 2013 with the objective of protecting human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. Zambia signed the Convention in 2013 and ratified it in 2016 and it came into force in August 2017. Under Article 7 and Annex C, the Convention provides for a number of interventions to mitigate and control anthropogenic emissions of mercury and mercury compounds in Artisanal and Small-Scale Gold Mining (ASGM).

As a way of assisting signatories to fulfil obligations under Article 7 of the Convention, various projects have been implemented in many countries to focus on mercury reduction in ASGM. In Zambia, the project being implemented is a “Regional Project on the Development of National Action Plans for the Artisanal and Small-Scale Gold Mining in Africa” (the Project). The project is a beneficiary of the Global Environment Facility (GEF) funding mechanism under the Convention which is aimed at assisting countries to develop National Action Plans (NAPs) to reduce the use of mercury and mercury compounds in, and the emissions and releases to the environment of mercury from, ASGM and processing. The project is being implemented by ZEMA with support from UNEP through the executing agency Africa Institute for Environmentally Sound Management for Hazardous and other waste.

The project has four components:

Component 1: Regional information exchange, capacity building and knowledge generation;

Component 2: Establishment of Coordination Mechanism and organisation of the process;

Component 3: Develop a national overview of the ASGM sector, including baseline estimates of mercury use and practices; and

Component 4: Develop, endorse and submit to the Minamata Convention Secretariat National Action Plans (NAPs) on ASGM.

This NAP has been developed under Component 4 of the Project which is anchored on behalf of the Government of the Republic of Zambia (GRZ), by the Zambia Environmental Management Agency (ZEMA), in collaboration with key stakeholders.

2.0 National Overview

2.1 Previous Experiences in addressing ASGM

Historically, mining has played a critical role in attaining the economic development of Zambia, with copper being the most exploited mineral. In the recent past, there has been an increase in the exploitation of precious metals, including gold. Zambia's formal gold production is only listed as starting post-2004, with production levels increasing during the period 2005 to 2010 at a compound annual growth rate of over 50 percent (USGS, 2013). The increased exploitation of gold, which has been driven in part by increased prices of the mineral on the international market has resulted in expansion of the ASGM sector

However, information on ASGM in Zambia is scarce. Studies have shown that Zambia's history of mining dates back to the early 1900s. The information gathered on matters pertaining to or related to ASGM is that gold mining has historically been the preserve of a few Small-Scale Miners (SSMs). Although more than 300 gold occurrences have been recorded, most are regarded to be at best only prospects, from an LSM perspective. Katongo (1999) listed the largest historical producers of gold as Dunrobin (990kg) and Matala (225kg) in the Mumbwa area, Jessie (390kg) in the Rufunsa area, and Sasare (390kg) in eastern Zambia. Most of this production was pre-2000 although gold has continued to be produced as a by-product of copper mining by ZCCM historically, and successor LSMs such as First Quantum Minerals Limited (KPMG, 2013).

2.2 Geographical Distribution of ASGM

ASGM activities occur in the Mwembeshi Shear Zone (MSZ) which spreads across Central, Eastern, Lusaka and North-Western Provinces of Zambia. The primary ASGM areas are distributed in Central Province (Luano Valley and Mumbwa), Eastern Province (Lundazi, Petauke and Vubwi) and Lusaka Province (Rufunsa). Other ASGM areas include Chisamba, Kabwe, Mkushi and Serenje (in the Central Province); Chadiza, Chipata, Lumezi and Lusangazi (in the Eastern Province); Chirundu, Chilanga and Kafue (in the Lusaka province); Mpika (in Muchinga Province); Kasempa, Mwinilunga and Solwezi (in the North Western Province); Senga (in the Northern Province); and Kazungula in the Southern Province. Out of these, seven (7) ASGM sites were visited during the baseline study in Chongwe, Luano, Lundazi, Mumbwa, Petauke, Rufunsa and Vubwi districts. These sites were selected based on

the availability of information on active ASGM sites, accessibility of the sites, given time frame and availability of resources. The geographical location of ASGM activities is as shown in Figure 2.1.

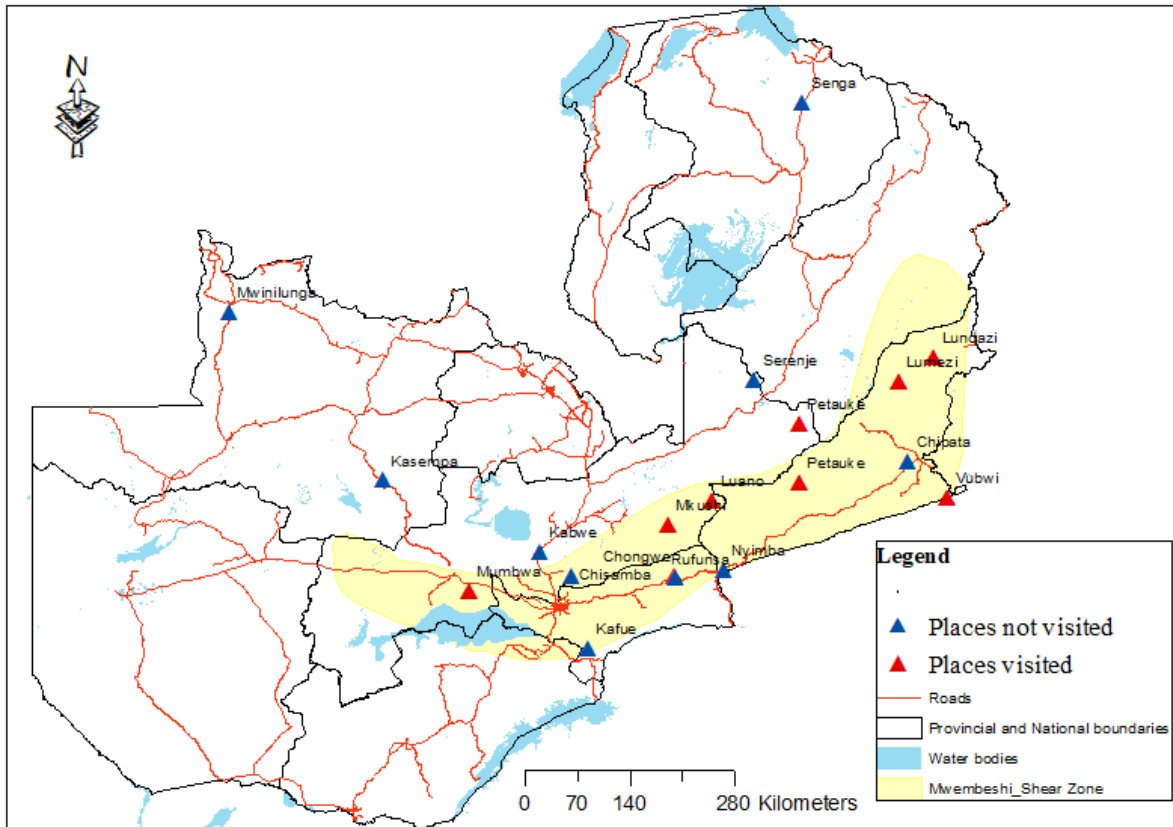


Figure 2. 1: Locations of ASGM in Zambia

The ASGM sites that were visited have been indicated in red text while the ones not visited have been indicated in blue (Figure 1).

Most of the ASGM operations were considered to be illegal as they were not formalised. Some operations took place in areas where licences were already allocated to other entities. Ownership of the mine usually would be a source of conflict between the licence holders and the ASGM miners. With regards to co-existence of Large-Scale Gold Mine and ASGM, ASGM miners are considered to be illegal when their activities occur in an area where an LSGM occurs. As such the two are constantly in conflict. An example is the ASGM activities that were reported during the baseline study on a licence belonging Luiiri Gold Mines Limited in Mumbwa (Figure 1) where ASG miners were illegally collecting stockpiles from the large-scale mining operations. The stockpile was further processed to extract gold.

2.3 Mining and Processing Information

The Baseline study of ASGM activities revealed that extraction of material by miners was either from alluvial deposits (river sediments) or lode deposits (typically gold in quartz veins). The extraction and processing techniques in use are predominantly panning and amalgamation.

However, in an attempt to formalise the ASGM activities, the Ministry responsible for mines have been engaging the licence holders to surrender the areas not being utilised within the licence areas in order to pave way for possible formalisation of the ASGM activities.

2.3.1 Extraction and Processing of Alluvial Gold

In Zambia, alluvial gold mining is mostly undertaken by individual labourers and it involves digging and sifting through materials such as mud, sand or gravel using shovels, sieves or a labourer's bare hands. In informal ASGM, liberation of gold is achieved by crushing, shaking and sieving of the slurry, thereby separating the denser from the lighter material. The ore is passed through sluice boxes or shaker tables inclined at 45 degrees where the fine lighter material is washed away. Gold is trapped in improvised rubber mats converted from motor vehicle rubber foot and pedal mats. In some cases, alluvial gold deposits do not require liberation, because gold already occurs as free gold particles such as nuggets.

In a typical alluvial gold mining process, physical separation methods such as screening and gravity separation are employed to separate the gold from the mineral fraction. This process involves separating particles of greater specific gravity i.e., gold from soils or gravel by washing in a pan with water, Figure 2.2. As such, the process is highly dependent on water availability. Gold panning is relatively slow and inefficient with the recovery rate as low as 10 percent with 90 percent of the fine particles of gold being left in the rubble.



Figure 2. 2: Gold processing in the riverbed

Source: BBT and Partners



Figure 2. 3: Mining on site A

Source: BBT and Partners



Figure 2. 4: Processing and Extraction at one of the mechanised mines Source: ZEMA, 2018

2.3.2 The Extraction and Processing of Lode Gold

This type of gold is extracted by blasting the solid rock using explosives. The blasted material is mined and taken for crushing using Jaw Crushers and fed into the Wet Pan Mills where mercury is added to increase the recovery of gold. This is a typical whole ore amalgamation process which has been widely reported to be a poor practice method for gold extraction; nonetheless, it's a wide spread act used to extract gold by ASG miners in Zambia. The concentrate is further processed to separate amalgam using panning dishes while excess mercury is released through the mill discharge launders for collection and reuse then the remainder is lost into the environment. Sometimes the rock type, or “reef gold”, is manually crushed and then ground using rudimentary ball mills. This is done in order to liberate the gold before processing it on the improvised sluice boxes locally referred to as James Tables, Figure 2.5.



Figure 2. 5: Improved Sluice Boxes

2.4 Baseline Estimates of the amount of Mercury used in ASGM

Mercury use was reported in the formal ASGM sector while its use in the informal sector largely remains undocumented. Although mercury use remains largely undocumented in the informal ASGM sector, its use in the sector was apparent due to the presence of instruments such as melting pans, retorts and other rudimentary equipment for gold recovery using mercury. This was the case for such ASGM sites as Mumbwa, Rufunsa, Vubwi and Lundazi. The lack of documentation on use of mercury onsite was mainly due to the secretive nature of mercury trade in the informal sector. Considering the foregoing, the mercury gold ratio could not be determined, resulting in inability to calculate the amount of mercury used per annum.

Mercury use in the formal sector was confirmed through interviews, observations and the use of X-ray Florescence (XRF) Spectrometer machine. Based on the information availed and using the UNEP ASGM Toolkit, 285.66 Kg of mercury was used to recover about 142.83 kg of gold representing a 2:1 mercury to gold a ratio. This falls outside the estimated mercury to

gold ratio using the Whole-ore amalgamation approach as presented in the UNEP guidance document.

The actual calculation for estimating mercury use in the ASGM sector was conducted using the UNEP AGC Toolkit (2017) for mercury inventories. The calculations are presented in Annex 1.

2.5 Legal and Regulatory Status

Various policies and pieces of legislation with a bearing on ASGM are in place and these include the Vision 2030, 7th National Development Plan, Mineral Resources Development Policy, National Policy on Environment, National Trade Policy, the Mines and Minerals Development Act No. 11 of 2015 (MMDA) and the Environmental Management Act No. 12 of 2011 (EMA).

The legal framework, under the MMDA covers various interests in the mining industry including Gold Panning, Artisanal and Small-Scale mining in general. The overarching objective of the existing regulatory framework is inclusive of ASGM, specifically the requirement to create an environment in which small-scale exploration, mining and value addition industries operate efficiently and profitably to ensure effective contribution to economic development and wealth creation. The regulatory framework further seeks to develop the small-scale mining sector to encourage the use of appropriate, affordable and safe-technologies as well as build capacities in regional mining offices to enhance their service delivery.

However, the existing regulatory framework, even though adequate to address ASGM, does not provide for the formalisation or specifically regulate ASGM as a sector. This challenge was prominently highlighted in interaction with informal small-scale miners in Zambia during the baseline study. The informal miners stated that they lacked sufficient funds to apply for licences relating to ASGM. It was revealed that for ASGM players interested in gold mining, where excavations are made, the youths or cooperatives are advised to consider acquiring a mining license (Artisanal Mining right - AMR or Small-Scale Mining License - SML). AMR has a non-refundable application fee of K900 while that for SML is K4, 500. AMR is solely issued to Zambian citizens and cooperatives while SML is available only to companies where a minimum of 5% shareholding belongs to Zambians. A Tax Clearance Certificate from ZRA, a certified copy of NRC/Passport, a positive Decision Letter from

ZEMA, an Environmental Project Brief (EPB) and a programme of intended mining operations are to be submitted upon application for an AMR. For a SML, a Tax Clearance Certificate from ZRA, certified copies of National Registration Card (NRC)/Passport of Directors of the company, Patents and Companies Registration Agency (PACRA) documentation, positive Decision Letter from ZEMA, an Environmental Project Brief (EPB), proposal for promotion of local business development, proposal for employment and training of Zambian citizens, and an extensive programme of intended mining operations should accompany the application. It is important to note that a SML cannot be granted prior to one possessing a Small-Scale Exploration License. However, an AMR needs no prior license as possession of it grants one to both explore and mine.

In the case where the youths or cooperatives want to pursue gold panning operations, which involve the collection of alluvial gold deposits from stream or river beds and does not permit any excavation works, the acquisition of a Gold Panning Certificate is K150 for a renewable period of two (2) years. To apply for this certificate, a Tax Clearance Certificate from ZRA, a certified copy of NRC/Passport, an Environmental Commitment Plan and a programme of intended panning operations by the applicant are to be submitted. Also, the area of interest should be independent/ free of any underlying mining or non-mining right. Gold Panning Certificates are only issued to indigenous Zambians and cooperatives consisting entirely of Zambian citizens.

The miners further stated that another barrier to formalisation was the fact that most Artisanal and Small-Scale Gold Miners do not own the areas of mining operations because their potential areas of interest fall in licensed tenements. Further, where a small-scale miner actually owns the area in which to conduct ASGM, the barrier presented is on the collection or picking of geographical coordinates for the application process. This is too costly and most small-scale miners cannot afford it. Other barriers to formalisation are lack of Tax Payer Identification Numbers (TPIN) which are necessary for obtaining a mining licence as most informal ASGM players have no bank accounts.

In light of the challenges above, the majority of the ASGM sites are informal and unlicensed. There are three main types of licences in ASGM in the country namely Artisanal, Small Scale, and Gold Panning Certificate. At the time of the baseline study, there were 151 artisanal licences, 93 small scale and 161 Gold Panning Certificates issued. The country also had 13 cooperatives with cooperative gold mining certificates.

At international level, Zambia is Party to a number of Conventions that have a bearing on the ASGM sector and these include the Minamata Convention on Mercury, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and Rotterdam Convention.

Concerning the institutional framework, there are a number of Government ministries, private institutions and cooperating partners that play a role in the management of the ASGM sector in Zambia. The key Government institutions are the Ministry responsible for Mines and Minerals Development and ZEMA.

2.6 Leadership and Organization of ASGM at National and Local Levels

The leadership and organisation structure of the ASGM sector is highly informal. However, there are voluntary associations such as the Federation of Small-Scale Miners Association of Zambia (FSSMZ) and the Association of Zambian Women in Mining (AZWIM) that seek to ensure the wellbeing of small-scale miners. At community level, there is some form of organised leadership structure as most ASGM activities occur in areas governed by traditional leadership.

2.7 Mercury Trade and Demand

Mercury trade among ASGM miners has been necessitated by the low recovery rate of gold arising from the rudimentary methods of processing. Therefore, mercury is added to the ore in order to increase the quantity of gold recovered. Mercury users interviewed during the baseline study reported that the mercury was manufactured and/or purified in South Africa and smuggled in the country through Malawi, Mozambique, Tanzania and Zimbabwe. At the ASGM site, mercury was being sold at a cost of US\$ 250 to 350 per flask (1 flask is equivalent to about 35kg) and sometimes exchanged with gold.

2.8 Economic Aspects

The emergence of SSM in Zambia was driven largely by the concurrence of rising levels of poverty and unemployment due to poor economic policies and the opening up of the mining industry to the private sector after the introduction of economic reforms in 1991.

A pilot study on Supply Chains in ASM in the Great Lakes Region, observed that the economic characteristics of the ASM in Zambia limited the potential of the sector to

contribute to the country's economic development (ICGLR, 2015). This is similar to the findings of the Baseline Estimate study which revealed that there were relatively low earnings in the sector estimated at 6 percent Mineral Royalty Tax (MRT). ASGM is largely informal and unlicensed but supports livelihoods in the country. However, its contribution to mineral production and national economy largely remains undocumented by official statistics.

Considering the fact that mining is deemed to be high risk even at large scale level, access to any form of financing by the formal ASGM miners still remains a challenge due to the following factors:

- i. Lack of bankable geological information to provide to financial institutions;
- ii. Lack of understanding (on the part of financing institutions) of the dynamics of the ASGM sector and its potential since it is fairly novel in Zambia;
- iii. Lack of developed market linkages for the gold subsector;
- iv. Scepticism from financial institutions to provide any form of credit due to the high risk and informality of the ASGM sector;
- v. Interest rates from local banks may be higher than ASGMs margin on gold sales;
- vi. Financial illiteracy among the ASGM; and,
- vii. Lack of proven financial accounts and traditional form of collateral by ASGMs.

In 2016, a scoping study conducted in Rufunsa, Vubwi and Luano to assess the practical and economic viability of government involvement in the purchase of the gold, and since then, MTCI and MMMD have been looking at ways in which sanity and structures can be brought to the ASGM sector in Zambia.

The two ministries in collaboration with ZCCM Investments Holdings (ZCCM-IH) sought to group the miners in their respective communities into registered Cooperatives who would in turn formalize their operations by obtaining panning certificates for the Cooperative. Once the cooperatives are registered and licensed, ZCCM-IH leases gold panning equipment to the Cooperatives who in turn use the equipment to produce gold. Under this arrangement the Cooperatives are not charged any fees for use of the equipment however, the cooperative is required to sell all the gold produced to ZCCM-IH. This is an initiative that if implemented successfully could significantly improve access to investment for the ASGM sector in Zambia. Aside from this, other formal lending institutions are usually not interested in

funding ASGM (whether formal or informal) due to the general lack of understanding of the sector. Additionally, another aspect affecting lack of financing is that due to lack of geological data that characterizes the ASGM sector, commercial lending institutions view the sector as highly risky as stated earlier.

Despite the various economic considerations, an important observation in the ASGM is the lack of economic development in the areas where ASGM activities occur. This is mainly attributable to the hand-to-mouth nature of the gold panning activities. ASGM (including the formalized ones) generally struggle to access financial services from the formal markets and instead resort to dealing with unscrupulous middle men who visit the gold panning areas and offer them short term financing in exchange for low prices for their gold.

2.9 Demographic and Social Information

The ASGM sector is mainly dominated by men with women and children participating to a lesser extent. The baseline estimate report revealed that there were approximately 30,000 miners engaged in ASGM activities of which 77 percent were male, 18 percent female and 5 percent children (Figure 2.6). Research has shown that the participation of women in artisanal gold mining varied depending on beliefs from nationals of different countries as well as local communities. In Zambia, women are involved in the artisanal and small-scale mining activities particularly in the crushing of the ore and panning operations. However, the role of women is not limited to mining activities but also extends to the supply of food, tools and equipment and sex services. The reported sex services could have exposed the communities to sexually transmitted diseases, including HIV/AIDS. The study further revealed that due to the limited social amenities, women and children were subjected to gender-based violence in the sites visited.

Women in Zambia are among the marginalized groups hence face challenges socially and economically. These challenges range from limited opportunities to inequalities both in the formal and informal sectors. Low literacy levels coupled with societal demands and expectations from women inhibit the majority of them from competing for certain jobs with men. This is also due to opportunity inequalities where certain jobs are reserved for men. This scenario is also prevalent in the ASGM sector where women are biologically inhibited from doing certain jobs within the sector. As a result of this, women in the ASGM sector are

left to do the easier jobs and are thus more dispensable than men. In the ASGM sector, Gender Based Violence against women is also rife both at work and in the homes.

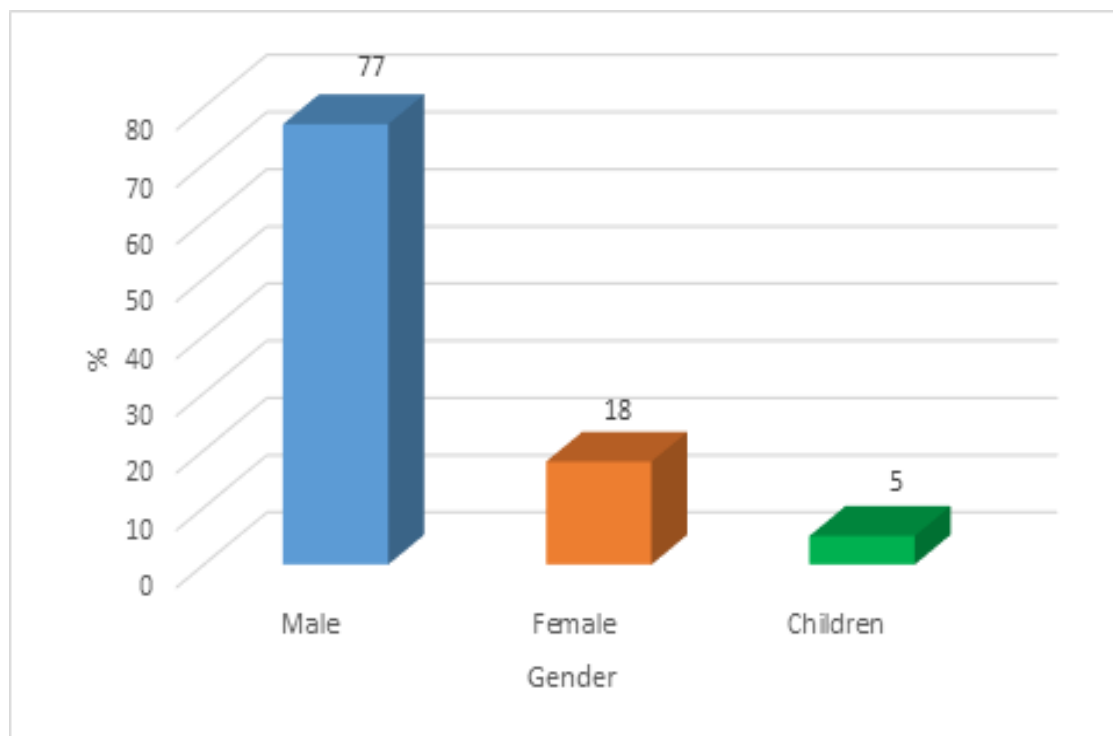


Figure 2. 6: Distribution of miners engaged in ASGM

In addition to the challenges highlighted above, women lack access to credit to boost their businesses due to lack of information and collateral. As such, there are limited numbers of women who have taken up opening of ASG mines on account of insufficient funds. Low literacy levels among women contribute to the low numbers of women in decision making positions in the ASGM sector. While women in formal employment receive equal wages as their male counterparts, those in the informal ASGM sector have to rely on their negotiation ability, which may at times result in sexual exploitation.

Women land rights in Zambia are governed by both law and custom. Although formal law such as the Constitution, Chapter 1 of the Laws of Zambia and the Lands Act, Chapter 184 of the Laws of Zambia supports property rights and prohibits gender-based discrimination, customary rules and practices often discriminate against women when it comes to access and control over land. The roles of children were largely to supply goods and services.

In addition, 88 percent of the miners were Zambian with Tanzanians, Malawians, Rwandese and Chinese forming the remaining 12 percent. The graph (Figure 2.7) shows the presentation of the distribution of the miners in the ASGM by nationality.

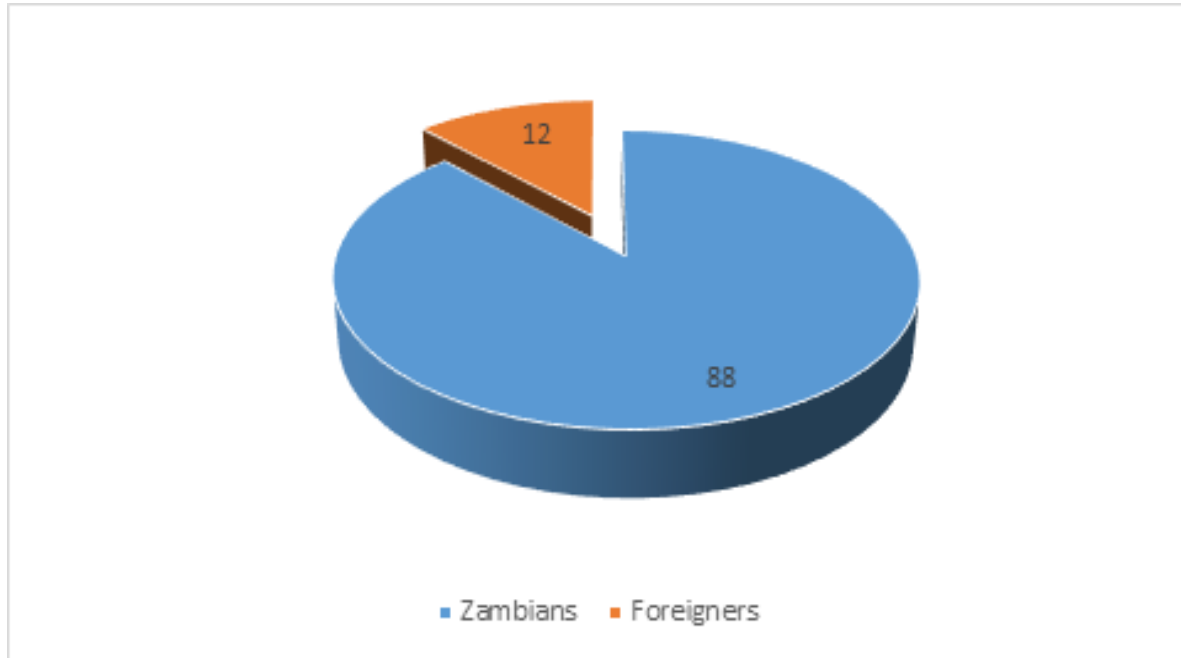


Figure 2. 7: Distribution of Miners engaged in ASGM by Nationality

The majority of miners at the ASGM sites had attained primary education with some having secondary and tertiary education. There were inadequate social services with regard to health and education provision in ASGM sites which consequently resulted in limited access to these services. In addition, it was observed that there was inadequate housing in most of the ASGM sites, with miners living in tents and temporary houses. In most areas, the biggest challenge was lack or limited availability of basic infrastructure, for provision of sanitation and potable water. This was due to the fact that the mining camps were constructed in a hurry, resulting in poor planning. Potable water was another social service that was scarce due to contamination and silting of the streams. The lack of potable water in the ASGM sites also contributed to the increased water borne diseases such as diarrhoea.

In Zambia currently there are no criminal activities formally recorded in the ASGM. The Technical report on the management of mercury in Zambia revealed that there were insufficient education awareness programmes on the effects of mercury on human health and the environment among the miners and communities surrounding the ASGM sites (ZEMA, 2014).

2.10 Environmental Information

The major adverse environmental impacts of ASGM activities include impacts associated with land, soils, flora and fauna, surface/groundwater, aquatic life and biodiversity. In the Baseline report, the environmental impacts identified were land degradation, deforestation, contamination of surface and groundwater, siltation of water bodies, water stagnation in abandoned mine pits, pollution from mercury use in gold amalgamation, and dust and noise pollution. These impacts correlate with studies done worldwide.

2.10.1 Impacts on Flora and Fauna

The baseline revealed that ASGM activities resulted in destruction and modification of the original landscape with resultant effect of loss of biodiversity and habitat. It was established that activities affected the overall functions of ecosystems. Further, the presence of mercury in the environment could have negatively impacted soil, water and flora and fauna. All alluvial gold mining activities were observed to be located in the perennial streams and riverbeds which would lead to siltation of streams and rivers. Additionally, ASGM activities near protected areas negatively impacted on wildlife population due to migration and poaching (Figure 2.8).

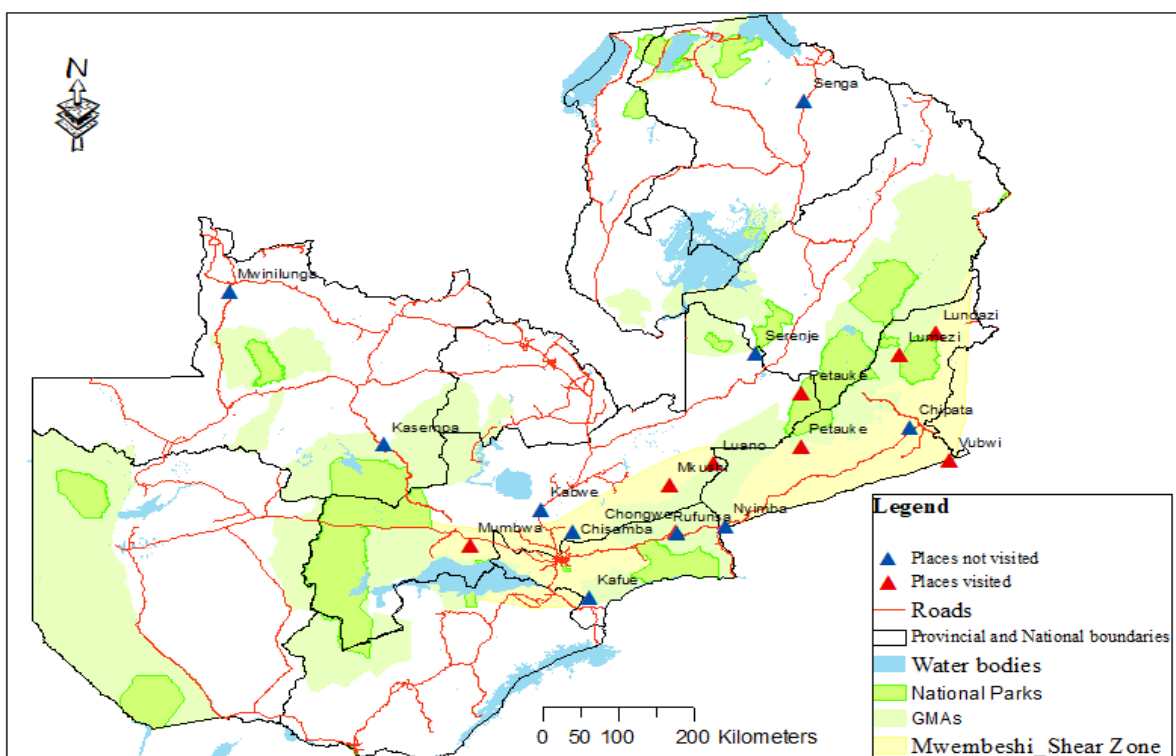


Figure 2. 8: Map of Protected Areas/ASGM Sites

2.10.2 Impact on Land and Soils

The environmental effects from ASGM activities included land degradation, abandoned pits, siltation and sedimentation of streams. The baseline estimate report revealed that the informal miners were not compelled to reclaim or rehabilitate the land once mining was complete. This situation is attributed to the fact that institutions that are mandated to regulate environmental matters relating to informal ASGM find it difficult to regulate them. The problem is more pronounced with artisanal miners due to the fact that they are not required to undertake an environmental impact assessment (EIA). On the other hand, the small-scale miners are required by law to undertake an EIA therefore, they are duty bound to implement the Environmental management plan which includes decommissioning activities such as rehabilitation of mining areas. In view of the fact that the majority of the gold miners are artisanal, mining activities are done haphazardly in the licence area.

The baseline report further revealed that abandoned pits in the visited sites eventually became traps for domestic and wild animals and breeding grounds for mosquitoes. The increased mosquito population may lead to high incidence of malaria, which in turn negatively affects the productivity of the miners.

In the case of trapped wild animals, depending on the size of the pits the animals may injure themselves or die. If the practice of non-rehabilitation of pits are unresolved it will lead into a decimation of wild animals around those areas which will ultimately affect tourism and the revenue that the government and the private sector operators realise from tourism.

ASGM has additional impacts such as loss of or degradation of arable land due to change of land use from agriculture to mining. The baseline study revealed that flat terrains such as Chenyenta, where land is amenable to both crop and livestock farming, arable land had been taken over by mining operations and mine waste disposal. The beneficiation processes employed in gold recovery results in the production of tailings both on land and in the river beds. The tailings dams formed results in land degradation and source of runoff containing an array of pollutants including mercury which cumulatively contributes to land degradation.

2.10.3 Impact on Surface and Groundwater

ASGM activities are normally conducted along perennial streams and seasonal water bodies. The study revealed that anthropogenic activities of ASGM had negative impacts on both

surface and groundwater. The major impacts include among others water pollution (discharge of effluent with high concentration of mercury, other heavy metals, and silt), destruction of aquatic life, disruption of the natural flow regime.

During the baseline study, a total of 47 sediments and water samples were collected from ASGM sites in Petauke, Lundazi, Chongwe, Vubwi, Mumbwa and Rufunsa areas. These samples were collected from areas in which extraction and processing of gold was conducted as well as from the resulting tailings dams. The samples were analysed using hand held XRF as well as laboratory analysis. From the analysis, three samples from Chongwe revealed the presence of mercury with values between 10 mg/l and 55 mg/l as shown in (Figure 2.9). The rest of the samples were below detection limits (Figure 2.10). Mercury presence in concentration detected as the risks presented are significant to cause impact on humans and the environment. The results obtained indicate that the levels of mercury are way above the acceptable limits as the maximum permissible limits for mercury in water is 0.001 mg/l according to the Zambian Standard (ZS ISO 5666).

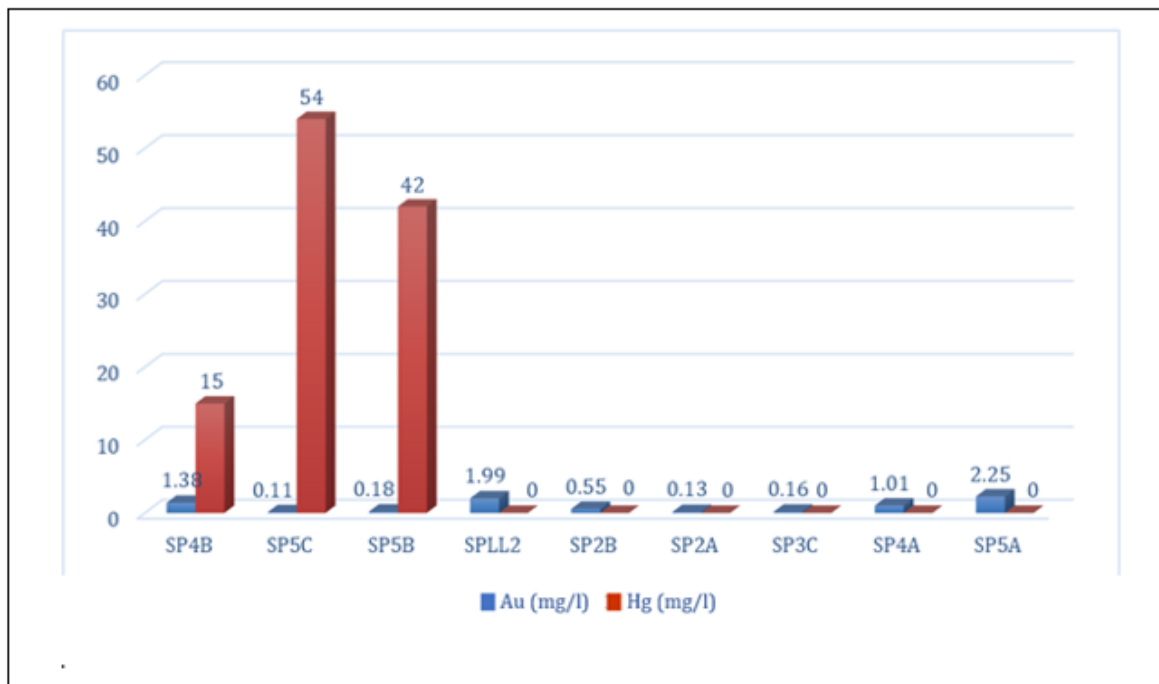


Figure 2. 9: Gold (Au) and Mercury (Hg) content from Formal ASGMs

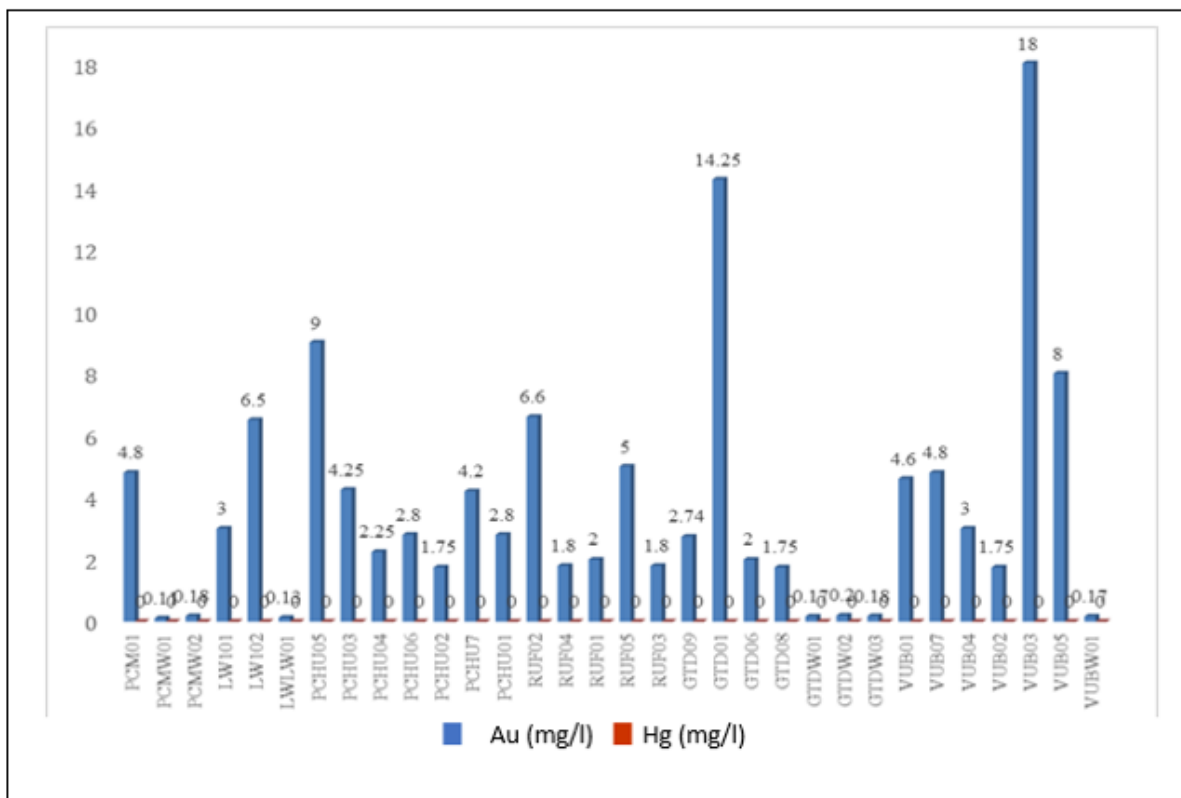


Figure 2. 10: Gold and Mercury content from Informal ASGMs

For instance, at Chumbwe mine, where mercury use was confirmed, and detected in the soils and the sediments in effluent channels around the processing area, the design of the plant at Chumbwe revealed that the effluent from the gold extraction process was being discharged into the Chibombe Stream, resulting in possible contamination of surface water and negative impacts on human health, animals and aquatic life. This is because the stream was used for fishing and as a source of water for crop irrigation and home use.

2.11 Health Information

ASGM activities have been known to affect human health. Identified health impacts associated with ASGM activities were musculoskeletal and hypertension. Communities were also exposed to sexually transmitted diseases such HIV/AIDS.

It was established through the institutional assessment conducted that access to health services in ASGM areas were generally limited. The study revealed that most health care facilities were not within the recommended radius of the 5 km as the nearest health facilities were located more than 10km away from the ASGM sites. The proximity to health facilities

resulted in miners having a low tendency of seeking medical attention from health facilities. It was also observed that seeking medical attention was considered a weakness which would deem a miner unfit for mining.

Findings on the health assessment of the ASGM sector revealed that none of the miners at the informal ASGM sites had Personal Protective Equipment (PPE) despite the hazardous nature of the activity. Additionally, it was discovered that women were exploited and exposed to hazards due to the nature of the work environment which does not provide necessary amenities including appropriate PPE. Lack of appropriate PPE made the miners more prone to mercury exposure and other hazards. Further, none of the visited sites had first aid equipment to attend to any form of emergencies that could have occurred within the ASGM sites.

The use of mercury presents significant occupational health risks arising from indoor air pollution during the ore amalgamation burning process in residential areas. Mercury vapour poisoning risks associated with these processes are well documented globally, consequently any use in Zambia will inadvertently result in neurological disorders, respiratory infections and other related ailments among ASGM miners involved in the amalgamation.

During the baseline study, interviews with some ASGM players revealed that indoor burning of amalgam in homes of ASGM areas was rife. However, due to the secretive nature of mercury use in the ASGM sector, an analysis to confirm the presence of mercury emanating from indoor burning of the amalgam was not done.

2.12 Towards Decision Making Process

The data collected has been instrumental in the formulation of strategies towards implementation of the NAP. The strategies, among other things are skewed towards creating awareness of the dangers of mercury to both the public as well as the leaders of the nation. This is aimed at enabling them make better decisions and policies as far as matters pertaining to mercury are concerned. Further, the data collected has provided the necessary baseline to enable Zambia undertake reduction measures from an informed perspective.

3.0 National Goal and Objectives

3.1 National Goal

To reduce, and where feasible, eliminate the use of mercury and mercury compounds in the ASGM sector in Zambia

3.2 Objectives

Objective1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25%% by 2030.

Objective 2: To increase the percentage of formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030.

Objective 3:

To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030.

Objective 4: To achieve 40% provision of health care services to ASGM players by implementing public health and Social Protection strategies aimed at improving health by 2030.

4.0 Implementation Strategy

The strategies and approaches towards achieving the set objectives stated above in line with each element of the NAP have been provided under each objective. The detailed actions necessary to implement the described strategies are further provided in the Work Plan section

Objective 1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030.

Mercury-dependent ASGM is the largest source of mercury pollution on Earth. In this practice, elemental mercury is used to extract gold from ore as an amalgam. This and many other practices have widely been reported to have toxic effects on human health and the environment. The worst practices stated in Annex C section 1(b) of the Minamata convention that have also been identified as worst practices in ASGM in Zambia include; whole-ore amalgamation, open burning of amalgam or processed amalgam, and burning of amalgam in residential. The focal target is that in the foreseeable future, the use of mercury in the ASGM sector should be curtailed; in as much as this may be the case, it is more realistic to gradually phase out mercury-based techniques for gold processing in the ASGM sector. Thus, there is the need to formulate pertinent strategies that can be employed with the intention of facilitating the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030.

The strategies under this objective address the following elements of the NAP:

- i. Actions to Eliminate Worst Practices*
- ii. Strategies for promoting the reduction of emissions, releases, and risks of exposure to mercury*

The strategies and their respective activities highlighted below are in line with the target of reaching out to 7,500 miners' country wide within the time frame of up to 2030.

4.1 Phased reduction and subsequent elimination of whole ore amalgamation practices

This strategy works towards the phased reduction and subsequent elimination of one of the worst practices in ASGM that is also widely practiced in Zambia namely whole ore amalgamation (WOA). In WOA, mercury is brought into contact with 100% of the ore

(‘whole ore’). WOA is regarded as a poor practice for a number of reasons some of which include:

- High mercury use. Usually, in WOA, mercury use ranges from high (4 parts mercury for each part gold recovered) to very high (20 parts mercury for every part gold or higher). In extreme cases, for example where ore is rich in silver, the ratio can be 50:1
- WOA is inefficient - it rarely captures more than 30% of the gold and results in major losses of mercury to tailings (waste material)
- Large amounts of mercury are lost to the tailings because the mechanical process produces tiny mercury droplets (“floured mercury”) that are too dispersed to capture. The result is mercury contaminated sites that are very difficult to clean up
 - a) Monitor adherence of ore concentration prior to amalgamation
 - b) Promote alternative methods to mercury-based gold processing methods

4.2 Sensitization programmes for key stakeholders on the environmental and health implications of burning of the amalgam in open-air environment as well as in residential settings

As aforementioned above, open burning of amalgam or processed amalgam, and burning of amalgam in residential areas has been categorized as a worst practice in ASGM. This act is also quite rife in Zambia’s ASGM. In the course of the open burning of the amalgam around the mining sites and residential areas, excessive amounts of mercury are liberated into the environment and consequently taken up by humans and organisms hence affecting their health. Mercury poisoning is a tremendous burden to human health, especially in ASGM communities thus the key stakeholders should be sensitized on the environmental and health implications of burning of the amalgam in open-air environment as well as in residential settings. The proposed relevant activities under this strategy include:

- a) Monitor adherence against open-air and residential burning of amalgam
- b) Enforce and promote alternative methods to gold processing

4.3 Undertake a follow-up detailed study to determine the quantities of mercury used and gold produced in all ASGM active sites

It is generally accepted that there is widespread use of mercury in the ASGM sector in Zambia. In spite of this, the extent of mercury application is not well known in terms of quantities used or manner of use in all the ASGM sites. The baseline study did conduct some investigation to determine the quantities of mercury used in selected ASGM active site in Zambia. It is therefore, justifiable that a detailed follow up study to the baseline would be a good opportunity to bridge that gap of knowledge. The proposed activities under this strategy are the following:

- a) Formation of coordination mechanism and hold coordination meetings
- b) Formulation of terms of reference for the multidisciplinary team to undertake a detailed study on mercury use and gold production in ASGM.
- c) Formation of a multidiscipline team to undertake study to quantify the amounts of mercury used and gold produced.
- d) Site visits to quantify the amounts of mercury in use and gold produced in ASGM
- e) Validation of results of the study.

4.4 Promote use of equipment that captures mercury for reuse

There are a number of well-established methods/measures that have been employed in the ASGM sector that have proven to considerably abate mercury emissions, releases and risks of exposures to mercury. In the Zambian context, while it is ideal to move to non-mercury processing and refining, it is often a realistic initial step to reduce mercury use or its emission first. This can help set the stage to move to mercury free practices over time. There are short-term and long-term measures. In as much as it is desirable that in the long run mercury use in ASGM is brought to an end, the short-term measures can be implemented even before the longer-term transition to lower-mercury and mercury free technologies. This is where extensive introduction and promotion of equipment that capture mercury during gold processing comes in. Quite also relevant is the need to continually ascertain mercury contamination in surroundings where the equipment is in use as well as bio-monitoring of the levels of mercury in those individuals operating the equipment. The activities under this strategy include:

- a) Set up pilots of centralized station equipped with mercury amalgam retorts for burning of the amalgam;
- b) Acquisition and installation of mercury testers at the centralized stations.

4.5 Prohibit any mercury or cyanide-based gold processing techniques within 100 meters of a natural water body including rivers, streams and lakes

Processing of gold from its ore using mercury in close proximity to natural water bodies has been observed in certain active ASGM sites in Zambia. These acts have consequential effects on the concentration of mercury in water bodies. While the human cost of mercury poisoning in ASGM is the most important and immediate concern, mercury pollution also damages the wider ecosystem—compromising food chains and biodiversity. The mercury used in ASGM sector near water bodies ends up contaminating them consequently finding its way into aquatic organisms including fish. It is common for the people living near these ASGM areas to eat fish as a major source of dietary protein, which leads to high mercury levels even in non-miners. Prohibition of use of chemical-based gold processing including use of mercury, within 100 meters of a natural water body is thus, very necessary. In line with this statement, the suggested activity under this strategy is:

- a) Banning use of chemical-based gold processing within 100 meters of a natural water body;
- b) Continued monitoring contamination levels in rivers and other environmental sinks close to mercury processing sites.

4.6 Promote mercury free alternative methods in gold processing

The harmful effects of mercury poisoning in humans cannot be overemphasized. Introduction of non-mercury-based techniques as alternatives to mercury-based techniques is therefore, of considerable importance. The foremost intention for this NAP is that in the near future, the utilization of mercury in gold mining should come to a cessation. In this regard, a number of safer alternative methods other than the exclusive use of mercury should be recommended and introduced and to the ASGM sector in Zambia. The recommended activities aligning with this strategy include:

- a) Purchase of equipment and reagents for demonstration of alternative technologies;

- b) Encourage co-operatives leaders to spearhead technology acquisition and use of mercury free methods.

4.7 Potential health impacts associated with the introduction of alternatives sources of energy e.g., gensets

Energy use is central to human society and provides many benefits as well as health effects. The biggest health impacts accrue to the harvesting and burning of solid fuels, coal and biomass, mainly in the form of occupational health risks and household and general ambient air pollution (Smith *et al.*, 2013).

In the ASGM, generators are used as an alternate energy source. While this provides the energy needed at the sites, it has public health issues. Not only do they cause injury through direct mechanical and physical means, they also are a source of noise and air pollution. The air pollution is associated with asthma attacks as well as other respiratory infections. Other health and social impacts include hearing loss and silicosis, conditions generated by the blasting and drilling events with the resultant noise and dust, which have become irritants in mining sites (Basu *et al.*, 2015).

4.8 Comparison of the methods of gold production between the current method that uses mercury and the proposed alternatives with respect to effectiveness and health impacts

Table 4. 1: Comparative Analysis of Mercury and Borax on Human Health

| Health impacts | Mercury | Borax (proposed alternative) |
|------------------------|--|--|
| Toxicity | <p><i>Acute toxicity:</i> Acute mercury exposure can lead to tremors, memory loss, respiratory distress and even death</p> <p><i>Chronic toxicity:</i> Chronic exposure to mercury gas may lead to renal failure, tremors, movement disorders, and various psychosis and memory impairment</p> | <p><i>Acute toxicity:</i> Borax is not acutely toxic</p> <p><i>Chronic toxicity:</i> Reproductive and developmental toxicity are the main concerns associated with chronic oral/ingestion exposure to boric acid</p> |
| Carcinogenicity | Inorganic mercury and methylmercury are not likely to cause cancer in humans | Not yet classified borax with respect to human carcinogenicity. There currently is no human evidence of carcinogenicity and the sparse animal literature shows no effect. |
| Reproductive | Children and unborn fetuses who are exposed in the womb are at high risk for mercury | No clear evidence of male reproductive effects attributable to |

| | | |
|-------------------------------------|--|---|
| | exposure and neurodevelopmental effects Mercury exposures can cause miscarriages, respiratory failure, psychotic reactions, cardiovascular disease and death, with pregnant women | boron in studies of highly exposed workers |
| Neurological Disorders | Studies have shown increased deep tendon reflexes, poor leg coordination, decreased performance on visuospatial organization tests, and reduction in motor function, attention, visual contrast sensitivity and manual dexterity | Improves neurological outcome |
| Occupational Health Exposure | inhalation of mercury vapours during work might be the most important exposure pathway, other exposures such as skin contact or contaminated food or water were not excluded | Inhalation is the primary route of exposure and not absorbed across intact skin unless through damaged skin |
| General Health Risk in ASGM | Exposure to high levels of elemental mercury has been associated with kidney effects | No studies exist of borax exposure levels or adverse health outcomes in ASGM |
| Bioaccumulation | bioaccumulate in the body of animals, or increase in concentration over time | Does not bioaccumulate in the body |

Sources: (Gibb *et al.*, 2014; Esdaile and Chalker, 2018; ScD and DrPH, 2013; Appel and Na-Oy, 2012)

4.9 Alternative methods of gold extraction using mercury amalgamation and remedies to mercury nuisance

Mercury is widely used by ASGMs to concentrate and recover gold through amalgamation. The common practice by many ASGMs is whole ore amalgamation which is (1) inefficient, (2) uses a lot of mercury per gram of gold produced, and (3) produces huge amount of mercury contaminated wastes. Proposed alternative method to whole ore amalgamation is the application of beneficiation (i.e., crushing, grinding and concentration) before amalgamation. Gold concentration methods that can be accessed by ASGMs are (in increasing order of complexity and cost) sluicing, magnets, spirals, vortexes, centrifuges, shaking tables, and flotation. The comparison and advantages of beneficiation before amalgamation to whole ore amalgamation are presented in Table 4.2 (Hinton *et al.*, 2003; Stoffersen *et al.*, 2019). For concentration methods that need electrical energy input, generators or better still clean and green energy source like solar energy can be used.

To drive off mercury from amalgam, retort furnaces, where product fumes are directed and treated, is proposed instead of open burning practiced by most ASGMs. Beneficiation of gold ore and the use of retort furnaces to heat and drive off mercury from amalgam reduce mercury use to around 1 part per 20 parts of gold produced with over 95% mercury recycling efficiency. The source of energy for heating amalgam may include bioenergy (i.e., biomass fuel, biofuel, or biogas).

Use of mercury for amalgamation of gold from gold concentrate can be completely eliminated with the use of the proposed non-mercury method Borax (sodium borate), which is environmentally benign. The comparison of borax to mercury amalgamation is presented in Table 4.3 (Appel and Jønsson, 2010; Council and Programme, 2012; Davies, 2014; Stoffersen et al., 2019). Similarly, the source of energy for heating may include bioenergy.

Leaching is recommended for gold ores that contain very fine particles (e.g., quartz gold vein) and gold sulphides that are not amenable to treatment by gravity concentration and amalgamation. Non-cyanide lixivants (solutions) that are environmentally friendly such as deep eutectic solvent (DES) ionic liquids (Jenkin *et al.*, 2016), thiosulphate solution, and halides among others (Hilson and Monhemius, 2006; Vieira, 2006) should be used to leach gold from concentrate. Recovery of gold from pregnant leach solution may include chemical precipitation (e.g., use of oxalic acid, sodium metabisulfite, sodium nitrate) or reductive precipitation (e.g., using zero-valent zinc and zero-valent aluminium (bar or powder)).

Table 4. 2: Comparison of whole ore amalgamation to beneficiation before amalgamation by ASGMs

| | Whole ore amalgamation | Beneficiation before amalgamation |
|---|--|---|
| Amount of mercury | Mercury use per part of gold ranges from 20:1 to 4:1. | Beneficiation (concentration) may result in reduction of mercury consumption to around 1 part per 1 part of gold. |
| Contaminated waste generated | Huge amount of waste contaminated with mercury are generated. | Very minimal and manageable mercury contaminated wastes are generated. |
| Possibility of mercury recycling | High loss of mercury to the waste material. Around 20–30% added mercury is lost to wastes. | Most of the added mercury ends up in amalgam hence recycling rate of mercury (i.e., using retort furnaces) can be as high as 95%. |

Table 4. 3: Comparison of Borax to mercury amalgamation for gold recovery by ASGMs

| Borax | Mercury amalgamation |
|--|---|
| Environmentally benign. | Toxic element to humans and negatively affects the ecosystem. |
| Readily available and cheaper than mercury | Relatively expensive and mostly sold to ASGMs secretly. |
| Produces purer gold than mercury amalgamation. | Produces impure gold with trapped mercury as high as 10 wt%. |
| Lowers the melting point of gold hence primitive heat source can be used to melt gold. | Does not affect the melting point of the amalgam. |
| Can work only when the gold concentration is around and above 90 wt% | Can be used to concentrate gold from whole ore. |
| Recovery efficiency is 40% higher than mercury amalgamation | Recovery of gold is lower than Borax. |

4.10 Promote field research on impacts of mercury and its compounds on miners and their families and especially children, women and pregnant women from exposure to mercury

In the ASGM sector in Zambia, there is pervasive unawareness of the detrimental effects mercury has on human health. It is for this reason that many of the above-mentioned worst practices are prevalent in this sector. It is essential that research is conducted to ascertain the impacts of mercury and its compounds on primary key-players in Zambia’s ASGM sector and raise awareness on the known impacts of mercury and its compounds on human health and the environment. Hence, there is relevance in promoting field research on impacts of mercury and its compounds on miners and their families especially children, women and pregnant women who are regarded as the most vulnerable population, to exposure mercury. Under this strategy, the following activities have been recommended:

- a) Conduct research on site specific exposure route and fate of mercury (soil, air, water, sediment, and biota);
- b) Conduct research on mercury presence in human matrices (blood, breast milk, tissue, hair, urine);
- c) Undertake a national detailed study on the participation of women in the ASGM to determine their involvement and exposures to mercury and its compounds;

- d) Conduct health impact assessments of ASG miners and vulnerable population which shall be for direct and indirect impacts arising from ASGM activities;
- e) Conduct environmental monitoring of contaminated areas in ASGM sites and the surrounding communities;
- f) Strengthen laboratory capacity to undertake environmental and human biometrics analysis.

4.11 Management of ASGM Gold ore Processing Tailings/Waste

Several cases of environmental degradation due to AGS operations in mining sites have widely been reported; the status of the environment during and after gold processing leaves much to be desired. This is the main difference between the large-scale formal gold mining sector and the ASGM sector. The ASGM generally does not practice good waste management or do so using substandard practices leading to contaminated sites. From the baseline study, it was noted that there was no management system put in place to handle any waste arising from the processing of gold where large amounts of mercury are utilized. The solid waste generated from ASGM, with high mercury and gold contents, therefore, may be found in several active gold mining sites. The mercury-laden tailings in ASGM are one of the more challenging problems for remediation. Nonetheless, measures can be put in place to address further soil contamination in ASGM sites. Consistent with this assertion, the activities proposed under this strategy are:

- a) Sampling and analysis of tailings in active mining sites to ascertain levels of mercury contamination

Objective 2: To increase the percentage of the formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030.

The strategies related to this objective address the following elements of the NAP:

- i. Steps to facilitate formalization or regulation
- ii. Strategies for managing trade and preventing diversion of mercury and mercury compounds

The following are the proposed strategies to be implemented under this objective:

4.12 Delineate Land for ASGM

This strategy seeks to ensure that ASGM players have a designated area in which to conduct ASGM activities. This is vital as currently, many informal ASGM players have been unable to formalise their mining activities due to the fact that the areas in which they intend to conduct ASGM already sit on large scale mining licences or on the title of another person. Delineating land for ASGM will thus enhance the formalisation process as the barrier of lack of an authorised area to conduct ASGM activities will be eliminated. The strategy will be achieved through the concerted efforts of the Ministry of Mines and Minerals Development (MMMD), Ministry of Lands and Natural Resources (MLNR) and the Ministry of Water Development, Environment and Sanitation Protection (MWDSEP). The planned activities under this strategy are to-

- a) Conduct detailed geological survey in all gold mineralised areas in the country;
- b) Allocate areas of operations in gold occurrence districts to ASGM individuals and cooperatives;
- c) Identify and isolate protected and ecologically sensitive areas from ASGM activities; and,
- d) Develop conservation value maps

4.13 Facilitate Formation of Miners' Organizations

This strategy aims at ensuring widespread formalisation of ASGM through the creation of ASGM cooperatives. It is the desire of the strategy that the cooperatives will result in improved coordination of ASGM activities, reduce illegal mining and processing, improve household incomes and increase the participation of women and youth in ASGM activities. Formation of miners' organisations will make this possible as each organisation will have registered ASGM miners under it and will be answerable to the government for the manner in which ASGM activities are being conducted. As currently there are already 13 cooperatives that exist, the aim is to increase the number of ASGM cooperatives to 40 which will translate into 4 cooperatives per province. The Ministry of Commerce, Trade and Industry (MCTI) will be instrumental in the implementation of this strategy. The planned activities under this strategy are to-

- a) Establish 40 viable ASGM cooperatives;

- b) Provide training on governance and business administration, mining technical services to ASGM cooperatives;
- c) Establish a national association of ASGM miners with the support of the ministry responsible for mining; and,
- d) Organize and facilitate participation of ASGM players in regional and international workshops/conferences/exhibitions on ASGM activities

4.14 License and Regulate ASGM

This strategy seeks to ensure the formalisation of ASGM activities through issuance of licences to ASGM players as well as their mining rights. An essential part of this strategy involves examining possible weaknesses in the legislative or policy system relating to ASGM and rectifying the weaknesses identified. The MMMD will play a leading role in this strategy. The planned activities under this strategy are to:

- a) Review and strengthen the regulatory framework to address possible gaps, barriers and inconsistencies in provisions relating to formalisation of ASGM;
- b) Facilitate the issuance of mining and non-mining rights related to ASGM activities; and,
- c) Facilitate the issuance of environmental clearance to ASGM activities.

4.15 Organize the Supply Chain

This strategy seeks to enhance formalisation by establishing a comprehensive supply chain of players in the trade of ASGM as well as providing tax incentives to ASGM players. The strategy will attract more ASGM players to formalise as they will have an opportunity to participate in legal export of gold as well as provide a favourable tax regime for ASGM players. MMMD will play a leading role in the implementation of this strategy. The planned activities under this strategy are to:

- a) Register at least 50% of national gold exports by Customs;
- b) Review and implement favourable tax regime specific to ASGM; and,
- c) Establish an independent national assayer for ASGM gold trade and exports.

4.16 Facilitate access to Finance, Markets, and Services

This strategy seeks to ensure formalisation by introducing measures that will enable formalised ASGM players to be financially secure. The key player in this strategy is the Ministry of Finance (MoF). The planned activities under this strategy are to:

- i. Facilitate 40 ASGM cooperatives to open bank and/or mobile accounts;
- ii. Facilitate the establishment of savings and loans groups in ASGM communities;
- iii. Receive training in financial literacy including at least 40% participation of women;
- iv. Encourage financial institutions (including corporate, stock markets and development banks) to come up with tailor made financial instruments for accessibility to ASGM miners;
- v. Establish market and trading centres for gold and other precious minerals including gem stones;
- vi. Standardise a uniform gold price pegged against the LBMA/LME spot prices;
- vii. Facilitate establishment of value addition linkages downstream in the gold value chain; and
- viii. Facilitate setting-up of localised small refineries/smelting furnaces with capacity of not less than 50 kilograms of gold processing per day, in areas of gold mineralisation.

4.17 Monitor, Evaluate and Enforce ASGM Regulations

This strategy seeks to enhance formalisation by introducing mechanisms that will improve evaluation and monitoring of ASGM regulations so as to better enforce them against defaulting ASGM payers. A key legal requirement for conducting ASGM activities is that one must have the necessary licence. Hence, the strategy will compel informal ASGM players to formalise. The key institutions in this strategy are MMMD and ZEMA. The planned activities under this strategy are to:

- a) Establish local mining district offices and provincial bureaus to effectively monitor and enforce compliance;
- b) Evaluate the effectiveness and efficiency of local mining district offices and provincial bureaus in enhancing compliance; Strengthen existing regional mining bureaus to effectively monitor and enforce compliance;

- c) Strengthen the capacity of institutions to enforce breach of ASGM related obligations; and,
- d) Evaluate the effectiveness of ASGM compliance to mining and environmental regulations in all gold mineralised areas.

4.18 Manage Mercury Trade and Mercury Compounds

This strategy aims to strengthen laws and regulations regarding mercury, including its domestic use and treatment as well as to domesticate international agreements relevant to the regulation of mercury trade. The strategy will result in enhanced compliance to mercury trade regulations by ASGM players as the laws relating to mercury trade will provide sanctions for defaulting parties. A key legal provision as far as mercury trade is concerned is that a trader must have a licence from ZEMA. As such, this strategy will be essential in the formalisation of ASGM. ZEMA is the institution that will be key in implementing this strategy. The planned activities under this strategy are to:

- a) Review and implement domestic laws and regulations regarding mercury, including its domestic use and treatment, as well as its trade internationally;
- b) Take an inventory of “pressure points” or other factors that will affect mercury trade;
- c) Monitor mercury trade flows across borders and within the country; and
- d) Identify the sources of illegal mercury imports, including the existing or likely mercury entry points into the country, and the distribution networks within the country.

4.19 Prevent diversion of mercury and mercury compounds from being used in ASGM

This strategy seeks to ensure formalisation of the ASGM sector through registration of local mercury traders as well as registration of permits issued for the importation of mercury and mercury compounds. The strategy will also provide for punitive measures on ASGM players that fail to adhere to the aims of the strategy. ZEMA will be key in implementing the strategy. The planned activities under the strategy are to:

- a) Develop licensing requirements for mercury traders and/or large mercury sales;
- b) Restrict the issuance of permits for the importation of mercury and mercury compound; and

- c) Undertake regular site inspections to trace the source of mercury used on ASGM areas of operations.

4.20 Cross-cutting Issues

This strategy aims to enhance the formalisation of the ASGM sector by introducing services that will be beneficial to players in the ASGM sector as an incentive to formalise. The key institution in this strategy is the Ministry of Housing and Infrastructure Development (MIHD). The planned activities under this strategy are to:

- a) Establish ASGM desks in institutions relevant to ASGM activities. ASGM desks are points of contact in various relevant institutions at which the agenda of formalisation of ASGM through that institution will be the primary object.; and
- b) Build infrastructure (roads, communication, hospitals, security) in all gold mineralised areas.

Objective 3: To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030.

This objective draws strategies in accordance with Article 7 of the Minamata Convention to address the following elements:

- i. Strategies for involving stakeholders; and
- ii. Strategies for providing information to ASGM and affected communities.

Strategies for achieving this objective with respective activities are noted below:

4.21 Create coordinating structures for the implementation of the ASGM activities

This strategy will focus on the establishment and operationalization of accountable coordinating structures in the bid to ensure the optimal implementation of ASGM related activities. Membership will be drawn from various relevant line ministries and private sector organisations such as Ministry of Mines and Mineral Development (MMD), Ministry of Health (MOH), Ministry of Community Development and Social Services (MCDS), Ministry of Land and Natural Resources (MLNR) Academia, NGOs, Small-scale miners' associations etc. The Advisory Council on ASGM and Technical Committee will be established based on

the current technical working groups. For purposes of effectiveness, the technical committee could be divided into appropriate subcommittees depending on expertise/responsibilities. The TORs and procedures for efficient management will also be developed. Membership will be through institutional nomination or assignment in line with established line ministries/institutional guidelines or work policies rather than obligatory recruitments which may tend to be unsustainable in the long run. Ministry of Mines and Natural Resources will be lead line ministry under the stewardship of the Zambia Environmental Management Agency (ZEMA).

Additionally, the strategy recognizes the need for strengthening capacities of the Council members and other stakeholders as well as physical resources of relevant line ministries/institutions. To this effect, a series of capacity building activities including Trainer of Trainers workshops and orientation workshops will be organised to provide central and local government with knowledge and skills necessary for enforcement of ASGM related activities. Development of guidelines and training manuals will be done for use in trainings and workshops. Technical support will be required from cooperating partners to ensure implementation of activities under this strategy.

Below are the activities under this strategy.

- a) Conduct workshop to identify and orient relevant stakeholders on their role/involvement;
- b) Conduct a national capacity building meeting for stakeholders on the implementation of ASGM activities; and
- c) Conduct workshop to develop stakeholder coordination guidelines.

4.22 Develop and implement awareness strategies on the dangers of mercury use, emerging good practices and formalisation in order to provide a balanced narrative on ASGMs potential contribution to national development

This strategy asserts the importance of a strategic communication process in the implementation of the NAP. The focus will be on dissemination of a variety of knowledge/information through the involvement and collaboration among civil society organisations, sector associations, line ministries, community leaders and ASGM miners. The aim is to organize and promote awareness events that would positively influence attitude and behavioural change among of ASGM participants and communities. The strategy will work

to develop web-based platforms about ASGM activities such as forums, knowledge bases, social networks and content websites besides using already existing websites under MMMD and ZEMA. This will ensure involvement, collaboration and continuous information flow among ASGM communities, government institutions, sector associations, cooperating partners and other stakeholders including vulnerable groups. Communication specialists will be engaged to produce IEC materials for print (brochures, booklets, newsletters etc.), broadcast (radio and TV), online and social media and performing arts (drama/sketches, plays, music etc.). Collaborations with various community radio stations, media organisations and the National Broadcasting Corporation will be cardinal in disseminating information and raising community awareness on ASGM activities and the impact of mercury on human health and the environment. Furthermore, community forums, workshops, meetings, community outreach and advocacy campaigns through the use of performing arts will also be included in the communication strategy. The activities for the strategy are as follows:

- a) Develop a communication strategy in line with the NAP objectives and strategies;
- b) Develop and produce Information, Education and Communication materials for print (brochures, booklets, newsletters etc.), broadcast (radio and TV), online and social media and performing arts (drama/sketches, plays, music etc.); and
- c) Disseminate information, education and communication materials including those targeting the vulnerable population – use different community radio stations, national television, online/social media platforms as well as Community outreach and advocacy campaigns.

Objective 4: To achieve 40% provision of health care services to ASGM players by implementing public health and Social Protection strategies aimed at improving health by 2030.

The following strategies under this objective relate to strategies of the Article 7 of the Convention on:

- i. Public health; and
- ii. Prevention of vulnerable groups from exposure to mercury.

Strategies for achieving this objective with respective activities are noted below:

4.23 Institutional Strengthening and Systems Building (ISSB) for regulators, line ministries and all key stakeholders in addressing impacts of mercury and its compounds

This strategy seeks to address institutional capacity challenges faced among stakeholders in addressing the impacts of mercury. The strategy is aimed at reducing the negative impacts of mercury and its compounds on human health. One of the key challenges identified was the inadequate and in certain instances, lack of access to health services in the ASGM sites. The implementation of this strategy will be integrated into the existing programmes under the National Health Policy (2012) and the National Health Strategic Plan (2017-2021). Institutional capacity shall be strengthened among the health care workers through capacity building programmes on early detection, diagnosis and treatment of mercury-related symptoms and illnesses. The following are the activities to be implemented under this strategy:

- a) Develop diagnosis and treatment protocols for mercury exposure;
- b) Integrate mercury and other neurotoxins in the health information system (develop data collection tools and indicators);
- c) Capacity building for health care workers in diagnosing and treating mercury poisoning; and
- d) Implement outreach programs to ASGM sites and the surrounding communities.

4.24 Establish and implement the monitoring plan for human exposure within the ASGM sites and the surrounding communities

The above strategy aims at protecting the vulnerable population particularly children and women of child-bearing age from exposure to mercury used in ASGM through regular tracking and detection of mercury. The results obtained from the monitoring will inform government on the conditions of human exposure at the ASGM sites and the surrounding communities to ensure informed decision and appropriate actions are taken. This will be implemented through the following:

- a) Development of a monitoring plan for human exposures; and
- b) Regular monitoring of humans for mercury and other toxic chemical poisoning for exposed miners and communities surrounding ASGM sites.

4.25 Strengthen the prevention measures in relation to exposure to mercury and its compounds among vulnerable populations, particularly children and women of child-bearing age, especially

The strategy focuses on the means of preventing vulnerable populations from exposure to mercury. It will address the vulnerabilities which cause people to be engaged in activities that expose them to mercury and its compound. This strategy will facilitate accessibility of the available livelihood and empowerment programmes to the vulnerable populations within their communities. It will be implemented through the following activities:

- a) Provide alternative livelihood and empowerment interventions to vulnerable populations;
- b) Create and facilitate a transition to viable alternatives livelihoods for ASGM miners;
- c) Counselling of parents and guardians on the importance of education so as to ensure that children go to school instead of engaging in ASG mining activities;
- d) Provision of child care services; and
- e) Provision of bursaries for vulnerable school going children.

4.26 Promote occupational health and safety in ASGM sites

This strategy is focused at improving the working environment of the ASG miners and ensuring there is compliance with health and safety standards at the ASGM sites thereby reducing exposure among ASG miners and the surrounding communities. This strategy will be implemented through enforcement of occupational health and safety, environmental and mining regulations at the sites. The strategy is aimed at ensuring adherence to OHS guidelines including the use of PPE by all ASG miners. The ASG miners will also be provided with trainings on risks associated with the use of mercury exposure, poisoning and symptoms, occupational health and safety. To implement this strategy, the following are the planned activities:

- a) Enforcing of environmental, mining and other related regulations prohibiting the use of mercury by children including child labour in mining, through penalties against employers;
- b) Collaborate with ASG miners and other key stakeholders in developing safe working procedures.
- c) Training ASG miners in risks associated with the use of mercury;

- d) Strengthen medical surveillance for miners engaged in ASGM.

4.27 Implement measures to address direct and indirect impacts from ASG mining activities on the environment and human health

This strategy seeks to address direct and indirect impacts that arise from ASGM mining activities. Direct impact such as environmental degradation and exposure to mercury and its mercury compounds, while the indirect impacts including social ills and human-animal conflict. Human-animal conflicts involving the operation of gold mining activities in protected areas (Game Management Areas), disturbing animal habitats. Most of the ASGM sites are located in GMA thereby giving rise to potential human-animal conflict. The strategy will be implemented by different stakeholders.

In addressing this strategy, the following four activities will be implemented:

- a) Undertake human-animal conflict prevention and mitigation measures;
- b) Collaborate with the relevant stakeholders in the provision of the social services to ASGM sites;
- c) Provide reproductive health, sexual and family planning education to young miners and the women at ASGM sites and the surrounding communities; and
- d) Purchase and distribute basic exploration tools for cooperatives to prevent rat hole mining to prevent environment degradation.

5.0 Work Plan

Table 5.1 describes concrete actions necessary to implement the strategies delineated above. It presents how the activities are linked to the set strategies, and describes how these will be implemented. It includes information about purpose, the schedule for the implementation of the NAP, estimated budget, activity lead and expected results. Detailed information on the budget for the implementation plan is provided in Annex 7.

Table 5. 1: Implementation Plan

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|---|--|--|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| Objective 1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030 | | | | | | | | | | | |
| 1.1 | 1.1 Phased reduction and subsequent elimination of whole ore amalgamation practices. | 1.1.1 Monitor adherence of ore concentration prior to amalgamation. | 1 | ZEMA | MMMD, ZP, MLGH | ✓ | ✓ | GRZ/Co operating Partners | 15,100 | Reduced and eventual elimination of whole ore amalgamation | Reduced level of whole ore amalgamation practices |
| | | 1.1.2 Promote alternative methods to mercury-based gold processing methods | 1 | ZEMA | MMMD, MoHA, MLGH | | ✓ | GRZ/Co operating Partners | 36,700 | Reduced and eventual elimination of whole ore amalgamation | Reduced level of whole ore amalgamation practices |
| 1.2 | 1.2 Sensitization programmes for key stakeholders on the environmental and health implications of burning of the amalgam in open-air environment as well as in residential settings. | 1.2.1 Monitor adherence against open-air and residential burning of amalgam. | 1 | ZEMA | MMMD, MoHA, MLGH | ✓ | | GRZ/Co operating Partners | 14,800 | Reduced and eventual elimination of open-air and residential burning of amalgam | Reduced reported incidences of open-air and residential burning of amalgam |
| | | 1.2.2 Enforce and promote alternative methods to gold processing. | 1 | ZEMA | MMMD, MoHA, MLGH | | ✓ | GRZ/Co operating Partners | 20,800 | Reduced and eventual elimination of open-air and residential burning of | Reduced reported incidences of open-air and residential burning of amalgam |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|--|--|----------|------------------|---|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| 1.3 | | | | | | | | | | amalgam | |
| | 1.3 Undertake a follow-up detailed study to determine the quantities of mercury used and gold produced in all ASGM active sites. | 1.3.1 Formation of coordination mechanism | 1 | ZEMA | MMMD, MoHA, MLGH, FSSMAZ | ✓ | | GRZ/Co operating Partners | 19,500 | Estimates of quantities of mercury used and gold produced in the ASGM sector in Zambia. | Quantities of mercury and gold produced in the ASGM sector in Zambia |
| | | 1.3.2 Formulation of terms of reference for the multidisciplinary team to undertake a detailed study on mercury use and gold production in ASGM. | 1 | ZEMA | MMMD, MoHA, MLGH, FSSMAZ | | | GRZ/Co operating Partners | 0 | Estimates of quantities of mercury used and gold produced in the ASGM sector in Zambia. | Quantities of mercury and gold produced in the ASGM sector in Zambia |
| | | 1.3.3 Formation of a multidiscipline team to undertake study to quantify the amounts of mercury used and gold produced. | 1 | ZEMA | MMMD, MoHA, MLGH, FSSMAZ Association of Zambia (FSSMAZ) | ✓ | | GRZ/Co operating Partners | 0 | Estimates of quantities of mercury used and gold produced in the ASGM sector in Zambia | Availability of a Multi-disciplinary team Quantities of mercury and gold produced in the ASGM sector in Zambia |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|---|----------|------------------|------------------------------|-----------------------|------|---------------------------|---------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| | | 1.3.4 Site visits to quantify the amounts of mercury in use and gold produced in ASGM | 1 | ZEMAA | MMMD, MoHA, MLGH, FSSMAZ | ✓ | | GRZ/Co operating Partners | 40,050 | Estimates of quantities of mercury used and gold produced in the ASGM sector in Zambia | Availability of a Multi-disciplinary team Quantities of mercury and gold produced in the ASGM sector in Zambia |
| | | 1.3.5 Validation of results of the study | 1 | | MMMD, MoHA, MLGH, FSSMAZ | ✓ | | GRZ/Co operating Partners | 9,500 | Estimates of quantities of mercury used and gold produced in the ASGM sector in Zambia | Availability of a Multi-disciplinary team Quantities of mercury and gold produced in the ASGM sector in Zambia |
| | | 1.4.1 Set up pilots of centralized station equipped with mercury amalgam retorts for burning of the amalgam | 2 | ZEMA | MMMD, FSSMAZ, UNZA, CBU, MoF | ✓ | | GRZ/Co operating Partners | | Reduced mercury emissions and releases to the environment. | Reduction in mercury emissions and releases to the environment |
| 1.4 | 1.4 Promote use of equipment that captures mercury for reuse. | 1.4.2 Acquisition and installation of mercury testers at | 2 | ZEMA | MMMD, FSSMAZ, UNZA, | | ✓ | GRZ/Co operating Partners | | Quarterly monitoring of mercury levels | Mercury levels in the environment |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|--|---|----------|------------------|---|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | the centralized stations. | | | CBU, MoH | | | | | in the environment | |
| 1.5 | 1.5 Prohibit any mercury or cyanide-based gold processing techniques within 100 meters of a natural water body including rivers, streams, lakes etc. | 1.5.1 Banning use of chemical-based gold processing within 100 meters of a natural water body. | 1 | ZEMA | DNPW, MMMD, FSSMAZ, UNZA, CBU | ✓ | | GRZ/Co operating Partners | 44,800 | Absence of chemical-based gold processing activities within 100 meters of a natural water body | Availability of a Data base of concentration levels of mercury in selected natural water bodies |
| | | 1.5.2 Continued monitoring contamination levels in rivers and other environmental sinks close to mercury processing sites | 1 | ZEMA | DNPW, MMMD, FSSMAZ, UNZA, CBU, WARMA, MoJ | ✓ | | GRZ/Co operating Partners | 14,800 | Absence of chemical-based gold processing activities within 100 meters of a natural water body. | Availability of a Data base of concentration levels of mercury in selected natural water bodies |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|---|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| 1.6 | 1.6 To promote mercury free alternative methods in gold processing such as the use of; i. the borax method; ii. corn starch (α -Cyclodextrin, α -CD); iii. gravity-only concentration e.g. panning, sluicing, shaking tables, spiral concentrators, vortex concentrators, centrifuges etc; and iv. thiosulphate. | 1.6.1 Purchase of equipment and reagents for demonstration of alternative technologies. | 1 | ZEMA | MMMD, FSSMAZ, UNZA, CBU | ✓ | | GRZ/Co operating Partners | 387,700 | Training programs delivered and equipment purchased | Level of knowledge and skills on the use of alternative technologies miners enhanced. Deployment of equipment and reagents for alternative technologies. |
| | | 1.6.2 Encourage co-operatives leaders to spearhead technology acquisition and use of mercury free methods | 1 | ZEMA | MMMD, FSSMAZ, UNZA, CBU | ✓ | | GRZ/Co operating Partners | 23 800 | Training programs delivered and equipment purchased | Level of knowledge and skills on the use of alternative technologies miners enhanced Deployment of equipment and reagents for alternative technologies. |
| 1.7 | 1.7 Promote research on impacts of mercury and its compounds on | 1.7.1 Conduct research on site specific exposure | 1 | UNZA/CBU | MoH ZEMA CSO | ✓ | | GRZ/Co operating Partners | 18,900 | Research Protocols Developed | i. Availability of research protocols |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|--|---|----------|------------------|---|-----------------------|------|---------------------------------|---------------------|--|--|
| | | | | | | 2023 | 2030 | | | | |
| | miners and their families and especially children, women and pregnant women from exposure to mercury | route and fate of mercury (soil, air, water, sediment, biota). | | | DNPW NISIR | | | | | | |
| | | 1.7.2 Conduct research on mercury presence in human matrices (blood, breast milk, tissue, hair, urine). | 1 | UNZA/CB U | MoH ZEMA CSO DNPW NISIR | ✓ | | GRZ/Co operating Partners | 64,750 | Baseline data on site specific exposure route and fate of mercury established (on soil, air, water, sediment, biota) | i. Number of ASGM sites where there is exposure to mercury ii. Size of land with exposure to mercury iii. Levels of mercury in the soil, air, water, sediment, biota |
| | | 1.7.3 Undertake a national detailed study on the participation of women in the ASGM | 1 | UNZA/CB U | NISIR MoH CSO ZEMA TDRC DNPW | ✓ | | GRZ/Co operating Partners | 54,750 | Baseline data on mercury presence in human matrices (blood, breast milk, tissue, hair, urine) established | i. Number of people with presence of mercury detected in human matrices ii. Levels of mercury present in human matrices (blood, breast milk, tissue, hair, urine) |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|--|----------|------------------|--|-----------------------|------|--------------------------------------|---------------------|--|--|
| | | | | | | 2023 | 2030 | | | | |
| | | 1.7.4. Conduct health impact assessments of ASG miners and vulnerable population | 1 | MoH/MoG | NISIR UNZA CBU CSO MoCTI MCDSS AZWIM MLSS MMMD | ✓ | | GRZ/Co operating Partners | 40,250 | The baseline data on the on the role of women in the ASGM established | i. Number / Percentage of women involved in ASGM ii. Type of enterprises and services in which women are involved |
| | | 1.7.5 Conduct environmental monitoring of contaminated areas in ASGM sites and the surrounding communities. | 1 | MoH/MoG | NISIR UNZA CBU CSO MoCTI MCDSS AZWIM MLSS MMMD | ✓ | | GRZ/Co operating Partners | 40,250 | The baseline data on the on the health impacts of ASG miners and vulnerable population established | i. Number of persons affected by ASGM activities ii. The extent of the impacts |
| 1.8 | 1.8 Management of ASGM gold ore processing tailings/waste | 1.8.1 Sampling and analysis of tailings in active mining sites to ascertain levels of mercury contamination. | 1 | | ZEMA, DNPW (Department of National Parks and Wildlife), Ministry of Mines and | ✓ | ✓ | Government and Co-operating partners | 50,900 | Reduced and eventual elimination of whole ore amalgamation. | Report on rate of whole ore amalgamation practices |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|---|-------------------------|--|----------|------------------|--|-----------------------|------|---------------------------|---------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| | | | | | Minerals Development, the Zambia Police Service. | | | | | | |
| Objective 2: To increase the percentage of formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030. | | | | | | | | | | | |
| | Delineate land for ASGM | Conduct detailed geological survey in all gold mineralised areas in the country | 1 | MMMD | MMMD, MTA, MLNR | | ✓ | GRZ/Co operating Partners | 21,165,090.51 | A primary gold source that generates alluvial gold will be established for each gold mineralised area. | Availability of geological survey reports; |
| | | Allocate areas of operations in gold occurrence districts to ASGM individuals and cooperatives | 2 | MMMD | MLG | | ✓ | GRZ/Co operating Partners | | Legalised and regulated areas of operations. | Formalised and organised mining and processing activities. |
| | | Identify and isolate protected and ecologically sensitive areas from ASGM | 1 | MLNR | MMMD, MTA, MWDSEP, MLG, ZEMA | ✓ | | GRZ/Co operating Partners | | Demarcated protected and sensitive areas | No mining and non-mining rights offered in protected and sensitive areas; |
| | | | | | | | | | | | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|---|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|--|--|
| | | | | | | 2023 | 2030 | | | | |
| | | activities | | | | | | | | Relocated ASGM miners | No mining/processing activities in protected and sensitive areas |
| | | Develop conservation value maps in 10 provinces | 1 | MWDSEP | MLNR, MMMD, MTA | ✓ | | GRZ/Co operating Partners | | Improved coordination and planning among relevant institutions | Availability of a digital conservation map per province |
| | | | | | | | | | | Improved resource management | |
| | Facilitate formation of miners' organizations | Establish 100 viable ASGM cooperatives | 1 | MCTI | MMMD, ZCCM-IH/ZGC | | | GRZ/Co operating Partners | 791,630.06 | Reduced illegal mining and processing | Number of organised and functioning gold mining cooperatives |
| | | | | | | | | | | Improved coordination of ASGM activities | Number of women and youth participating in ASGM activities |
| | | Improved household incomes | | | | | | | | | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|--|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|--|--|
| | | | | | | 2023 | 2030 | | | | |
| | | | | | | | | | | Increased number of women and youth participating in ASGM activities | |
| | | Provide training on governance and business administration, mining technical services, safety, health and environment to ASGM cooperatives and individuals | 2 | MCTI, MMMD | ZDA, CEEC, ZEMA, MoH | ✓ | | GRZ/Co operating Partners | | Improved performance of ASGM sector | Number of trainings conducted relevant to improving ASGM activities. |
| | Reduction in the number of accidents; | | | | | | | | | Number of women and youth participating in ASGM activities | |
| | Reduction in the use and exposure of mercury | | | | | | | | | | |
| | Improved environmental management | | | | | | | | | | |
| | Increased number of women and youth participating in ASGM | | | | | | | | | | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|----------|---|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | | | | | | | | | activities | |
| | | Establish a national association of ASGM miners with the support of the ministry responsible for mining | 1 | FESSMAZ | MMMD, MLSS, MCTI | ✓ | | GRZ/Co operating Partners | | Improved coordination of ASGM sector players | Established ASGM national association |
| | | Organize and facilitate participation of ASGM players in local, regional and international workshops/conference/exhibitions on ASGM activities. | 3 | ZDA | MCTI, ZCCM-IH/ZGC, MMMD | | ✓ | GRZ/Co operating Partners | | Adoption of best ASGM mining practices; Exposure to markets. | Number of local and international regional workshops/conferences/exhibitions attended |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---------------------------|---|----------|------------------|-------------------------------------|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | License and regulate ASGM | Review and strengthen the regulatory framework to address all gaps, barriers, and inconsistencies | 1 | MMMD | MoJ, BRRR, ZEMA, ZLDC, MCTI, MWDSEP | ✓ | | GRZ/Co operating Partners | 69,842.70 | Revised and strengthened regulatory framework on ASGM sector (Mines and Minerals Act, Environmental Management Act, Border Management & Facilitation Act) | Number of ASGM players compliant |
| | | Facilitate the issuance of mining and non-mining rights related to ASGM activities | 1 | MMMD | ZEMA | | ✓ | | | GRZ/Co operating Partners | Enhanced compliance and adherence levels |
| | | | | | | | | | | | Enhanced adherence to ASGM regulations |
| | | | | | | | | | | | Increased formalisation of ASGM activities. |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---------------------------|--|----------|------------------|---------------------------|-----------------------|------|---------------------------|---------------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | Facilitate the issuance of environmental clearance to ASGM activities. | 1 | ZEMA | MMMD | | ✓ | GRZ/Co operating Partners | | Improved environmental management in ASGM sector | Number of environmental clearance licences issued to ASGM |
| | Organize the supply chain | Register at least 50% of national gold exports | 1 | MMMD | ZRA, ZCCM-IH/ZGC | ✓ | | GRZ/Co operating Partners | 16,660.39 | Increased revenue from gold exports | Number of registered gold exporters |
| | | | | | | | | | | Increased gold exports from ASGM sector | Quantity of gold exports from ASGM sector |
| | | | | | | | | | | Known quantities of gold exports from ASGM sector. | Tracking system for gold movements from source to final destination |
| | | Review and implement favourable tax regime specific to ASGM | 1 | MMMD | MCTI, MoF, MoJ, ZDA, BRRA | | ✓ | GRZ/Co operating Partners | | Increased licenced ASGM players | Number of tax incentives introduced for ASGM sector. |
| | | | | | | | | | Improved national revenue | Revised laws on taxation favourable to the growth of ASGM sector. | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|--|----------|------------------|-------------------------|-----------------------|------|-------------------------------------|---------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| | | Establish an independent national assayer for ASGM gold trade and exports. | 1 | MMMD | ZCCM-IH/ZGC, MCTI, ZDA | ✓ | | GRZ/Co operating Partners | | Enhanced quality assurance | Established independent national gold assayer |
| | | | | | | | | | | Captured quantity of gold in which mercury is used | |
| | | | | | | | | | | Enhanced tax collection | |
| | Facilitate access to finance, markets, and services | Facilitate 100 ASGM cooperatives to open bank and/or mobile accounts | 1 | MCTI | ZCCM-IH/ZGC, BoZ | | | GRZ/Co operating Partners | 450,443.82 | Improved livelihoods of ASGM players due to savings | Number of cooperatives using bank/mobile accounts facilities. |
| | | | | | | | | | | Ease of business transactions in gold trade; | |
| | | | | | | | | | | Captured money circulation from ASGM sector. | |
| | | Facilitate the establishment of savings and loans groups in ASGM communities | 2 | MCTI | BoZ | | | Improved savings among ASGM players | | Number of village banking groups among ASGM communities. | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|----------|--|----------|------------------|--------------------------|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | | | | | | | | | Improved access to affordable financing among ASGM | |
| | | Conduct training in financial literacy for ASG Miners including at least 40% participation of women | 1 | MoF | BoZ, MCTI | ✓ | | GRZ/Co operating Partners | | Improved financial literacy levels among ASGM players including women | Number of trainings conducted Number of women trained in financial literacy. |
| | | Encourage financial institutions (including corporate, stock markets and development banks) to come up with tailor made financial instruments for accessibility to ASGM miners | 1 | MoF | LuSE/SEC, BoZ, MCTI, ZDA | | ✓ | GRZ/Co operating Partners | | Improved access to finance | Number of financial institutions providing tailor-made financial solutions to ASGM sector |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|----------|---|----------|-------------------|--------------------------|------------------------------------|--|---------------------------|---------------------|-------------------------------------|---------------------------------------|
| | | | | | | 2023 | 2030 | | | | |
| | | Establish market and trading centres for gold and other precious minerals including gem stones | 1 | ZCCM-IH/ZGC, MMMD | MCTI, MHI, MLG, MLNR | | ✓ | GRZ/Co operating Partners | | Improved gold trading among ASGM | Number of trading centres established |
| | | | | | | Formalised gold trading among ASGM | Enhanced transparency in gold marketing and trading in ASGM sector | | | | |
| | | Standardise a uniform gold price pegged against the London Base Metals (BMA)/London Metals Exchange (LME) spot prices | 1 | ZCCM-IH/ZGC | BoZ, MoF, ZRA, MCTI, ZDA | ✓ | | GRZ/Co operating Partners | | Improved gold collection | |
| | | | | | | | | | | Increased production | |
| | | | | | | | | | | Local economic transformation | |
| | | | | | | | | | | Reduced exploitation of ASGM miners | |
| | | | | | | | | | | Reduced gold smuggling | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|--|--|----------|------------------|-------------------------|-----------------------|---------------------------|-----------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| | | Facilitate establishment of value addition linkages downstream in the gold value chain. | 2 | MCTI, ZDA | ZCCM-IH/ZGC, MMMD | | ✓ | GRZ/Co operating Partners | | Improved value | Number of Gold processing firm and jewellery |
| | | | | | | | | | | Enhance market linkages | Uptake of Gold by local Goldsmith |
| | | | | | | | | | | Increased investments in ASGM value chain | Capacity building in gold value addition and beneficiation |
| | | Facilitate setting-up of localised small refineries/smelting furnaces with capacity of not less than 50 kilograms of gold processing per day, in areas of gold mineralisation. | 2 | ZCCM-IH/ZGC | MMMD | ✓ | GRZ/Co operating Partners | Improved gold purity levels | | Number of gold smelting centres established | |
| | Monitor, evaluate and enforce ASGM regulations | Establish local mining district offices and provincial bureaus to effectively monitor and enforce compliance | 2 | MMMD | MoF, MLG | | ✓ | GRZ/Co operating Partners | 19,820.22 | Enhanced compliance to ASGM regulation | Number of District office and provincial bureaux established |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator | |
|-----|----------|---|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|--|---|--|
| | | | | | | 2023 | 2030 | | | | | |
| | | Evaluate the effectiveness and efficiency of local mining district offices and provincial bureaus in enhancing compliance | 3 | MMMD | ZEMA | ✓ | | GRZ/Co operating Partners | | Informed Knowledge of the effectiveness and efficiency of local mining district offices and provincial bureaus in enhancing compliance | i.M & E reports Evaluation reports on compliance levels | |
| | | Strengthen existing regional mining bureaus to effectively monitor and enforce compliance | 2 | MMMD | ZEMA | ✓ | | GRZ/Co operating Partners | | Improved performance of regional bureaux in monitoring enforcing compliance | Performance Reports on compliance M & E framework and reports | |
| | | Evaluate the effectiveness of ASGM compliance to mining and environmental regulations in all gold mineralised areas | 2 | MMMD, ZEMA | MLG, MWDSEP, MoH, | | ✓ | GRZ/Co operating Partners | | Enhanced compliance to mining and environmental regulations in all gold mineralised areas | Number of Quarterly Reports from ASGM reviewed Monthly production and labour Returns submitted | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|--|---|----------|------------------|------------------------------|-----------------------|------|---------------------------|--------------------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| | | | | | | | | | | | 80% of licensed ASGM entities are fully compliant with the country's Mining Regulations |
| | | Strengthen the capacity of institutions to enforce breach of ASGM related obligations. | 1 | ZEMA, MMMD | MCTI, MLSS | | ✓ | GRZ/Co operating Partners | | Enhanced compliance to ASGM regulations | Number of enforcement measures employed per Institution |
| | | | | | | | | | Enhance institutional capacity | | |
| | Manage mercury trade and mercury compounds | Review domestic laws and regulations regarding mercury, including its domestic use and treatment, as well as its trade internationally. | 1 | ZEMA | MMMD, MoJ, MWDSEP, MCTI, MoH | ✓ | | GRZ, Cooperating partners | 26,661.18 | Strengthen laws and regulations regarding mercury, including its domestic use and treatment | Number of laws and regulations reviewed, amended and harmonised. |
| | | | | | | | | | | Domesticate laws and regulations regarding mercury, including its domestic use and treatment | Number of domestic laws consistent with Minamata Convention obligations enacted. |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|----------|--|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | Take an inventory of “pressure points” or other factors that will affect mercury trade. | 1 | ZEMA | MMMD, MWDSEP, MCTI, ZRA | ✓ | | GRZ, Cooperating partners | | Quantified required amounts of mercury for relevant sectors. | Record of quantities of mercury demand in relevant sectors. |
| | | Monitor mercury trade flows across borders and within the country. | 1 | ZEMA | ZRA, MCTI, ZABS | ✓ | | GRZ, Cooperating partners | | Introduce a point-of-sale register for all domestic mercury transactions. | Number of points of sale register for all domestic mercury transactions |
| | | Identify the sources of illegal mercury imports, including the existing or likely mercury entry points into the country, and the distribution networks within the country. | 1 | ZEMA | MoA, MCTI, ZRA | ✓ | | GRZ, Cooperating partners | | Develop manifest requirements for mercury transport. | A standard manifest requirement for mercury transport developed. |
| | | | | | | | | | | Measures to curb the illegal importation and trade of mercury introduced. | Number of measures put in place to curb illegal mercury importation. |
| | | | | | | | | | | Reduced quantities of mercury illegally imported. | Reduced traces of mercury usage at gold mining and processing sites. |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|---|----------|------------------|--------------------------|-----------------------|------|---------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| | Prevent diversion of mercury and mercury compounds from being used in ASGM. | Develop licensing requirements for mercury traders and/or large mercury sales. | 1 | ZEMA | MMMD, MCTI | ✓ | | GRZ, Cooperating partners | 28,880.90 | Regulated mercury use and trade. | A register of legal mercury traders |
| | | Restrict the issuance of permits for the importation of mercury and mercury compounds. | 1 | ZEMA | MMMD, MCTI, ZRA | ✓ | | GRZ, Cooperating partners | | Strengthen compliance in the use of mercury and its compounds for the intended purpose. | Availability of a register of permits issued for the importation of mercury and mercury compounds. |
| | | Undertake regular site inspections to trace the source of mercury used on ASGM areas of operations. | 2 | ZEMA | MMMD, MoA, ZRA | ✓ | | GRZ, Cooperating partners | | Reduced diversion of mercury and its compounds for use in ASGM sector | Reduction in the use of mercury and its compounds in ASGM sector |
| | Cross cutting issues | Establish ASGM desks in institutions relevant to ASGM activities. | 1 | ZEMA, MMMD | ZRA | | ✓ | GRZ | | Improved service delivery | Presence of established ASGM desks in the relevant institutions |
| | | Build infrastructure (roads, communication, hospitals, security) in all | 2 | MHI | MoA, MCT, MoH, MMMD, MLG | | ✓ | GRZ | | Improved service delivery | Number of infrastructure built and constructed |
| | | | | | | | | | | Improved access to all Gold mineralised areas | |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|---|--|--|----------|------------------|----------------------------------|-----------------------|------|------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| | | gold mineralised areas | | | | | | | | Improved way of doing business | |
| Objective 3: To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030. | | | | | | | | | | | |
| | Create coordinating structures for the implementation of the NAP: i. Advisory Committee, ii. Technical Committee | Conduct workshop to identify and orient relevant stakeholders on their role/involvement | | ZEMA, MMMD | MIBS, MOH, MTCI, MISA, ACADEMI A | 2023 | | GRZ | 6, 750 | Stakeholder coordinating committees established | Number. of stakeholders identified |
| | | Conduct a national capacity building meeting for stakeholders on the implementation of the NAP | | ZEMA, MMMD, | MIBS, MTCI, MISA, Academia, MOH | 2023 | | GRZ and partners | 33, 000 | Efficient implementation of the NAP | Number. of capacity building meetings held |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-----|---|--|----------|------------------|--|-----------------------|------|------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| | | Conduct workshop to develop stakeholder coordination guidelines | | ZEMA, MMMD, | MIBS, MOH, MISA, MTCI, Academia | 2023 | | GRZ and Partners | 24, 550 | Efficient coordinating committees | Availability of Coordination Guidelines |
| | Develop and implement awareness strategies on the dangers of mercury use, emerging good practices and formalisation in order to provide a balanced narrative on ASGMs potential contribution to national development. | Develop a communication strategy in line with the NAP objectives and strategies. | | MIBS, ZEMA, | MMMD, MISA, Academia, MCTI, MOH | 2023 | | GRZ and Partners | 23, 800 | Effective communication mechanism established | Availability of a Communication strategy |
| | | Develop and produce Information, Education and Communication materials for print, radio, TV, digital media and performing arts | | MIBS, ZEMA, | MMMD, MISA, Academia | 2021 | 2030 | GRZ and Partners | 18, 550 | Content for various IEC materials developed | Number of IEC materials developed |
| | | Disseminate information, education and communication materials via various platforms | | MIBS, ZEMA, | MMMD, MISA, Academia, CSOs, Community Leadership | 2023 | 2030 | GRZ and Partners | 49, 750 | Increased awareness levels among various ASGM players | Number of awareness activities conducted |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|--|---|--|----------|------------------|-------------------------|-----------------------|------|----------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| | | including community outreach and advocacy campaigns, and those targeting the vulnerable and children | | | | | | | | | |
| Objective 4: To achieve 40% provision of health care services to ASGM players by implementing Public Health and Social Protection strategies aimed at improving health by 2030. | | | | | | | | | | | |
| 1.1.1 | Institutional Strengthening and Systems Building (ISSB) for regulators, line ministries and all key stakeholders in addressing impacts of mercury and its compounds | Develop diagnosis and treatment protocols for mercury exposure. | 1 | MoH | ZEMA, WHO | X | | GRZ, Partners | 13,400.00 | Improved diagnosis and treatment for mercury exposed patients | Availability of the diagnosis and treatment protocols |
| 1.1.2 | | Integrate mercury and other neurotoxins in the health information system. (develop data collection tools and indicators) | | MoH | CSO, Smart Zambia | X | | Partners | 35,800.00 | Improved data on mercury exposure and registration of mercury related poisoning and illnesses at ASGM | Number of reported cases on mercury and other neurotoxins poisoning |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-------|---|--|----------|------------------|---|-----------------------|------|---------------------------|---------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| 1.1.3 | | Capacity building for health care workers in diagnosing and treating mercury poisoning | | MoH | ZEMA, Academia | X | | Partners | 43,600.00 | Improved capacities of health care workers in diagnosis and treatment of mercury exposure cases | Number of health care workers trained |
| 1.1.4 | | Implement outreach programs to ASGM sites and the surrounding communities | | MoH | MMMD, FSSMAZ, Partners | X | x | Partners | 157,800.00 | ASGM sites provided with health care services to improve the health status of miners and the surrounding communities | Number of outreach programmes conducted |
| 1.2.1 | Establish and implement the monitoring plan for human, environmental and biological exposure within the ASGM sites and the surrounding communities. | Develop a monitoring plan for human biological exposures | 1 | ZEMA, MoH | NISIR, DNPW, MWDSEP, Academia, Laboratories | X | x | GRZ, Cooperating partners | 77,750.00 | Improved monitoring of human, environmental and biological exposures | Availability of a monitoring plan for human, environmental and biological exposures |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|--------------|---|--|----------|------------------|-------------------------------|-----------------------|------|---------------------------|---------------------|--|---|
| | | | | | | 2023 | 2030 | | | | |
| 1.2.2 1.2 | | Regular monitoring of humans for mercury and other toxic chemical poisoning for exposed miners and communities surrounding ASGM sites. | 1 | MoH | NISIR, Academia, Laboratories | X | x | GRZ, Cooperating partners | 77,750.00 | Informed decision making based on scientific data | Number of people monitored for exposure to mercury and other toxic substances |
| 1.3.1 | Strengthen the prevention measures in relation to exposure to mercury and its compounds among vulnerable populations, particularly children and women of child-bearing age, especially pregnant women and those that rely heavily on eating fish that may be contaminated by ASGM activities. | Provide alternative livelihood and empowerment interventions to vulnerable population. | 2 | MCDSS | MoG, MoCTI, MoA, MLF, MoYSCD | | x | GRZ, Cooperating partners | 400,000.00 | Women engaged in alternative livelihood thereby reducing the number of women exposed to mercury and its compounds at ASGM sites. | Number of women engaged in self-sustaining income generation |
| .3.2 | | Create and facilitate a transition to viable alternatives livelihoods for ASGM miners | 1 | MCDSS | MLSS, MMMD, Community leaders | | x | GRZ, Cooperating partners | 177,800.00 | ASGM miners engaged in alternative livelihood | Number of ASGM miners engaged in alternative livelihood |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|------|--|--|----------|------------------|-------------------------------------|-----------------------|------|---------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| .3.3 | | Counselling of parents and guardians on the importance of education so as to ensure that children go to school instead of engaging in ASGM mining activities. | 1 | MCDSS | MLSS, MMMD, MoGE, Community Leaders | | x | GRZ, Cooperating partners | 158,340.00 | Reduced number of children in ASGM activities | Number of children enrolled in schools |
| | | | | | | | | | | | Number of children in ASGM sites |
| .3.4 | | Provision of bursaries for vulnerable school going children | 2 | MoGE | MLSS, MMD, Community leaders | | x | GRZ, Cooperating partners | 1,000,000.00 | Reduced number of children in ASGM activities | Reduced number of children in ASGM activities |
| .4.1 | Promote occupational health and safety in ASGM sites | Enforcing of environmental, mining and other related regulations prohibiting the use of mercury by children including child labour in mining, through penalties against employers. | 2 | MMMD | ZEMA, MLSS, MoH | X | | GRZ, Cooperating partners | 157,800.00 | ASGM miners compliant with regulatory requirement | i. Number of ASGM mines which are compliant ii. Number of children in ASGM sites ii. Number of inspections conducted |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-------|--|---|----------|------------------|-------------------------|-----------------------|------|---------------------------|---------------------|---|--|
| | | | | | | 2023 | 2030 | | | | |
| | | Collaborate with ASG miners and other key stakeholders in developing safe working procedures. | | MMMD | MoH, MLSS, FSSMAZ, ZEMA | X | | GRZ, Cooperating partners | 40,500.00 | Reduced exposure to mercury and its compounds | Number of safe working Procedures developed and implemented. |
| .4.3 | | Training ASG miners in risks associated with the use of mercury. | 1 | MMMD, MoH | MLSS, FSSMAZ, ZEMA | X | x | GRZ, Cooperating partners | 31,250.00 | Knowledge transfer to ASG miners on the risks associated with mercury and its compound | Number of ASG miners trained |
| 1.4.4 | | Strengthen medical surveillance for miners engaged in ASGM. | 1 | MoH | MMMD | X | x | GRZ, Cooperating partners | 13,750.00 | Health status of ASG miners established | Percentage of ASG Miners examined |
| .4.1 | Implement measures to address direct and indirect impacts from ASG mining activities on the environment and human health | Undertake human-animal conflict prevention and mitigation measures. | 2 | DNPW | ZEMA, MCDSS | X | | GRZ, Cooperating partners | 77,750.00 | Reduced number of animals and humans killed/Injured as a result of human animal conflicts | Number of reported cases of human animal conflict |

| S/N | Strategy | Activities | Priority | Lead Institution | Supporting Institutions | Timeline Completed by | | Funding source | Activity cost US \$ | Expected results | Indicator |
|-------|----------|---|----------|------------------|--------------------------------|-----------------------|------|---------------------------|---------------------|---|---|
| | | | | | | 2023 | 2030 | | | | |
| 1.4.1 | | Collaborate with the relevant stakeholders in the provision of the social services to ASGM sites. | 1 | MCDSS | ZEMA, MWDSEP, WARMA, MoH, MoGE | X | x | GRZ, Partners | 12,600.00 | Coordinated and improved social services provision | Number of stakeholder meetings held Number of ASGM community members accessing social services |
| 1.4.2 | | Provide reproductive health, sexual and family planning education to young miners and the women at ASGM sites and the surrounding communities | 2 | MoH | | X | x | GRZ, Cooperating partners | 157,800.00 | Increased health outcomes on reproductive, sexual health of women and reduced risks of STIs | Number of reproductive health and sexual cases reported |
| 1.4.3 | | Purchase and distribute basic exploration tools for cooperatives to prevent rat hole mining to prevent environment degradation. | 2 | MMMD | FSSMAZ | | x | GRZ, Cooperating partners | 580,000.00 | Environmental prevention of environmental degradation | Reduced number of sites with environmental degradation |

Table 6. 1: Evaluation Mechanism

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|--|---|---|---------------------|--|------|--------------------------|
| | | | 2019 | 2023 | 2030 | |
| Objective 1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030. | | | | | | |
| | Phased reduction and subsequent elimination of whole ore amalgamation practices | Proportion of miners using whole ore amalgamation practices | 60% | 25% | | ZEMA |
| | | Proportion of miners adopting mercury free methods | 0 | 25% | | ZEMA |
| | To kick-start sensitization programmes for key stakeholders on the environmental and health implications of burning of the amalgam in open-air environment as well as in residential settings. | Proportion of miners practicing open-air and residential burning of amalgam | 80% | 60% | | ZEMA |
| | | Level of emission mercury techniques and alternatives to mercury-based gold processing technologies | 0 | 25% | | ZEMA |
| | Undertake a follow-up detailed study to determine the quantities of mercury used and gold produced in all ASGM active sites. | Availability of reports on open-air and residential burning of amalgam | NONE | Available in first Q 2021 on thirteen (13) sites visited | | ZEMA |
| | | Reduction in reported cases of f open-air and residential burning of amalgam | | | | |
| | Promote use of equipment that captures mercury for reuse | Number of centralised pilot stations and mercury testers set up. | 0 | ?? | | ZEMA |
| | Prohibit any chemical-based gold processing techniques within 100 meters of a natural water body including rivers, streams, lakes etc. | Number of miners use chemical-based techniques prohibited from operating near natural water bodies. | 0 | 7,500 or 25% of miners | | ZEMA |

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|---|---|---|---------------------|--|------|--------------------------|
| | | | 2019 | 2023 | 2030 | |
| | To promote mercury free alternative methods in gold processing such as the use of; i. the borax method; ii. corn starch (α -Cyclodextrin, α -CD); iii. gravity-only concentration e.g. panning, sluicing, shaking tables, spiral concentrators, vortex concentrators, centrifuges etc; and iv. thiosulphate. | Number of equipment purchased and set-up for centralized gold processing Number of cooperatives championing the use of alternative gold processing technologies. | 0 | Three (3) model plants in place with twelve (12) leading acquisition | | ZEMA |
| | Promote research on impacts of mercury and its compounds on miners and their families and especially children, women and pregnant women from exposure to mercury | Availability of baseline data | 0 | 1 | | ZEMA |
| | | Number of studies conducted on impacts of mercury and its compounds on vulnerable population | 0 | 4 research reports | | ZEMA |
| | | Number of guidelines and measures put in place to curb illegal mercury importation. | 1 | 4 research reports | | ZEMA |
| Objective 2: To increase the percentage of formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030. | | | | | | |
| | Delineate land for ASGM | Number of detailed geological survey reports for gold mineralised areas | 3 | 9 | | MMMD |
| | | Percentage of delineated areas allocated to ASGM individuals and cooperatives | 2% | 80% | | MMMD |
| | | Number of provincial digital conservation maps | 1 | 4 | | MLNR, MMMD, MWDSEP, MTA |
| | Facilitate formation of miners' organizations | Number of organised and functioning gold mining cooperatives | 13 | 40 | | MCTI, MMMD, ZCCM-IH/ZGC |

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|-----------|---|---|---------------------|-----------------------|------|--------------------------------|
| | | | 2019 | 2023 | 2030 | |
| | | Availability of established ASGM national association | 0 | 1 | | FESSMAZ, MMMD, MLSS, MCTI |
| | License and regulate ASGM | Number of laws revised relevant to ASGM sector, harmonised and amended. | 0 | 3 | | MMMD, ZEMA, ZLDC, MCTI, MWDSEP |
| | | Increased formalisation of ASGM activities. | 2% | 40% | | ZEMA |
| | Organize the supply chain | Establish a tracking system of gold movements from source to final destination | 0 | 1 | | ZCCM-IH/ZGC |
| | | Number of tax incentives introduced for ASGM sector | 0 | 2 | | MCTI, MMD, MoJ, ZDA, BRRA |
| | | Availability of an established independent national gold assayer | 0 | 1 | | MMMD |
| | Facilitate access to finance, markets, and services | Number of trainings conducted on financial literacy | 0 | 40 | | MCTI |
| | | Number of financial institutions providing tailor-made financial solutions to ASGM sector | 0 | 4 | | MoF, LuSE/SEC, BoZ |
| | | Number of trading centres established | 0 | 5 | | ZCCM-IH/ZGC, MCTI, MHA |
| | | Number of smelting furnaces/refineries established | 1 | 3 | | ZCCM-IH/ZGC, MCTI, MMMD |
| | | Availability of Market reflective gold pricing | 0 | 1 | | BoZ, ZCCM-IH/ZGC, MoF, ZRA |
| | Monitor, evaluate and enforce ASGM regulations | Number of District office and Provincial bureaux established | 0 | 10 | | MMMD, MoF, MLG, ZEMA |
| | | Availability of M & E framework and reports | 0 | 30 | | MMMD, ZEMA |

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|-----------|---|---|---------------------|-----------------------|------|-------------------------------|
| | | | 2019 | 2023 | 2030 | |
| | | Number of enforcement measures employed per Institution | 0% | 100% | | ZEMA, MMMD |
| | Manage mercury trade and mercury compounds | Availability of a Database of quantities of mercury demand in relevant sectors and ASGM sector. | 0 | 1 | | ZEMA, MMMD, MWDSEP, MCTI, ZRA |
| | | Number of points of sale register for all domestic mercury transactions | 0 | 20 | | ZEMA, ZABS, ZRA, MCTI |
| | | Number of guidelines and measures put in place to curb illegal mercury importation. | 1 | 2 | | ZEMA, MoA, MCTI, ZRA |
| | Prevent diversion of mercury and mercury compounds from being used in ASGM. | Presence of a register of legal mercury traders and permits issued for the importation of mercury and mercury compounds | 0 | 1 | | ZEMA, MMMD, MCTI |
| | | Reduction in the traces of mercury usage at gold mining and processing sites | 100% | 50% | 0 | ZEMA, MMMD, MCTI, ZRA |
| | | Reduction in the use of mercury and its compounds in ASGM sector | 0 | 50% | | ZEMA, MMMD, MoA, ZRA |
| | Cross-cutting issues | Availability of ASGM desks established in the relevant institutions | 0 | 2 | | MMMD, ZEMA |
| | | Percentage of gold mineralised operating sites made accessible | 0 | | 50% | MHI, MoH, MoGE |

Objective 3: To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030.

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|--|---|---|---------------------|-----------------------|------|---|
| | | | 2019 | 2023 | 2030 | |
| | Create coordinating structures for the implementation of the NAP - i.) Advisory Committee ii.) Technical Committee | Effective and efficient coordination in the implementation of the NAP (Or effective & efficient coordination structures for the implementation of the NAP) | 0 | 1 | | ZEMA, MMMD |
| | Develop and implement awareness strategies on the dangers of mercury use, emerging good practices and formalisation in order to provide a balanced narrative on ASGMs potential contribution to national development. | Increased awareness levels among ASGM players/stakeholders | 0 | 1 | | ZEMA, MIBS, MOH, MMMD, MCTI, Academia, MISA |
| Objective 4: To achieve 40% provision of health care services to ASGM players by implementing public health and Social Protection strategies aimed at improving health by 2030. | | | | | | |
| | Institutional Strengthening and Systems Building (ISSB) for regulators, line ministries and all key stakeholders in addressing impacts of mercury and its compounds | Improved capacities for regulators, line ministries and all key stakeholders | 0 | | 40% | |
| | | Number of ASGM sites provided with health care services | | | | |
| | Establish and implement the monitoring plan for human exposure within the ASGM sites and the surrounding communities | Availability of a Monitoring plan for human exposures within the ASGM sites and the surrounding communities | 0 | 1 | | |
| | | Number of ASGM sites monitored for human exposures within the and the surrounding communities | 0 | 1 | | |
| | Strengthen the prevention measures in relation to exposure to | Number of Vulnerable populations empowered | 0 | 10% | 20% | |

| Objective | Strategy | Indicators | Baseline Findings * | Timeline Completed by | | Responsible Organization |
|-----------|---|--|---------------------|-----------------------|------|--------------------------|
| | | | 2019 | 2023 | 2030 | |
| | mercury and its compounds among vulnerable populations, particularly children and women of child-bearing age, especially pregnant women and those that rely heavily on eating fish that may be contaminated by ASGM activities. | Number of vulnerable populations with knowledge on dangers associated with the exposure to mercury and its compounds | 0 | 40% | 80% | |
| | | Reduction in the number of children in ASGM activities | 5% | 3% | 0 | |
| | Promote occupational health and safety in ASGM sites; | Availability of OHS safety procedures | 0 | 1 | | |
| | | Number of ASGM sites complying to safe working Procedures | 0 | | 100% | |
| | Implement measures to address direct and indirect impacts from ASG mining activities on the environment and human health | Availability of mitigation measures for indirect impacts from ASG mining activities | 0 | 1 | | |
| | | Number of ASGM sites at which mitigations measures are implemented | 0 | | 50% | |
| | | Reduction in the prevalence of indirect impacts from ASG mining activities | 0 | | 40% | |

*- The baseline column represents the findings during the baseline estimates study.

ANNEXES

Annex 1: Terms of Reference of the Working Group

The working group developing the NAP were divided into four (4) groups as follows:

- 1) Baseline TWG
- 2) Formalisation TWG
- 3) Communication TWG
- 4) Public Health TWG

The Terms of References were provided based on the guidance documents and each TWG was required to:

- Review the Baseline Estimates report on ASGM in Zambia
- Develop the strategy for ASGM for each of the TWG
- Report to the Advisory Group on progress made in the TWG
- Provide support to other TWGs in the development of the strategies
- Perform any other task as assigned by the TWG

Annex 2: Detailed National Baseline Analysis

The baseline study confirmed the existence of ASGM activities in Zambia and provided valuable insights relating to mining, processing, mercury use and emissions to the environment, impact of mercury on human health and the environment, economic, social and demographic aspects, the organisation of the sector including the legal and regulatory framework available to support formalisation.

The detailed analysis of the baseline is as set out below.

a) Location of ASGM Activities

The baseline study revealed that the primary ASGM areas are distributed in Central Province (Luano Valley and Mumbwa), Eastern Province (Lundazi, Petauke and Vubwi) and Lusaka Province (Rufunsa). Other ASGM areas include Chisamba, Kabwe, Mkushi and Serenje (in the Central Province); Chadiza, Chipata, Lumezi and Lusangazi (in the Eastern Province); Chirundu, Chilanga and Kafue (in the Lusaka province); Mpika (in Muchinga Province); Kasempa, Mwinilunga and Solwezi (in the North Western Province); Senga (in the Northern Province); and Kazungula in the Southern Province. The ASGM sites visited during the baseline study were in Chongwe, Luano, Lundazi, Mumbwa, Petauke, Rufunsa and Vubwi.

b) Methods of ASGM

The Baseline study of ASGM activities revealed that extraction of material by ASGM players was either from alluvial deposits (river sediments) or lode deposits (typically gold in quartz veins). The study revealed that the extraction and processing techniques in use are predominantly panning and amalgamation.

The study revealed that while use of mercury was reported in the formal ASGM sector, its use in the informal sector largely remains undocumented. It is worth noting that even though mercury use remains largely undocumented in the informal ASGM sector, its use in the sector was apparent due to the presence of instruments such as melting pans, retorts and other rudimentary equipment for gold recovery using mercury. The lack of documentation on use of mercury onsite was mainly due to the secretive nature of mercury trade in the informal sector. Considering the foregoing, the mercury gold ratio could not be determined, resulting in inability to calculate the amount of mercury used per annum.

c) Demographics of ASGM Players

The ASGM sector is mainly dominated by men with women and children participating to a lesser extent. The baseline estimate report revealed that there were approximately 30,000 miners engaged in ASGM activities of which 77 percent were male, 18 percent female and 5 percent children. In Zambia, women are involved in the artisanal and small-scale mining activities particularly in the crushing of the ore and panning operations. However, the role of women is not limited to mining activities but also extends to the supply of food, tools and equipment and sex services. The reported sex services could have exposed the communities

to sexually transmitted diseases, including HIV/AIDS. The study further revealed that due to the limited social amenities, women and children were subjected to gender-based violence in the sites visited. In the ASGM sector, women are biologically inhibited from doing certain jobs within the sector and as a result of this, they are left to do the easier jobs and are thus more dispensable than men. In the ASGM sector, Gender Based Violence against women is also rife both at work and in the homes.

d) Impacts of ASGM on various Sectors

As ASGM is a sector that comprises a number of players using natural resources, it is inevitable that it has consequences on society, health and the environment. Some of the notable impacts of ASGM as recorded in the baseline study are set out below.

i. Impact on Flora and Fauna

The baseline revealed that ASGM activities resulted in destruction and modification of the original landscape with resultant effect of loss of biodiversity and habitat. It was established that activities affected the overall functions of ecosystems. Further, the presence of mercury in the environment could have negatively impacted soil, water and flora and fauna. All alluvial gold mining activities were observed to be located in the perennial streams and riverbeds which would lead to siltation of streams and rivers. Additionally, ASGM activities near protected areas negatively impacted on wildlife population due to migration and poaching.

ii. Impact on Land and Soils

The environmental effects from ASGM activities included land degradation, abandoned pits, siltation and sedimentation of streams. The baseline estimate report revealed that the informal miners were not compelled to reclaim or rehabilitate the land once mining was complete. This situation is attributed to the fact that institutions that are mandated to regulate environmental matters relating to informal ASGM find it difficult to regulate them. The problem is more pronounced with artisanal miners due to the fact that they are not required to undertake an environmental impact assessment (EIA). On the other hand, the small-scale miners are required by law to undertake an EIA therefore, they are duty bound to implement the Environmental management plan which includes decommissioning activities such as rehabilitation of mining areas. In view of the fact that the majority of the gold miners are artisanal, mining activities are done haphazardly in the licence area.

The baseline report further revealed that abandoned pits in the visited sites eventually became traps for domestic and wild animals and breeding grounds for mosquitoes. The increased mosquito population may lead to high incidence of malaria, which in turn negatively affects the productivity of the miners.

In the case of trapped wild animals, depending on the size of the pits, the animals may injure themselves or die. If the practice of non-rehabilitation of pits are unresolved it will lead into a

decimation of wild animals around those areas which will ultimately affect tourism and the revenue that the government and the private sector operators realise from tourism.

ASGM has additional impacts such as loss of or degradation of arable land due to change of land use from agriculture to mining. The baseline study revealed that flat terrains such as Chenyenta, where land is amenable to both crop and livestock farming, arable land had been taken over by mining operations and mine waste disposal. The beneficiation processes employed in gold recovery results in the production of tailings both on land and in the river beds. The tailings dams formed results in land degradation and source of runoff containing an array of pollutants including mercury which cumulatively contributes to land degradation.

iii. Impact on surface and groundwater

The study revealed that anthropogenic activities of ASGM had negative impacts on both surface and groundwater. The major impacts include among others water pollution (discharge of effluent with high concentration of mercury, other heavy metals, and silt), destruction of aquatic life, disruption of the natural flow regime.

iv. Impact on Health

Identified health impacts associated with ASGM activities were musculoskeletal and hypertension. Communities were also exposed to sexually transmitted diseases such HIV/AIDS.

Findings on the health assessment of the ASGM sector revealed that none of the miners at the informal ASGM sites had Personal Protective Equipment (PPE) despite the hazardous nature of the activity. Additionally, it was discovered that women were exploited and exposed to hazards due to the nature of the work environment which does not provide necessary amenities including appropriate PPE. Lack of appropriate PPE made the miners more prone to mercury exposure and other hazards. Further, none of the visited sites had first aid equipment to attend to any form of emergencies that could have occurred within the ASGM sites.

The use of mercury presents significant occupational health risks arising from indoor air pollution during the ore amalgamation burning process in residential areas. Mercury vapour poisoning risks associated with these processes are well documented globally, consequently any use in Zambia will inadvertently result in neurological disorders, respiratory infections and other related ailments among ASGM miners involved in the amalgamation.

During the baseline study, interviews with some ASGM players revealed that indoor burning of amalgam in homes of ASGM areas was rife. However, due to the secretive nature of mercury use in the ASGM sector, an analysis to confirm the presence of mercury emanating from indoor burning of the amalgam was not done.

Annex 3: Methodology

Please describe here country specific methodology used to collect and analyse the data, including:

Methodology

(i) Description of the sampling framework, (i.e. the criteria for selecting the information sources, informants, choice of field sites/regions to be sampled, etc);

a) Study Areas

The study site for the ASGM activities were taken from three provinces in which the MSZ falls. The provinces were Central (Mumbwa and Luano Valley); Lusaka (Rufunsa and Chongwe) and Eastern (Lundazi, Lumezi, Petauke and Vubwi). Other ASGM activities are found in Northern (Senga) and North-Western (Kasempa, Lunga and Kasensele) provinces although these were not visited

b) Study Design

The study was conducted over a period of 14 months from October 2017 to December 2018. Training of stakeholders on the use of the AGC Toolkit was conducted. Literature review and desk study were employed to compile all available information on ASGM in Zambia. The desk study was complemented by interviews with key stakeholders and focus group discussions with community members. In addition, field visits to selected ASGM sites in the country was carried out in order to collect more in-depth information from the mining community. Field observations and collection of samples were also done.

c) Sampling

The study team focused on 10 ASGM areas in the MSZ where ASGM activities are prominent. Out of 10, seven were visited in Mumbwa, Luano, Rufunsa, Chongwe, Lundazi, Lumezi, Petauke and Vubwi. Three other ASGM areas in Kasempa, Senga and Kafue were not visited. A Random Sampling was used to select the ASGM sites and Stratified Sampling was used for stakeholder engagements.

(ii) description of tools and procedures used to collect the data in the field;

a) Research Tools

The main research tools used were questionnaires adapted from the UNEP and AGC Toolkit (2017) tools. The questionnaire had six sections which sought to collect both qualitative and quantitative data as follows:

Location;

- Community;

- Onsite gold traders;
- General ASGM onsite observations;
- Extraction, transport, processing and earnings; and
- Mercury use

Data was collected from landowners and community leaders, health facilities, ASGM miners, mine leaders and gold traders among others. In addition, expert interviews were conducted with key informants

(iii) and description of the data analysis process

Data analysis

The data collected was processed and analysed using Microsoft Excel while some water, soil and sediment samples collected were processed and analysed using the X-ray Florescence (XRF) Spectrometer machine to determine the presence of mercury.

Study Limitations

The major study limitation of the study was the inability to capture all aspects related to ASGM activities, especially the actual use of mercury at ASGM sites. This was more common at the informal than formal ASGM sites. Further, the clandestine nature of ASGM meant that respondents were unwilling to confirm the use of mercury for fear of prosecution. Other limitations included inaccessibility of some ASGM sites, which in some cases was a result of the sites being located in areas where the terrain does not allow easy access. Also, the seasonal nature of the activity meant that not all key informants were onsite to be interviewed.

Annex 4: Results

Study Results

The study showed that ASGM activities were prevalent in the MSZ. Gold in the MSZ was either in form of alluvial or lode deposits. A lode deposit is referred to as an occurrence of gold in a crack in a rock formation or between layers of rock. Lode deposits were found in Chobwe and Mumbwa sites whilst the rest of the sites had alluvial deposits. The size of grains of gold determines whether mercury will be used in gold recovery and the fine grain sizes generally ranged from 0.5 to 1 mm while coarse grains measured as much as 5mm. The operations in the ASGM sites were either underground or surface mining depending on the parent rock hosting the gold. The extraction and processing techniques were predominantly panning and amalgamation.

With regards to gold trade, there were both local and international markets. On the local market, on spot trading of gold was predominant and only a considerable quantity was traded at covert trading centres. Considerable quantities were exported to the international market in Malawi, Tanzania, Mozambique, South Africa and the United Arab Emirates with Tanzania offering the biggest trading market. The average price of gold on the local market ranged from US\$ 35 to 45 per gram compared to the international market price being US\$ 48.49 per gram as at 27th September 2019. Vubwi was the site where gold was cheapest whilst Rufunsa and Petauke offered good returns both on-site and off-site. In addition to the cash trade in gold, the survey also established that a considerable quantity of gold was traded through the barter system. In this instance, gold was exchanged with either mercury or the use of equipment such as gold detectors. The study results also revealed that the biggest consumers of gold were jewellers. Despite this, there was no direct trade between jewellers and gold miners due to the dominance of the middlemen in the gold supply chain. This dominance was also extenuated by the absence of an official gold market in the country.

Mercury use was reported in the formal ASGM sector while its use in the informal sector largely remains undocumented. Mercury use in the informal ASGM sector was inferred from the presence of instruments such as melting pans, retorts and other rudimentary equipment for gold recovery using mercury. This was the case for such sites as Mumbwa, Rufunsa, Vubwi and Lundazi. The lack of documentation on the use of mercury onsite resulted in the inability to calculate the amount of mercury used per annum.

Mercury use in the formal sector was confirmed through interviews, observations and the use of X-ray Florescence (XRF) Spectrometer machine. Chobwe Mine was found to use mercury for gold processing. Based on the information availed by proponent and using the AGC Toolkit, 285.66 Kg of mercury was used to recover about 142.83 kg of gold representing a 2:1 mercury to gold ratio. This falls outside the estimated mercury to gold ratio using the whole-ore amalgamation approach as presented in the UNEP guidance document. Although ASGM is largely informal and unlicensed, it contributes to the livelihoods in the country. It is also worth noting however, that its contribution to mineral production and national economy largely remains undocumented by official statistics. In terms of formalisation of ASGM and access to financial and technical assistance, the country has a Mineral Resources Development Policy (MRDP) in place which has made provision for strategies to develop the mining sector in general including small-scale mining in particular. In addition, the MMD Act No. 11 of 2015 provides that Artisanal mining can only be undertaken by a citizen or a co-operative wholly composed of citizens.

Government through the Ministries responsible for Mines and Commerce embarked on a process to formalise the ASGM sector. The roadmap for the formalisation was developed and the process included the purchase of equipment as one way of encouraging miners to access financial and technical assistance. Consequently, trainings in gold mining operations were conducted for members of the cooperatives and a total of 214 members involved in the illegal gold mining were trained. At the time of the study, a total of 161 Gold Panning Certificates were issued to both individuals and cooperatives.

Major environmental impacts of ASGM were identified and were associated with land, soils, flora and fauna, surface and groundwater, aquatic life and biodiversity. The identified impacts were land degradation, deforestation, contamination of surface and ground water, siltation of water bodies, water stagnation in abandoned mine pits, pollution from mercury use in gold amalgamation, and dust and noise pollution. ASGM activities have been known to affect human health. Identified health impacts associated with ASGM activities were water bone diseases due to scarcity of potable water, muscular skeleton and connected tissue, respiratory system infection non-pneumonia and hypertension.

The main social ills mainly affected women and children. Traditional concepts of gender in the ASGM community to a large extent reflected general trends in Zambia, particularly in rural areas. Alcohol and drug abuse, gender-based violence, child labour with cases of

school-aged children being involved in active mining were common findings in this study. Behavioural and lifestyle-related diseases were also prevalent. Another recurring problem was inadequate housing in some sites such as Rufunsa and Lundazi, with most living in tents and temporary structures.

Annex 5: Knowledge Gaps

Although there was extensive research undertaken during the project, a number of knowledge and information gaps were identified in the ASGM sector which posed a challenge to formalizing the ASGM sector. One such gap identified is the availability of accurate information of how many people are involved in ASGM in Zambia. Most of the literature available on ASGM is outdated and may no longer be applicable due to factors such as the constant migration of miners and new entrants who have recently joined the sector. This coupled with the lack of trust by the individuals who participate in the sector makes the accurate collection of data difficult. Previously Zambia's main focus was on LSM and it was only until 2015 that MMMD that the country developed specific legislation that specifically focused on the ASGM sector. As a result, a lot of the participants outside the areas that have been visited by MMMD may lack information of the provisions of the provisions of the MMMD Act. Part of the difficulty in legalizing and formalizing ASGM is due to the nature of the mineral deposits themselves. The nature of the deposits has important implications in terms of the use and exploitation of the mineral resources. The type of mining employed to exploit the mineral resource will also affect the amount of investment that the ASGM sector can attract. This gap is evident in the lack of financing available for ASGM sector.

Annex 6: Calculations for Estimation of Mercury Use on Formal ASGM Sites

To estimate mercury, use on ASGM sites the following information was used:

- i. Amount of mercury consumed per unit of gold produced i.e. Hg: Au;
- ii. Quantity of gold produced per year;
- iii. Using the ore extraction-based method; or
- iv. Using the miner earnings-based method.

The following information was obtained at Chobwe Mine to estimate the amount of gold produced using the miner incomes-based method:

- i. Miner income per day = \$13.04/day
- ii. Working days per year = 23 days x 12 months = 276 days/yr.
- iii. Average gold spot price over the year = \$35/g
- iv. Distribution of gold produced = 40% of gold given to miners
- v. Miners per shaft = 10/shaft
- vi. Total number of shafts = 5
- vii. Percentage of spot received by miners = 70 %

1) To calculate total number of miners:

[Number of shafts x Number of miners per shaft

total number of miners] [5 shafts x 10 miners per shaft = 50 miners]

2) To calculate total daily miner income:

[Total number of miners x daily income per miner = total daily miner income]

[50 miners x \$13.04/miner/day = \$652/day]

3) To calculate total annual miner income:

[Total daily miner income x working days/year = Total yearly miner income]

[\$652/day x 276 days/year = \$179,952/year]

4) To calculate annual miner gold production:

[Total yearly miner income / (Average spot price x percentage of spot received by miners) = Annual miner gold production] [$\$179,952 / (\$35/\text{g} \times 70\%) = 7.34 \text{ kg/year}$]

However: this constitutes only 40 % of the production (because the shaft leader and concession holder taken 60%, so the total production would be closer to 18.36Kg.

The following information was obtained at Chobwe mine to estimate the amount of gold produced using the ore extraction-based method:

- i. Number of Shafts = 5
- ii. Daily ore extraction per shaft = 7 ton/day
- iii. Average ore grade = 13/ton
- iv. Working days per year = 276 days/year

1) To calculate total daily ore extraction:

[Daily production per shaft x Number of shafts = total daily ore production]
[7 tons/shaft/day x 5 shafts = 35 tons/day]

2) To calculate total daily gold production:

[Total daily ore production x ore grade = daily gold production]
[35 tons/day x 13 g/tons = 455g/day]

3) Calculate total annual gold production:

[Daily gold production x working days/year = Total yearly gold production]
[455 g/day x 276 days/year = 125.58kg/year]

The estimates of gold production from miner income were too low and therefore it was disregarded and focused on estimates of gold production from ore extracted that gave 142.83Kg per year.

To estimate the Hg:Au Ratio the following information was obtained:

- i. Total Hg added = 1500g
- ii. Sponge gold produced = 500g

iii. Total Hg remaining = 500g

1) To calculate total Hg loss during amalgamation:

[Total Hg added - Total Hg remaining = Hg loss]

[1,500g - 500 g = 1000 g]

2) To calculate Hg:Au ratio:

[Hg loss / Sponge gold produced = Hg: Au ratio]

[1000 g / 500g = 2]

Therefore, to determine total mercury use, the following information was used:

i. Gold production estimate from either:

a) Ore extraction estimate = 142.83kg

ii. Hg:Au ratio = 2:1

3) Total mercury use based on ore extraction estimate:

[Extraction gold production x Hg:Au ratio = Total Hg use]

[142.83kg x 2 = 285.66 kg Hg]

Annex 7: Implementation Budget

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---|--|-----------|----------|---------------|------------------|
| Objective 1: To facilitate the gradual phase out of mercury-based gold processing techniques by ASGM miners by 25% by 2030 | | | | | |
| 1.1 | Phased reduction and subsequent elimination of whole ore amalgamation practices. | | | | |
| 1.1.1 | Monitor adherence of ore concentration prior to amalgamation | | | | |
| 1.1.1.1 | DSA Costs per person; 100 x 5 days x 4 quarters x 5 persons = 10,000 | 100.00 | 20.00 | 5.00 | 10,000.00 |
| 1.1.1.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip)= 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | - | - | - | - |
| 1.1.1.2 | Round trip fuel total Costs 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.1.1.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| 1.1.1.4 | Hiring of equipment = 100 x 3 days= 300 | 100.00 | 1.00 | 3.00 | 300.00 |
| | | | | | - |
| | Sub Total | | | | 15,100.00 |
| 1.1.2 | Enforce alternative methods to gold processing | | | | |
| 1.1.2.1 | Multidisciplinary team to host training workshop on alternative methods | | | | |
| 1.1.2.2 | Total DSA costs for 5 persons (for 3 meetings) = 100 x 15 persons x 3 meetings= 4,500 | 100.00 | 15.00 | 3.00 | 4,500.00 |
| 1.1.2.3 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip)= 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | - | - | - | - |
| 1.1.2.4 | Conference package for 30 persons for 3 meetings= 50 x 30 persons x 3 meetings x 2 visits | 50.00 | 30.00 | 6.00 | 9,000.00 |
| 1.1.2.5 | Round trip fuel total Costs per meeting (3 meetings) = 2 x 400 L x 3 meetings = 2,400 | 2.00 | 400.00 | 3.00 | 2,400.00 |
| 1.1.3.0 | Enforcement | | | | |
| 1.1.3.1 | DSA Costs per person (8 persons); 100 x 5 days x 4 quarters= 16,000 | 100.00 | 8.00 | 20.00 | 16,000.00 |
| 1.1.3.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip)= 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | - | - | - | - |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--------------|---|-----------|----------|---------------|------------------|
| 1.1.3.2 | Round trip fuel total Costs= 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.1.3.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 36,700.00 |
| | | | | | |
| 1.2 | To kick-start sensitization programmes for key stakeholders on the environmental and health implications of burning of the amalgam in open-air environment as well as in residential settings. | | | | |
| 1.2.0 | Undertake a follow-up detailed study to determine the quantities of mercury used and gold produced in all ASGM active sites. | | | | |
| 1.2.1.1 | DSA costs for 5 persons: 100x5daysx4quartersx5 persons | 100.00 | 5.00 | 20.00 | 10,000.00 |
| 1.2.1.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | | | | |
| 1.2.1.2 | Round trip fuel total Costs= 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.2.1.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 14,800.00 |
| | | | | | |
| 1.2.2 | Promote alternative methods to gold processing. | | | | |
| 1.2.2.1 | DSA Costs per person (8 persons); 100 x 5 days x 4 quarters= 16,000 | 100.00 | 8.00 | 20.00 | 16,000.00 |
| 1.2.2.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | | | | - |
| 1.2.2.2 | Round trip fuel total Costs= 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.2.2.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 20,800.00 |
| | | | | | |
| 1.3 | Undertake detailed study to determine the quantity of mercury used and gold produced in ASGM. | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--------------|---|-----------|----------|---------------|------------------|
| 1.3.1 | Formation of coordination mechanism Coordination meetings | | | | |
| 1.3.1.1 | DSA costs for 20 persons for 5 meetings= 100x20x5= 10, 000 | 100.00 | 20.00 | 5.00 | 10,000.00 |
| 1.3.1.2 | Conference package for 20 persons for 5 meetings= 50 x 20 persons x 5 meetings= 5, 000 | 50.00 | 20.00 | 5.00 | 5,000.00 |
| 1.3.1.3 | Review of work under this strategy: DSA Costs per person for 15 persons for 3 meetings; =100 x 15 x 3= 4,500 | 100.00 | 15.00 | 3.00 | 4,500.00 |
| | Sub Total | | | | 19,500.00 |
| | | | | | |
| 1.3.2 | Formulation of terms of reference for the multidisciplinary team to undertake a detailed study on mercury use and gold production in ASGM: Office work by ZEMA secretariat: Costs: No cost | | | | |
| 1.3.3 | Formation of a multidiscipline team to undertake study to quantify the amounts of mercury used and gold produced. Costs: No Costs | | | | |
| 1.3.4 | Site visits to quantify the amounts of mercury in use and gold produced in ASGM. | | | | |
| 1.3.4.1 | DSA costs for 6 persons for a Site visits= 100 x 6 persons x 35 days | 100.00 | 6.00 | 35.00 | 21,000.00 |
| 1.3.4.2 | Fuel Costs 2 per L x 400 L x 8 Trips | 2.00 | 400.00 | 8.00 | 6,400.00 |
| 1.3.4.3 | Annual working fuel costs (half of round-trip travelling fuel) | 6,400.00 | 0.50 | 1.00 | 3,200.00 |
| 1.3.4.4 | Hiring Equipment (Gold detectors, camera, XRF etc) | 100.00 | 1.00 | 35.00 | 3,500.00 |
| 1.3.4.5 | Car Hire Costs 170 x 35 | 170.00 | 1.00 | 35.00 | 5,950.00 |
| | Sub Total | | | | 40,050.00 |
| | | | | | |
| 1.3.5 | Validation of results of the study. | | | | |
| 1.3.5.1 | DSA costs for 30 persons for a meeting= 100 x 30 persons x 1 = 3, 000 | 100.00 | 30.00 | 1.00 | 3,000.00 |
| 1.3.5.2 | Local Transport costs for 20 persons= 50 x 20 persons=1000 | 50.00 | 20.00 | 1.00 | 1,000.00 |
| 1.3.5.3 | Conference package for 30 persons for 1 meeting= 50 x 30 persons x 1 meeting | 50.00 | 30.00 | 1.00 | 1,500.00 |
| 1.3.5.4 | Transport Costs for those outside Lusaka (10 persons) =400 x 10 persons=4,000 | 400.00 | 10.00 | 1.00 | 4,000.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|-----------|----------|---------------|------------------|
| | Sub Total | | | | 9,500.00 |
| | | | | | |
| 1.4.0 | Promote use of equipment that captures mercury for reuse. | | | | |
| 1.4.1.0 | Set up pilots of centralized station equipped with mercury amalgam retorts for burning of the amalgam. | | | | |
| 1.4.1.1 | Purchase of Mercury amalgam retorts costs (With the view of fabrication locally, consider UNZA-TDAU); 1,000 per retort x 12 Sites= 12, 000 | 1,000.00 | 12.00 | 1.00 | 12,000.00 |
| 1.4.1.2 | Deployment and commissioning of Mercury amalgam retorts | | | | |
| 1.4.1.3 | Conference package for 30 persons for 1 meeting= 50 x 30 persons x 1 meeting | 50.00 | 30.00 | 1.00 | 1,500.00 |
| 1.4.1.4 | DSA Costs per person per meeting (3 cooperatives to be attended to); 100 x 3 days x 4 meeting*5persons = 6000 | 100.00 | 5.00 | 12.00 | 6,000.00 |
| 1.4.1.5 | Travelling fuel= 1 L per 7 km (2 per 1 L), Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Total Fuel per round trip (L)= 2800/7 = 400 L, Round trip fuel total Costs per meeting= 2 x 400 L = 800: Total fuel costs for 4 meetings= 800 x 4 = 3, 200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| | Sub Total | | | | 22,700.00 |
| | | | | | |
| 1.4.2 | Acquisition and installation of mercury testers at the centralized stations. | | | | |
| 1.4.2.1 | Purchase of mercury vapor testing kits (Drager Pumps) =500 per unit x 12 testing kits= 6,000 | 500.00 | 12.00 | 1.00 | 6,000.00 |
| 1.4.2.2 | Drager pump detector tubes (100 per pack of 10, consumables) = 100 x 12 packs =1,200 | 100.00 | 12.00 | 1.00 | 1,200.00 |
| 1.4.2.3 | Urine Mercury Testers (e.g. Mercury Tri-Test®) at 600 each | 600.00 | 12.00 | 1.00 | 7,200.00 |
| | Sub Total | | | | 14,400.00 |
| | | | | | |
| 1.5 | Prohibit any chemical-based gold processing techniques within 100 meters of a natural water body including rivers, streams, lakes etc. | | | | |
| 1.5.1 | Banning use of chemical-based gold processing within 100 meters of a natural water body | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--------------|---|-----------|----------|---------------|------------------|
| 1.5.1.1 | Stakeholder meetings: DSA costs for 30 persons 3 meetings= 100 x 30 persons x 3 = 9,000 | 100.00 | 30.00 | 3.00 | 9,000.00 |
| 1.5.1.2 | Local Transport costs for 20 persons= 50 x 20 persons x 3 meetings =3,000 | 50.00 | 20.00 | 3.00 | 3,000.00 |
| 1.5.1.3 | Transport Costs for those outside Lusaka (10 persons) =400 x 10 persons x 3 meetings =12,000 | 400.00 | 10.00 | 3.00 | 12,000.00 |
| 1.5.1.4 | Enforcement Costs | | | | |
| 1.5.1.5 | Total DSA Costs; 100 x 5 days x 4 quartersx8persons= 16,000 | 100.00 | 8.00 | 20.00 | 16,000.00 |
| 1.5.1.6 | Travelling fuel= 1 L per 7 km (2 per 1 L), Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Total Fuel per round trip (L)= 2800/7 = 400 L, Round trip fuel total Costs per meeting= 2 x 400 L = 800: Total fuel costs for 4 meetings= 800 x 4 = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.5.1.7 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total (For Stakeholder Meetings) | | | | 44,800.00 |
| | | | | | |
| 1.5.2 | Continued monitoring of contamination levels in rivers close to mercury processing sites. | | | | |
| 1.5.2.1 | DSA Costs per person; 100 x 5 days x 4 quarters 5 persons= 10,000 | 100.00 | 5.00 | 20.00 | 10,000.00 |
| 1.5.2.2 | Travelling fuel= 1 L per 7 km (2 per 1 L), Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Total Fuel per round trip (L)= 2800/7 = 400 L, Round trip fuel total Costs per meeting= 2 x 400 L = 800: Total fuel costs for 4 meetings= 800 x 4 = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.5.2.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 14,800.00 |
| | | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|---|------------|----------|---------------|-------------------|
| 1.6 | To promote mercury free alternative methods in gold processing such as the use of; (i) the borax method, (ii) corn starch (α -Cyclodextrin, α -CD), iii. gravity-only concentration e.g. panning, sluicing, shaking tables, spiral concentrators, vortex concentrators, centrifuges etc; and (iv) thiosulphate | | | | |
| 1.6.2 | Purchase of equipment and reagents for alternative technologies trainings. | | | | |
| 1.6.2.1 | Costs of borax-based methods | 1,000.00 | 12.00 | 1.00 | 12,000.00 |
| 1.6.2.2 | Costs of Sluices @ 500 each | 500.00 | 12.00 | 1.00 | 6,000.00 |
| 1.6.2.3 | Costs of Thiosulphate @ 500 per tonne | 500.00 | 1.00 | 1.00 | 500.00 |
| 1.6.2.4 | DSA Costs per person per meeting (3 cooperatives to be attended to); 100 x 3 days x 4 meeting*5persons = 6000 | 100.00 | 5.00 | 12.00 | 6,000.00 |
| 1.6.2.5 | Travelling fuel= 1 L per 7 km (2 per 1 L), Furthest distance (round trip)= 1,400 km x 2 = 2800 km, Total Fuel per round trip (L)= 2800/7 = 400 L, Round trip fuel total Costs per meeting= 2 x 400 L = 800: Total fuel costs for 4 meetings= 800 x 4 = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.6.2.6 | Purchase of gravity concentrators, sluice box, vortex concentrator (100,000) and genset (30 kV, 20,000) | 120,000.00 | 3.00 | 1.00 | 360,000.00 |
| | Sub Total | | | | 387,700.00 |
| 1.6.3 | Encourage and implement co-operatives to spearhead technology acquisition | | | | |
| 1.6.3.1 | DSA Costs per person (5 persons); 100 x 5 days x 4 quarters= 16,000 | 100.00 | 5.00 | 20.00 | 10,000.00 |
| 1.6.3.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | | | | - |
| 1.6.3.3 | Round trip fuel total Costs= 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.6.3.4 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| 1.6.3.5 | Conference package for 30 persons for 3 meetings= 50 x 30 persons x 3 meetings x 2 visits | 50.00 | 30.00 | 6.00 | 9,000.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--------------|--|-----------|----------|---------------|------------------|
| | Sub Total | | | | 23,800.00 |
| | | | | | |
| 1.7.0 | Promote and conduct research on impacts of mercury and its compounds on miners and their families and especially children, women and pregnant women from exposure to mercury. | | | | |
| 1.7.1.0 | Develop Protocols for Research | | | | |
| 1.7.1.1 | Conference Package (2 meetings) | 20.00 | 15.00 | 10.00 | 3,000.00 |
| 1.7.1.2 | Total DSA Costs | 100.00 | 15.00 | 10.00 | 15,000.00 |
| 1.7.1.3 | Transport refund for the workshop participants | 10.00 | 15.00 | 4.00 | 600.00 |
| 1.7.1.4 | Lunch Allowance (for participants) | 10.00 | 15.00 | 2.00 | 300.00 |
| | Sub Total | | | | 18,900.00 |
| 1.7.2.0 | Conduct research on site specific exposure route and fate of mercury (soil, air, water, sediment, biota). | | | | |
| 1.7.2.1 | Total DSA Costs (5 teams visiting 5 different regions) | 100.00 | 25.00 | 15.00 | 37,500.00 |
| 1.7.2.2 | Round trip fuel total Costs (400 x 5 trips) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 1.7.2.3 | Research Tools (GPS, Stationary) | 500.00 | 50.00 | 1.00 | 25,000.00 |
| 1.7.2.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 64,750.00 |
| 1.7.3.0 | Undertake a national detailed study on the role of women in the ASGM | | | | |
| 1.7.3.1 | Total DSA Costs (5 teams visiting 5 different regions) | 100.00 | 25.00 | 15.00 | 37,500.00 |
| 1.7.3.2 | Round trip fuel total Costs (400 x 5 trips) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 1.7.3.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 1.7.3.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 40,250.00 |
| 1.7.3.0 | Conduct health impact assessments of ASG miners and vulnerable population | | | | |
| 1.7.3.1 | Total DSA Costs (5 teams visiting 5 different regions) | 100.00 | 25.00 | 15.00 | 37,500.00 |
| 1.7.3.2 | Round trip fuel total Costs (400 x 5 trips) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 1.7.3.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 1.7.3.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 40,250.00 |
| 1.7.4.0 | Conduct environmental monitoring of contaminated areas in ASGM sites and the surrounding communities. | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|---|-----------|----------|---------------|------------------|
| 1.7.4.1 | Total DSA Costs (5 teams visiting 5 different regions: Once per year) | 100.00 | 25.00 | 30.00 | 75,000.00 |
| 1.7.4.2 | Round trip fuel total Costs (400 x 5 trips per year) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 1.7.4.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 1.7.4.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 77,750.00 |
| 1.7.5.0 | Strengthen laboratory capacity to undertake analysis | | | | |
| 1.7.5.1 | Procurement of laboratory reagents | | | | 10,000.00 |
| 1.7.5.2 | Total DSA Costs (Training for laboratory staff) | 100.00 | 25.00 | 10.00 | 25,000.00 |
| 1.7.5.3 | Round trip fuel total Costs (400 x 5 trips per year) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 1.7.5.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 37,250.00 |
| | | | | | |
| 1.8.0 | Strategy 1.8 Management of ASGM gold ore processing tailings/waste | | | | |
| 1.8.1.0 | Sampling and analysis of tailings in active mining sites to ascertain levels of mercury contamination. | | | | |
| 1.8.1.1 | DSA Costs per person; 100 x 5 days x 4 quarters= 2000 Total DSA costs for 5 persons= 2000 x 5 = 10, 000 | 2,000.00 | 5.00 | 1.00 | 10,000.00 |
| 1.8.1.2 | Round trip annual= 800 x 4 Trips | 800.00 | 4.00 | 1.00 | 3,200.00 |
| 1.8.1.3 | Annual working fuel costs (half of round-trip travelling fuel) | 1,600.00 | 1.00 | 1.00 | 1,600.00 |
| 1.8.1.4 | Hiring of equipment = 100 x 3 days | 100.00 | 1.00 | 3.00 | 300.00 |
| | Other confirmatory laboratory costs (50 per sample x 26 sites x 5 samples) | 50.00 | 26.00 | 5.00 | 6,500.00 |
| | Sub Total | | | | 21,600.00 |
| 1.8.2.0 | Ensure safe disposal of tailings by miners for future land reclamation by relevant stakeholders. | | | | |
| | DSA, conference package and Fuel Costs (To educate stakeholders on safe disposal of tailings) | | | | |
| 1.8.2.1 | Total DSA costs for 5 persons (for 3 meetings) = 300 x 5 persons x 3 times a year | 300.00 | 5.00 | 3.00 | 4,500.00 |
| 1.8.2.2 | Total fuel costs for 3 meetings= 800 x 3 | 800.00 | 3.00 | 1.00 | 2,400.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---|---|---------------------|-------------|---------------|----------------------|
| 1.8.2.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 8,500.00 |
| 1.8.3.0 | Enforcement costs | | | | |
| 1.8.3.1 | DSA Costs per person (8 persons); 100 x 5 days x 4 quarters= 16,000 | 100.00 | 8.00 | 20.00 | 16,000.00 |
| 1.8.3.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (2 per 1 L) and Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | | | | - |
| 1.8.3.3 | Round trip fuel total Costs= 2 x 400 L x 4 quarters = 3,200 | 2.00 | 400.00 | 4.00 | 3,200.00 |
| 1.8.3.4 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 20,800.00 |
| | | | | | |
| | Grand Total Objective 1 | | | | 994,700.00 |
| | Contingency (10% of grand Total) | | | | 99,470.00 |
| | Grand Total - Baseline Working Group | | | | 1,094,170.00 |
| | | | | | |
| Objective 2: To increase the percentage of formalised group of ASGM miners in all gold mineralised areas from the current 2% to 50% by 2030. | | | | | |
| 2.1.0 | Delineate land for 3 ASGM | | | | |
| 2.1.1.0 | Conduct detailed geological survey in all gold mineralised areas in the country | | | | |
| 2.1.1.1 | Daily Subsistence Allowance | 99,971.91 | 1.00 | 3.00 | 299,915.73 |
| 2.1.1.2 | Fuel | 2,002.08 | 1.00 | 3.00 | 6,006.24 |
| 2.1.1.3 | Materials and Equipment | 8,440.45 | 1.00 | 3.00 | 25,321.35 |
| 2.1.1.4 | Diamond Drilling | 6,919,101.12 | 1.00 | 3.00 | 20,757,303.37 |
| | Activity Total | 7,029,515.56 | | | 21,088,546.69 |
| | | | | | |
| 2.1.2.0 | Allocate areas of operations in gold occurrence districts to ASGM individuals and cooperatives | | | | |
| 2.1.2.1 | Daily Subsistence Allowance | 3,651.69 | 1.00 | 3.00 | 10,955.06 |
| 2.1.2.2 | Fuel Refunds | 525.84 | 1.00 | 3.00 | 1,577.53 |
| | Activity Total | 4,177.53 | | | 12,532.59 |
| | | | | | |
| 2.1.3.0 | Identify and isolate protected and ecologically sensitive areas | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|------------------|-------------|---------------|----------------------|
| | from ASGM activities | | | | |
| 2.1.3.1 | Daily Subsistence Allowance | 8,426.97 | 1.00 | 3.00 | 25,280.90 |
| 2.1.3.2 | Transport Refunds | 674.16 | 1.00 | 3.00 | 2,022.47 |
| 2.1.3.3 | Conference Package | 2,528.09 | 1.00 | 3.00 | 7,584.27 |
| | Activity Total | 11,629.21 | | | 34,887.64 |
| | | | | | |
| 2.1.4.0 | Develop conservation value maps in 10 provinces | | | | |
| 2.1.4.1 | Daily Subsistence Allowance | 7,191.01 | 1.00 | 3.00 | 21,573.03 |
| 2.1.4.2 | Transport Refund | 359.55 | 1.00 | 3.00 | 1,078.65 |
| 2.1.4.3 | Conference Package | 2,157.30 | 1.00 | 3.00 | 6,471.91 |
| | Activity Total | 9,707.87 | 1.00 | 3.00 | 29,123.59 |
| | Strategy 1: Total | | | | 21,165,090.51 |
| | | | | | |
| 2.2.0 | Facilitate formation of miners' organizations | | | | |
| 2.2.1.0 | Establish 40 viable ASGM cooperatives and establish a national association of ASGM miners with the support of the ministry responsible for mining | | | | |
| 2.2.1.1 | Daily Subsistence Allowance | 3,651.69 | | 27.00 | 98,595.51 |
| 2.2.1.2 | Fuel | 1,539.33 | | 27.00 | 41,561.80 |
| 2.2.1.3 | Conference Package | 7,415.73 | | 27.00 | 200,224.72 |
| | Activity Total | 12,606.74 | | | 340,382.03 |
| | | | | | |
| 2.2.2.0 | Provide training on governance and business administration, mining technical services to ASGM cooperatives; | | | | |
| 2.2.2.1 | Daily Subsistence Allowance | 2,949.44 | | 23.00 | 67,837.08 |
| 2.2.2.2 | Fuel | 2,550.56 | | 23.00 | 58,662.92 |
| 2.2.2.3 | Stationery | 206.74 | | 23.00 | 4,755.06 |
| 2.2.2.4 | Conference Package | 13,483.15 | | 23.00 | 310,112.36 |
| | Activity Total | 19,189.89 | | | 441,367.42 |
| | | | | | |
| 2.2.3.0 | Organize and facilitate participation of ASGM players in regional and international workshops/conference/exhibitions on ASGM activities. | | | | |
| 2.2.3.1 | Daily Subsistence Allowance | 2,247.19 | | 3.00 | 6,741.57 |
| 2.2.3.2 | Transport Refund | 89.89 | | 3.00 | 269.66 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|---|------------------|----------|---------------|-------------------|
| 2.2.3.3 | Stationery | 282.30 | | 3.00 | 846.91 |
| 2.2.3.4 | Conference Package | 674.16 | | 3.00 | 2,022.47 |
| | Activity Total | 3,293.54 | | | 9,880.61 |
| | Strategy 2: Total | | | | 791,630.06 |
| | | | | | |
| 2.3.0 | License and regulate ASGM | | | | |
| 2.3.1.0 | Review and strengthen the regulatory framework to address all gaps, barriers, and inconsistencies | | | | |
| 2.3.1.1 | Position and Issues Papers | | | | |
| 2.3.1.2 | Daily Subsistence Allowance | 3,370.79 | | 1.00 | 3,370.79 |
| 2.3.1.3 | Fuel | 224.72 | | 1.00 | 224.72 |
| 2.3.1.4 | Conference Package | 1,516.85 | | 1.00 | 1,516.85 |
| | Sub-Total | 5,112.36 | | 1.00 | 5,112.36 |
| 2.3.2.0 | Review Process - Stakeholder Engagement | | | | |
| 2.3.2.1 | Daily Subsistence Allowance | 1,404.49 | | 10.00 | 14,044.94 |
| 2.3.2.2 | Fuel | 977.53 | | 10.00 | 9,775.28 |
| 2.3.2.3 | Conference Package | 2,949.44 | | 10.00 | 29,494.38 |
| | Sub-Total | 5,331.46 | | 10.00 | 53,314.60 |
| | | | | | |
| 2.3.3.0 | Validation | | | | |
| 2.3.3.1 | Fuel | 449.44 | | 1.00 | 449.44 |
| 2.3.3.2 | Conference Package | 674.16 | | 1.00 | 674.16 |
| | Sub-Total | 1,123.60 | | 1.00 | 1,123.60 |
| | Activity Total | 11,567.42 | | | 59,550.56 |
| | | | | | |
| 2.3.4.0 | Facilitate the issuance of mining and non-mining rights related to ASGM activities and facilitate the issuance of environmental clearance to ASGM activities | | | | |
| 2.3.4.1 | Daily Subsistence Allowance (Inspections) | 3,932.58 | | 2.00 | 7,865.17 |
| 2.3.4.1 | Fuel | 1,213.48 | | 2.00 | 2,426.97 |
| | Activity Total | 5,146.07 | | | 10,292.14 |
| | Strategy 3: Total | | | | 69,842.70 |
| | | | | | |
| 2.4.0 | Organize the supply chain | | | | |
| 2.4.1.1 | Register at least 50% of national gold exports | - | - | - | - |
| 2.4.2.0 | Review and implement favourable tax regime specific to ASGM; | | | | |
| 2.4.2.1 | Daily Subsistence Allowance | 5,898.88 | | 1.00 | 5,898.88 |
| 2.4.2.2 | Fuel | 337.08 | | 1.00 | 337.08 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|-----------------|----------|---------------|------------------|
| 2.4.2.3 | Stationery | 38.20 | | 1.00 | 38.20 |
| 2.4.2.4 | Conference Package | 505.62 | | 1.00 | 505.62 |
| | Activity Total | 6,779.78 | | | 6,779.78 |
| | | | | | |
| 2.4.2.0 | Organize and facilitate participation of ASGM players in regional and international workshops/conference/exhibitions on ASGM activities (Local Events) | | | | |
| 2.4.2.1 | Daily Subsistence Allowance | 2,247.19 | | 3.00 | 6,741.57 |
| 2.4.2.2 | Fuel | 89.89 | | 3.00 | 269.66 |
| 2.4.2.3 | Stationery | 282.30 | | 3.00 | 846.91 |
| 2.4.2.4 | Conference Package | 674.16 | | 3.00 | 2,022.47 |
| | Activity Total | 3,293.54 | | 3.00 | 9,880.61 |
| | Strategy 4: Total | | | | 16,660.39 |
| | | | | | |
| 2.5.0 | Facilitate access to finance, markets, and services | - | | | - |
| 2.5.1 | Facilitate 100 ASGM cooperatives to open bank and/or mobile accounts | - | | | - |
| 2.5.2 | Facilitate the establishment of savings and loans groups in ASGM communities | - | | | - |
| 2.5.3 | Receive training in financial literacy including at least 40% participation of women | - | | | - |
| 2.5.4 | Encourage financial institutions (including corporate, stock markets and development banks) to come up with tailor made financial instruments for accessibility to ASGM miners | - | | | - |
| 2.5.5 | Facilitate setting-up of localised small refineries/smelting furnaces with capacity of not less than 50 kilograms of gold processing per day, in areas of gold mineralisation | | | | |
| 2.5.6 | Purchase smelting furnaces and installation | 6,000.00 | | 3.00 | 18,000.00 |
| | Activity Total | 6,000.00 | | | 18,000.00 |
| 2.5.7 | Establish market and trading centres for gold and other precious minerals including gem stones; | - | | | - |
| 2.5.7.1 | Identification of Sites | 1,573.03 | | 5.00 | 7,865.17 |
| 2.5.7.2 | Fuel | 393.26 | | 5.00 | 1,966.29 |
| 2.5.7.3 | Tendering | 252.81 | | 5.00 | 1,264.04 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------------|----------|---------------|-------------------|
| 2.5.7.4 | Construction of Structures (Offices, Police, Market Center, Storage Facilities) | 84,269.66 | | 5.00 | 421,348.31 |
| | Activity Total | 84,522.47 | | | 432,443.81 |
| 2.5.8.0 | Standardise a uniform gold price pegged against the LBMA/LME spot prices; | - | | | - |
| 2.5.9.0 | Facilitate establishment of value addition linkages downstream in the gold value chain. | - | | | - |
| | Activity Total | - | | | - |
| | Strategy 5: Total | | | | 450,443.81 |
| 2.6.0 | Monitor, evaluate and enforce ASGM regulations | | | | |
| 2.6.1.0 | Establish local mining district offices and provincial bureaus to effectively monitor and enforce compliance | | | | |
| | Activity Total | - | | | - |
| 2.6.2.0 | Evaluate the effectiveness and efficiency of local mining district offices and provincial bureaus in enhancing compliance; | | | | |
| 2.6.2.1 | Daily Subsistence Allowance | 4,494.38 | | 3.00 | 13,483.15 |
| 2.6.2.2 | Fuel | 606.74 | | 3.00 | 1,820.22 |
| | Activity Total | 5,101.12 | | | 15,303.37 |
| 2.6.3.0 | Strengthen existing regional mining bureaus to effectively monitor and enforce compliance; | - | | | - |
| 2.6.4.0 | Strengthen the capacity of institutions to enforce breach of ASGM related obligations; and, | - | | | - |
| 2.6.5.0 | Evaluate the effectiveness of ASGM compliance to mining and environmental regulations in all gold mineralised areas. | - | | | - |
| 2.6.5.1 | Daily Subsistence Allowance | 898.88 | | 3.00 | 2,696.63 |
| 2.6.5.2 | Fuel | 606.74 | | 3.00 | 1,820.22 |
| | Activity Total | 1,505.62 | | | 4,516.85 |
| | Strategy 6: Total | | | | 19,820.22 |
| 2.7.0 | Manage mercury trade and mercury compounds | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--------------|--|------------------|----------|---------------|------------------|
| 2.7.1.0 | Review domestic laws and regulations regarding mercury, including its domestic use and treatment, as well as its trade internationally. | | | | |
| 2.7.1.1 | Position and Issues Papers | | | | |
| 2.7.1.2 | Daily Subsistence Allowance | 3,370.79 | | 2.00 | 6,741.57 |
| 2.7.1.3 | Fuel | 224.72 | | 2.00 | 449.44 |
| 2.7.1.4 | Conference Package | 1,516.85 | | 2.00 | 3,033.71 |
| | Sub Total | 5,112.36 | | | 10,224.72 |
| | Review Process | | | | |
| 2.7.2.0 | Stakeholder Engagement | | | | |
| 2.7.2.1 | Daily Subsistence Allowance | 1,404.49 | | 2.00 | 2,808.99 |
| 2.7.2.2 | Fuel | 977.53 | | 2.00 | 1,955.06 |
| 2.7.2.3 | Conference Package | 2,949.44 | | 2.00 | 5,898.88 |
| | Sub Total | 5,331.46 | | | 10,662.93 |
| 2.7.3.0 | Validation | | | | |
| 2.7.3.1 | Fuel | 449.44 | | 2.00 | 898.88 |
| 2.7.3.2 | Conference Package | 674.16 | | 2.00 | 1,348.31 |
| 2.7.3.3 | Sub-Total | 1,123.60 | | | 2,247.19 |
| | Activity Total | 11,567.42 | | | 23,134.84 |
| | | | | | |
| 2.8.2 | Take an inventory of “pressure points” or other factors that will affect mercury trade. | | | | |
| 2.8.2.1 | Stakeholder Consultation in Border Districts | | | | |
| 2.8.2.2 | Daily Subsistence Allowance | 800.56 | | 1.00 | 800.56 |
| 2.8.2.3 | Fuel | 1,741.57 | | 1.00 | 1,741.57 |
| 2.8.2.4 | Stationery | 478.60 | | 1.00 | 478.60 |
| 2.8.2.5 | Conference | 505.62 | | 1.00 | 505.62 |
| | Activity Total | 3,526.35 | | | 3,526.35 |
| 2.8.3.0 | Monitor mercury trade flows across borders and within the country. | | | | |
| 2.8.3.0 | Identify the sources of illegal mercury imports, including the existing or likely mercury entry points into the country, and the distribution networks within the country. | | | | |
| | Strategy 8: Total | | | | 26,661.19 |
| | | | | | |
| 2.9.0 | Prevent diversion of mercury and mercury compounds from being used in ASGM. | | | | |
| 2.9.1.0 | Develop licensing requirements for mercury traders and/or | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---|---|-----------------|----------|---------------|----------------------|
| | large mercury sales. | | | | |
| 2.9.1.1 | Daily Subsistence Allowance | 5,617.98 | | 2.00 | 11,235.96 |
| 2.9.1.2 | Fuel | 449.44 | | 2.00 | 898.88 |
| 2.9.1.3 | Conference Package | 2,106.74 | | 2.00 | 4,213.48 |
| | Activity Total | 8,174.16 | | | 16,348.32 |
| | | | | | |
| 2.9.2.0 | Restrict the issuance of permits for the importation of mercury and mercury compounds. | | | | |
| | | | | | |
| 2.9.3.0 | Undertake regular site inspections to trace the source of mercury used on ASGM areas of operations. | | | | |
| 2.9.3.1 | Daily Subsistence Allowance | 3,651.69 | | 3.00 | 10,955.06 |
| 2.9.3.2 | Fuel | 525.84 | | 3.00 | 1,577.53 |
| | Activity Total | 4,177.53 | | | 12,532.59 |
| | Strategy 9: Total | | | | 28,880.91 |
| | | | | | |
| 2.10.0 | Cross-cutting issues | | | | |
| 2.10.1 | Establish ASGM desks in institutions relevant to ASGM activities. | - | | | - |
| 2.10.2 | Build infrastructure (roads, communication, hospitals, security) in all gold mineralised areas. | - | | | - |
| | Activity Total | - | | | - |
| | | | | | |
| | Total Objective 2 | | | | 22,569,029.79 |
| | Contingency (10% of grand Total) | | | | 2,256,902.98 |
| | Grand Total - Objective 2 | | | | 24,825,932.77 |
| | | | | | |
| OBJECTIVE 3: To establish a coordination mechanism and strengthen synergies between line ministries and stakeholders in the implementation of the ASGM related activities by 2030. | | | | | |
| 3.1.0 | STRATEGY 1: Create coordinating structures for the implementation of the NAP - i.) Advisory Committee ii.) Technical Committee | | | | |
| 3.1.1.0 | conduct meeting to identify and orient the relevant stakeholders | | | | |
| 3.1.1.1 | Conference Package | 20.00 | 50.00 | 2.00 | 2,000.00 |
| 3.1.1.2 | Transport Refund for orientation | 40.00 | 50.00 | 2.00 | 4,000.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|-----------|----------|---------------|------------------|
| | meeting | | | | |
| 3.1.1.3 | Refreshments for preparatory meetings | 50.00 | 10.00 | 1.00 | 500.00 |
| 3.1.1.4 | Transport Refund for preparatory meetings | 10.00 | 10.00 | 1.00 | 100.00 |
| 3.1.1.5 | Working Allowance | 15.00 | 10.00 | 1.00 | 150.00 |
| | Sub Total | | | | 6,750.00 |
| | | | | | |
| 3.1.2.0 | Conduct a national capacity building meeting on the implementation of the NAP | | | | |
| 3.1.2.1 | Conference Package | 20.00 | 50.00 | 2.00 | 2,000.00 |
| 3.1.2.2 | Total DSA costs | 100.00 | 50.00 | 5.00 | 25,000.00 |
| 3.1.2.3 | Transport Refund for capacity building meeting | 40.00 | 50.00 | 2.00 | 4,000.00 |
| 3.1.2.4 | Lunch Allowance | 10.00 | 50.00 | 1.00 | 500.00 |
| 3.1.2.5 | Refreshments for preparatory meetings | 50.00 | 10.00 | 2.00 | 1,000.00 |
| 3.1.2.6 | Transport Refund for preparatory meetings | 10.00 | 10.00 | 2.00 | 200.00 |
| 3.1.2.7 | Working Allowance | 15.00 | 10.00 | 2.00 | 300.00 |
| | Sub Total | | | | 33,000.00 |
| | | | | | |
| 3.1.3.0 | Develop stakeholder coordination guidelines | | | | |
| 3.1.3.1 | Conference Package | 20.00 | 15.00 | 10.00 | 3,000.00 |
| 3.1.3.2 | Total DSA Costs (2 *5 days meeting) | 100.00 | 15.00 | 10.00 | 15,000.00 |
| 3.1.3.3 | Transport refund for the workshop | 20.00 | 15.00 | 4.00 | 1,200.00 |
| 3.1.3.3 | Lunch allowance | 50.00 | 15.00 | 2.00 | 1,500.00 |
| | Sub Total | | | | 20,700.00 |
| | | | | | |
| 3.1.4.2 | Stakeholder Validation meeting for the guidelines | | | | |
| 3.1.4.1 | Conference Package | 20.00 | 40.00 | 1.00 | 800.00 |
| 3.1.4.2 | Transport refund | 20.00 | 40.00 | 1.00 | 800.00 |
| 3.1.4.3 | Refreshments for preparatory meetings | 50.00 | 10.00 | 1.00 | 500.00 |
| 3.1.4.4 | Transport Refund for preparatory meetings | 10.00 | 10.00 | 1.00 | 100.00 |
| 3.1.4.5 | Working Allowance | 15.00 | 10.00 | 1.00 | 150.00 |
| 3.1.4.6 | Printing of the handbook guidelines | 15.00 | 100.00 | 1.00 | 1,500.00 |
| | Sub Total | | | | 3,850.00 |
| | Total Strategy 1 | | | | 64,300.00 |
| | | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------|----------|---------------|------------------|
| 3.2.0 | Strategy 2: Develop and implement awareness strategies on the dangers of mercury use, emerging good practices and formalisation in order to provide a balanced narrative on ASGMs potential contribution to national development. | | | | |
| 3.2.1.0 | Develop a communication strategy in line with the NAP objectives and strategies | | | | |
| 3.2.1.0 | Workshop to develop Communication Strategy | | | | |
| 3.2.1.1 | Conference Package | 20.00 | 15.00 | 10.00 | 3,000.00 |
| 3.2.1.2 | Total DSA Costs (2 *5 days meeting) | 100.00 | 15.00 | 10.00 | 15,000.00 |
| 3.2.1.3 | Transport refund for the workshop | 20.00 | 15.00 | 4.00 | 1,200.00 |
| 3.2.1.4 | Lunch allowance | 50.00 | 15.00 | 2.00 | 1,500.00 |
| | Sub Total | | | | 20,700.00 |
| 3.2.2.0 | Stakeholder Validation meeting for the communication strategy | | | | |
| 3.2.2.1 | Conference Package | 20.00 | 40.00 | 1.00 | 800.00 |
| 3.2.2.2 | Transport refund | 20.00 | 40.00 | 1.00 | 800.00 |
| 3.2.2.3 | Refreshments for preparatory meetings | 50.00 | 10.00 | 1.00 | 500.00 |
| 3.2.2.4 | Transport Refund for preparatory meetings | 10.00 | 10.00 | 1.00 | 100.00 |
| 3.2.2.5 | Working Allowance | 15.00 | 10.00 | 1.00 | 150.00 |
| 3.2.2.6 | Printing of the communication strategy booklet | 15.00 | 50.00 | 1.00 | 750.00 |
| | Sub Total | | | | 3,100.00 |
| | | | | | |
| 3.2.3 | Develop and produce Information, Education and Communication materials for print (brochures, booklets, newsletters etc.). broadcast (radio and TV), Online and social media and performing arts (drama/sketches, plays, music etc.) | | | | |
| 3.2.3.0 | Develop and produce IEC materials | | | | |
| 3.2.3.1 | Lunch Allowance | 10.00 | 20.00 | 5.00 | 1,000.00 |
| 3.2.3.2 | Refreshments for development of IEC materials meeting | 50.00 | 1.00 | 5.00 | 250.00 |
| 3.2.3.3 | Transport Refund for development of IEC materials meeting | 10.00 | 20.00 | 5.00 | 1,000.00 |
| 3.2.3.4 | Working Allowance | 15.00 | 20.00 | 5.00 | 1,500.00 |
| 3.2.3.5 | Printing | 100.00 | 100.00 | 1.00 | 10,000.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|--|--|-----------|----------|---------------|-------------------|
| 3.2.3.6 | Produce community radio programmes | 100.00 | 13.00 | 1.00 | 1,300.00 |
| 3.2.3.7 | Produce television programmes | 3,500.00 | 1.00 | 1.00 | 3,500.00 |
| | Sub Total | | | | 18,550.00 |
| | | | | | |
| 3.2.4.0 | Disseminate information, education and communication materials including those targeting the vulnerable and children – use different community radio stations, national television, online/social media platforms as well as Community outreach and advocacy campaigns. | | | | |
| 3.2.4.1 | a.) Electronic Platforms | | | | |
| 3.2.4.1.1 | Online/Social media updates | 50.00 | 52.00 | 1.00 | 2,600.00 |
| 3.2.4.1.2 | Broadcasting cost for community radio programmes | 100.00 | 13.00 | 1.00 | 1,300.00 |
| 3.2.4.1.3 | Broadcasting cost for television programmes | 600.00 | 1.00 | 2.00 | 1,200.00 |
| | Sub Total | | | | 5,100.00 |
| 3.2.4.2 | b.) Community Outreach & Advocacy Campaigns activities | | | | |
| 3.2.4.2.1 | Total DSA Costs (5 teams visiting 5 different regions) | 100.00 | 80.00 | 5.00 | 40,000.00 |
| 3.2.4.2.2 | Round trip fuel total Costs (1 x 400 L x 5 trips) | 1.00 | 400.00 | 5.00 | 2,000.00 |
| 3.2.4.2.3 | Refreshments (for participants) | 100.00 | 1.00 | 16.00 | 1,600.00 |
| 3.2.4.2.4 | Lunch Allowance (for Secretariat) | 10.00 | 5.00 | 1.00 | 50.00 |
| 3.2.4.2.5 | DSA ZANIS Official | 100.00 | 2.00 | 5.00 | 1,000.00 |
| | Sub Total | | | | 44,650.00 |
| | Total Strategy 2 | | | | 92,100.00 |
| | Total Objective 3 | | | | 156,400.00 |
| | Contingency (10% of grand Total) | | | | 15,640.00 |
| | Grand Total - Objective 3 | | | | 172,040.00 |
| | | | | | |
| Objective 4: To achieve 40% provision of health care services to ASGM players by implementing Public Health and Social Protection strategies aimed at improving health by 2023. | | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------|----------|---------------|------------------|
| 4.1.0 | STRATEGY 1. Institutional Strengthening and Systems Building (ISSB) for regulators, line ministries and all key stakeholders in addressing impacts of mercury and its compounds | | | | |
| 4.1.1.0 | a. Develop diagnosis and treatment protocols for mercury exposure | | | | |
| 4.1.1.1 | DSA Costs per person; (100 x 5 days x 15 persons) | 100.00 | 20.00 | 5.00 | 10,000.00 |
| 4.1.1.2 | Fuel Costs: Travelling fuel= 1 L per 7 km (1 per 1 L) and distance (round trip) = 50 km x 2 = 2800 km, Fuel per L= 2800/7) | 20.00 | 20.00 | 1.00 | 400.00 |
| 4.1.1.3 | Hiring of conference (20 x 5 days x 20 persons) | 20.00 | 20.00 | 5.00 | 2,000.00 |
| 4.1.1.4 | Report writing and consolidation of guidelines (100 x 2 days x 5 persons) | 100.00 | 5.00 | 2.00 | 1,000.00 |
| | Sub Total | | | | 13,400.00 |
| 4.1.2.0 | b. Integrate mercury and other neurotoxins in the health information system (develop data collection tools and indicators) | | | | |
| 4.1.2.1 | DSA Costs per person (20 persons); (100 x 5 days x 2 meetings) | 100.00 | 30.00 | 10.00 | 30,000.00 |
| 4.1.2.2 | Fuel for a round trip 1 x 400 L x 4 quarters = 3,200 | 400.00 | 2.00 | 1.00 | 800.00 |
| 4.1.2.3 | Procurement of equipment (computers) | 500.00 | 10.00 | 1.00 | 5,000.00 |
| | Sub Total | | | | 35,800.00 |
| 4.1.3.0 | c. Capacity building for health care workers in diagnosing and treating mercury poisoning | | | | |
| 4.1.3.1 | DSA costs for 5 persons: (100x5daysx2 sessions x 30 persons) | 100.00 | 10.00 | 30.00 | 30,000.00 |
| 4.1.3.2 | Fuel for a round trip 1 x 400 L x 4 quarters = 3,200 | 1.00 | 400.00 | 30.00 | 12,000.00 |
| 4.1.3.3 | Annual working fuel costs (half of round-trip travelling fuel) = 1,600 | 3,200.00 | 0.50 | 1.00 | 1,600.00 |
| | Sub Total | | | | 43,600.00 |
| 4.1.4.0 | d. Implement outreach programs to ASGM sites and the surrounding communities | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------|----------|---------------|-------------------|
| 4.1.4.1 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.1.4.2 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.1.4.3 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.1.4.4 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 163,800.00 |
| | Total for Strategy 1 | | | | 256,600.00 |
| 4.2.0 | STRATEGY 2: Establish and implement the monitoring plan for human exposure within the ASGM sites and the surrounding communities | | | | |
| 4.2.1.0 | a. Develop a monitoring plan for human biological exposures | | | | |
| 4.2.1.1 | Total DSA Costs (5 teams visiting 5 different regions: Once per year) | 100.00 | 25.00 | 30.00 | 75,000.00 |
| 4.2.1.2 | Round trip fuel total Costs (400 x 5 trips per year) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 4.2.1.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 4.2.1.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 77,750.00 |
| 4.2.2.0 | b. Regular monitoring of humans for mercury and other toxic chemical poisoning for exposed miners and communities surrounding ASGM sites. | | | | |
| 4.2.2.1 | Total DSA Costs (5 teams visiting 5 different regions: Once per year) | 100.00 | 25.00 | 30.00 | 75,000.00 |
| 4.2.2.2 | Round trip fuel total Costs (400 x 5 trips per year) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 4.2.2.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 4.2.2.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 77,750.00 |
| | Total for Strategy 2 | | | | 155,500.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------|----------|---------------|-------------------|
| 4.3.0 | STRATEGY 3: Strengthen the prevention measures in relation to exposure to mercury and its compounds among vulnerable populations, particularly children and women of child-bearing age, especially pregnant women and those that rely heavily on eating fish that may be contaminated by ASGM activities. | | | | |
| 4.3.1.0 | a. Provide alternative livelihood and empowerment interventions to vulnerable population. | | | | |
| 4.3.1.1 | Empowerment Package to women | 125.00 | 3,000.00 | 1.00 | 375,000.00 |
| 4.3.1.2 | life and Business Skills Trainings: DSA Costs per person for 10 persons for 20 days | 100.00 | 10.00 | 20.00 | 20,000.00 |
| 4.3.1.3 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.3.1.4 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.3.1.5 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.3.1.6 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 558,800.00 |
| 4.3.2.0 | b. Create and facilitate a transition to viable alternatives livelihoods for ASGM miners | | | | |
| 4.3.2.1 | Skills Trainings: DSA Costs per person for 10 persons for 20 days | 100.00 | 10.00 | 20.00 | 20,000.00 |
| 4.3.2.2 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.3.2.3 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.3.2.4 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.3.2.5 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 183,800.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|-----------|----------|---------------|---------------------|
| 4.3.3.0 | c. Counselling of parents and guardians on the importance of education so as to ensure that children go to school instead of engaging in ASG mining activities. | | | | |
| 4.3.3.1 | Mobilisation of community members (ZANIS and Community Radio) | 12.00 | 45.00 | 1.00 | 540.00 |
| 4.3.3.2 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.3.3.3 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.3.3.4 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.3.3.5 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 164,340.00 |
| 4.3.4.0 | d. creation of child day care services | | | | |
| 4.3.4.1 | Construction of child day care facilities | 15,000.00 | 31.00 | | 465,000.00 |
| 4.3.4.2 | Recruitment and Payment of service providers | 5,000.00 | 93.00 | | 46,500.00 |
| 4.3.4.3 | Procurement of furniture, toys, learning and play accessories | 5,000.00 | 31.00 | | 155,000.00 |
| 4.3.4.4 | Training of child day care services | 50.00 | 10.00 | 155.00 | 77,500.00 |
| | Sub Total | | | | 744,000.00 |
| 4.3.5.0 | d. Provision of bursaries for vulnerable school going children | | | | |
| 4.3.5.1 | Bursaries for Vulnerable Children for a period of 10 years | 100.00 | 1,000.00 | 10.00 | 1,000,000.00 |
| | Sub Total | | | | 1,000,000.00 |
| | Total for Strategy 3 | | | | 2,650,940.00 |
| 4.4.0 | STRATEGY 4: Promote occupational health and safety in ASGM sites; | | | | |
| 4.4.1.0 | a. Enforcing of environmental, mining and other related regulations prohibiting the use of mercury by children including child labour in mining, through penalties against employers. | | | | |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|--|-----------|----------|---------------|-------------------|
| 4.4.1.1 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.4.1.2 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.4.1.3 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.4.1.4 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 163,800.00 |
| 4.4.2.0 | b. Collaborate with ASG miners and other key stakeholders in developing safe working procedures. | | | | |
| 4.4.2.1 | DSA Costs per person; 100 x 6 days x 15 persons x 3 meetings | 100.00 | 15.00 | 18.00 | 27,000.00 |
| 4.4.2.2 | Conference facilities (Venue) 15 x 50 x 18 | 50.00 | 15.00 | 18.00 | 13,500.00 |
| 4.4.2.3 | Fuel Cost Fuel Costs: 1 L per 7 km (2 per 1 L) and Furthest distance (round trip) = 1,400 km x 2 = 2800 km, Fuel per L= 2800/7 = 400 L | | | | |
| 4.4.2.4 | 400 L x 2/L x 20 | 2.00 | 400.00 | 3.00 | 2,400.00 |
| | Sub Total | | | | 42,900.00 |
| 4.4.3.0 | c. Training ASG miners in risks associated with the use of mercury. | | | | |
| 4.4.3.1 | DSA Costs per person; 100 x 5 days x 5 resource persons x 10 training sessions ((Eastern (3), North-western (2) Central, (3), Lusaka (2)) 100 x 5 x (5 x 10) | 100.00 | 5.00 | 50.00 | 25,000.00 |
| 4.4.3.2 | Fuel Cost Fuel Costs for round trip | 400.00 | 5.00 | 3.00 | 6,000.00 |
| 4.4.3.3 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 31,250.00 |
| 4.4.4.0 | d. Strengthen medical surveillance for miners engaged in ASGM. | | | | |
| 4.4.4.1 | DSA per person; 100 x 5 days x 5 officers in 4 areas (provinces): | 100.00 | 5.00 | 15.00 | 7,500.00 |
| 4.4.4.2 | Fuel Costs for round trip | 400.00 | 5.00 | 3.00 | 6,000.00 |
| 4.4.4.3 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 13,750.00 |
| | Total for Strategy 4 | | | | 251,700.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|----------------|---|-----------|----------|---------------|-------------------|
| 4.5.0 | STRATEGY 5: Implement measures to address indirect impacts from ASG mining activities on the environment and human health | | | | |
| 4.5.1.0 | a. Undertake human-animal conflict prevention and mitigation measures. | | | | |
| 4.5.1.1 | Total DSA Costs (5 teams visiting 5 different regions: Once per year) | 100.00 | 25.00 | 30.00 | 75,000.00 |
| 4.5.1.2 | Round trip fuel total Costs (400 x 5 trips per year) | 400.00 | 5.00 | 1.00 | 2,000.00 |
| 4.5.1.3 | Research Tools (Stationary) | 100.00 | 5.00 | 1.00 | 500.00 |
| 4.5.1.4 | Lunch Allowance | 10.00 | 25.00 | 1.00 | 250.00 |
| | Sub Total | | | | 77,750.00 |
| 4.5.2.0 | b. Collaborate with the relevant stakeholders in the provision of the social services to ASGM sites. | | | | |
| 4.5.2.1 | Hold Multidisciplinary meetings (2 meetings per year=6 meetings) | | | | |
| 4.5.2.2 | Total DSA costs (for 12 meetings) (100 x 15 persons x 6meetings= 4,500) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.5.2.3 | Round trip fuel total Costs per meeting (1 x 20 L x 12 meetings = 2,400) | 20.00 | 15.00 | 6.00 | 1,800.00 |
| 4.5.2.4 | Refreshments for coordination meetings (20 x 15 persons x 6 meetings) | 20.00 | 15.00 | 6.00 | 1,800.00 |
| | Sub Total | | | | 12,600.00 |
| 4.5.3.0 | c. Provide reproductive health, sexual and family planning education to young miners and the women at ASGM sites and the surrounding communities | | | | |
| 4.5.3.1 | Lunch allowances costs for (20 persons x 20 sites for 12 quarters) | 30.00 | 400.00 | 12.00 | 144,000.00 |
| 4.5.3.2 | Round trip fuel total Costs (1 x 400 L x 12 quarters) | 1.00 | 400.00 | 12.00 | 4,800.00 |
| 4.5.3.3 | Review Costs: DSA Costs per person for 15 persons for 6 meetings; (100 x 15 x 3) | 100.00 | 15.00 | 6.00 | 9,000.00 |
| 4.5.3.4 | Conference package (50 x 20 persons x 6 meetings) | 50.00 | 20.00 | 6.00 | 6,000.00 |
| | Sub Total | | | | 163,800.00 |

| S/N | ACTIVITIES | UNIT COST | QUANTITY | TARGET (Days) | TOTAL USD |
|---------|--|-----------|----------|---------------|----------------------|
| 4.5.4.0 | d. Purchase and distribute basic exploration tools for cooperatives to prevent rat hole mining to prevent environment degradation. | | | | |
| 4.5.4.1 | Exploration tools for Rat-hole mining | 14,500.00 | 40.00 | 1.00 | 580,000.00 |
| | Sub Total | | | | 580,000.00 |
| | Total for Strategy 5 | | | | 834,150.00 |
| | | | | | |
| | Total Objective 4 | | | | 4,148,890.00 |
| | Contingency (10% of grand Total) | | | | 414,889.00 |
| | Grand Total - Objective 4 | | | | 4,563,779.00 |
| | | | | | |
| | GRAND TOTAL NATIONAL ACTION PLAN | | | | 30,655,921.77 |

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