

Guidelines E2



**Government of Sierra Leone
Ministry of Mineral Resources
Mines and Minerals Act 2009**

Guidelines for preparing applications and technical reports required for mining licences

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1. Introduction

These guidelines provide information on how to apply for a small-scale or large-scale mining licence under the Mines and Minerals Act 2009 and also on reporting requirements.

An application for a mining licence must be accompanied by a number of studies and reports demonstrating that a mineral deposit exists which can economically be extracted without causing unacceptable, permanent damage to the environment and/or to the local communities. All feasibility and environmental work must be completed prior to applying for a mining licence; normally, therefore, these investigations would be carried out during the final stages of an exploration licence. (Note: in view of this, any application for a second (and final) renewal of an exploration licence must include a programme of feasibility and environmental studies covering the entire period of the renewal - maximum two years).

Specifically, an application for a small-scale or large-scale mining licence must include:

- a technical feasibility study including financial plan;
- an environmental impact assessment;
- a mine plan and programme of mining operations;
- an environmental management programme; and
- potentially a community development agreement.

Once granted, a mining licence carries obligations to maintain detailed records and to report regularly. Specifically, the law requires:

- a monthly production report;
- a quarterly financial report;
- an annual technical report on mining and exploration activities;
- an annual environmental management programme report;
- a surrender report or reports (whenever ground is surrendered, either in part or on termination of the licence);
- an annual report on community development; and
- an annual report on employment and training.

All of the above relate to the licence year. In addition, the holder of a large-scale mining licence must submit an audited financial report within ninety days of the end of the financial year.

Renewal of a small-scale or large-scale mining licence requires:

- a technical and financial summary report covering all activities to date;
- evidence that mineral reserves remain that can be economically extracted; and
- an updated mining plan.

These guidelines offer information, advice and general guidance on the content and format of reports, but the responsibility for compliance and thus for ensuring that all licence conditions under the Act and regulations are met, is ultimately that of the holder. Because mining operations all differ

from one another in detail, no definitive template can be provided. It is for the holder to ensure that studies carried out, and the reports prepared, meet all requirements.

These guidelines form an extension to, and should be read in consultation with, Guidelines E1 of the Fifth Schedule (reconnaissance & exploration licences) which contain more specific information on report preparation.

2. Requirements for small-scale and large-scale mining licences

To obtain a mining licence, sufficient work must have been undertaken to establish the viability of the proposed mining operation. Small-scale and large-scale mining licence applications both require similar types of technical information but the degree of detail for a small-scale licence will generally be less. However, this will also vary in the case of large-scale licences, where the extent of the investigations will depend on the proposed mining method (e.g. underground or open-pit), the processing, the amount and type of waste products, and more generally the overall scale of the project. Essentially and in all cases, the applicant will need to demonstrate that he has undertaken sufficient investigation to prove that the resource can be economically exploited whilst at the same time acting responsibly in respect to the environment. In assessing the information, the Minerals Advisory Board and the Minister will take account of the type and size of the mining operation, the level of the investment, and the history and capabilities of the applicants. Notwithstanding that the scope will be less in the case of a small-scale enterprise, all technical reports must be professionally competent, must provide essential information, and must be fit for purpose. Those making the assessment will want to be assured that all necessary preliminary work has been done and that mining will be carried out responsibly; thus, every application for mining licence will need an environmental management plan, based on an environmental impact assessment, covering the life of the mine, including its eventual closure.

Feasibility stage investigations cover a wide range of activities. The feasibility work advances the earlier exploration to a new level and ultimately shows whether or not the resource is sufficient in size, grade and situation to be economically extracted. It includes both a technical (geological) assessment leading to a resource model and financial modelling. Feasibility stage work may be subdivided into three main stages although in the case of a small mine or quarry these may become telescoped into a short, continuous evaluation. During the early stages, the explorer will wish to assess, through 'order of magnitude studies', that the general geological parameters are favourable and that the indications justify the further, escalating expenditure of moving to the next stage. If satisfactory, the work will move onto the 'pre-feasibility' (or scoping) stage where the ore body will be characterised in detail, perhaps through intensive pitting, drilling or underground bulk sampling, and preliminary financial modelling will be carried out using best assumptions. Finally, the work will move onto the full 'feasibility' stage. By now, the explorer will be confident that the mineral deposit can be mined but needs to bring all work together and consider in detail all aspects that will affect the final mine model.

Alongside the geological investigations, the explorer needs to gather baseline data on the state of the natural environment and from this assess the potential damaging effects of the development, and in turn the costs of prevention or clean-up. Baseline studies similarly cover a wide range of studies sufficient to enable the environment to be characterised so that: (1) decisions can be made on ways to minimise damage and (2) there is a 'yardstick' against which any changes as a result of mining can be measured.

The environmental impact assessment (EIA) forms the basis for the environmental management programme (EMP). The latter is a plan extending over the lifetime of the mine and beyond, which aims to minimise damage by recognizing the potential impacts in advance, attempting to avoid or mitigate them by design, monitors the actual impacts on a continuous basis, and is responsive to events. At eventual mine closure the EMP will guide the process of rehabilitation and reclamation.

Arising out of the technical feasibility study including the constraints and the cost implications of the EMP, the final mine plan and plan of mining operations will be developed. This is a detailed working document describing in detail every phase and component of the development including scheduling and - importantly - the final financial model. This is the ultimate blueprint for the mine.

3. Feasibility phase studies

A mining feasibility study is an evaluation of a proposed mining project to determine whether the mineral resource can be mined economically. It is an engineering study based on test work and engineering analysis, which presents enough information to determine whether or not the project should be advanced to the final engineering and construction stage. It defines the physical parameters, assesses financial viability and considers the options. Together with the environmental impact assessment and environmental management programme, it forms the basis for developing a mine plan. A feasibility report is a complex, multifaceted set of documents which describes the ore body and provides information on the measured, indicated and inferred reserves that define the resource model. The studies examine the various options for mining, financing, treatment methods, waste disposal, environmental impacts, social impacts, management plans, rehabilitation etc. The scope of any feasibility study will depend on the nature of the mineral deposit and the scale of the mining operation but in all cases the information produced must be sufficient to guarantee (using safe assumptions) a financial return on the initial investment.

A checklist of the possible components of a feasibility study is given in Annex 1. This covers a broad range of engineering studies but what is relevant or appropriate in any particular situation will depend on the actual project, including the type of deposit, its geological setting and structure, the mining method (e.g. whether it is a small-scale surface mining operation or a large-scale underground or open-pit mine), the size and extent of the mineralization, its geographical location and natural environment, and the extent to which mining will impact on local communities. The checklist can therefore be used only as a general guide for designing an appropriate plan.

Normally, the feasibility study will take place in parallel with the baseline investigations of the EIA, and will be guided by its results on an ongoing basis.

As well as being a requirement for obtaining a mining licence, the feasibility study is part of due diligence without which a mining venture cannot be properly evaluated nor financed. Before embarking on feasibility investigations, it is strongly advised that explorers discuss their plans with the Director of Mines and the Director of Geological Survey, and with the Environmental Protection Agency (EPA) and local community representatives as appropriate.

3.1 Feasibility study for small-scale mining licence

A surface mining or dredging operation is generally less technologically involved than a large-scale underground or open-pit mine, and the complexity of the feasibility study will be correspondingly less. Nevertheless, applicants are expected to have made a proper assessment of the mineral

resource, mining methods, infrastructural requirements including power and water, financial resources, employment of citizens, health & safety, environmental management, and rehabilitation. In deciding an application, the Minerals Advisory Board and the Minister will take account of what might reasonably be expected of the applicant given the proposed scale of the investment. Surface mining is inherently destructive and the benefits must be balanced by costed plans for appropriate reclamation. The Directors of Mines and of Geological Survey may be able to offer helpful advice. Normally, given the invasive nature of feasibility studies, an applicant for a new small-scale mining licence would need to be the holder of an exploration licence. However, this is not a requirement under the law.

3.2 Feasibility study for a large-scale mining licence

Large-scale mining operations range from the relatively small to the very large, and the scope of the feasibility study will vary accordingly. Again, it is very strongly advised that a dialogue is established with the Director of Mines and Director of Geological Survey at an early stage, and that they are kept informed and involved (beyond the normal reporting requirements) throughout the feasibility stage to ensure that the studies entirely meet the Government expectations.

Any major investment requires due diligence to international standards of best practice. In submitting an application for a large-scale mining licence, the Minerals Advisory Board and the Minister will expect full disclosure of the results of the investigations carried out, including the feasibility studies. Again, the checklist in Annex 1 may be used to develop an appropriate plan but most mining companies will have their own approach and template. Nevertheless, Annex 1 provides an indication of the extent of what is expected to be submitted. Even so, it is far from exhaustive.

3.3 Mine plan

The mine plan is a comprehensive, technical and financial plan comprising a whole-of-lifecycle plan for the mining operation up to and including eventual mine closure, reclamation and rehabilitation of the land.

The mine plan builds on the conclusions of feasibility study and the EIA. It provides details of the proposed mining operation at every stage. It describes the mining method; treatment and processing of the ore; waste disposal; infrastructure (buildings, plant, machinery); human resources; power and water; access and transportation; local employment and training; and a financial model including costs and a source of funding. It should be linked to the environmental management programme and make reference to the community development agreement (which must be provided separately with an application for a mining licence). Finally, it must discuss mine closure and provide proposals for financial security to cover the costs of damage and rehabilitation. Detailed maps and drawings should be provided to support the mine plan.

A checklist for a mine plan is provided in Annex 3. As ever, this is very generalised and covers a wide range of mine type so cannot be considered a template for any individual mine. Again, it is not exhaustive. In general, the level of detail and complexity will be greater for a large-scale than for a small-scale mine. Nevertheless, the plan must in all cases comprehensively describe the proposed operation. It is appreciated that many small-scale mines may have limited information in terms of a whole-of-lifecycle plan, for example the information on measured reserves may be sufficient only to justify the initial investment (with an expectation that these will increase), but regardless of the sophistication, the mine plan must demonstrate the financial viability of the proposal. The Minerals Advisory Board, in considering the proposal, will need to be assured that the applicant has considered all aspects sufficiently and that the business model is sound. The plan should consider

how damage may be minimised especially in regard to pollution of water, erosion, and how ground may be restored or reclaimed in the course of, and subsequent to, mining. Environmental protection and clean-up will be a high priority consideration.

3.4 Environmental impact assessment

References to environmental impacts are included under both small-scale and large-scale mining licences in the 2009 Act. Both licences require an environmental impact assessment licence issued under Act 2 of 2000. Protection of the environment, including the need for an environmental impact assessment, is described more fully in Part XV of the Act. These requirements are elaborated on here.

The environmental impact assessment involves a number of components leading to recommendations that inform both the final feasibility study and the environmental management programme. The initial stage of the EIA involves comprehensive baseline studies aimed at recording, documenting and measuring the existing environment in and around the proposed mine. It is in essence an inventory of the natural environment prior to mining. It also includes social statistics of the local communities. This work involves repeated surveys and measurements over an extended period, and so must be begun at an early stage during the feasibility phase. Based on the baseline information, the EIA then considers the potential impacts on the environment of the proposed operations. Third, the EIA examines options to avoid or minimise disruption and damage, including any impacts that are unavoidable and permanent. Finally, the EIA makes recommendations that feed into the design of the mine plan and environmental management programme.

Baseline studies involve the collection of data repeated at appropriate intervals to qualitatively and quantitatively document the pre-mining environment. The studies include maps, observations, measurements and analyses of the topography, climate, soils, fauna & flora, endangered and rare species, land capability, land use, previous development/mining, surface and ground water (amount & quality), air quality, noise, cultural/heritage aspects, visual aspects, and socio-economics.

Potential impacts consider the effects of the proposed development during the construction, operational and post-operational phases. It will identify the fragile or vulnerable elements of the environment and will try to assess the impacts of each phase of the outline mine plan.

The third component of the EIA uses the identified potential impacts to consider alternative strategies. It seeks to influence the final mine design in ways that will reduce or mitigate any damaging effects but which do not compromise the operational model. It considers whether and how damage may be avoided or minimised, and pays attention to any especially significant impacts or sensitive areas. In addition to the effects in the mine area itself, an important consideration may be the consequential damage caused by construction of roads and infrastructure, and the use of resources such as timber and water. Here, the EIA might guide planning perhaps by locating infrastructure in less sensitive locations. The siting of waste and tailings disposal is of considerable significance especially in tropical areas where rainfall is heavy. Not only do tailings dumps permanently sterilise/contaminate land but they can form a potential long-term hazard in respect of acid leakage and dam failure under extreme weather conditions. Treatment facilities can similarly cause significant environmental damage through disposal or spillage of chemicals etc.

Finally, having considered the possibilities and implications, the EIA makes recommendations to be incorporated in developing the final plan of mining operations and in the design of the environmental management programme.

In some instances, an application for a mining licence will relate to an existing mining operation (e.g. an application based on a priority right in respect of an expiring mining lease issued under the 1994 Act). Here, true baseline studies may be impossible due to the already-disturbed state of the environment. In this case, the Minerals Advisory Board will expect a limited environmental impact assessment to be undertaken sufficient to provide basic information on which an environmental management plan can be designed.

An application for a dredging permit, either in association with a small-scale or large-scale mining licence, or in respect of an artisanal mining licence or exploration licence, requires an environmental management plan, which in turn needs to be based on a limited environmental impact assessment focusing specifically on the effects of dredging. In general, the MAB will be looking for assurances that dredging can be conducted without causing unacceptable and irreparable environmental damage. Advice may be sought from the Directors of Mines and of Geological Survey on the precise requirements of the EIA related to a dredging permit.

An EIA requires a range of environmental science skills that may not be available in-house within mining companies, and it is common therefore for such studies to be sub-contracted to an environmental science firm, or at least for a specialist consultant to be engaged to design, advise and monitor the work done. In considering an EIA report, the Minerals Advisory Board and the Minister will want to be assured that the environmental work and the conclusions reached represent independent, unbiased views, conducted to high professional standards. All environmental reports are non-confidential and will be made open for public inspection via the Mining Cadastre Office. Indeed, as part of an environmental impact assessment, the Minerals Advisory Board will want to see evidence that there has been public consultation, including at a local level, and that any concerns arising have been taken into account in the final report. In the case of a large development involving significant environmental disruption, the Minerals Advisory Board might decide to submit the studies to external peer review (to be paid for by the applicant) before any recommendation on the mining licence is given to the Minister. As with all work undertaken during the feasibility stage, it is strongly advised that a dialogue is commenced early on with the Ministry and that plans for the EIA are agreed in advance.

3.5 Environmental management programme

Like the mine plan, the EMP is a whole-of-lifecycle plan that seeks to ensure that damage to the environment is minimised throughout the construction and operational phases of the mine. Furthermore, it establishes a plan for rehabilitation when the mine eventually closes. The EMP should set out specific objectives and establish a management structure within the company that guarantees environmental matters are treated with the seriousness they deserve on an ongoing basis. Those charged with monitoring should hold a position of authority sufficient to enable them to change bad practice and to ensure that action is taken quickly in 'emergency' situations. Environmental meetings should involve the mine manager and senior personnel, and should take place at frequent intervals. As with all environmental reports and matters, the results of discussions should be made public and communicated to the local community.

The EMP will summarise the main conclusions from the EIA and establish procedures for the continuous monitoring of the environmental parameters recommended by the EIA into the operational phase. Such ongoing monitoring should identify harmful effects as construction and mining proceeds and, if appropriate, will enable corrective measures to be taken. Regular (at least annual) reports should be prepared and made generally available.

The EMP should consider in outline how mine closure will be managed and who will have responsibility for implementing environmental clean-up. It should include a provisional plan for the decommissioning phase which will consider all aspects including (but not limited to): reclamation; making safe; landscaping; reforestation; replanting of cultivation; restoration of wildlife habitats; reintroduction of species; alternative uses of mined-out areas and infrastructure; social impacts; and alternative industry and livelihoods for the local ex-mining community.

4. Periodic technical reports required under a mining licence

4.1 Technical reports

All technical reports in relation to small-scale and large-scale mining licences are to be submitted to the Mining Cadastre Office together with the prescribed form. With the exception of environmental reports, all technical reports will be regarded as confidential.

A **six-monthly** report is a progress report required midway through every year that a small-scale or large-scale mining licence is held. It is an interim report, briefly summarising the work undertaken to that point together with expenditures incurred. The required information is entered on the prescribed form.

An **annual** report on mining and exploration is a detailed technical report covering all work carried out during the year. Exploration work conducted under a mining licence may include surface and underground testing and proving of extensions to the known mineralization as well as exploration for new mineral deposits elsewhere within the mining licence area.

An **annual environmental management programme** report is a detailed technical report describing the monitoring activities and interventions undertaken during the year in respect of the approved plan. It will include a summary of management meetings, actions arising, and communication with the public. It will include any changes to the programme as a consequence of events or findings.

A **surrender** report is a technical report required when a portion of a licence area is given up. It is a detailed technical summary covering all exploration and mining work undertaken in or over the area being surrendered since the licence was first granted. A surrender report must accompany any application to surrender ground or on renewal of only part of an existing mining licence. In some cases, where the area being surrendered was the object of little exploration or mining work, the surrender report may be brief; however, it is still a requirement.

A **final** report is a variant of the surrender report required at termination or on surrender of an entire mining licence. It must include a detailed summary of all exploration and mining undertaken in or over the entire licence area from the outset.

Other than the six-monthly report, which requires the completion of a form, all technical reports are expected to provide a full narrative account of the work carried out. A suggested structure is given in Annex 5. This is very generalised and is intended mainly as a checklist to ensure that reports are comprehensive and structured. The contents will vary and the checklist should not prevent or limit the inclusion of any other relevant information depending on the work actually done. Indeed,

notwithstanding any guidance given here, it is a requirement that the all mining undertaken is described together with information on production, processing, recovery and sales, and that exploration is fully described with results, assays, and implications on the reserves.

4.1.1. Annual report on mining & exploration

An annual report must be submitted at the end of each twelve month period that a small-scale or large-scale mining licence is held. It is a technical report summarizing all mining and exploration activities conducted in the preceding year. An annual report should at least include:

- executive summary ;
- description of mining and exploration activities during period;
- mine construction and development; excavations; stripping of overburden;
- mining production (tonnages and/or volumes of ore and waste);
- mining statistics - ore processed, recovery rates, concentrate produced, minerals/metals/gems produced (quantities, grades);
- revised measured, indicated and inferred reserves;
- mineral and gemstone sales and exports; prices;
- underground development statistics (pits, shafts, and adits);
- underground exploration statistics (drilling, sampling, assay results);
- summary of new mineral exploration within licence area;
- the exploration approach and work programme;
- mapping, pitting, drilling, geochemical & geophysical surveys
- discussion and interpretation of analytical/geochemical data;
- summary maps, plans, sections, figures or other graphics;
- discussion of results, conclusions and recommendations;
- expenditures on exploration during the reporting period;
- health & safety report (accidents);
- financial report on mining and exploration;
- anticipated programme of mining and exploration for following year;
- appendices containing complete data including large maps and plans (underground and/or surface mining maps), tables, full assays and analyses etc.

4.1.2. Annual report on the environmental management programme

The EMP report is a comprehensive report on all activities undertaken during the year. For ease of comparison with the planned work, it should follow a structure similar to that of the EMP itself, reporting section by section on monitoring activities, and interpreting the results in terms of impacts on the environment. The report should describe any major environmental incidents, how they were dealt with, and make recommendations for change and improvement to the EMP. The report must provide an account of the management of the programme including public awareness and consultation. It should include a general assessment on the programme and its effectiveness. The EMP report may follow the following general format but should include other aspects as appropriate:

- executive summary;
- description of the mining project (development stage, operations summary);

- objectives of the EMP;
- strategy & methodologies for EMP;
- environmental management meetings held (frequency, outcomes & effectiveness);
- public awareness & consultation, including community relations;
- results of long-term monitoring – description and discussion (separately under each environmental category);
- assessments of environmental impacts; temporary & long-term environmental damage, remediation, mitigation strategies, social impacts;
- environmental incidents and responses (including photographic evidence);
- recommendations for changes to EMP;
- recommendations for improvements to mitigation strategies;
- summary & conclusions;
- appendices containing all full, original monitoring data & analyses, sections by section, plus maps, tables, analyses, photographs etc.

4.1.3. Surrender report

Where a licence holder wishes to surrender part of a mining licence, a surrender report must be provided. This is required in addition to the annual report for the year (which will cover all work over the entire licence area). A surrender report is a detailed technical report summarizing all mining and exploration work carried out in and over the surrendered part of the licence *since commencement*. It should reproduce all original data, statistics, information, interpretation and discussion contained in earlier annual reports. This also applies to any digital data previously submitted which must now be supplied for the surrendered ground. It will be up to the Minister, on the advice of the Minerals Advisory Board, to decide whether the surrender report will be kept confidential or placed on open file. But in any event, the report should relate only to the ground being given up and should not include any confidential information or data relating to retained areas.

4.1.4. Final report

A final report is a variant of the surrender report required when a mining licence is wholly surrendered or reaches expiry. In essence, it is a summary report documenting the history of the mine from first discovery to closure. Like a surrender report, it will be considered a non-confidential document. A final report should summarise all work carried out over the licence area over the entire period the licence was held. It should begin with a brief account of the history of exploration and discovery. It must give a description of each phase of the operation (feasibility, construction, operation) including summary production and sales statistics. While it is not necessary to reproduce all the detailed data contained in previous annual reports, the relevant reports should be listed and referenced as appropriate in the text, and the report should contain sufficient maps, figures, diagrams, tables and other information to make it a stand-alone, informative record of the mining operation from the outset. (NB: An annual report for the final year may be required in addition to the final report).

4.2 Submission requirements for technical reports

Applications for a new licence or licence renewal require that eleven (11) copies of all supporting reports are submitted.

For six-monthly, annual, annual EMP, surrender, and final reports, two (2) hard copies must be submitted.

Other than six-monthly reports, all reports should be permanently bound such that pages cannot be easily removed. All text pages, figures, tables, maps and plots should be sequentially numbered and listed in the contents. Loose maps may be contained in a pocket at the back or placed in a separate volume or volumes. They should be referenced to the report. Where a single volume would be excessively large, it may be subdivided into separate volumes (e.g. where the amount of data requires it, or if there are subcontractor reports to be included, or where a separate folder is required to hold large format maps/plans).

In addition to the paper copies, a digital read-only copy must be provided in PDF format on CD or DVD of every report. This file must be unprotected by password and virus-free. It should be clearly labelled with the report title, date, and formats used. In addition to the scanned report, all quantitative data (e.g. analyses) must be provided in digital readable form such as an Access database or Excel spreadsheet. Large images and other plots/maps may be provided as raster, JPEG or TIFF files. The digital data provided should be described in the accompanying report and summarized on a label attached to the disk.

4.3 Confidentiality

Feasibility reports, mine plans, monthly, and annual reports in respect of a mining licence and any accompanying digital data shall be kept confidential and, after assessment and approval by the Director of Mines and the Director of Geological Survey, shall be registered in a digital database in the Mining Cadastre Office. Both the paper copies and the digital data shall be stored securely with access restricted to the Director of Mines, the Director of Geological Survey and officers authorised by them who have relevant business under the Act.

Environmental impact assessment reports, environmental management programmes and annual environmental programme reports are public documents which, after review and acceptance will be made available for public inspection in the Mining Cadastre Office. Similarly, the report on community development is a non-confidential document.

Where the MAB considers it necessary to obtain independent expert opinion, for example in the case of a large mine development, the feasibility report(s) may be made available in confidence to the outside consultants appointed for the review.

Annual and feasibility reports once they cease to be confidential (ninety days after termination of the mining licence), and all final and surrender reports ninety days after submission, shall be transferred to the Geological Survey and entered into the database of open-file reports. They shall be made available for inspection to the general public and copies may be provided upon payment of a copying fee.

4.4 Financial accounts

Information on mining production and sales must be provided on the form that accompanies the annual report for small-scale or large-scale mining licences. Additionally, in the case of a large-scale mining licence, the licence holder must submit an audited financial report within ninety calendar days of the end of each financial year showing the profit or loss for the year and the state of financial affairs of the holder at the end of each financial year. These reports are all considered confidential.

However, the quarterly financial report submitted for as part of the Extractive Industries Transparency Initiative is, of course, non-confidential.

5. Annexes

ANNEX 1: CHECKLIST FOR A FEASIBILITY STUDY REPORT

Component	Topic	Activity
Executive summary		
Background	Land & title	<ul style="list-style-type: none"> • Mineral rights • Land ownership • Stakeholders • Land issues • Consultation & agreements
Geography		<ul style="list-style-type: none"> • Physiography & topography • Vegetation, forestry • Water resources (streams, lakes, groundwater) • Roads & communications • Centres of population and potential workforce
Political & economic		<ul style="list-style-type: none"> • Political climate & stability • Mining & associated legislation • Trade unions • Fiscal regime
Geology	Regional geology	<ul style="list-style-type: none"> • Historical • Regional geological setting & mapping • Regional geochemistry • Regional geophysics • Prospectivity & mineralisation
	Prospect geology	<ul style="list-style-type: none"> • Detailed geological mapping • Detailed drilling • Detailed prospect geochemistry • Detailed geophysical surveys • Potential for further mineralisation
	Ore deposit	<ul style="list-style-type: none"> • 3D geological structure • Pitting, bulk sampling • Underground/detailed drilling • Bulk sampling • Geochemistry & petrography • Ore mineralogy • Ore grades • Metallurgy
Feasibility studies	Order of magnitude stage	<ul style="list-style-type: none"> • Conceptual modelling • Alternative mine models • Pre-mine exploration & development costs & timescale
	Pre-feasibility stage	<ul style="list-style-type: none"> • Mining options • Fundamental design parameters • Underground mine design • Open pit design & dimensions • Costs & time to complete feasibility study
	Feasibility stage	<ul style="list-style-type: none"> • Measured, indicated & inferred reserves

		<ul style="list-style-type: none"> • Metallurgical testing & recoveries • Mine parameters (overburden; stripping ratio; waste & tailings; mine depth; surface footprint) • Ore production • Ore processing (cominution, concentration, smelting) • Power & water demands & options • Computer-based mine planning • Potential mine & equipment designs • Waste & tailings disposal options • Transportation options • Environmental • Final resource model
Financial	Costs	<ul style="list-style-type: none"> • Pre-production capital costs (infrastructure; construction; buildings, plant & machinery etc) • Development phase costs • Mine operating costs • Power costs • Transportation • Interest on loans • Bonds • Compensation to landowners/rent • Licence costs • Royalties, tax etc • Community costs • Environmental rehabilitation
	Financial modelling	<ul style="list-style-type: none"> • Assumptions • Options • Time scales • Demand and trends • Price forecasts & projections • Risk assessment • Sensitivity analysis & contingencies • Cash flows • Payback analysis • Contingency & escalation • Net present value
Environmental	Summary of environmental impact assessment (from separate study)	<ul style="list-style-type: none"> • Baseline studies • Impacts on natural environment (water; air, soils, land surface, land use) • Impacts on wild life • Impacts on communities
	Summary of environmental management plan (from separate study)	<ul style="list-style-type: none"> • Monitoring • Temporary & permanent disturbance • Effects beyond mining area • Community development • Mitigation, rehabilitation & reclamation

		<ul style="list-style-type: none"> • Mine closure plan • Cost implications
Timeline		<ul style="list-style-type: none"> • Completion of feasibility stage • Approvals • Pre-construction • Construction (& infrastructure) • Operational (mine life) • Closure & rehabilitation
Summary & conclusions		<ul style="list-style-type: none"> • Review of options • Financial viability & risks • Selected/preferred mine design • Outline development plans & timetable • Next steps

ANNEX 2: CHECKLIST FOR A MINE PLAN

Component	Topic	Activity
Executive summary		
Background	Feasibility study	<ul style="list-style-type: none"> • Executive summary taken from main study
	Environmental impact assessment	<ul style="list-style-type: none"> • Executive summary taken from main study
	Environmental management plan	<ul style="list-style-type: none"> • Executive summary taken from main study
Mine design		<ul style="list-style-type: none"> • Mining method (underground; surface; open pit; dredging etc) • Mining rate • Mine plan • Power & water requirements & provision • Production forecasts • Detailed mine design • Site layout • Surface buildings (power; concentration; smelting; refining; laboratories; workshops; administration; accommodation; hospital; recreational etc) • Plant & machinery • Roads & transportation • Vehicles • Fuel • Consumables • Dewatering • Health & safety • Waste, pollution and environment
	Ore processing	<ul style="list-style-type: none"> • Crushing & comminution (design; size; throughput/capacity; power requirements) • Concentration & mineral recovery • Washing • Smelting/refining • Consumption of materials (e.g. chemicals; water)
	Waste disposal	<ul style="list-style-type: none"> • Properties of waste • Waste & tailings disposal plans • Waste water processing/recycling • Pollution prevention (incl. exceptional weather events) • Environmental monitoring
	Financial & business model	<ul style="list-style-type: none"> • Costs • Loans • Payback • Projections • Net present value • Sensitivity analysis

		<ul style="list-style-type: none"> • Assumptions • Contingency
Schedule	Pre-construction phase	<ul style="list-style-type: none"> • Licence & approvals • Community agreement • Resettlement • Markets & contracts • Financial arrangements
	Mine development phase	<ul style="list-style-type: none"> • Surface stripping • Underground development • Bulk sampling & metallurgical testing • Tailings dam construction • Plant, machinery & equipment
	Construction phase	<ul style="list-style-type: none"> • Workforce recruitment & training • Surface mine site construction • Plant and infrastructure • Continued underground development • Roads • Community development implementation
	Production phase	<ul style="list-style-type: none"> • Start up • Administration & human resources • Mining & processing operations • Transportation & shipment • Health & welfare • Education & training • Community development reviews • Environmental management programme
	Mine closure phase	<ul style="list-style-type: none"> • Environmental management programme • Provisional timetable and sequence for post-mine clear up • Post mining responsibilities • Financial surety & guarantees • Restoration & rehabilitation of land • Alternative uses of mined out areas • Safety considerations • Sociological impacts • Models for economic diversity & alternative livelihoods for community • Removal of plant & machinery • Alternative uses of infrastructure • Ongoing environmental monitoring • Contingency fund & trust fund

ANNEX 3: CHECKLIST FOR AN ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Component	Topic	Activity
Executive Summary		<ul style="list-style-type: none"> • Overall benefits of project • Major environmental findings • Environmental management to prevent, mitigate or rehabilitate
Brief project description		<ul style="list-style-type: none"> • Licence number • Date granted; date expires • Holder • Location & area description • Land tenure • Mineral deposit & reserves • Mine products • Proposed mining method • Proposed mine duration
Baseline studies : description of the pre-mining environment	Geology	<ul style="list-style-type: none"> • Regional geological setting • Detailed geology & structure • Type & size of ore body • Overburden • Photographs of pre-mine prospect
	Climate	<ul style="list-style-type: none"> • Regional climate • Rainfall statistics for project area (max, min & mean) over 2 years • Wind statistics over 2 years • Incidence of extreme weather
	Topography	<ul style="list-style-type: none"> • Large scale topographic map • Photographs of original landscape
	Soils	<ul style="list-style-type: none"> • Soils map • Soils description (type, depth, chemistry) • Photographs of soil profiles
	Land-capability (prospect area)	<ul style="list-style-type: none"> • Inventories in respect of areas of agriculture, forestry, wildlife, fisheries, recreation • Distribution, species, crops etc • Photographs of all categories
	Land-use (within 2km)	<ul style="list-style-type: none"> • Land use distribution map • Agriculture • Forestry • Existing infrastructure, roads, settlements • Photographs of all categories
	Flora (within 2 km)	<ul style="list-style-type: none"> • Inventory of species (trees, endangered, rare) • Map of distribution, habitats • Photographs of species; habitats
	Fauna	<ul style="list-style-type: none"> • Inventory of large animals, birds, insects • Endangered & rare species • Habitats, distribution & migration • Sensitivity analysis • Photographs of species, habitats
	Previous mining	<ul style="list-style-type: none"> • Disturbance caused by exploration (drilling,

		<ul style="list-style-type: none"> • pitting, trenching etc) • Previous mining disturbance • Photographs of past damage
	Surface water	<ul style="list-style-type: none"> • Map of surface water • Water courses, standing water, wetlands • Catchments • Flow rates (dry & wet season) • Mean annual runoff • Flooding • Water balance • Water rights & usage • Water quality (pH, chemical, TDS) • Sediment geochemistry • Photographs of surface water
	Groundwater	<ul style="list-style-type: none"> • Water table • Aquifer description • Boreholes & well • Water quality (pH, chemical, TDS) • Groundwater rights & usage
	Air quality	<ul style="list-style-type: none"> • Dust and pre-mining pollution
	Noise & vibration	<ul style="list-style-type: none"> • Pre-mining noise
	Archaeological & cultural aspects	<ul style="list-style-type: none"> • Map of heritage sites • Record details & condition • Cultural significance • Photographs of sites
	Sensitive landscapes & protected areas	<ul style="list-style-type: none"> • Sites of special scientific interest • Closed areas • National parks • Photographs of selected areas
	Visual aspects	<ul style="list-style-type: none"> • Scenic views • Tourist potential • Photographs
	Regional & socio-economic aspects	<ul style="list-style-type: none"> • Population inventory • Locations of habitation, agriculture, housing, schools, hospital, recreation • Employment & income profile • Education • Recreation • Health and death rates • Crime • Facilities • Photographs of traditional village life
	Public consultations	<ul style="list-style-type: none"> • List of stakeholders • Public liaison, consultations • Identification of issues of concern • Response to feedback
Description of the proposed project	Surface infrastructure	<ul style="list-style-type: none"> • Requirements for roads, railways • Industrial & domestic waste • Mine waste & tailings disposal

		<ul style="list-style-type: none"> • Water pollution management • Water balance & treatment • Workshops, buildings, housing, administration, social
	Construction phase	<ul style="list-style-type: none"> • Activities • Disruption/destruction of land surface • Employment • Water & power requirements • Transport & storage of materials • Time schedule • Waste
	Operational phase	<ul style="list-style-type: none"> • Plans of mine infrastructure & layout • Topography & topology • Mining • Dredging • Processing • Waste & tailings disposal • Power, water • Employment • Transport
Potential environmental impacts	Construction phase	<ul style="list-style-type: none"> • Depletion & sterilization of ore body • Changes to landscape & topography • Changes to land use, water courses, soils, , forestation, vegetation, • Impacts on wildlife (flora & fauna) • Impacts on surface water • Impacts on groundwater • Impacts on air quality • Impacts on heritage sites • Noise • Socio-economic impacts • Impacts beyond mine area
	Operational phase	<ul style="list-style-type: none"> • As above (during mine phase) • Concurrent rehabilitation possibilities
	Decommissioning phase & closure	<ul style="list-style-type: none"> • Reclamation & rehabilitation
	Residual impacts after closure	<ul style="list-style-type: none"> • Long-lasting or permanent impacts to topography, land, land usage, surface and ground water, fauna, flora, communities • Impacts beyond mine area
Environmental management programme	Construction phase	<ul style="list-style-type: none"> • Proposed management of each identified impact
	Operational phase	<ul style="list-style-type: none"> • Proposed management of each identified impact
	Decommissioning phase & closure	<ul style="list-style-type: none"> • Proposed management of each identified impact • Future land use
	Proposed timetable, duration & sequence	<ul style="list-style-type: none"> • Description & timeline for all activities

	Financial provision	<ul style="list-style-type: none"> Proposals to provide secure funding for environmental matters through all stages including decommissioning
Consultation process		<ul style="list-style-type: none"> Publication of information Liaison with stakeholders Public debate Feedback and responses Outcomes of consultation
Conclusions		

ANNEX 4: CHECKLIST FOR AN ENVIRONMENTAL MANAGEMENT PROGRAMME

Component	Topic	Activity
Executive summary		
Overview	Objectives	<p>(Examples only)</p> <ul style="list-style-type: none"> To continuously monitor the environment against the baseline measurements of the EIA To mitigate as far as possible the deleterious effects of construction and mining as they proceed To rehabilitate the land as far as is possible where damage is done To minimise damage to the natural environments, and to protect wildlife and habitats To minimise cultural damage to local communities To inform local communities and seek to improve environmental management To implement a plan for mine closure including rehabilitation of the natural environment and creation of alternative industry and livelihoods
	Management of EMP	<ul style="list-style-type: none"> Appointment of a qualified environmental manager to a position of authority to advise on and implement environmental management good practice Monthly environmental management meetings (to include representatives from local community, local government and mining company) Annual reports to the Ministry of Mineral Resources
	Main conclusions from EIA	<ul style="list-style-type: none"> Current status of the environment Main threats from mining Mitigation strategies Recommendations for environmental management during the construction, operational, decommissioning, and post-mining phases of the project
Construction phase	Monitoring	<ul style="list-style-type: none"> Changes to landscape & topography Changes to land use, water courses, soils, , forestation, vegetation, Impacts on wildlife (flora & fauna) Impacts on surface water Impacts on groundwater Impacts on air quality/dust Impacts on heritage sites Noise Socio-economic impacts

		<ul style="list-style-type: none"> • Impacts beyond mine area • Photographs of construction phase
	Mitigation plan	<ul style="list-style-type: none"> • Development of strategies to minimise environmental damage during construction and mining • Decision paths to respond quickly to environmental accidents and incidents
		<ul style="list-style-type: none"> • Storage and replacement of topsoil • Protection of wildlife habitats • Protection of endangered or rare species • Protection of water courses • Measures to prevent spillage and contaminated mine drainage
Long-term monitoring	Climate	<ul style="list-style-type: none"> • Set up weather stations & compile long-term statistics • Record extreme events (and impacts) • Photographs of effects
	Topography	<ul style="list-style-type: none"> • Record progressive disruption to landscape • Large scale maps showing changes to topography • Photographs of changes
	Soils	<ul style="list-style-type: none"> • Monitor & map soil erosion • Photographs of erosion
	Land capability	<ul style="list-style-type: none"> • Annual inventories of areas under cultivation, forestry • Areas of deforestation • Annual inventory of wildlife, fisheries, recreational areas • Evidence of erosion & landsliding • Photographs showing changes
	Land use (within 2 km)	<ul style="list-style-type: none"> • Quarterly inspection of impacts on agriculture, forestry • Photographs showing changes
	Flora (within 2 km)	<ul style="list-style-type: none"> • Annual inventory of trees, endangered & rare species • Photographs of deforestation
	Fauna	<ul style="list-style-type: none"> • Annual inventory of large animals, birds, insects • Focusing on endangered or rare species • Evidence of disruption to habitats • Migrations • Photographs showing damage
	Surface water	<ul style="list-style-type: none"> • Changes to water courses & surface water • Monthly monitoring of water quality (chemistry, TDS) • Evidence of chemical pollution, acid mine drainage • Stream gauge continuous measurements • Flooding

		<ul style="list-style-type: none"> • Annual sediment geochemistry • Photographs of flow, pollution
	Groundwater	<ul style="list-style-type: none"> • Monthly measurements of water table • Reports on boreholes and wells • Monthly monitoring of water quality
	Air quality	<ul style="list-style-type: none"> • Monthly dust collection & analysis
	Noise & vibration	<ul style="list-style-type: none"> • Monthly noise measurements
	Archaeological & cultural aspects	<ul style="list-style-type: none"> • Damage to heritage sites • Photographs showing damage
	Sensitive landscapes & protected areas	<ul style="list-style-type: none"> • Damage to areas of special scientific interest and national parks • Photographs showing changes
	Visual aspects	<ul style="list-style-type: none"> • Visual impacts of the mining development • Photographs showing changes
	Regional & socio-economic aspects	<ul style="list-style-type: none"> • Annual sociological assessment of the effects of the mining development on local communities including changes in population statistics, income, employment, education, health & death rates, crime, recreation • Photographs of community life
	Waste & tailings	<ul style="list-style-type: none"> • Weekly monitoring of waste dumps and tailings ponds/dams • Chemical composition of seepage • Reports on seepage into water courses • Groundwater monitoring in adjacent boreholes (drilled specially for purpose) • Damage or spillage during extreme events • Photographs of filling; spillage etc
	Mining practice	<ul style="list-style-type: none"> • Monitoring of activities and identification of bad practice • Implementation of change • Photographs of bad practice
Decommissioning phase & closure		<ul style="list-style-type: none"> • Authority to draw on environmental trust fund • Consultation process with local community • Reclamation plan for mined-out areas • Making safe former mine workings • Replacement of stockpiled topsoil • Reinstatement of cultivation • Landscaping • Reforestation • Replanting & erosion prevention • Restoration of wildlife habitats • Reintroduction of endangered or rare species • Reinstatement of water courses • Measures to prevent contaminated mine drainage • Alternative uses for mined out areas and infrastructure

		<ul style="list-style-type: none"> • Creation of alternative industry and livelihoods • Photographs documenting rehabilitation at all levels
Reporting		<ul style="list-style-type: none"> • Annual report on environmental management • Reports on environmental damage and monitoring (plus photographic evidence) • Recommendations • Revisions to the EMP for following year

ANNEX 5: GENERAL CHECKLIST FOR TECHNICAL REPORTS (ANNUAL, SURRENDER, FINAL)

General
<u>Title, date and authors:</u> The report cover and/or inner page should include a suitable title and other information including: licence area name; licence number; name of licence holder, name of operator (if different), report type (e.g. annual, surrender, final), author(s), reporting period, and date of report. It may be also helpful to add a company report reference number.
<u>Contents:</u> A contents page should give a breakdown section by section, including appendices, together with page numbers. It should list tables, figures and maps including any loose maps contained in a sleeve at the back of the report or in a separate volume. Where a report comprises more than a single volume, each volume should be numbered, and sub-titled. Each should have its own contents page which should additionally refer to the other volumes.
<u>Executive summary (ES):</u> Reports should contain a summary (or abstract) of the work carried out and the results obtained. The ES should provide a synopsis aimed at the competent, non-specialist, avoiding jargon as far as possible. The ES should not normally need to exceed 1 to 2 pages. Where there is more than one volume, the ES to the main volume should cover all reports whilst the ES to each of the other volumes should cover only the work contained in that volume.
Main text (the subject matter will dictate the precise content)
Introduction Background and context Logical sections of work covered, each subdivided as appropriate, for example: <ul style="list-style-type: none"> • Previous work • Strategy, logistics • Description of work during reporting period • Interpretation of results • Conclusions and recommendations General conclusions and recommendations Future work (if appropriate)
Appendices
A separate appendix should be provided for each dataset acquired and referred to in the main report. This will include, but not be limited to: geochemical stream sediment, soil and rock samples; drilling logs (qualitative, mineralogical, grade, geophysical etc); and geophysical datasets. These will normally be presented in tabular form and correspond to the data supplied in digital format.
All maps, plans, sections, logs, locational information etc must be clearly labelled
Maps and plans should be compiled and presented at standard scales (e.g. 1:500, 1:1,000, 1:25,000; 1: 50,000) with a scale bar in metric units, and a north point (grid, true or magnetic). They should show full coordinates referenced to the UTM projection for Sierra Leone (Grids 28 & 29)
A copy of the approved work programme and expenditure commitment for the period reported on should be included as an appendix.
List of all digital data provided including details of data formats.
References