COOPERATIVE REPUBLIC OF GUYANA

MINISTRY OF EDUCATION

GUYANA EDUCATION SECTOR PROGRAM PROJECT - P174244

E-Waste Management Guidelines

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Acronyms

EMIS	Education Management Information System
EPA	Environmental Protection Agency
ESCP	Environmental and Social Commitment Plan
ESP	Education Sector Plan
GRA	Guyana Revenue Authority
IDA	International Development Association
MoE	Ministry of Education
NDC	Neighbourhood Democratic Council
RDC	Regional Democratic Council
REDO	Regional Education Officer

1.0 Introduction

The Education Strategic Plan (ESP) 2021-2025 – Vision 2030 sets five priority areas which focus on (a) improving governance and accountability, (b) improving performance at all levels, (c) improving the efficiency of the education sector, (d) reducing inequities in education, and (e) contributing to lifelong learning and employability.

The Government, with support of the International Development Association (IDA) through the World Bank is currently implementing the Guyana Education Sector Plan Implementation Grant for further enhancement of the education sector and assist in implementation of the ESP. The Project will assist the Government in achieving its goals by focusing on improving learning outcomes at the pre-primary and primary levels, supporting management of systems, and targeting vulnerable students to reducing inequities, all of which would increase future economic opportunities for students.

The project comprised of three components. Component 2 focuses on the promotion of technology assisted learning at the primary level. Under this component tablets will be provided to both students and teachers to support this objective. In addition, smart classrooms will be established to support learning. These classrooms will be equipped with smart boards, desktops, laptops and LCD projectors. Component 3 of the project focuses on institutional capacity strengthening, including the scaling up of the Education Management Information System (EMIS). This component will provide tablets to both primary and secondary schools to assist with this objective.

During the screening and appraisal of the project it was determined that the main potential environmental risk is the appropriate management of the e-waste to be generated through the implementation of the components 2 and 3 through the tablet programs and smart classrooms. It was recommended that the e-waste to be generated from these initiatives should be managed through developing and implementing e-waste management guidelines, which should be prepared as a standalone document. The MoE had committed to the preparation of the guidelines for the management of e-waste in the Environmental and Social Commitment Plan (ESCP) prepared for the proejct.

In this regard, these guidelines contained in this document were prepared. This document outlines the guidelines for the collection, storage, transport, and disposal of e-waste in accordance with national requirements and best practices.

2.0 Project Description

The Guyana Education Sector Plan Implementation Grant is being implemented by the Ministry of Education (MoE) with funding provided by the IDA through the World Bank. The project is estimated to cost US$7 million and will be implemented over a 3-year period, commencing in 2021.

The Project Development Objectives are to:

I. Improve learning conditions at the Nursery level in selected areas;
II. Increase access to technology-assisted learning at the Primary level in selected areas; and
III. Improve functionality of the education management information system nationally.

The Project would support the Government's efforts to address longer-term structural constraints in early childhood level, primary education, and education sector management, while also supporting continuity of learning and learning recovery in the short and medium term. The Project would achieve its development objective through the implementation of three components:

Component 1: Improving Learning Conditions at the Nursery level - This component aims to improve teaching and learning conditions in both schools and homes to increase longer-term school readiness. This will be achieved through three subcomponents: teacher training at the Nursery level to improve pedagogy and delivery of the new curriculum, provision of accompanying materials to support learning, and parental education to support home-based learning.

- **Subcomponent 1.1: Teacher training to accompany the new curriculum -** This subcomponent would support the delivery of the reformed curriculum, to be piloted starting in September 2021, through training of all teachers and school leaders in Nursery 1 and 2. The training will include foundational skills, as well as student-centered pedagogy and formative assessment. The component would also provide follow-up mentorship and classroom observation using the open source TEACH[1] Early Childhood Development tool. Training will take place in person or online, to be determined and adapted as the public health situation unfolds. Digital options for administering TEACH will be explored accordingly. The content would be delivered to hinterland teachers without internet access through regional hubs and by CD-ROM or other methods provided by traveling inspectors. Socio-emotional aspects will be included in the training, of particular importance during the current pandemic, which can take a toll on students, parents, and teachers. The activities would contribute to the successful transition for students from Nursery to Primary, as the curriculum has been designed to flow from one to the other, and the training provided to teachers at the primary level (under the Guyana Secondary Education Improvement Project) will be consistent with the training provided in this subcomponent. The subcomponent would finance training activities, including consultants, master trainers and logistical support as

[1] TEACH is a free classroom observation tool was designed by the World Bank to help countries track and improve teaching quality. Teach is currently employed at the Primary level in Guyana.
https://www.worldbank.org/en/topic/education/brief/teach-helping-countries-track-and-improve-teaching-quality

needed.

- **Subcomponent 1.2: Learning materials.** To support the rollout of the curriculum at the early childhood level, this subcomponent would finance accompanying learning materials for Regions 1, 7, 8, 9 at the Nursery level 1 and 2. The subcomponent would finance the acquisition and adaptation of textbooks and other materials for age-appropriate play-based learning. The volume of materials will be revised on the basis of the costing as the Project is prepared. Should schools remain closed due to the pandemic, materials will be delivered to the homes of students to support parental instruction and distance learning provided by television/radio and online formats (delivered by the MOE).

- **Subcomponent 1.3. Primary caregiver education.** This subcomponent would support the provision of primary caregiver education through "parenting circles" in Regions 1 and 7, building on a previous pilot. A training program will be designed and implemented to strengthen parenting awareness, knowledge, and skills in support of children's emerging literacy and numeracy. This activity complements the materials being provided under subcomponent 1.2, as well as home-based learning kits provided under a separate activity.[2] Caregiver engagement is key to ensuring that children's learning continuity is secured in the medium and long term, in connection with or in lieu of access to regular schooling. The activity can also reach an additional target group of younger children prior to enrollment in Nursery. Parental engagement can take various formats, through in-person meetings should the context allows it, or through print media, telephone, radio or digital formats. An outreach campaign to parents will be included. The subcomponent would finance provision of training and associated logistical costs.

- **Component 2: Promoting Technology-Assisted Learning at the Primary Level** - This subcomponent would support technology-assisted learning in mathematics and literacy, as critical foundational skills, through the use of tablets in Grade 5. A consultancy will be undertaken to map the new Mathematics and the literacy curriculum, with a specific emphasis on reading, onto a digital platform. Tablets equipped with the software, likely Kolibri, a learning software that provides access to Khan Academy Lite (and other learning platforms), will be provided to primary students in Grade 5 nationally. Master trainers will be trained, who will in turn train Mathematics/Language teachers in each school the use of the tablets and software, both from a pedagogical and technical perspective. The training will be followed up by visits to the classroom to provide hands-on coaching for the teachers to use the tools with the students once school resumes (or digitally, if needed). The design will be adapted to the current context as needed, in particular by providing tablets to students to use at home, exclusively or as part of a hybrid distance/in-person model. The Project will take advantage of the Government's initiative of bringing internet to various remote communities to ensure benefits to the most vulnerable students, but the software on the tablets will also include offline capability to ensure ability to use in areas with low connectivity. This will help ensure continuity of learning whilst out of school, as well as assist with learning recovery to help teachers teach to the right level to make up for learning

[2] Through the Early Learning Partnership, the Bank is supporting the production of interactive lessons to be aired on radio and television to support learning continuity; the provision of resources to support home-based learning; and the development of a tool to assess learning losses when learners return to school, to allow for targeted interventions.

losses when schools resume. Roving technical teams will be engaged to provide maintenance, and hotlines established to provide support for both teachers and students. In order to improve achievement for both boys and girls, the teacher training will include gender-informed motivational strategies for increasing participation of both girls and boys. To monitor progress in closing achievement gaps, the project will perform pre- and post-tests as part of the tablet program and disaggregate the results by gender.

- **Subcomponent 2.2: Smart classrooms to support learning -** This subcomponent would support technology-assisted learning through select classrooms to be equipped as Smart Classrooms, including smartboards, tablets, and projectors, in schools in both urban and rural areas. Teachers will be trained to utilize this equipment during lessons to supplement their teaching or to provide self-guided options for students. In addition, the smart classrooms would enable long-term remote learning by connecting better-performing, centrally located teachers to classrooms in remote schools ("twinning"), whereby the central teacher can lead a class whilst the local teacher facilitates the lesson. Schools will be selected based on specific criteria, including connectivity, presence of IT personnel and interest of head teachers, as well as need, as determined by test scores, to ensure that vulnerable students benefit. The smart classrooms will also play a key role in the context of COVID-19, as they can be used to support a hybrid distance/in-person model by linking classrooms to students at home. In this manner, the smart classrooms will provide learning continuity as well improved learning once school resumes. The subcomponent would finance provision of hardware, software, and training.

3.0 Relevant Legislations, Regulations, Policies and Strategies

Solid waste management in Guyana is mandated in various legislations and policies initiatives and international agreements.

3.1 The Basel Convention (1989)

The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their disposal was adopted in March 22, 1989. The Convention is concerned with the protection of human health and the environment against the effects of hazardous wastes. Guyana acceded to the Basel Convention on April 4, 2001. Parties are generally prohibited from exporting covered waste to, or import covered waste from, non-parties to the Convention. The 1989 Convention states that illegal hazardous waste traffic is criminal.

Guyana acceded to the Convention in 2001 and the Environmental Protection Agency (EPA) is the Focal Point and the Competent Authority of the Convention in Guyana.

3.2 Environmental Protection Act 1996

The Environmental Protection Act 1996 is an Act to provide for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment, the sustainable use of natural resources and for matters incidental thereto or connected therewith.

3.3 Environmental Protection (Litter Enforcement) Regulations 2013

The Litter Enforcement Regulations 2013 made under Section 68 the Environmental Protection Act 1996 is concerned with littering offences and conviction, and the establishment of litter prevention wardens.

3.4 Environmental Protection Guidelines – Management and Export of Electronic Waste 2014

Guyana does not have an organized or approved waste collection and disposal system for e-waste. However, the EPA's Environmental Protection Guidelines on the Management and Export of Electronic Waste aims to provide information on the management of electronic waste in Guyana. It intends to promote the reuse of e-waste (in whole or in part), and outlines methods for storage, and the process for its exportation rather than final disposal at landfill/dumpsite or incineration. The E-waste Management Guidelines does not address the final disposal of e-waste owing to the lack of facilities for its treatment or recycling in country.

The Guidelines outlines the process for the exportation of e-waste in accordance with the Basel Convention, and in collaboration with the Guyana Revenue Authority (GRA).

The Environmental Protection Guidelines on the Management and Export of Electronic Waste is attached in the Appendix.

3.5 Environmental Protection (Hazardous Wastes Management) Regulations 2000

The Hazardous Waste Management Regulations 2000 made under the Environmental Protection Act 1996 is concerned with the generating, treatment, storage and disposal of waste that are considered dangerous. The Regulation also outlines requirement of an environmental authorization and emergency preparedness plans, as well as offences and penalties under the Regulations.

3.6 Municipal and District Council Act

The Municipal and District Council Act is an Act to better the operations of the municipal councils and districts. The Act empowers the Councils to establish, maintain, and carry out sanitary service for the removal and destruction or management of refuse and effluent, and to make by-laws and prescribe penalties for illegal dumping and littering.

3.7 Solid Waste Management Bill 2014

The Solid Waste Management Bill (2014) provides for the management of solid waste, the establishment and functions of the Solid Waste Management Authority and for connected matter. E-waste is described in the Bill as being “white goods”. The Bill under Part VII Section 68 (2) states that white good and scrap metal shall be taken by the owner to an approve landfill site or other site approved to manage derelict white good.

3.8 Solid Waste Management Strategy 2013 – 2024

The Solid Waste Management Strategy was developed with the aim to provide an integrated approach and framework for the administration and management of solid waste in Guyana. Implementing a recycling programme for e-waste was identified as an objective of the Management Plan.

4.0 Institutional Framework

Solid waste management in Guyana is a shared responsibility between a number of agencies that are mandated by law or policy directive, with the coordination of regional waste management being the responsibility of the Ministry of Local Government and Regional Development.

4.1 Ministry of Local Government and Regional Development

The Ministry of Local Government and Regional Development is responsible for formulating national policies and strategies for waste management and providing waste management oversight of Regional Democratic Councils (RDCs), Neighbourhood Democratic Councils (NDCs) and City/Town Councils. The Solid Waste Management Authority coordinates waste management within the Regions.

4.2 Environmental Protection Agency

The Environmental Protection Agency (EPA) is responsible for the administration of environmental assessment and authorization of solid waste management processes and systems, prescribes standards for waste management facilities and issues permits for waste management activities.

4.3 Regional Democratic Councils (RDCs)

The Regional Democratic Councils are the implementing agencies for national solid waste management plans and programmes of central government and oversees the waste management activities of the Neighbourhood Democratic Councils.

4.4 The Neighbourhood Democratic Councils (NDCs)

The Neighbourhood Democratic Councils are responsible for the delivery of solid waste management services to residence at the local level within their boundaries.

4.5 The City/Town Councils

The City and Town Councils are responsible for the delivery of solid waste management services to residence within their boundaries.

4.6 Guyana Revenue Authority

The GRA is a key agency in the e-waste exporting process, and is responsible for authorizing the movement of the waste and the issuance of the Movement Document to the Exporter which is to be submitted to the EPA.

5.0 General E-Waste Impacts and Management

5.1 Definition and Scope of E-Waste and E-Waste Management

According to the Basel Convention (1989) E-waste is categorized as hazardous waste due to the presence of toxic materials such as mercury, lead, and brominated flame-retardants, which are considered hazardous waste.

5.2 Impacts of Hazardous Materials in E-waste on Human Health

Improper treatment and disposal of the hazardous waste found in electronics is harmful to the lives of humans, and cause immediate and long-term effects on human health. The effects of hazardous waste on human health will vary depending on type and reaction type to the human system. Some immediate effects are:

- Eye and skin irritation
- Chemical burns
- Respiratory problems
- Headaches and nausea
- Behavioral abnormalities
- Cancer

Other effects have a longer reaction time and are listed in the table below.

Table 1 Hazardous substance in E-waste and Risk to Human Health

Toxic Materials	Birth Defects	Brain Damage	Heart/Liver/ Lungs/Spleen Damage	Kidney Damage	Nervous/ Reproductive System Damage	Skeleton Damage
Barium		✓	✓			
Cadmium	✓		✓	✓	✓	✓
Lead Phosphorous	✓	✓		✓ ✓	✓	
Lithium	✓	✓	✓	✓	✓	
Mercury Nickel	✓ ✓	✓	✓ ✓	✓ ✓	✓ ✓	
Beryllium			✓	✓		

Source: EPA Guidelines for the Management and Export of Electronic Waste 2014

5.3 Impacts of Hazardous Materials in E-waste on Environmental Health

The mismanaging of hazardous waste and its improper disposal can have a negative impact on the environmental health and ecosystem services. Hazardous pollutants can cause acute toxicity, which is an immediate effect of the hazardous pollutants, or chronic toxicity, which is the long-term exposure to hazardous pollutants.

Risks such as water, soil, and air pollution, fires, wildlife mutation and contamination are among the key long and short term effects of hazardous waste on the environment.

5.4 Standard Operating Procedures for E-Waste Management in Guyana

Guyana currently does not have a facility that treats, recycle, or dispose of electronic waste. The EPA Guidelines on E-waste Management (2014) suggest three options to address e-waste in Guyana. These are:

- **Reuse of E-Waste -** The Guidelines states that the inappropriate and premature disposal of electronics can be avoided by reusing the equipment and has recommended three areas:

    I. Direct Reuse: reassigning electronic equipment to other individuals.
    II. Refurbishment and Reuse: repairing and upgrading systems or components of the electronic equipment to extend its life.
    III. Component Reuse: dismantling and utilizing components in part or as whole in other electronic systems and equipment.

- **Collect and Store** - Once the electronic equipment has exhausted the reuse phase, the Guidelines recommend that E-waste be collected and stored in accordance with the measures outlined. E-waste arrives at the landfill site at the disposer and is stored for future disposal. Prior to the arrival to the landfill site, E-waste must be:

    I. Store in a fully enclosed building
    II. Store in a way that prevents contact with environmental elements and breakage
    III. Store in an area that is inaccessible to the public
    IV. Have an emergency plan in place to cater for any breakage of the Cathode Ray Tube

- **Export of Hazardous Waste** – Export of hazardous waste is recommended since there are very limited disposal options existing in Guyana. Any export of this waste type will have to be in accordance with the requirements of the Basel Convention. The following documents are required to facilitate exportation:

    I. Application Form for Environmental Authorization
    II. EPA's Letter of Authorization
    III. Transboundary Movement of Hazardous Waste Notification Form
    IV. Guyana Revenue Authority Movement Document
    V. Letter of Consent from Country of Import

    The approval process is outlined below:

    I. Application to the EPA three months prior to the first export shipment of hazardous waste and payment of application fee.
    II. The application is reviewed and once in compliance, a letter of Environmental Authorization is issued to the Exporter and is valid for one year and subjected to renewal.

III. A Notification Document for Transboundary Movement of Waste required under the Basel Convention (1989) is required to be completed along with the payment of a prescribed fee.
IV. A Movement Document is issued by the GRA to the Exporter and is submitted with the Notification Document.
V. The documents are reviewed and forwarded to the Executive Director of the EPA for final approval from the EPA.
VI. The Competent Authority of the country of import is notified in writing about the proposed shipment of hazardous waste by the EPA as the country of export in accordance with the Basel Convention (1989).
VII. Once permission is granted, a Letter of Consent is granted and is valid for one year.
VIII. The Exporter returns to GRA with approved documents to begin exportation.
IX. The information is recorded in the EPA's Hazardous Waste Notification Database for future reference.

5.5 Current Capability in E-waste Disposal

In Guyana there is no facility for the disposal of e-waste. The Solid Waste Management Authority, which falls under the Ministry of Local Government and Regional Development and the responsibility for waste management, has indicated that currently e-waste is collected and stored at the Haags Bosch Landfill until a suitable method for disposal is determined. As such, all e-waste generated, including those from the outlying regions, will have to be transported to the landfill.

Given the need to service the emerging oil and gas sector and the expanding economy it is envisaged that in the near future they may be facilities established with the capability of treating/disposing of E-waste. Already facilities are being established to treat and dispose other types of hazardous wastes.

6.0 GSEP E-Waste Management Guidelines

Under component 2 of the project, tablets will be provided to both students and teachers at schools across the country, in all regions. In addition, smart classrooms will be established to support learning in selected school. These classrooms will be equipped with smart boards, desktops, laptops and LCD projectors. Under component 3 of the project tablets will be provided to both primary and secondary schools to assist with scaling up of the EMIS.

Non-working tablets and accompanying accessories will be collected, stored, transported, and disposed of in accordance with the EPA's Environmental Guidelines for the Management and Export of Electronic Waste 2014 and the Solid Waste Management Strategy 2013-2024. While there is no facility that treats, recycles or disposes e-waste, the systems that are available allow for the storage of e-waste or white goods at the landfill site, until it can be disposed of permanently.

The plan is to ensure that the collection, storage, and transportation of the e-waste generated by the project is safe and adequately executed in accordance with the EPA's E-waste Management Guidelines.

6.1 Categories of E-waste

The Project is expected to generate waste relating to the distribution and use of electronic tablets, in parts or as a whole, including charger, battery, screen, and headphone. In addition, a few smart boards, desktops, laptops, photocopier and LCD projectors will be provided by the project.

6.2 Estimated Amount of E-waste

The Project is expected to provide eight thousand seven hundred and forty-one (8,741) pieces of electronic equipment and its accompanying accessories within a two-year period between 2021 -2023, with scope for replacement after three years. This is the main device to be provided. A few desktops, laptops, photocopiers, and LCD projectors will be provided by the project.

A breakdown on the quantity of device type to be provided under the project and from which the e-waste is expected to be generated from is outlined in Table 2. The expected lifespan of a consumer grade electronic tablet is 3-5 years with adequate servicing, updates and responsible use. This does not include damages and dysfunction due to misuse and other user negligence or manufacture's faults. The average lifetime for the electronic devices to be utilized by the project is outlined in Table 3.

Table 2: Quantity of Electronic Devices to be provided

Electronic Equipment	2021	2022	2023	Total
Tablets		8698	0	8698
Smart Boards		5	5	10
Desktops	1	5	5	11
Laptops		5	5	10
Projectors		5	5	10
Photocopier	1			
Printer	1			
Total	**3**	**8718**	**20**	**8741**

Table 3: Estimated Timeframe for Generation of E-waste by Project Devices

E-Waste	1-3 Years	3-5 Years	5 Years and Over
Electronic Tablets	✓		
Chargers, Cables, Keyboards, Mouse			✓
Smart Boards, Projectors			✓
Batteries	✓		
Screens		✓	

6.3 Reusable and Non – Reusable Components

Accessories, such as chargers and headphones that are in safe and good working condition will be considered reusable accessories, and therefore continuation of its use with other compatible electronic devices will be encouraged. This will reduce the waste stream and avoid unnecessary disposal of working equipment. Reuse of working components will be encouraged within the user's home and friends circle.

Non- reusable components, such as the tablets and batteries will be considered E-waste and will be disposed of at the end of life using the prescribed methods provided for in this plan.

6.4 Disposal of Non-Reusable Components

6.4.1 Collection and Storage

Non-working tablets and accompanying accessories will be collected and stored at a central point, with the school or place of distribution being the primary collection point. At the primary collection point, the school's administration staff will be responsible for the collection, recording, and storing of non-working devices with oversight by the Head Teacher. The devices will be stored under the prescribed EPA Guidelines at the school until

it can be easily and safely transported to a secondary location within the school district's Regional Education Offices.

When a substantial amount of E-waste has been accumulated at the primary collection point, it will be moved to the school district's Regional Education Office under the EPA's Guidelines. The Regional Education Officer will be responsible for coordinating the pick-up and transportation of e-waste from schools within the school districts. E-waste will be accumulated and stored within the Regional Education Office safely. Once a significant quantity is accumulated, the E-waste will be transported by the Regional Education Offices to the MoE approved site for storage. The MoE will responsible for the final movement of the E-waste to the approved landfill site under the EPA's guidelines.

The EPA E-waste guidelines advises that E-Waste should be stored properly and remain intact as not to cause harm to humans or the environment. At the collection and storage facilities, it will be ensured that E-waste are stored:

I. In a fully enclosed building
II. In a way that prevents contact with environmental elements
III. Eliminate possible conditions for brakeage and dismantling of devices
IV. In an area that is inaccessible to the public

Therefore, non-working devices will be stored as prescribed above until a suitable method of disposal becomes available.

For devices that have been broken or compromised, including batteries, it shall be stored:

I. Individually wrapped in paper and bagged to prevent littering of materials and glass
II. In a plastic container with cover

At the school level the Head Teacher and administration staff will be responsible for the collection of E-waste and designating an area for storage. Personal Protective Equipment for the safe handling of E-waste will be provided by the Project to the primary and secondary collection points to ensure the safe handling of E-waste in a manner that does not cause harm to themselves and others. The schools will maintain a record to reflect the items, date of collection, student/teacher name and contact information. This information will be shared with the secondary collection point for their records.

The Regional Education Officers (REDO) in the various regions will be responsible for the collection and storage of the E-waste generated by each school within their respective regions. The Regional Education Offices will be required in their planning and budgeting framework to make provision for the collection and storage of the e-waste, and the final movement of the E-waste to the MoE. Additional, the Regional Education Office will be required to keep a database with the information received by the schools, and additional information such as schools' name and volume of E-waste, and offloading at the at the MoE. The REDO is required to share their collection database with the MoE at the time of transfer of E-waste. .

In the Regional Education Offices there will be scheduled reporting to the Ministry of Education. This information can be utilized for the devices to be written off. The Project's environmental personnel will have oversight of the collection, storage and movement of e-waste generated from this project.

6.4.2 Transportation and Disposal

E-waste will be transported from the secondary collection site under the guidance of the Regional Education Officer and the Ministry of Education. Effective transportation will be employed in order to assure the safest logistical avenues are utilized. Temporary storage will be facilitated at the Ministry of Education Office pending transfer to the approved landfill site. The MoE will be responsible for the final movement of E-waste to the approved landfill site.

Transportation of e-waste will:

I. Be done in an enclosed and appropriate vehicle to avoid contact with the environmental elements
II. Eliminate possible breakage of devices, or exposure of compromised devices

6.5 Monitoring

The collection site (school/education office) will keep a record of all devices lodged for disposal and the conditions of the devices, and the reason for disposal. This is to ensure that there is account of the devices distributed against the devices returned.

Schools or primary collection points are required to report periodically on the status of E-waste collection, or on any difficulty they may be experiencing to the Regional Education Office.

Regional Education Officers will be required to provide periodical update in their reporting mechanism to the MoE on the progress of the collection, storage, and transportation of E-waste. Officers may record any difficulties at this time.

The MoE will collect and record in their waste management database the volume, source, date and time, and any other information that may be necessary. This information will be kept as a permanent record.

6.6 Communication and Training

Upon distribution of the devices, a summary of the E-waste Guidelines will be made available with each device. This will ensure that the Guidelines are communicated effectively and in writing so that it is readily available for future reference.

Additionally, disposal information will be attached to the back of the device on how to properly store the not-working device and where to return the device.

Further, the REDOs for each region will be briefed on the management procedures for E-waste outlined in the guidelines.

6.7 Implementation Framework

The MoE, as the implementing agency for the project, will be responsible for the overall management and disposal of all E-waste generated by the project. As such, the Ministry will be responsible for the implementation of these guidelines.

Each school will be responsible for the collection and temporary storage of all E-waste generated. Once a significant quantity is generated the waste will be transported to the Regional Education Offices for consolidation with E-waste generated by other schools. Once a significant quantity is accumulated regionally, the waste will be transported to the approved landfill site or to the Ministry's central office in Georgetown for consolidation with E-waste accumulated by other regions. Once the Ministry accumulates a significant quantity of E-waste these will be transported to the Haags Bocsh Landfill to be stored as white goods until an acceptable mean of disposal is determined.

At the school level the Head Teacher will be responsible for the collection of E-waste and designating an area for storage. The REDO in the various regions will be responsible for the collection and storage of the e-waste generated by each school within their respective regions. The REDO will also be responsible for the transport of the waste to the approved landfill site. The Project Coordinator, with support from the Environmental Personnel, will oversee the collection, storage, transportation and disposal at the level of the Ministry.

Given the type of E-waste to be generated, which is mainly inoperable devices, the storage and transportation will not require the provision of highly specialized facilities or procurement of special vehicles, nor will it require the use of specialized personal protective gear. In addition, no significant training will be required for personnel handling this waste. As such, the process will not require significant resources, since existing facilities and vehicles will be utilised. The cost associated with the collection, storage, transportation and disposal of E-waste will be covered by the Ministry's operational budget.

7.0 Other Considerations

In the procurement process, efforts will be made to source electronic devices that are considered to have Extended Producers Responsibility so that there is a potential avenue for the exportation of E-waste by the supplier. If this is successful the same process will be applied to collect the E-waste and transport to the central Ministry for accumulation. The mechanism to facilitate the transport of the waste back to the supplier will be determined at that stage.

Other consideration such as extended warranty, product and technical support, and after use care will be considered when selecting a supplier.

8.0 Conclusion

The EPA's Guidelines on E-waste management is straightforward and easy to follow, it is the Project's intention to implement the measures outlined here to prevent the risk of improper disposal of E-waste that may cause harm to human and environmental health.

If in the near future facilities are established locally to treat/dispose of E-waste these will be considered and this guideline will be adjusted accordingly.

Annex – EPA's E-waste Guidelines

Environmental Guidelines

Management and Export of Electronic Wastes

Environmental Management Permitting Division

Environmental Protection Agency

2014

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Environmental Guidelines for the Management and Export of Electronic Wastes

1. OBJECTIVE

These guidelines were prepared to provide information on the management of electronic wastes (E-Waste) in Guyana. It intends to promote the concept of reuse of E-Waste, e.g. computers, either as "whole" or "in part", rather than final disposal at a landfill/dump site or incineration.

2. SCOPE

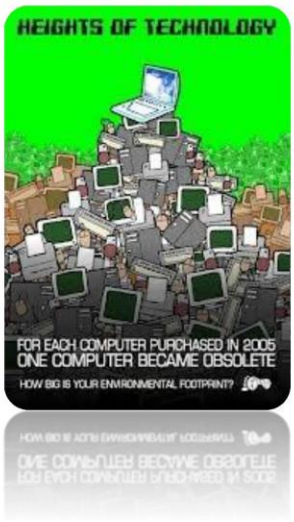
These Guidelines are aimed at businesses and other entities that may generate Electronic Wastes from routine activities. These Guidelines focus on defining Electronic Wastes (E-Waste) and the potentially harmful effects that may arise from improper handling. They further address the best practices for E-Waste management, tips for its reuse, methods of storage and the process involved in its exportation.

These Guidelines do not focus greatly on waste generation and collection in households because the quantities generated individually are not substantial and Guyana currently does not have an organised or approved waste collection system for Electronic Wastes. Apart from this, the Guidelines do not address final disposal of Electronic Wastes in Guyana due to the lack of facilities for its treatment or recycling.

3. ELECTRONIC WASTE: What is it?

Electronic Wastes (E-Wastes) are electronic products that have become unwanted, non-working or obsolete and have reached the end of their useful life. Electronic Waste is anything electronic; namely, computers, TVs, Monitors, Cell Phones, VCRs, CD Players, Fax Machines and Printers.

With the turn of the 21st century,



electronic devices have become a significant part of our lives and many daily activities would be impossible without some of these devices. With the high rate at which technology is being advanced, electronic devices become obsolete in a far shorter time than in previous years. The computer and mobile Phone, two major types of E-Wastes, have seen a decrease in their life span over the years. The computer has dropped from a lifespan of six (6) years in 1997 to approximately two (2) years in 2005 while mobile phones currently have a life span of approximately two (2) years.

The use of electronic devices (mainly computers) has increased significantly in developing countries. Internet use has increased in the last five years by almost 50 % rising from 44 % in 2006 to 62 % in 2011. Estimates are that by 2030 developing countries will discard 400-700 million tons of obsolete computers per year when compared to 200-300 million tons that will be produced by developed countries. This will create an enormous challenge since most developing countries will lack the necessary capacity to manage and recycle the hazardous materials found in E-Wastes. In these countries, the E-Wastes that are currently being generated are already being disposed inappropriately, primarily with municipal waste thus polluting the environment and posing a serious health risk.

"The challenge of E- Waste is of greater concern in developing countries because most of these countries lack the capacity for handling and recycling the hazardous materials contained in E-Wastes"

- UNIDO E-Waste Initiative for Tanzania

3.1. ENVIRONMENTAL AND HEALTH RISK OF E- WASTES: Why the Concern about E-Wastes?

Electronic wastes comprise a multitude of components containing toxic substances that can have adverse impacts on human health and the environment if handled improperly. Most times, persons become exposed to these damaging substances via inhalation or ingestion of contaminated food supplies. Direct exposure can result in health risks such as defects to vital organs in the body. It is important to note that these components of E-Wastes are not hazardous to the

environment and human health once used in the manner they were designed to be used.
E- Wastes become dangerous when disposed of inappropriately in landfills or when they are incinerated. Discarding E- Waste into a landfill or burning it can cause harmful substances to be released into the atmosphere posing a hazard to persons handling the waste.

Toxic Material	Where found	Effects on Humans					
		Birth Defects	Brain Damage	Heart, Liver, Lungs and Spleen Damage	Kidney damage	Nervous/Reproductive System damage	Skeleton System Damage
Barium	Computers, Television		X	X			
Cadmium	Insulation Wires in Computers & Phones	X		X	X	X	X
Lead	Printers, Computers, Mobile Phones	X	X		X	X	
Lithium	Computers, Phones	X	X	X	X	X	
Mercury	Mobile Phones	X	X	X	X	X	
Nickel	Circuit Boards, batteries	X		X	X	X	
Beryllium	Computers			X			
Phosphorous	Computers				X		

Table 1: Hazardous/Toxic substances in Electronic Wastes and their Possible Effects on Human Health.

3.2. THE BASEL CONVENTION & E- WASTES

The Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their disposal was adopted on March 22, 1989, in Basel, Switzerland.

The main objective of the Convention is to protect human health and the environment against the effects of hazardous wastes.

- Guyana acceded to the Basel Convention on 04 April, 2001, and the Environmental Protection Agency is both the Focal Point and Competent Authority of the Convention in Guyana.

Noting the hazardous components of computers and the dangerous effects they can have on humans if managed, disposed or recycled inappropriately, the Convention embarked on three (3) major projects:

I. **Partnership for Action Computing Equipment (PACE):** this partnership was launched in Bali, Indonesia in June 2008 at the 9th meeting of the Conference of Parties. The main purpose of the partnership was to provide information on managing computing equipment from its collection point to refurbishment, recovery or recycle point.

II. **Mobile Phone Partnership Initiative (MPPI):** The partnership is aimed at developing and promoting environmentally-sound management for end-of-life mobile phones.

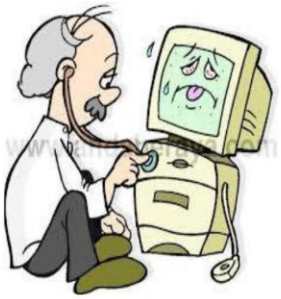
III. **E- Waste Africa Project:** this is a comprehensive programme which seeks to enhance the environmental governance of E-wastes and creates favourable social and economic conditions for small businesses in the recycling sector in Africa.

The Convention also released the *Draft Technical Guidelines for the Transboundary Movement of E-wastes and Used Electrical and Electronic Equipment* in 2012. These Guidelines focus on the management of E-wastes as they relate to the principles of the Convention and provide general guidance on the transboundary movement of E-Waste.

4. Reuse of E-Waste

In order to prevent the inappropriate and premature disposal of E-wastes, reuse is of paramount importance. The aim of reuse is to have a system that utilises Electrical and Electronic Equipment (EEE) to minimise environmental health and safety impacts. Reuse should be seen as a means of minimising the waste stream.

COMPUTERS



Most computers become obsolete long before they lose their ability to perform all their basic functions. Here are three (3) ways in which computers can be reused:

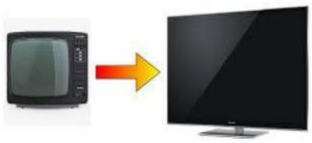
- **Direct Reuse:** this is the use of a computer 'as is' without any changes. It can involve a simple reassigning to another user in the company.
- **Refurbishment & Reuse:** This involves repair or upgrading a component of the computer before being reused. This extends the life of the computer.
- **Component Reuse:** if after refurbishing, a computer still cannot perform its basic function, **DO NOT DISCARD!!!** The computer is still valuable. The computer still contains one or more components (such as disc and memory drives) which can be reused. Parts of the computer can be exchanged or sold to persons or entities involved in computer repairs.

MOBILE PHONES

Like the computer, mobile phones are becoming outdated before they lose their ability to function. To ensure phones last longer, it is advised to charge phones according to manufacturer's instructions and protect all phones by storing in protective cases. Instead of discarding phones in the garbage:

- **Sell:** There may be repair shops who would buy mobile phones for parts or there may be some individual who would like to purchase an old phone.
- **Donate /Give away:** Look for organisations/centres that may be able to utilise the used phone or pass it along to another family member who needs a phone.

TELEVISIONS (TV)



The television has seen a number of changes through the years and many are discarded on a regular basis. Before discarding your television, ask yourself "Do I need a new television?" Asking such simple questions can reduce our contributions to the growing electrical waste stream. Some suggestions to consider:

- **Reuse:** If you plan on buying a new TV, use old televisions in other parts of the house.
- **Donate to a charity:** Give the old television to an organisation that can donate to a family in need.
- **Sell:** to an interested person either whole or in part.

5. STORAGE OF ELECTRONIC WASTES

The management and reuse of electronic equipment can accomplish only so much before it eventually becomes waste.

THERE IS NO FACILITY IN GUYANA THAT TREATS, RECYCLES OR DISPOSES E-WASTES

Cathode Ray Tube (CRT), found in computers and televisions are responsible for the images seen. However, they are toxic because of the presence of phosphour and lead. A CRT Spill Kit is needed in times of breakage and includes:
Hand held broom, Small plastic bag, Dust pan, Disposal Dust mask, Latex gloves.

Step to clean up:

1. Isolate the area.
2. Put on PPE.
3. Use broom & dust pan to all glass.
4. Place in bag (bag must be in plastic container).
5. Spray area with water and wipe up any residue with paper towel.
6. Throw gloves, mask & towel in garbage.
7. Store broken glass. DO NOT DISCARD IN TRASH!

The EPA currently advises all persons to store all E-Wastes properly until a suitable method of disposal is available locally.

Here are several tips to follow when storing Electronic Waste:

- ✓ Store in a fully enclosed building.
- ✓ Store in a way that prevents contact with environmental elements and breakage.
- ✓ Store in an area that is inaccessible to the public.
- ✓ **Remember once E-Wastes remain intact, they will not cause harm to humans or the environment.**
- ✓ Have an emergency plan in place to cater for any breakage of the Cathode Ray Tube (CRT)
- ✓ Never touch or pick up glass from broken CRT unit without wearing appropriate Personal Protective Equipment (PPE).

6. EXPORTATION OF ELECTRONIC WASTES

The EPA has the responsibility to execute all obligations under the Basel Convention, being Guyana's Focal Point and Competent Authority of the Convention. As part of its responsibilities, the Agency ensures all hazardous wastes are managed, handled and exported in an environmentally-sound manner. Due to its composition, E-wastes can be considered hazardous, as such all persons who desire to export E-wastes must apply to the Agency for approval.

6.1. DOCUMENTS REQUIRED FOR EXPORTATION:

1. Application Form for Environmental Authorisation.
2. EPA's Letter of Authorisation.
3. Transboundary Movement of Hazardous Waste Notification Form.
4. Guyana Revenue Authority (GRA) Movement Document.
5. Letter of Consent from Country of Import.

6.2. EPA'S PROCEDURES FOR EXPORT OF HAZARDOUS WASTES

1a. The Notifier/Exporter should apply to the EPA at least **three (3) months** prior to first shipment of hazardous waste.

1b. An *Application Form for Environmental Authorisation* can be obtained from the EPA Office or can be downloaded from the EPA website (www.epaguyana.org). A non-refundable fee of US $50.00 or *the Guyana equivalent according to Scotia Bank daily rates is* required for the processing of the Application. The processing of this Application should take no more than six weeks.

1c. After the Application has been reviewed and processed by the Agency and found to be in compliance, the *Notifier/Exporter* is issued with a *Letter of Environmental Authorisation.*

1d. Environmental Authorisation: *The Letter of Environmental Authorisation* is valid for one (1) year, after which it is subject to renewal.

2. Whilst the Application is being processed, the *Notifier/Exporter* collects a *Notification Document for Transboundary Movements of Wastes* (a Notification Form required under the Basel Convention) from the EPA Office or downloads an electronic copy via the EPA website and fills it out.

3. The completed Basel Convention Notification Form is submitted to and reviewed by the EPA Officers to ensure that all the relevant information is provided. Information such as the type of hazardous waste, country of export/dispatch and Competent Authority, are thoroughly checked. *The Notification Form must be submitted to the Agency along with a processing fee of US$20 or the Guyana equivalent according to Scotia Bank daily rates.*

4. The GRA-Customs Administration Department issues a Movement Document to the Notifier/Exporter, which is submitted simultaneously with the Notification Form to the EPA.

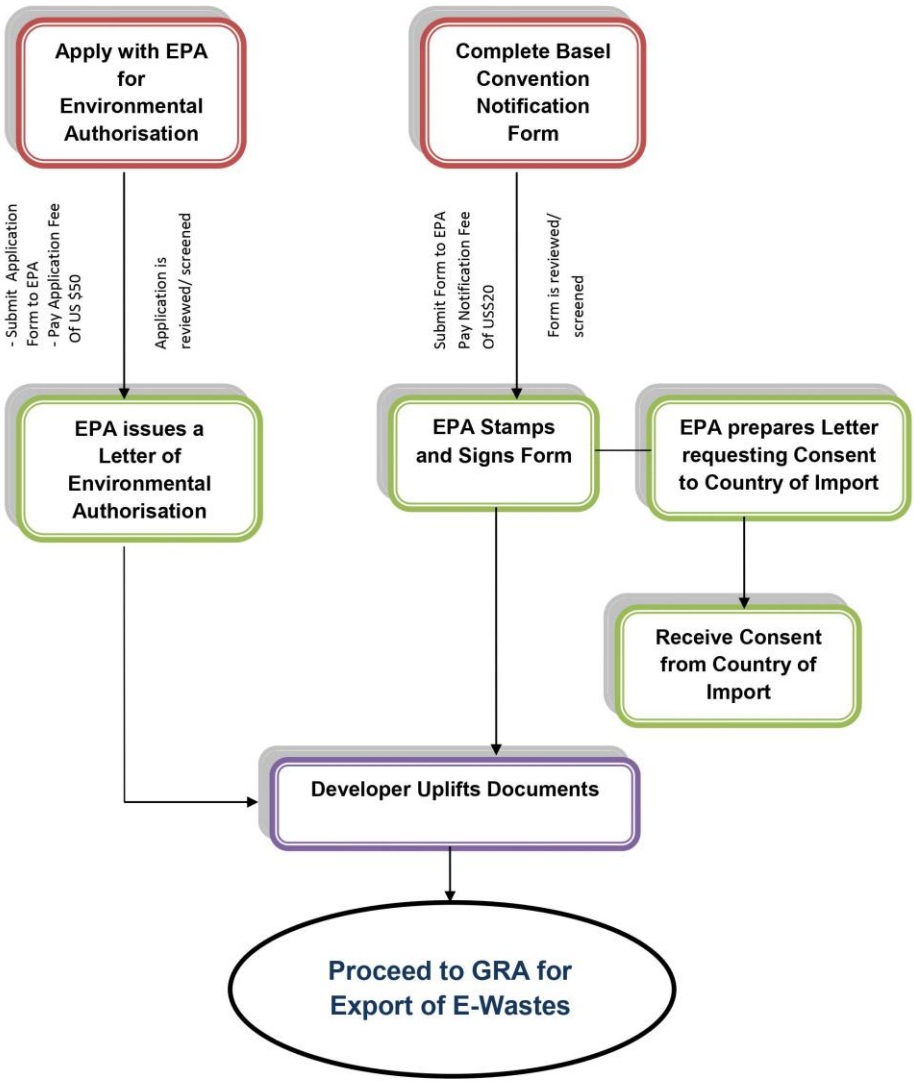
4b. Provided that a satisfactory revision is completed, the *Movement Document along with the Notification Form* is forwarded to be signed and stamped by the Executive Director of the EPA.

5. The EPA as the Basel Convention Competent Authority of the country of export is then mandated to notify the Competent Authority of the country of import in writing about the proposed shipment of hazardous waste.

5b. Should permission be granted, a *Letter of Consent* from the Competent Authority of the country of import is received and kept on file. The *Letter of Consent* is valid for one (1) year.

6. The *Notifier/Exporter* then returns to the GRA-Customs with the relevant documents, where export of the hazardous waste is allowed.

7. The relevant documents of the entire process are recorded in the EPA's Hazardous Wastes Notification Database for future reference.



Flow chart showing the Environmental Authorisation Process for the Export of Electronic Wastes.

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