



Technical Assistance to the Republic of Seychelles for the GCCA Seychelles Global Climate Change Alliance+ *Component A*

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**Climate change and environmental sustainability audit and
action plan for the Seychelles National Assembly**

1 April 2019



Implemented by a consortium led by:



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ACRONYMS

GCCA+	Global Climate Change Alliance Plus
NA	National Assembly
MNA	Member of the National Assembly
PUC	Public Utilities Corporation
ICT	Information and Communication Technology
SBC	Seychelles Broadcasting Corporation
S4S	Sustainability for Seychelles

1 BACKGROUND

The Seychelles Global Climate Change Alliance project based at the GOS-UNDP-GEF Coordination Unit in Victoria was launched in November 2017, to help the Government of Seychelles mainstream climate change into its national systems and processes, across diverse sectors. The project is being funded by the European Union's GCCA+ program, managed by the consulting firm STANTEC under the supervision of the Ministry of Environment, Energy and Climate Change (MEECC). It is being delivered by a core team of consultants, working in collaboration with government counterparts and other partners. Under the GCCA+ project Sustainability for Seychelles (S4S) is contracted by STANTEC to provide a maximum of 30 working days for senior non-key experts. Under this arrangement, S4S requested and received GCCA+ support in undertaking a climate change and environmental sustainability audit of the operations of National Assembly of Seychelles and developing an action plan to help the Assembly sustain and improve its environmental and climate change performance. This was at the request of the National Assembly.

In the *Seychelles National Climate Change Strategy (2009)*, the *Seychelles Energy Policy 2010 - 2030 (2009)* as well as the *Intended Nationally Determined Contribution (INDC, 2015)* Seychelles has pledged to reduce its absolute greenhouse gas emissions economy-wide by 21.4% by 2025 and by 29% by 2030, relative to baseline emissions. Furthermore, in a Cabinet Memorandum of 20th April 2016¹ the recommendation to reach 100% renewable electricity production as soon as possible was approved.

In 2018 Seychelles' total CO² emission was estimated at over 400,000 Metric tons of carbon dioxide equivalent per year (MtCO²e/a). Based on a population of approximately 95,200 in 2018 this amounts to about 4.5 tons per person (considered as being in the medium range internationally). In order to meet the agreed targets it is estimated that this level has to decrease by almost half.

A climate change and sustainability audit is a tool that an organisation can use to identify the full extent of its environmental impacts along with best practices for sustainability. The outcomes should help it gain a better understanding of how it can improve its sustainability practices and climate change adaptation performance in order to meet the agreed targets.

¹ Titled: "A proposal to develop a 100% renewable energy roadmap for Seychelles", approved in May 2016.

2 CONTEXT

As a small island developing state, Seychelles is extremely vulnerable to the impacts of climate change. Although on a global scale Seychelles contributes a relatively small proportion of greenhouse gases, our contributions per capita are significant and increasing. The impacts of climate change are already being felt, especially in relation to changing rainfall patterns, coastal erosion, coral bleaching and sea-level rise. One of the key strategies the country can use to reduce these impacts and become more pro-active in terms of mitigation and adaptation to climate change is through raising awareness, developing and implementing appropriate policies and the establishment of legal frameworks that increase climate change resilience, promote a low carbon economy and foster sustainability.

2.1 The National Assembly

The National Assembly (NA) is the Seychelles' legislative body, and as the law-making body of the country it is in a key position to review laws that lead to unsustainable development, to use laws to protect and restore ecological integrity, and ultimately to ensure the development of an appropriate national legal structure for sustainability and responding to climate change. Therefore, its initiative to carry out a sustainability audit and raise awareness amongst the Members of the National Assembly and consequently the nation as a whole, is viewed as a very positive move in this direction. The Assembly has 33 members (14 women and 19 men), elected in September 2016 for a period of five years. It has a staff of 39 persons, the majority of whom are women. See the organogram of the National Assembly at Appendix 1.

All National Assembly sessions are televised and broadcast live by the Seychelles Broadcasting Corporation (SBC).

The National Assembly building was completed in 2008 with financial assistance of the Chinese Government and opened its doors in 2009. It is a two-storey rectangular building containing the main parliamentary hall, committee rooms, the main lobby area, a documentation centre and offices.

Figure 1 – the National Assembly building

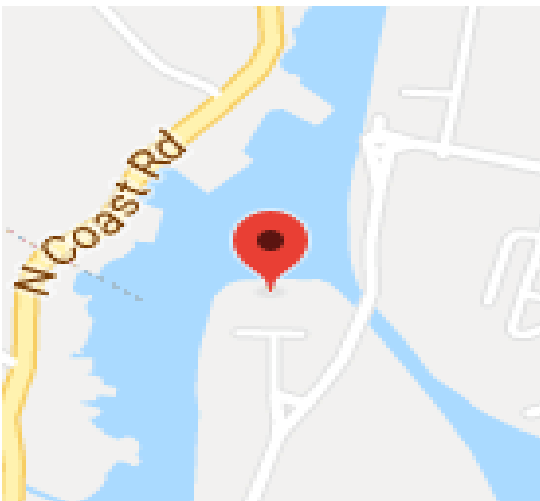


The building is operational five days a week from 08.00 -17.00 hours, although this can extend to later hours when the Assembly is in session. While officially a total of 72 persons work in the building or within its compound, several other people visit the premises daily, including school groups and members of the public who may wish to attend Assembly sessions. For the purposes of this study the number of persons using the buildings has been taken as an average of 85 during National Assembly sittings and 45 when not in session.

2.2 The site location

The NA building is located on Ile du Port in the northern part of Victoria, the capital city of Seychelles. It is on reclaimed land with a high saline water table.

Figure 2: Map of the site



3 OBJECTIVES

The main objective of this project is to help the National Assembly take on the challenge of becoming a more sustainable low carbon organization, and in doing so, move to translating sustainability into legal principles. The project should also serve as a model for other institutions to follow.

The first stage of this process is done through a climate change and environmental sustainability audit, which documents the National Assembly's successes and gaps in developing more sustainable practices, while engaging its members and stakeholders in the whole process. An action plan, derived from the outcomes of the audit should assist the Assembly in achieving these aims.

4 METHODOLOGY

Audits relating to the consumption of electricity and water, and the production and disposal of waste were done by the different specialised experts in these areas, using specific data collection tools developed for the purpose.

Energy: a walk-through inspection of the facilities was done, during which the efficacy of equipment was checked over and noted, including maintenance and operational issues. Interviews were carried out with maintenance and administration staff to get clearer views on matters of operation and consumption. The plans and diagrams for the electrical design were studied to obtain an overall view of the electricity network of the building.

Information on the electricity consumption of the NA was also obtained from PUC for the year 2018, and this provided an indication of how electricity was consumed over the period of one year. In addition, three energy analysers were installed on the main distribution board to collect data on the daily energy use of the building for one month - half the time when the Assembly was not in session and half when they were sitting. One of the analysers was used as a control to ensure the reliability of data collected.

Water: through several site visits during January and March 2019 the water system within and outside the building was studied, with the assistance of the maintenance staff and the gardener. Existing reticulation (the plumbing network) plans were checked over, along with existing water storage facilities and outlets. All PUC metered water bills for 2018 were analysed to obtain a reliable estimate of the yearly and daily potable water demand. The system for water leaks detection was also reviewed with maintenance staff.

The whole roof area was measured to assess the potential for rainwater collection, and inspection of the grounds were carried out to determine the optimal location for the retention pond and rainwater storage system.

Waste: Data was collected through walk-through surveys of the building over three days, general observation and interviews with heads of departments and units, supervisors and staff members including the housekeeper, cleaners, mechanic and gardeners. Questionnaires (72 in total) were given out to all members of secretariat staff as well as the National Assembly members to obtain more detailed information about current practices in the targeted areas, and to gauge participants' views on sustainable practices. Only 37 were returned – about 51% of respondents. (See questionnaire template at Appendix 2).

A waste sorting and auditing exercise of the waste generated over two working days (Tuesday 12 and Wednesday 13 March 2019, both days including Assembly sittings) was carried out with the assistance of maintenance staff. Inspection of the waste storage facilities was also done.

The team also undertook a desk review of relevant reports related to the functioning of the NA, the Seychelles Sustainable Development Strategy, as well as internationally produced documents on sustainable development. See the list of documents consulted at Appendix 3.

5 FINDINGS AND ANALYSIS

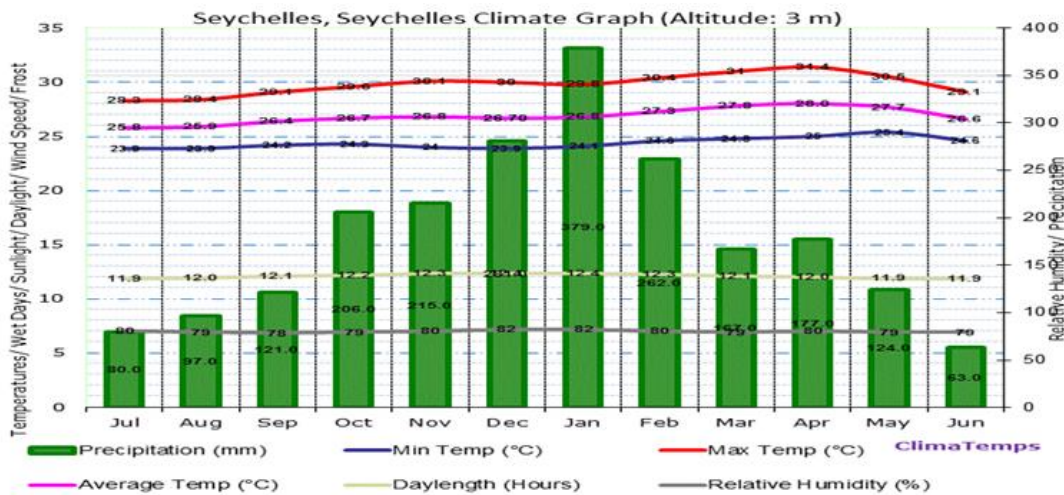
The findings, followed by an analysis of the findings, are discussed under the three main aspects audited – energy, water and waste.

5.1 Energy

5.1.1 Seychelles' Climate

The climate of the Seychelles is a “tropical wet” climate, according to the Köppen-Geiger classification. At around 5° south of the equator, Mahe experiences year-round warm weather, with daytime temperatures being typically around 30°C, while at night the temperature rarely drops below 24°C. With relative humidity around 80% and a dew-point in the range 21-23°C, buildings require air conditioning and/or adequate ventilation all year round to maintain comfortable conditions. This makes it a key to understanding the energy consumption in the NA building.

Figure 3: Climate Graph for Seychelles²



5.1.2 The Building and its Bioclimatic Potential

The NA building is of a rectangular shape, facing directly south. The building has a main lobby that extends to the first floor, as does the main hall. The rest of the building is comprised mainly of offices, meeting rooms and hallways on each floor.

² Source - <http://www.victoria-mahe.climatemps.com/victoria-mahe-climate-graph.gif>

Figure 4- Building Dimensions - m²

Block	Length/m	Width/m	Floor area/m ²
Ground Floor	46.60m	37.70m	2,096.05
1st Floor	46.60m	37.70m	2,096.05
TOTAL			4,192.10

The building is in an open location with no shading from other buildings or trees. It appears to have been designed with very limited bioclimatic considerations in mind. It is constructed of un-insulated single thickness concrete blocks, with a raised corrugated steel roof (un-insulated) over a ventilated attic space. The ceiling is a continuous concrete slab. There is no sisaliation (shiny insulation foil) present under the roof that would reduce the radiative heat gains into the attic space.

Figure 5 - The attic space



The roof overhang provides some solar shading for both floors, especially for the east and west facing sides. However, the south facing aspect of the building has an impact on the amount of solar gain into the building, especially given the fact that there is a lot of glass in the front of the building. All the windows are made of glass (single glazing) in aluminium frames, and all are fitted with curtains. The ones on the ground floor receive direct sunlight, all of which contribute to increased cooling demand.

As seen in Figure 5 the attic space still holds the old central air conditioning system installed when the building was constructed in 2008. The old system is no longer operational, and it has been replaced by split unit air conditioning systems which are reported on at 5.1.3 below.

5.1.3 Technical Facilities

Almost all the rooms are fitted with split unit air conditioning systems, mostly inverter types, and making up a total of 49 units.

Figure 6 - Air conditioning units

QUANTITY	CAPACITY
20	9,000 BTU
12	12,000 BTU
17	24,000 BTU

Lighting is mostly by fluorescent T8 strip lights which are not as efficient as LED lights. Plug loads are mainly related to office and communication equipment such as TV cameras, servers, computers and printers.

In addition, the building may soon exploit the significant potential for renewable electricity generation through a grid-tied photovoltaic (PV) system of panels. These have already been installed on the east-facing roof (see Fig 7), and they are expected to generate over 50% of the NA energy requirements – particularly as the operating hours are when the loads due to air conditioning are greatest during daylight hours. However, the system is still to be connected to the main Public Utilities Corporation (PUC) grid; a mismatch of fittings and missing parts appear to be the main obstacles; negotiations are ongoing with the companies concerned.

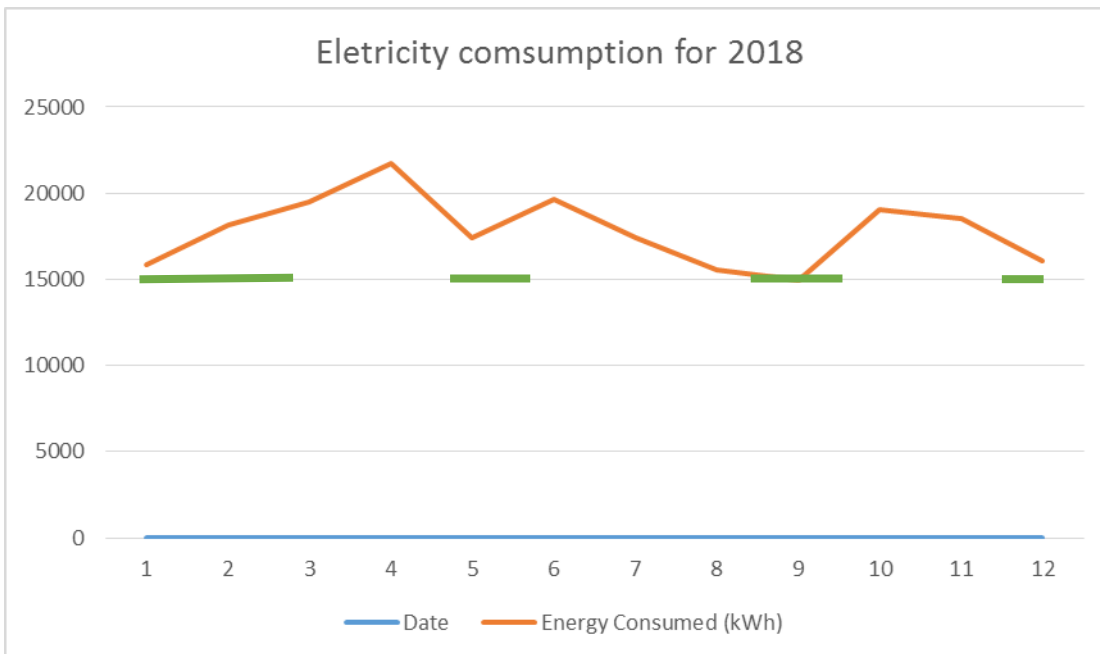
Figure 7 - Rear of the building (showing the split units and solar PV panels on the roof)



5.1.4 Electricity Consumption

The monthly electricity consumption for the year 2018 (data for January 2018 to December 2018) was analysed and the outcomes are presented in Fig 8.

Figure 8 - Monthly electricity use (kWh/month)



While there are slight monthly variations in energy demand, overall there is no significant trend, with average consumption at 17,800 kWh/month (3-year average is 17,919 kWh/m). The green line

represents the periods when the Assembly is in recess, meaning that only the administrative staff is present during those times.

The total electricity consumption for the 12 months of 2018 was 213,775 kWh/a. Compared to the conditioned floor area of 4,192.1 m², this represents a normalised consumption of 52.5 kWh/m²/a. Furthermore, the consumption of 213,775 units of electricity per year is equivalent to 60.5 tons of carbon dioxide emitted into the atmosphere for the same period.

Figure 9 - Electricity Consumption by Floor Area

Annual Electricity Consumption (kWh/a)	Floor area (m²)	Annual Electricity Consumption per m² floor area (kWh/m²/a)
213,775	4,192.1	50.9

5.1.5 Electricity Costs

Based on the PUC electricity tariff for government buildings, the annual cost of electricity is estimated as follows:

Figure 10 - Composition of Electricity Costs per year

	Units	Rate	Amount (SR)
Electricity consumption	213,775 kWh/a	4.71 SR/kWh	SR 1,006,880
Power demand charge	83 kVA ³	28.85 kVA/month	SR 28,652
TOTAL estimated cost of electricity for one year			SR 1,035,532

5.1.6 Consumption analysis

The on-site surveys and electrical recordings provide four categories of electricity consumption. Figure 11 shows the percentage split and Figure 12 shows the proportional split of the four categories. This will make it possible to estimate energy, financial and environmental saving potentials of the actions to be implemented.

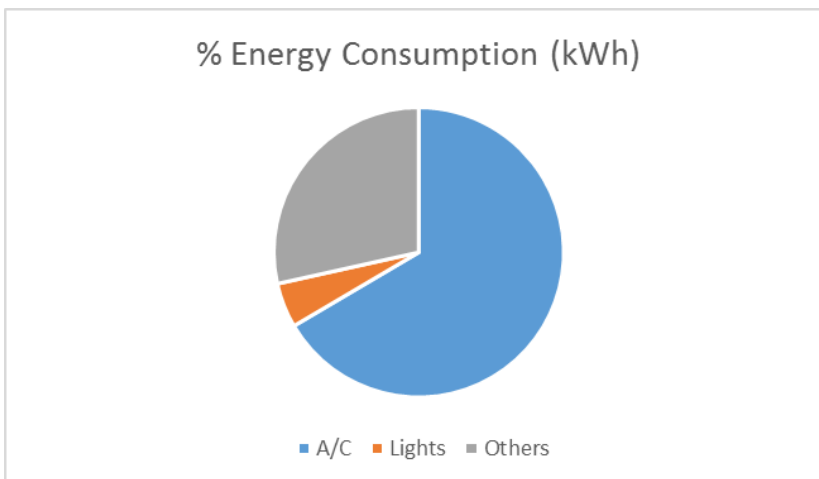
³ Based on the measured peak demand during the monitoring period

Figure 11 shows that the bulk of consumption is by the air conditioning units (67%). 95% of these units operate for 9 hours daily over 5 days a week. Although most of the 49 units are of the modern DC inverter types, this is the category where there is the greatest financial and environmental saving potentials.

Figure 11 - Final energy use

End Use	Installed power (kW)	Total (calculated) (MWh/a)	% energy use
Air Conditioning	214.53	142,209	67
Lighting	5.10	10,689	5
Others (mainly electronic, office and catering equipment)	115.00	60877	28
Total	334.63	213,775	

Figure 12 - Estimated proportional usage of energy consumption



As the air conditioning equipment are consuming the most energy, this is the area that should be given more attention to ensure more efficient use. The units are relatively new and the maintenance schedule seems up to date. There are no records of units that are broken or that are not functioning well. The focus will be to design and implement an education and awareness campaign to teach the staff about simple, but effective measures for using the systems that will provide comfort while reducing electricity consumption.

As noted at 5.1.3 the lighting is mostly from fluorescent T8 strip lights which are not as efficient as LED lights. While savings could be made by replacing them they represent only 5% of electricity consumption.

The ‘Others’ category, representing 28% of electricity consumption, comprises computers, printers, shredders, chargers, file servers, routers and other general office equipment, as well as broadcasting equipment and catering equipment. It was found that most of these equipment are relatively new and are in accordance with modern efficiency standards.

5.2 Water

5.2.1 Physical Structure and Water System

All water used inside the building is supplied by the Public Utilities Corporation (PUC). It comes from the greater Victoria distribution network of treated water, which is a mix of desalinated sea water and river water, all treated by chlorination. The water passes through a single meter in a 35mm underground pipe. It is stored in two tanks of 1 cubic meter each located in the attic space. In total they hold 2000 litres. From there it reticulates to all 4 toilet blocks and one kitchen. Water in the kitchen is heated in an electric hot water cylinder. All water pipes are integrated into the concrete walls.

The roof area is 1591m². Most of the rainwater runs into gutters, drained by 9 rainwater downpipes which discharge into channels leading to the nearby lagoon. One rainwater downpipe discharges into two 5000lit green polythene rainwater tanks at ground level (Fig 13). This water is used mainly for gardening and cleaning the floors. Automatic pumps are connected to these tanks to increase the pressure.

Figure 13 – Rainwater harvesting tanks



5.2.2 Water Usage

The bulk of the potable water is used in toilets, urinals and wash-hand basins. It was reported that showers in 3 bathrooms were rarely used. No food catering is done on site. Tea and coffee are made in the kitchen (for NA members) and in the offices for secretariat staff. Most crockery washing is done in the kitchen. Drinking water is usually purchased in 20 litre returnable containers and served in glasses which are washed in the kitchen. House-keeping activities use water for laundry, washing, mopping and general cleaning. Outside taps are only connected to the rainwater tanks.

A completely independent fire-hose system linked to the PUC network, with its own separate water meter and piping route linked to the different firefighting devices and system is networked in all the rooms. It has its own water storage metal tank on the attic floor (10,000 litres).

5.2.3 Metered Demand and Usage

PUC metered water bills from January to December 2018 were analysed to determine the daily average potable water demand for the year. This was done on the basis that one year of monthly consumption should provide a reasonable overview of usage. It is noted that outstanding amounts of water were metered in August and November. The maintenance supervisor reported that these were due to burst pipes hidden under concrete floors outside the building, and it took time to be discovered and localized.

Table 14 shows the metered water usage per month for 2018. It considers that each month on average has 22 working days and assumes an occupancy of 45 or 85 people per day, depending on the Assembly being in session or not. The months of August and November are not used due to water leaks.

Figure 14 –water usage for 2018

Period	Water Consumption (m3)	Notes	Litres per working-day	Occupants	Litres per occupant per day
January	20	Not in session	909	45	20
February	25	Not in session	1136	45	25
March	65	Assembly in session	2954	85	35
April	62	Assembly in session	2818	85	31
May	39	Not in session	1772	45	39
June	59	Assembly in session	2681	85	32
July	37	Not in session	1682	45	37

August	639	Water leak	n/a		
September	81	Assembly in session	3680	85	43
October	78	Assembly in session	3545	85	42
November	307	Water leak	n/a		
December	72	Assembly in session	3273	85	39
Averages	53.8		2445	69	34.3

Overall (and not considering the water leaks) the Assembly’s water demand is at 53.8 cubic meters per month. This represent an average of 2445 litres of water consumed per working day, and 34.3 litres per person per day. This is considered as reasonable, compared to the average daily consumption by households in Seychelles: 180 litres per person per day (PUC, 2018). It costs approximately SR1,547 per month. Over a year this would amount to SR18,564 (without leakage) but this is unlikely to be the case as leaks tend to happen due to aging infrastructure.

5.2.4 Rainwater Harvesting

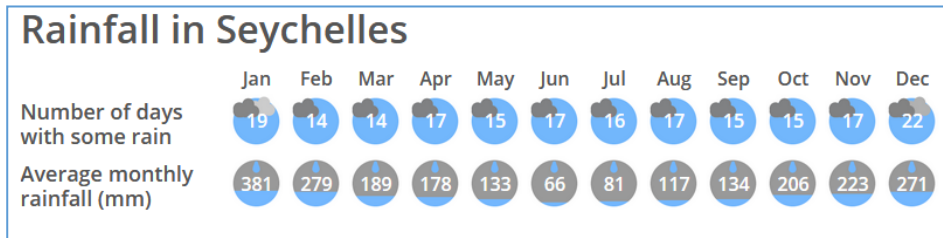
Presently two 5000lit plastic tanks connected to one rainwater downpipe hold enough rain water for gardening and cleaning purposes. Considering the total roof surface of 1591 square meters, with a system of gutters and downpipes already in place, the potential for harvesting large amounts of rainwater from the main building is very high: for instance, a normal rain shower of 10 mm would provide 16 000 litres of rain water (see table below); this represents the equivalent of 9 days water consumption at the National Assembly.

Figure 15: Volume of water harvested per rainfall amount with equivalent of consumption days

Rainfall (mm)	Volume of water collected (litres)	# days autonomy
10	15910	9
25	39775	23
50	79550	45
75	119325	68
100	159100	90
150	238650	135
300	477300	271
600	954600	541

Furthermore, Seychelles receives an abundant amount of rainfall annually, and it is fairly well spread throughout the year, making rainwater harvesting a particularly attractive option.

Figure 16 - Mean rainfall in Seychelles at Pointe Larue Airport from 1986 to 2018, source Met Office
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The purpose of any harvesting project is to have water security during the driest months and to span any extended ‘drought’ period. From Figure 16 it is noted that June and July tend to be the driest months; therefore, the proposal being made is based on a design for rainfall of 66mm per month. The table does not indicate how long any dry spell is during that month.

Drought conditions are not easy to predict and seem to occur every ten years. This assumption is changing now due to climate change and global warming and it is exponentially moving to longer droughts (IPCC report, October 2018)⁴. Our proposal should thus be to conserve enough water for a drought of three months.

5.3 Solid waste

This section presents the findings for waste types and waste sources, the management and disposal of waste, together with an analysis of these various aspects.

5.3.1 Types of Waste and Waste Sources

The waste from various parts of the building includes paper, cardboard, plastics, food, batteries, toner cartridges, electronic waste, chemicals and greenhouse gas emissions from transport.

Paper represents 38% of the waste produced per year, as estimated from the sorting audit and questionnaire responses. This includes used paper napkins, hand towels, etc. (making up 18% of the total amount) and office paper (12% of the total amount of waste). It is estimated that over one year 2,427 Kg of used paper towels are generated from the kitchen and bathrooms – (staff noted that 6 full bin liners are disposed of on every NA sitting day) – and 228 kg of toilet paper (contained on 2,400 rolls) is flushed away.

Dry and recyclable paper makes up the bulk of office paper consumed; some 81,000 sheets of A4 paper are utilised per year, equivalent to 1,125 sheets (2.25 reams) per person. According to staff most of the paper is used by Assembly members, who tend to prefer hard copies of most working documents. There is a move by the secretariat of the office of the Clerk (where minimal amounts of paper are used)

⁴ Global Warming of 1.5°C, IPCC, 2018

to reduce paper consumption by limiting hard copies to documents requiring signatures or stamps only, (eg. the Order Papers) and for committee work. Almost all documents are also distributed in soft copy via email, but staff explained that many NA members often requested the print versions as well. Copies are normally done back to back. Documents considered as confidential are shredded in small office shredders placed in the various departments.

Large amounts of office paper are also used during official overseas missions. In 2018, for instance, there were 52 overseas trips involving 114 persons (including members of the NA and staff). As most members prefer hard copies of documents for travel, they are usually provided with plastic folders containing an average of 50 sheets of printed paper each. This would have amounted to 114 plastic folders and 5,700 sheets of paper (11.4 reams).

It should be noted that a significant amount of the office paper used do not enter into the NA's disposal system as they are kept by members and staff for various periods of time. While the printing paper is purchased from recycled sources, this is not guided by any procurement policy – it seems to be more by chance than by design.

Six paper copies of local **newspapers** (daily, weekly and monthly editions) are purchased for use by NA staff. They are placed in the library for a few weeks and then archived in the attic. It is estimated that about 13,000 pages of newsprint are stored there per year. From time to time the papers are sent to the landfill during occasional clean-ups.

Cardboard packaging comes with most items ordered, especially IT equipment, stationery, food and beverages. The packaging often contains Styrofoam and plastics as well. The housekeeper referred to 'large amounts of packaging', primarily cardboard boxes, polystyrene and plastics, giving as example the ICT unit, which generated a minimum of 120 large cardboard boxes in 2018.

Plastic is another significant item in the waste stream - 15% was recorded during the waste sorting and auditing exercise. This could amount to as much as 774 kg of plastic going to the landfill per year. Most of the plastics come as packaging, but they also include plastic folders, pens and string.

In January 2019 the NA took the decision to ban single-use plastic water bottles in the Chamber on their return from recess in February. The substitution to glass water jugs was clear during the televised State of the Nation address on 26 February 2019 and the change attracted many positive comments from viewers through social media. As well as reducing the amount of plastic going to the landfill this decision also brought about a small reduction in costs: from purchasing 10,400 PET water bottles of 750ml a year for drinking water, the NA now uses and recycles 1,008 reusable 19lit plastic water dispensers, making a saving of SCR11,472 per year.

Food accounts for 17% of waste recorded and on that basis, it can be estimated that about 550kg is discarded per year – 10.6kg per week. Generally, lunch is not provided unless there are day-long committee meetings. Most staff and NA members purchase take-away lunch packs in biodegradable

boxes which, generally, are disposed of in the kitchen/lounge bins. On his own initiative one staff member is collecting food waste daily for animal feed.

Snacks for tea and coffee breaks during Assembly sittings are ordered from outside caterers at the cost of SR2000 per order, and the practice is that the same amounts are procured irrespective of the number of persons expected to be present. Food delivered on the premises is usually served in aluminium foil containers covered with plastic cling film.

According to housekeeping staff, double the amount of food waste is generated when the Assembly and their Committees are in session. This also comes with significantly larger amounts of other waste such as takeaway boxes, milk cartons, plastic cutlery and used paper towels.

Batteries (mainly alkaline ones) are consumed in relatively large numbers by the NA. They are used in air-conditioning remote-control units, recorders, cameras, clocks and radios – 1,728 alkaline batteries were procured in 2018. All are disposed of in the office waste bins and eventually sent to the landfill.

Toner cartridges also make up a significant amount of waste that goes to the landfill. Within the NA secretariat there are just over a dozen printers and photocopiers, and on average one toner cartridge is replaced per month.

Electronic equipment is found in all offices and the Assembly Chamber, including servers, 20 computers, 20 desktops, 10 laptops, 20 keyboards and mouse, along with network switches and routers. There are also 7 television screens and broadcasting equipment belonging to the Seychelles Broadcasting Corporation (SBC). All 33 Assembly members receive a smartphone and tablet for their work and personal use. A Chamber conferencing system was installed in 2016.

According to IT staff the equipment has a variable lifespan of 5 to 6 years. However, disposal was abnormally high in 2018 mainly because it was only then that the IT Unit obtained the necessary write-off authorisations to dispose of obsolete equipment stored in the attic over the past decade. During that same period 75% of monitors had been replaced, 60% of CPUs and desktops, 25% of keyboards and 90% of laptops. Judging from the physical waste sort, about 100kg of computer cables are also discarded per year.

Concerns were expressed over the 45% replacement level for TV sets, and the resilience of the smartphones. Possible explanations given were the high level of salinity, in view of the building's proximity to the sea and the poor quality of some of the equipment.

Chemicals which may be hazardous to health and to the environment are very often contained in materials used for housekeeping, maintenance and gardens. These materials account for 8% of waste disposed by the NA and, based on the waste sorting exercise, they may amount to about 550kg per year. All hand-washing and dishwashing liquids and detergents for cleaning are ordered in bulk and

dispensed from refillable dispensers at point of use, which is a good practice. However, most of the brands observed contained sulphates (foaming agents) and ammonia which are considered harmful to health. The detergents, especially bleach, often contain sodium hypochlorite, a known hazardous material for both health and the environment.

For purposes of controlling weeds and pests in the NA garden phosphate-based herbicides such as glyphosate and other weed killers are being used; they may be effective in practice, but they are extremely toxic to the users and the environment.

Greenhouse gas emission from transport is a global concern and for a small island state like Seychelles it is even more critical that every effort is made to reduce carbon emissions and improve our ‘eco footprint’. The NA provides daily transportation (through a contracted provider) for staff who wish to avail of it from English River Clinic and back twice a day, morning and evening, in view of the distance staff may have to walk. The NA has six official vehicles, all of which are 1500cc and above. One is a hybrid and there are plans to replace an old car with another hybrid. All members of the Assembly along with some of the secretariat staff have personal vehicles, and they each receive a fuel allowance of SR5,600 per month. Most members also travel overseas on NA business at least once a year.

Although most of the respondents did not fully respond to the section of the questionnaire related to transportation, a reasonable estimate would be that the cars of the majority of NA members are consuming about 100lit of fuel per month (100lit x 33 = 3,300lit per month) and per year this would amount to about 39,600lit. Based on 2.3kg of CO² being produced by 1litre of petrol (international benchmark), this would be equivalent to a total of 91.08 tons of carbon emissions. Added to this the annual overseas travel by plane (at a conservative estimate of 1.5 tons per person), and the estimated 60.5 tons of CO² produced by electricity consumption, the NA’s total carbon emissions for energy and transport would add up to 153.08 tons per year.

5.3.2 Waste Management and Disposal

While the NA does not have a formal waste management policy certain processes are in place that guide waste management and disposal, as indicated in Figure 17 below and the sections that follow. The Human Resource unit is also producing an ‘Employee Handbook’ for May Day, to be given to each staff member, that will include a section on issues related to waste production, management and disposal.

Figure 17 – Holding places for waste

Holding places for waste	
Office bins	Under desk bins lined with biodegradable bin-liners, containing mainly paper, spent batteries and small office materials – emptied once a day by housekeeping

	<p>staff into large bin bags, and deposited in larger bins at the general waste holding area.</p> <p>Paper shredders in some individual offices – emptied whenever full, often weekly.</p>
Cloakroom bins	Small bins for used paper towels after hand-washing – emptied twice a day.
Kitchen/lounge bins	<p>Larger bin for food waste and disposable food and drinks containers, cutlery and napkins generated by staff and Assembly members – emptied twice a day.</p> <p>Larger bin for kitchen paper, biscuit wrappers, cleaning material bottles and other cleaning items - emptied twice a day.</p>
Attic	<p>Holding place for newspapers, extra copies of documents, old journals and magazines; obsolete or broken down office equipment, electronic and electrical items, including computers, broken air-conditioning units, all kept until write-off authorisation is received.</p> <p>Also holds archives of past Assembly proceedings - on cassette tapes and CDs.</p>
General waste holding area	<p>A secure covered concrete structure (like a small store room) with washable concrete flooring containing 4 large bins (capacity 74cm x 54 x 45 cm) and 2 smaller ones (capacity 65x40x45cm). All bins have biodegradable bin-liners and are filled with waste from office, cloakroom and kitchen bins.</p> <p>All outsized items – such as cardboard and polystyrene packaging, large plastic bottles and chemical containers are placed next to the bins within this area.</p> <p>Larger items awaiting disposal, eg air-conditioning units, are placed outside the concrete structure.</p>

i) Each office worker has an under-desk bin lined with a compostable bin liner, which is changed only when visibly soiled or at the request of the particular office worker.

ii) In principle all food waste is expected to be deposited in their compostable boxes in a bin kept for the purpose in the kitchen/lounge. While there is an unwritten rule that food should only be consumed in the lounge, and most staff said they adhered to this, beverages and snacks are consumed at the desk and inevitably food related items end up in the office bin along with paper and other waste. These included plastic and foil biscuit packaging, plastic yoghurt tubs, foil lids, fruit peelings, teabags, used plastic desert bowls and cutlery, as noted during the office walk-through. Staff who miss their lunch during the assigned break also explained that they felt compelled to be at their desks on time, and so sometimes had lunch at their desks. Thus some take-away boxes with leftover food get into the office bins or are left on the desks for cleaning staff to clear.

iii) Used toner cartridges are replaced and collected by the ICT unit technicians and disposed of directly into the larger bins in the general waste holding area. The same applies for discarded computer cables.

iv) Authorisation for disposal of decommissioned or obsolete assets (such as office equipment and air-conditioning units) has to be sought from the Ministry of Finance in accordance with government policy, and this may be a lengthy process, done on average twice a year. Once authorisation is received the items are loaded onto hired pickup trucks and taken to the landfill. Records were not available of the weight or volume of the waste thus transported.

v) The waste is held in the general holding area until collected by the waste disposal company twice a week, on Tuesdays and Fridays. Large items are stacked on the floor or left outside the 'store' if too large. There is no weighing or volume estimation done of waste collected, or signing off to acknowledge acceptance of collection. The arrival and departure of the collecting waste vehicle is logged by the security guards on duty at the entrance of the NA premises. All waste collected is destined for the landfill.

vi) The holding area is regularly cleaned with a power washer and cleaning chemicals which flow over the concrete spacing between the holding area and the Assembly building, draining into the gutters running around the perimeter of the building, and eventually into the sea nearby.

vii) The ICT department has in the past re-used and recycled parts of obsolete equipment, and such items were observed in use in the server room.

viii) The NA currently spends SR396 per month and SCR 4,752 annually on waste collection from its premises. However, this is likely to change as the national waste collection system is under review and new tariffs are expected to be introduced later this year.

ix) The Human Resource unit is producing an 'Employee Handbook' for May Day, to be given to each staff member, that will include a section on issues related to waste production, management and disposal, and the NA's aim to reduce its carbon footprint.

6 RECOMMENDATIONS

Based on the analysis of the data collected through the whole audit process the following recommendations are made to help the NA reduce its ecological footprint. Many of them were also suggested by staff during interviews and through the questionnaires they completed.

The recommendations that follow would need to be prioritised by the NA staff and members in accordance with an agreed set of criteria – such as feasibility, financial implications, staff capacity and commitment, and time frames. To help ensure that the proposed actions are followed through it would be necessary to establish a framework within which the recommendations would be implemented. We therefore strongly recommend that the NA develops and implements an overall policy for ecological sustainability to guide their operations and improve their environmental performance by minimising pollution, resource consumption and promoting biodiversity.

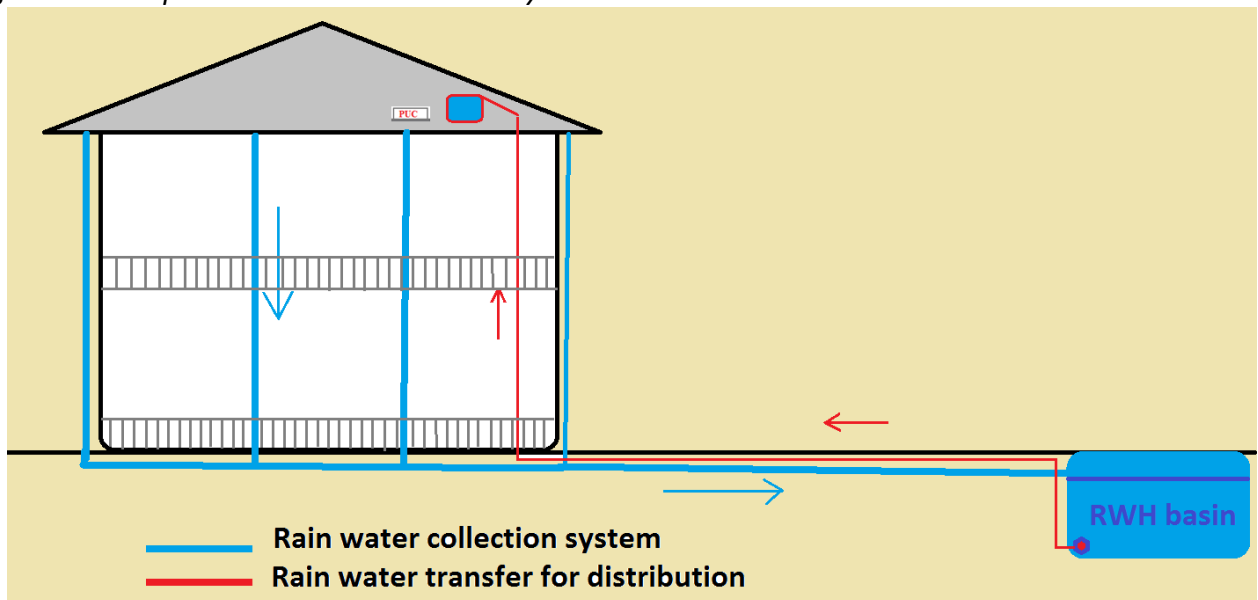
6.1 Energy

1. The air conditioning temperature should be increased from 21° C to between 24 and 26°C. This measure is expected to save approximately 15% on the energy cost that is equivalent to 32,066 kWhr. At this recommended temperature, there should not be a reduction in the level of comfort for the building occupants.
2. All windows and doors should be kept closed when the air conditioners are operational. It is also recommended that windows should be opened from time to time to allow fresh air into the building but ensure that air conditioners are switched off when windows are opened.
3. Shading over glass windows and shading over the air conditioning units on the outside of the building (especially the east and west facing sides) should be considered to increase the efficiency of the units.
4. Implement an education and awareness campaign to help people adapt to the more sustainable practices.
5. As a general policy the NA should buy energy efficient appliances (ones with high energy efficiency ratings as per the labels) when replacing equipment.
6. The NA should switch to LED lights for the whole building.

6.2 Water

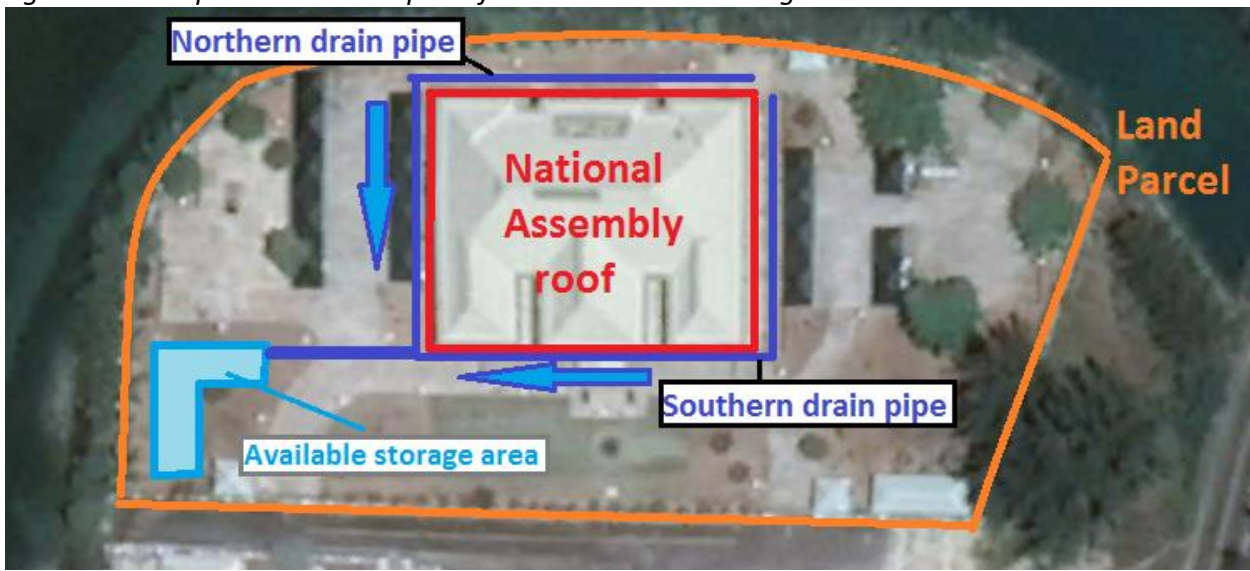
1. It is important to avoid major water leaks by carrying out regular checks once or twice a week. A reading should be taken in the evening when most staff are gone, and another in the morning before staff return. The difference in the two readings should notify possible leaks. The department responsible should train the security guard and other staff to carry out such routine checks.
2. A rainwater harvesting system should be set up by connecting all the downpipes into one network that will take all the rainwater to a retention pond, as indicated in Figure 18 below.

Figure 18 – Proposed rainwater collection system



Based on the amount of rainfall per year, a retention pond that can accommodate a 150 cubic meter volume of storage (ie 12m x 7m x 2m (approx. 150m³) should be built in the grounds of the NA, in the position proposed in the diagram below (Fig 19).

Figure 19 – Proposed retention pond for rainwater harvesting



The advantage of this site is that it would facilitate the integration of the pond into the landscaped garden area. Construction costs could be minimized by digging the hole and lining it with imported waterproof material. The rain water will pass through a sand filter and into the pond.

The pond should then become a feature of the garden and be fitted with a small fountain to maintain oxygen, native aquatic plants and some native freshwater fishes to maintain balance and constant water quality. A pergola over which vines and other plants could be grown would provide shade over the pond and reduce evaporation. A proper design will need to be developed, integrating the different aspects (landscaping, pipe fitting, overflows, garden, and pumps).

3. It is proposed that a hydrophore system (for regulating the water pressure and consisting of an intake and pump combined with a tank) is installed in the attic, whereby water is pumped into a 1000lit tank, similar to the existing PUC ones. It will serve as a distribution tank for all non-potable water use. The NA will need to decide on the most appropriate systems for reticulating the two water distribution networks: one for the PUC water and one for the rainwater, in accordance with existing regulations. A water filter, including UV filtration, could be installed at the outlet of the rainwater tank in the attic to provide clean potable water. Alternatively, a separate system connected to only the facilities not requiring potable water (toilets, showers, hoses...) can be installed.

Figure 20 - Overall cost estimate for the pond - climate adapted option - natural rainwater harvesting pond integrated into an aquatic ecosystem.

Items	Cost (purchase, installation/building) SCR
Rain water drains from NA to pond	11,000
Basin reservoir profiling, excavation	10,500
Waterproof tarp and geotextile (imported)	23,500
Plumbing intake (Automatic pump/pipe fitting)	8,000
Plumbing outlet (attic roof tank/valves, pipe, filter)	7,000
Air pump	600
Pergola cover	5,000
Soil & plants	5,000
Total estimated budget	SCR 70,600

6.3 Waste

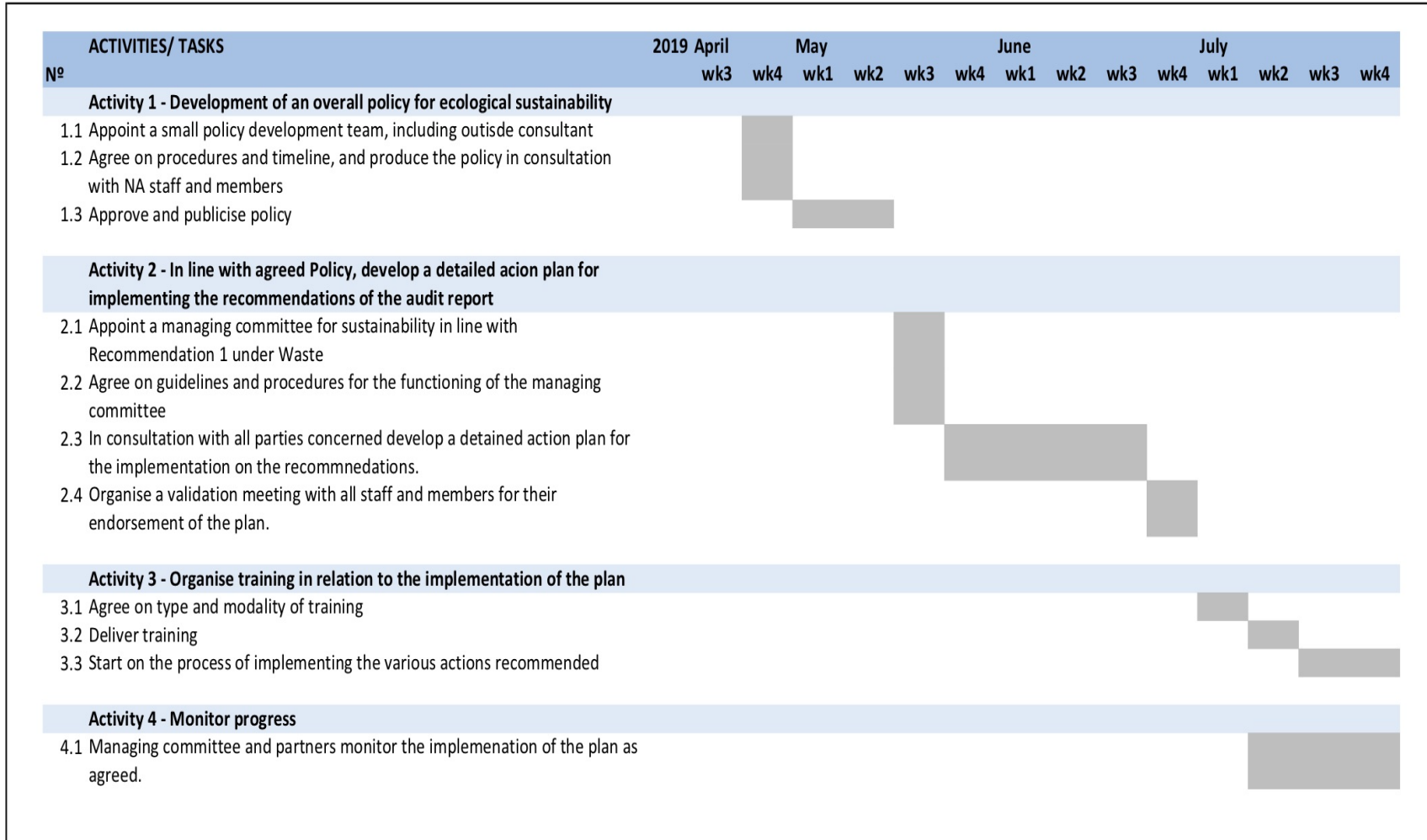
1. A sustainable waste management policy and guidelines should form part of the NA's environmental and sustainability policy as proposed above. A 'sustainable practice manager' should be assigned to oversee all sustainable operations with the assistance of team leaders from the various departments, including from the Chamber.
2. Through concerted efforts the NA should be able to reduce paper and plastic use, specifically office paper by 75 % within the next six months by using electronic forms of communication and documentation, recycling food waste landfilled by 100% within a month, reducing the use of chemicals by 50% (by investing in steam cleaners) and reducing the use of garden chemicals by 90%.
3. Build 'musts' criteria encouraging sustainability in the NA's purchasing and procurement process which must favour environmentally friendly products, and avoid packaging, especially plastics.
4. The secretariat must encourage the separation of waste at source and promote the principles and practice of 'reduce, reuse, repair and recycle' through locally available industries –eg recycling of PET bottles, cardboard and paper, car batteries and metal pieces.

5. The secretariat should organise for subscriptions to the e-versions of newspapers; apart from cutting on waste and archiving space it will also cut down on costs.
6. Where necessary offer training for NA members to switch to using digital formats of all documents, including Bills which can be scanned and then circulated to Members. Finally, this should become a requirement of the operations of the Chamber, to become paperless as far as possible.
7. The NA's purchasing policy should favour environmentally friendly and efficient products with reduced packaging as much as possible. The policy should also include a requisition process for all goods and materials issued to staff and the Chamber.
8. Food orders by the NA should be adjusted according to actual number of persons present on any particular day or week.
9. Encourage car-pooling and use of public transportation and encourage the purchase of low—emission and energy-efficient vehicles only. Also review the fuel allowance system to promote reduced consumption.
10. All NA issued equipment, including tablets and smart phones, should be returned to the NA secretariat by Members both for repair or when they are no longer usable, or at the end of the Members' term of office; options for recycling and responsible disposal should also be explored.
11. The NA must be cognisant of all local legislation and ensure that its operation is in line with all regulations and policies with regard to environmental impacts, waste, and use of harmful chemicals.

7 THE WAY FORWARD

Once the recommendations have been prioritised by the NA staff and Members, a detailed action will have to be developed to guide the implementation of the agreed actions. For the purposes of this audit report a tentative action plan is proposed (see below) to assist the NA in moving to the next stage of the process. Factors including feasibility, financial implications, time frames, staff capacity and commitment, must be incorporated into the final action plan.

Figure 21 – Suggested Action plan





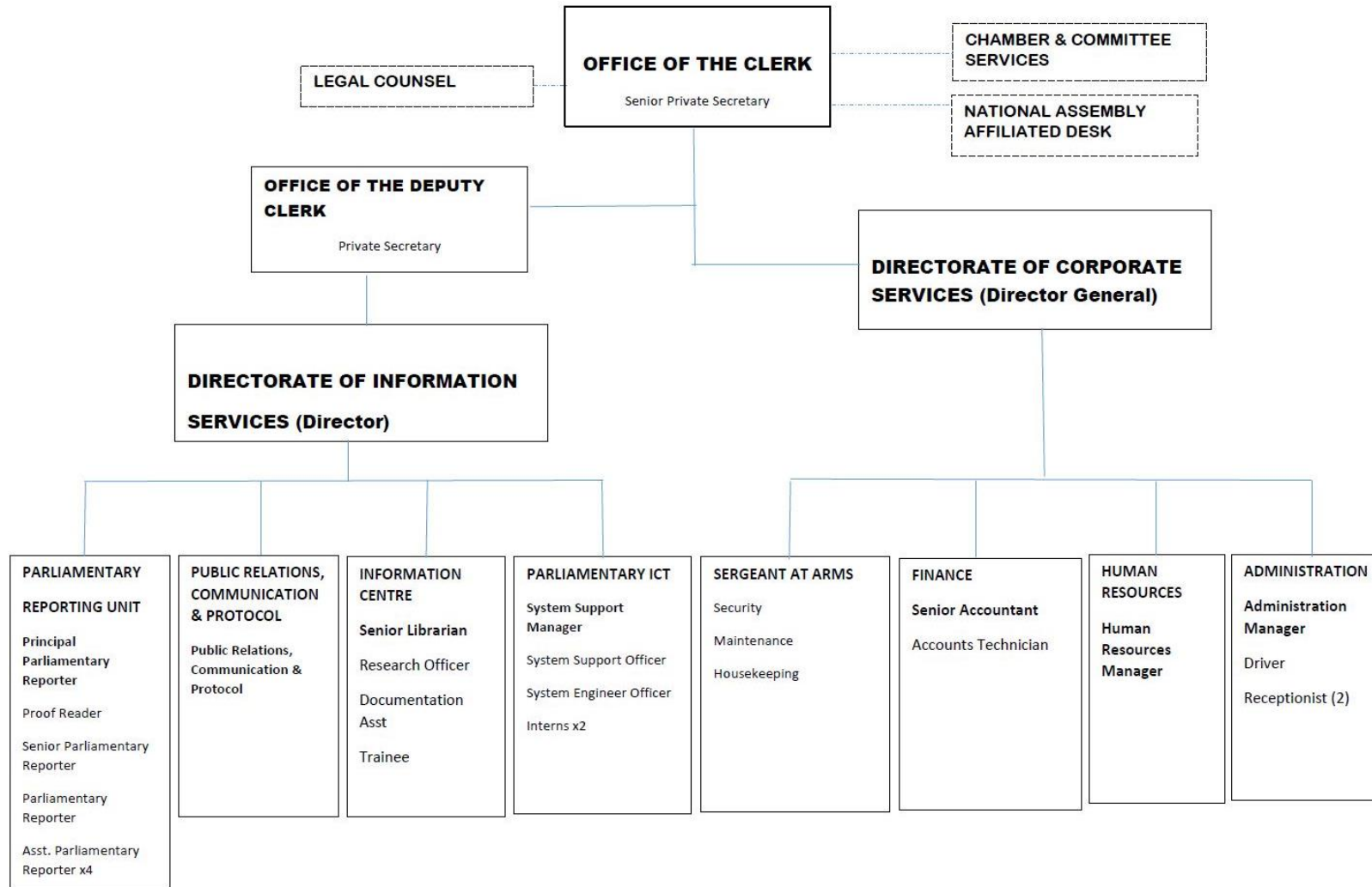
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TECHNICAL ASSISTANCE FOR THE GCCA SEYCHELLES

8 APPENDICES

8.1 Appendix 1 : Organogram of the National Assembly (2019)





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TECHNICAL ASSISTANCE FOR THE GCCA SEYCHELLES

8.2 Appendix 2: Questionnaire

Waste Awareness Questionnaire

National Assembly of Seychelles		
Date completed:		
Department	Building	Floor / area

Current Practice and Tendencies

(to be answered by all staff members and National Assembly Members. Forms are to be collected/compiled or submitted to auditor, anonymously)

1. Are you aware of any current policy on waste at the National Assembly?

.....

2. How often do you print? (circle the appropriate answer)

- a) I print all documents
- b) I only print documents for annotation /review and official letters for dispatch
- c) Rarely: I review all my documents electronically

3. Do you make use of scrap paper? If so, for what purpose? .(Eg for notes) -----

4. How many pages do you print in a day? Do you use double sided printing? -----

5. Do you receive one or two daily print newspapers? -----

6. How many magazines do you receive per month? Give number of pages each. -----

7. Do you car-pool or take public transport to and from work? -----

8. **What is the CC of your vehicle?** -----
9. **How many kilometres do you travel to get to work and back?** -----
10. **What type of fuel does your vehicle use and how much is used per week?** -----

- | | Meals during working hours | Comments (if any) | | | | | | |
|----------------------|--|--------------------------|----------------------------------|--------------|----------------------------------|----------------------|----------------------------------|--|
| 11. | I eat on the premises during
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 12. | I use paper cups, plates for
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 13. | I use plastic cups, plates and cutlery
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 14. | I use recyclable or compostable receptacles and cutlery
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 15. | I use reusable receptacles and cutlery
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 16. | I dispose of leftover food in the bin
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Lunch</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> <tr> <td>Afternoon tea</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | Lunch | 1 / 2 / 3 / 4 / 5 times per week | Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Lunch | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| Afternoon tea | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |
| 17. | I throw used food receptacles and cutlery in the bin
<table border="0" style="margin-left: 20px;"> <tr> <td>Break</td> <td>1 / 2 / 3 / 4 / 5 times per week</td> </tr> </table> | Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | |
| Break | 1 / 2 / 3 / 4 / 5 times per week | | | | | | | |

Lunch 1 / 2 / 3 / 4 / 5 times per week
Afternoon tea 1 / 2 / 3 / 4 / 5 times per week

18. I take leftover food off the premises and throw it in a bin somewhere else

Break 1 / 2 / 3 / 4 / 5 times per week
Lunch 1 / 2 / 3 / 4 / 5 times per week
Afternoon tea 1 / 2 / 3 / 4 / 5 times per week

19. I take leftover food off the premises and feed it to animals

Break 1 / 2 / 3 / 4 / 5 times per week
Lunch 1 / 2 / 3 / 4 / 5 times per week
Afternoon tea 1 / 2 / 3 / 4 / 5 times per week

20. I take leftover food off the premises and throw it in the compost

Break 1 / 2 / 3 / 4 / 5 times per week
Lunch 1 / 2 / 3 / 4 / 5 times per week
Afternoon tea 1 / 2 / 3 / 4 / 5 times per week

21. I take all food receptacles home

Morning break 1 / 2 / 3 / 4 / 5 times per week
Lunch 1 / 2 / 3 / 4 / 5 times per week
Afternoon tea 1 / 2 / 3 / 4 / 5 times per week

22. I use PET bottles (refreshments/water).

23. I use cans (refreshments/water).

	Quantity per week	Quantity per week
	Volume capacity of bottle	Volume capacity of
can		

24. (If yes) Where do you dispose of your bottles and cans?

25. How do you think you can help your organisation reduce the waste it generates?

26. What kind of support would you like to have to help lessen your and your organisation's carbon footprint?

8.3 Appendix 3: Documents Consulted

European Parliament (2015) *Briefing – Understanding Waste Streams*

Intergovernmental Panel on Climate Change (2018) *Global Warming of 1.5°C – Summary for Policymakers*.

Safety and Standards Consultancy and Training Agency (2018) *Risk Assessment for the National Assembly*.

Seychelles National Climate Change committee (2009) *Seychelles National Climate Change Strategy*.

Seychelles Government (2015) *Intended Nationally Determined Contribution (INDC)* - under the United Nations Framework Convention On Climate Change (UNFCCC).

Government of Seychelles (2011) *Seychelles Sustainable Development Strategy 2012 – 2020*.