Methodology:
Indicator SDG 6.3.4A – Proportion of waste lawfully disposed of

Version 1, March 2023

Goal 6:	Ensure availability and sustainable management of water and sanitation for all
Target 6.3:	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
Indicator 6.3.4A:	Proportion of waste lawfully disposed of

D1 THE INDICATOR

D1.1 Organisation(s)

Department of Water and Sanitation (DWS)
Department of Forestry, Fisheries and Environment (DFFE)
Statistics South Africa (StatsSA)

D1.2 Definition

Target 6.3 sets out to improve ambient water quality, which is essential to protecting both ecosystem health (Target 6.6 and SDGs 14 and 15) and human health (Target 6.1; recreational waters and drinking water sources), by eliminating, minimizing and significantly reducing different streams of pollution into water bodies. The main sources of pollution from solid waste include landfills, informal waste dumps, and unlawful disposal of solid waste by industry into facilities that have not been designed to receive that waste.

It must be noted that solid waste and the recycling of waste is also covered under SDG Indicators 11.6.1 (Urban Solid Waste), 12.4.2 (Hazardous Waste) and 12.5.1 (National Recycling Rate).

The proposed methodology for Indicator 6.3.4.A: *Proportion of Waste Lawfully Disposed Of* implies the mass of solid waste being disposed of lawfully, in comparative relation to the total mass of solid waste being disposed of. Table D.1 defines the terms used in terms of the application of policies and guidelines.

Table D.1: Phrase by phrase interpretation of Indicator 6.3.4.A

Indicator 6.3.4A	**Normative interpretation**
"Proportion of waste lawfully disposed of."	*"Proportion of"* Percentage of total
	"Waste" means any substance, whether or not that substance can be reduced, re-used, recycled and recovered— (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— (i) a by-product is not considered waste; and (ii) any portion of waste, once re-used, recycled and recovered, ceases to be Waste. (Definition from the National Environmental Management: Waste Act)

Indicator 6.3.4A	Normative interpretation
	"lawfully" In a way that conforms to or is permitted or recognized by the law.
	"disposed of" Burial, deposited, discharged, abandoned, dumped, placed or released into, or onto, any land. (Definition from the National Environmental Management: Waste Act).

D1.3 Rationale

Eliminating disposal of waste and minimizing the generation, use and discharge of hazardous substances will assist South Africa in achieving its raw water quality goals, as measured by SDG Indicator 6.3.2D.

The elimination of disposal of waste and minimizing the generation, use and discharge of hazardous substances, is also consistent with goals of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention on Persistent Organic Pollutants.

South Africa is a water scarce country, and therefore pollution reduction is imperative to conserve our limited freshwater resources.

D1.4 Concepts and Terms

The concepts and definitions used in the methodology have been based on existing international frameworks and glossaries unless indicated otherwise below.

Cumulative: Increase in quantity by successive additions.

Change: a shift from one condition to another; in this case it refers to a change in cumulative volume over time, in relation to a point of reference, within a water-related ecosystem.

Disaggregation: Breaking down of data into constituent data sub-sets. Data can be disaggregated by subnational regions as well as by urban/rural regions, providing information on equity.

Municipal Solid Waste: waste generated by households, and waste of a similar nature generated by commercial and business establishments, industrial and agricultural premises, institutions such as schools and hospitals, public spaces such as parks and streets and construction sites. (UN Habitat, 2016)

Other Solid Waste: waste that require special treatment such as hazardous waste from industrial processes, agricultural activities and mining wastes, hospital waste, end of life vehicles, construction and demolition waste and WEEE (Waste Electrical and Electronic Equipment). (UN Habitat, 2016).

Non-point source pollution: Diffuse pollutants that do not originate from a single discrete source, e.g. a pollution plume originating at a landfill site.

D1.5 Relationship between SDG Indicator 6.3.4A and Target 6.3.2D

SDG Indicator 6.3.4A measures the lawful disposal of waste. SDG Indicator 6.3.2D measures the quality of water resources around South Africa. The impact of unlawful waste disposal on the quality of ambient water can thus be established using this additional indicator.

D2 COMMENTS AND LIMITATIONS

Some data is available for the mass of waste lawfully disposed of, because this is a requirement when applying for a waste management licence. However, almost no data is available on the mass of solid waste disposed of unlawfully (illegal disposal is seldom monitored or reported).

D3 METHODOLOGY

D3.1 Computation Method

The proposed methodology includes estimation of the proportion of waste disposed of lawfully. The proportion of waste lawfully disposed of is: the mass of solid waste lawfully disposed of expressed as a percentage of the total mass of solid waste generated.

The proposed computation method consists of three calculations:

- Total mass of solid waste generated;
- Mass of solid waste lawfully disposed of; and
- Proportion of solid waste lawfully disposed of (calculated using the numbers in the points above)

D3.1.1 Formula

The total mass of solid waste generated in the country is currently not measured. However, it can be estimated for each sector using a combination of measurements and estimates, and added together to provide an overall total for the country. Equation 1 shows how the total can be estimated. The recommended monitoring unit is tonnes per annum.

Equation 1:

$$\boldsymbol{m_t = m_g + m_i + m_s}$$

Where:

m_t = total mass of solid waste generated in South Africa

m_g = total mass of general municipal solid waste generated (by households and commercial activities)

m_i = total mass of solid waste generated by the agricultural, power generation, and mining industries

m_s = total mass of solid waste generated by the manufacturing industries (chemicals, FMCG, fertiliser, tyres, etc)

Note: mass is measured by scales, weighbridges, etc. where mass data is available, and estimated per capita where mass data is not available.

The total mass of solid waste disposed of lawfully in the country is partially measured for some sectors, and estimated in others. The combination of these estimates and measurements can be used to provide an overall total for the country. Equation 2 shows how the total can be estimated. The recommended monitoring unit is tonnes per annum.

Equation 2:

$$\boldsymbol{m_{t,l} = m_{g,l} + m_{i,l} + m_{s,l}}$$

Where:

$m_{t,l}$ = total mass of solid waste lawfully disposed of in South Africa

$m_{g,l}$ = total mass of general municipal solid waste (generated by households and commercial activities) lawfully disposed of

$m_{i,l}$ = total mass of solid waste generated by the agricultural, power generation, and mining industries, that is lawfully disposed of

$m_{s,l}$ = total mass of solid waste generated by the manufacturing industries (chemicals, FMCG, fertiliser, tyres, etc), that is lawfully disposed of

Note: mass is measured by scales, weighbridges, etc. where mass data is available, and estimated per capita where mass data is not available.

The calculation for the proportion of waste lawfully disposed is in Equation 3 below.

Equation 3:

$$\boldsymbol{p_l = \frac{m_{t,l}}{m_t} \times 100}$$

Where:

p_l = proportion of solid waste lawfully disposed of in South Africa

$m_{t,l}$ = total mass of solid waste lawfully disposed of in South Africa

m_t = total mass of solid waste generated in South Africa

Lawful disposal in this context of this indicator means that the waste disposal was permissible in terms of the National Environmental Management: Waste Act, i.e. the waste was disposed of at a dedicated waste disposal facility, that was designed to receive the specific type of waste (e.g. general waste facility or hazardous waste facility). For households and businesses, lawful disposal means putting the waste in a designated container that is removed by the municipality or a waste management company.

The solid waste masses can be aggregated into municipality, province, watershed, or for the country as a whole. This will assist in providing data at a range of scales, while also providing comparisons between municipalities, regions, and provinces to give a better representation of the country's status quo and provide an understanding of where the main solid waste disposal challenges lie.

The percentages calculated can be presented graphically, and on maps using spatial techniques to assist with reporting and interpretation of the data.

In terms of progressive monitoring, municipalities can start with an estimation of volume, and gradually move towards more accurate quantitative estimations. Table D.2 provides an example of progressive monitoring.

Table D.2: Progressive Monitoring of Indicator 6.3.4A

Indicator 6.3.4A	Progressive Monitoring
"Proportion of waste lawfully disposed of"	*First step* Estimation of total masses of waste generated by households, using per capita estimates based on averages by location. These estimates should be aggregated into local municipalities, and then aggregated into district municipalities and provinces. Estimation of total masses of waste generated by commercial activities (businesses, malls, hospitals, etc.), based on municipal permits, and waste manifests of waste management companies. Estimation of total masses of industrial waste from waste management licences (that were granted but are not being declared or audited). Where available; actual masses should be used, as recorded on: • waste manifests from receiving landfills, • waste manifests from receiving waste management companies, • SAWIS. Where appropriate, masses should be inferred/extrapolated for similar activities (e.g. similar-sized businesses in the same local municipality).
	Second step Refined estimation of total masses of waste, including improved measurement of waste received at waste depots and landfilling facilities. Inclusion of total masses of waste disposed of unlawfully (e.g. informal community dump sites), using survey/spatial data to calculate mass based on volume of waste on land.
	Third step Further refined estimation of total masses of waste generated, using more measured data on lawful and unlawful disposal.

To align to the UN global reporting standard for SDG 6.3.4A, the proposed frequency of national data collection and reporting should be annually.

D3.2 Treatment of incorrect and missing data

In the first step of progressive monitoring, missing data on waste generation and disposal will be estimated, i.e. where there is no data for a given mass of waste generated, it will be calculated using per capita data, spatial data, or inferred data.

D3.3 Sources of discrepancies

There is a dearth of data on waste disposal, and as such, it is unlikely that duplicate data would exist for a given waste generator. However, if this does occur, the measured data, as declared on a waste manifest, will be used.

Various issues surrounding poor data capturing and uploading can exist namely:

- Insufficient funding for data collection and capture (human resources)

- Insufficient funding for data management systems (database maintenance, servers, backups, reporting software, etc.)
- Lack of training of human resources

D4 DISAGGREGATION OF DATA FOR MANAGEMENT PURPOSES

The measured and estimated data will make it possible to disaggregate national information to depict performance .

- Per receiving water resource
- Per draining region / catchment;
- Per Water Management Area (WMA);
- Per province;
- Per municipality;
- Per waste generation sector;
- Per waste type (e.g. general, hazardous);
- Per entitlement (authorization type/approval).

D5 DATA SOURCES

The data sources or monitoring mechanisms of information of management targets for Indicator 6.3.4A may include the following:

- Waste disposal data stored in the South African Waste Information System (SAWIS), established in terms of Section 60 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).
- Waste manifest from waste management companies;
- Waste manifests in informal waste sites (if available);
- Spatial data of for illegal dumping sites (that are not serviced by municipal waste removal services).

In addition to SAWIS data; additional supporting data is required to generate sufficient and appropriate intelligence to improve local water management efforts. Such additional and supporting data include the recording of-

- whether the activity falls within the municipal or non-municipal category;
- whether the disposal occurs to a municipal-controlled or privately controlled facility, or to an informal or illegal dump site;
- the quaternary drainage region name(s) and/ or number(s);
- the name of the municipality and/or the waste generator;
- the name and coordinates of the waste disposal sites;
- the type of waste generating activity;
- whether the waste disposal is permissible or not (Y/N);
- the entitlement (i.e. authorisation type/ municipal approval) received or required;
- whether waste masses are recorded by the regulator, the municipality and/ or waste generator (Y/N).

D5.1 Collection process

Data collection could follow the following processes:

- Scanning and download of data in the SAWIS database;
- Collection of all other waste management licence data not in the SAWIS database
- Formal directed request for information for businesses operating in industrial areas in municipalities countrywide;
- Spatial survey of informal and illegal dump sites;
- Scanning and download of publicly disclosed waste disposal data by major corporate entities (e.g. GRI and CDP Water disclosures);
- Direct request for per capita data for waste generation from StatsSA. If this data has not yet been calculated, then a workshop should be held with the StatsSA domestic survey team to calculate this data per municipality.

The initial data gathering is a once-off exercise to generate an initial database. Thereafter, data would be updated on an annual basis.

D6 DATA AVAILABILITY

D6.1 Availability

Only limited data is currently available (from a combination of sources such as SAWIS and waste management companies).

Water management licence data is incomplete and not all waste management licences are audited regularly to capture waste disposal data time series.

D6.2 Frequency

Data may not be captured in sufficient time intervals due to the above constraints.

The proposed frequency of national data collection and reporting should be annually.

D7 DATA PROVIDERS

Government data providers include:

- Local and district municipalities: waste management departments, human settlements departments,
- Department of Forestry, Fisheries and Environment (DFFE) waste authorisation and management departments,
- StatsSA: community survey and general household survey department

Private company data providers:

- Farm owners,
- Industrial company owners,
- Mine owners,
- Private waste management company owners.

D8 DATA COMPILERS

The DWS will be the primary data compiler, with support from the DFFE and district municipalities. DWS will provide this data to StatsSA, who is responsible for country-level reporting on the SDGs. The roles of the various players is outlined below:

Table D.3: SDG 6.3.4A Summary of Data and Information Compilers

Data Provider	SDG 6.3.3A
DWS	X
StatsSA	x
DFFE	X
District Municipalities	X
Private companies	x

X = Lead role player
x = supporting role player
- = No role

D9 MANAGEMENT TARGETS

SDG Indicator 6.3.4A is a new additional indicator under SDG 6.3. The purpose of SDG 6.3.4A sub-target is to provide a practical, step-by-step incremental and attainable integrated water quality management target that can be utilised for benchmarking purposes during SDG Target 6.3 implementation and reporting. Table D.4 includes the *Management* and supporting *Milestone Sub-targets* for SDG 6.3.4A.

Knowledge on the current baseline is necessary for the finalisation of the Milestone Sub-targets

Table D.4: Milestones and Management Targets to Benchmark Performance during SDG 6.3.4.A Implementation (Ref: DWS, SDG6.3 Methodology Report, Jan 2021)

Target Type	Year	Target Description
Milestone Sub-target	Baseline data	(baseline) % *waste lawfully dispose of*
	2022	Baseline + 1/10 or 10% of Baseline
	2023	Baseline + 2/10 or 20% of Baseline
	2024	Baseline + 2/10 or 20% of Baseline
	2025	Baseline + 3/10 or 30% of Baseline
	2026	Baseline + 3/10 or 30% of Baseline
	2027	Baseline + 4/10 or 40% of Baseline
	2028	Baseline + 4/10 or 40% of Baseline
	2029	Baseline + 5/10 or 50% of Baseline
	2030	Baseline + 5/10 or 50% of Baseline
Milestone Sub-Target (MST)	2030	100% of waste is lawfully disposed of
SDG Target 6.3		By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

Table D.5 summarises potential links between global and national indicators and targets for SDG 6.3.4A.

Table D5: SDG 6.3.4A Indicator and Targets from Global and South African Literature

Global and National Indicators for 6.3.4A	Targets
Medium-Term Strategic Framework (MTSF)	
PRIORITY 2: Spatial Integration, Human Settlements and Local Government	
2024 Impact: Achieving spatial transformation through improved integrated settlement development and linking job opportunities and housing opportunities	
2024 Impact: Rapid land and agrarian reform contributing to reduced asset inequality, equitable distribution of land and food security	
National Water and Sanitation Master Plan (NW&SMP)	
1.5 Improving raw water quality	
1.5.1 Determine in-stream Resource Water Quality Objectives (RWQOs), based on the SA Water Quality Guidelines (SA36), in support of RQO's Capacity, budgetary constraints	Publish the RWQOs for water quality
1.5.2 Routinely monitor resource water quality (SA46, SA47 SA48)	Laboratory facilities not readily available in all WMAs hampering IWQM
	National monitoring network in place but coverage requires expansion
	Regional water quality programmes insufficient to manage pressure on water resources
	Regional and local water quality programmes insufficient to manage pressure on water resources
1.5.4 Assess resource water quality information (SA52 & SA59)	Routine national assessments of water quality and input in support of the SDG process
1.5.10 Formalise governance frameworks to support engagements on water quality management (SA10, SA11, SA12, SA13, SA14, SA15, SA54 & SA61)	Build from IGR framework and SADC protocols
	Routine catchment assessments of water quality and the identification of "hot spots" for potential water quality management intervention
National Biodiversity Strategy and Action Plan (NBSAP)	
SO 3. Biodiversity considerations are mainstreamed into policies, strategies, and practices of a range of sectors	
Number of compliance inspections conducted	By 2019, 14 500 compliance inspections conducted.
Number of enforcement actions undertaken for non-compliance with environmental legislation	By 2019, 1 500 completed criminal investigations handed to the NPA for prosecution (for EMI Institutions) and 3 100 administrative enforcement notices issued for non-compliance with environmental legislation.
SO 6. Effective knowledge foundations, including indigenous knowledge and citizen science, support management, conservation, and sustainable use of biodiversity	
Single portal exists through which all biodiversity information can be accessed	By 2016, the single portal is established, and it is being populated
National Waste Management Strategy, 2020	
Pillar 2: Effective and Sustainable Waste Services	1. Integrated Waste Management Planning

Global and National Indicators for 6.3.4A	Targets
	2. Producers with the concurrence of Municipalities to provide recycling drop-off/buyback/storage centres 3. Waste Collection including separation at source 4. Safe Management of hazardous household wastes and absorbent hygiene products waste
Pillar 3: Compliance, Enforcement and Awareness	1. Compliance promotion and awareness 2. Waste Services Infrastructure Provision 3. Enforcement 4. Awareness and Community Participation 5. Reduce littering and illegal dumping 6. Ensure municipal landfill sites and waste management facilities comply with licensing requirements

D10 DISPLAY OF RESULTS

The percentages calculated of proportion of waste lawfully disposed of, can be presented graphically, and on maps to assist with reporting and interpretation of the data. The mass of waste disposed of can be aggregated into municipality, province, watershed, or for the country as a whole. This will assist in providing data at a range of scales, while also providing comparisons between municipalities, regions, and provinces to give a better representation of the country's status quo and provide an understanding of where the main waste disposal challenges lie.

Table D6 provides an example of the format in which the SDG 6.3.4A results and be formatted. Figure D1 provides a graphical representation of how the data sets can be presented and assessed for comparative purposes.

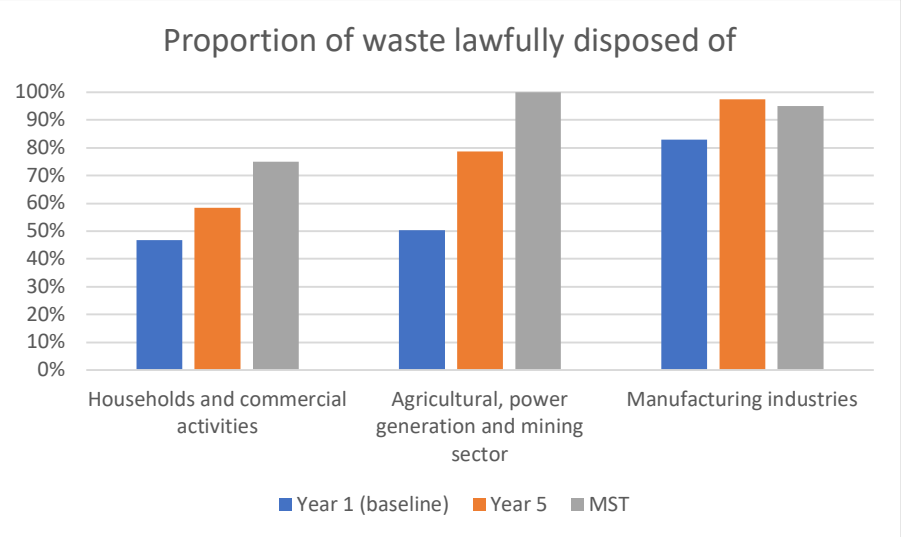

Figure D1: Example graph of proportion of lawful waste disposal by sector

Table D6: SDG 6.3.4A Fictitious Waste Disposal Data for South Africa

Category / Sector: Waste disposal	**YEAR 1 (BASELINE)**			**YEAR 5**			
	Total mass of waste generated [Equation 1]	**Total mass of waste lawfully disposed of [Equation 2]**	**Proportion of waste lawfully disposed of [Equation 3]**	**Total mass of waste generated**	**Total mass of waste lawfully disposed of**	**Proportion of waste lawfully disposed of red < MST green ≥ MST**	**Management Sub-Target (MST)**
	(tonnes/annum)	(tonnes/annum)	Percentage	(tonnes/annum)	(tonnes/annum)	Percentage	
Households and commercial activities	599 667	280 513	47%	629 900	68 051	58%	75%
Agricultural, power generation and mining sector	1 426 010	717 197	50%	1 205 202	948 650	79%	100%
Manufacturing industries	750 890	622 162	83%	605 900	590 216	97%	95%

D11 COMMENTS AND LIMITATIONS

Data collection in relation to lawful waste disposal has only tracked to a limited extent, and has not had a formal methodology for such tracking. The data is largely incomplete, and requires a concerted effort to be collected, captured, and organised.

It is important that the same methods are used by all reporting agencies from which data is obtained for DWS's use when compiling data according to this new methodology. The methods, approaches, and interpretations should be consistently applied by owners of all wastewater sources.

This methodology document should be a living document, and should be updated as more information of constraints and details of recycling/reuse, become available.

D12 IMPLEMENTATION CALENDAR

Table D7 describes how reporting on this indicator will be improved over time:

Table D7: Improvement in the Availability of Data and Information for Indicator 6.3.4A

Indicator	**Tier 1** **First step of progressive monitoring and information handling**	**Tier 2** **Second step of progressive monitoring and information handling**	**Tier 3** **Third step of progressive monitoring and information handling**
SDG 6.3.3A *"Proportion of waste lawfully disposed of."*	Estimation of total masses of waste generated by households, using per capita estimates based on averages by location. Estimates are aggregated into local municipalities, and then aggregated into district municipalities and provinces. Estimation of total masses of waste generated by commercial activities (businesses, malls, hospitals, etc.), based on municipal permits, and waste manifests of waste management companies. Estimation of total masses of industrial waste from waste management licences (that were granted but are not being declared or audited).	Refined estimation of total masses of waste, including improved measurement of waste received at waste depots and landfilling facilities. Inclusion of total masses of waste disposed of unlawfully (e.g. informal community dump sites), using survey/spatial data to calculate mass based on volume of waste on land	Further refined estimation of total masses of waste generated, using more measured data on lawful and unlawful disposal

Indicator	Tier 1 First step of progressive monitoring and information handling	Tier 2 Second step of progressive monitoring and information handling	Tier 3 Third step of progressive monitoring and information handling
	Where available; actual masses are used. Where appropriate, masses are inferred/extrapolated for similar activities.		
	Mid 2024	End 2025	Data collection on an annual basis to be reported on annually

Table D8 contains a summary of due dates and responsibilities for key implementation activities that apply to the roll-out of the Indicator methodology.

Table D8: Key Implementation Activities and Due Dates to be Completed for Indicator 6.3.4A

Implementation Activities		Due Date	Responsibility
1	Methodology Finalised	June 2023	DWS,DFFE, StatsSA
2	National database of available data and estimated data (baseline)	June 2024	DWS,DFFE, StatsSA
3	National database with all data captured	December 2025	DWS,DFFE, StatsSA
4	Data analysis and national reporting	2024, 2026, 2028, 2030	DWS,DFFE, StatsSA

D14 METHODOLOGY REPORT COMPILERS

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D15 REFERENCES

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