Methodology:
Indicator SDG 6.3.5A – Proportion of waste recycled or reused

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 6.3.5A:	Proportion of waste recycled or reused

E1 THE INDICATOR

E1.1 Organisation(s)

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

E1.2 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.

The 2020 National Waste Management Strategy has the concept of the "circular economy" at its centre. The circular economy is an approach to minimising the environmental impact of economic activity by reusing and recycling processed materials to minimise: (a) the need to extract raw materials from the environment; and (b) the need to dispose of waste. In the waste management hierarchy, reuse takes precedence over recycling, because reuse can take place without additional treatment or processing. Both reuse and recycling divert waste from the need for disposal, thereby freeing up available landfill space.

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 6.3.5.A: *Proportion of Waste Recycled or Reused* implies the mass of solid waste being recycled or reused, in comparative relation to the total mass of solid waste being generated. Table E.1 defines the terms used in terms of the application of policies and guidelines.

Table E.1: Phrase by phrase interpretation of Indicator 6.3.5.A

Indicator 6.3.5A	Normative interpretation
"Proportion of waste Recycled or Reused."	*"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;

Indicator 6.3.5A	Normative interpretation
	(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)
	"Recycled" The recovery of materials from products (post-consumer) or manufacturing processes (pre-consumer) and returning them to the feedstock for some other process. (Definition from: A Circular Economy Guideline for the Waste Sector, DEFF, 2020)
	"or Reused" To re-use whole products after their current users no longer have use for them. This may include testing or minor repairs to ensure that products will perform reliably in the next life cycle. Multiple re-use cycles may be possible for a given product, especially if durability and reuse have been considered during its design. (Definition from: A Circular Economy Guideline for the Waste Sector, DEFF, 2020)

E1.3 Rationale

Reducing the amount of waste disposed of by diverting waste to landfill by increasing recycling and reuse, will assist South Africa in achieving its raw water quality goals, as measured by SDG Indicator 6.3.2D.

The elimination of 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.

E1.4 Concepts and Terms

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

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.

E1.5 Relationship between SDG Indicator 6.3.5A and Target 6.3.2D

SDG Indicator 6.3.5A measures the recycling and reuse of waste (which is linked to a decrease in waste disposal). SDG Indicator 6.3.2D measures the quality of water resources around South Africa. The impact of reduced waste disposal on the quality of ambient water can thus be established using this additional indicator.

E2 COMMENTS AND LIMITATIONS

Some data is available for the mass of waste generated, because there are many waste management entities operating in South Africa, as well as household surveys by StatsSA. However, the total data set for waste generation is incomplete.

E3 METHODOLOGY

E3.1 Computation Method

The proposed methodology includes estimation of the proportion of recycled and reused. This indicator relies on the total mass of waste generated, which is computed as part of SDG Indicator SDG 6.3.4A. As such, that indicator will need to be used as source data for Indicator 6.3.5A. Please reference the SDG Indicator 6.3.4A methodology document for reference.

The proposed computation method consists of three calculations:

- Total mass of solid waste generated (using the number generated in SDG Indicator 6.3.4A);
- Mass of solid waste recycled and reused; and
- Proportion of solid waste recycled and reused of (calculated using the numbers in the points above)

E3.1.1 Formula

The total mass of solid waste generated in the is calculated in the methodology for SDG 6.3.4A (Equation 1), which produces the variable "m_t", the total mass of solid waste generated in South Africa. The recommended monitoring unit is tonnes per annum. Equation 1 is shown below for clarity and information.

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 recycled and reused 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:

$$\boldsymbol{m_{t,r} = m_{r1} + m_{r2}}$$

Where:

$m_{t,r}$ = total mass of solid recycled and reused of in South Africa

m_{r1} = total mass of solid waste recycled

m_{r2} = total mass of solid waste reused

Note: mass is measured by scales, weighbridges, etc. where mass data is available, and estimated by the waste recycler/reuser using proxy data such as pump rates, processing rates, etc. where mass data is not available.

The calculation for the proportion of waste recycled and reused is shown in Equation 3 below.

Equation 3:

$$p_r = \frac{m_{t,r}}{m_t} \times 100$$

Where:

p_r = proportion of solid waste recycled and reused in South Africa

$m_{t,r}$ = total mass of solid waste recycled and reused in South Africa

m_t = total mass of solid waste generated in South Africa

The masses of solid waste recycled and reused 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 recycling and reuse 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 mass, and gradually move towards more accurate quantitative estimations. Table E.2 provides an example of progressive monitoring.

Table E.2: Progressive Monitoring of Indicator 6.3.5A

Indicator 6.3.5A	Progressive Monitoring
"Proportion of waste recycled and reused"	*First step* Calculation of total masses of waste recycled and reused, using existing data from municipalities and private waste recyclers and reusers by location. These estimates should be aggregated into local municipalities, and then aggregated into district municipalities and provinces. Estimation of total masses of waste recycled and reused by the informal sector, using surveys from informal waste workers (waste pickers). Where available; actual masses should be used, as recorded on: • waste manifests of receiving processing facilities, • waste manifests of reuse applications, • SAWIS • Sales records in the informal sector. 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 recycled and reused, including improved measurement of waste received at waste depots, recycling facilities, and reuse end users. Inclusion of total masses more waste streams, using survey/spatial data to calculate mass based on volume of waste on land.
	Third step Further refined estimation of total masses of waste recycled and reused, using more measured data on recycling and reuse streams.

To align to the UN global reporting standard for SDG 6.3.5A, the proposed frequency of national data collection and reporting should be annually.

E3.2 Treatment of incorrect and missing data

In the first step of progressive monitoring, missing data on waste generation and recycling and reuse 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.

E3.3 Sources of discrepancies

There is a dearth of data on waste recycling reuse, 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, or point of use scale/weighbridge, 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

E4 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).

E5 DATA SOURCES

The data sources or monitoring mechanisms of information of management targets for Indicator 6.3.5A may include the following:

- Scale, weighbridge and/or conveyor data from waste recycling companies or reuse end users;
- 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 manifests from waste management companies;
- Waste manifests in informal waste sites (if available);
- Spatial data of for informal waste management sites (e.g. waste picker central operations).

In addition to the above data; additional supporting data is required to generate sufficient and appropriate intelligence to improve recycling and reuse efforts. Such additional and supporting data include the recording of-

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

E5.1 Collection process

Data collection could follow the following processes:

- Scanning and download of data in the SAWIS database;
- Collection of all waste management licence data not in the SAWIS database (from private companies that recycle/reuse waste)

- Formal directed request for information from recycling businesses and reuse end users operating countrywide;
- Spatial survey of informal and illegal dump waste recycling/reuse sites;
- Scanning and download of publicly disclosed waste recycling and reuse data by major corporate entities (e.g. GRI and CDP Water disclosures);

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

E6 DATA AVAILABILITY

E6.1 Availability

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

Waste management licence data is incomplete and not all waste management licences are audited regularly to capture waste recycling/reuse data time series.

E6.2 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.

E7 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,

Private company data providers:

- Recycling/reuse company owners,
- Mine owners,
- Farm owners,
- Private waste management company owners.

E8 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 E.3: SDG 6.3.5A 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

E9 MANAGEMENT TARGETS

SDG Indicator 6.3.5A is a new additional indicator under SDG 6.3. The purpose of SDG 6.3.5A 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 E.4 includes the *Management* and supporting *Milestone Sub-targets* for SDG 6.3.5A.

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

Table E.4: Milestones and Management Targets to Benchmark Performance during SDG 6.3.5.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	50% of waste is lawfully disposed of* (based on US target for 2030, SA target is 25% for 2023)
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 E.5 summarises potential links between global and national indicators and targets for SDG 6.3.5A.

Table E5: SDG 6.3.5A Indicator and Targets from Global and South African Literature

Global and National Indicators for 6.3.5A	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 2. Producers with the concurrence of Municipalities to provide recycling drop-off/buyback/storage centres 3. Waste Collection including separation at source

Global and National Indicators for 6.3.5A	Targets
	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
Key Principles Underpinning the NWMS 2020	1. Waste as a Resource: beneficiating waste through re-use, recycling, treatment and recovery to reduce the amount and the toxicity of waste disposed of. Targets for 2025: - 70% of paper recycled, - 60% of plastic recycled, - 90% of glass recycled, - 90% of metals recycled and - 40% of fly-ash recycled

E10 DISPLAY OF RESULTS

The percentages calculated of proportion of waste recycled/reused, can be presented graphically, and on maps to assist with reporting and interpretation of the data. The mass of waste recycled/reused 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 recycling/reuse challenges lie.

Table E6 provides an example of the format in which the SDG 6.3.5A results and be formatted. Figure E1 provides a graphical representation of how the data sets can be presented and assessed for comparative purposes.

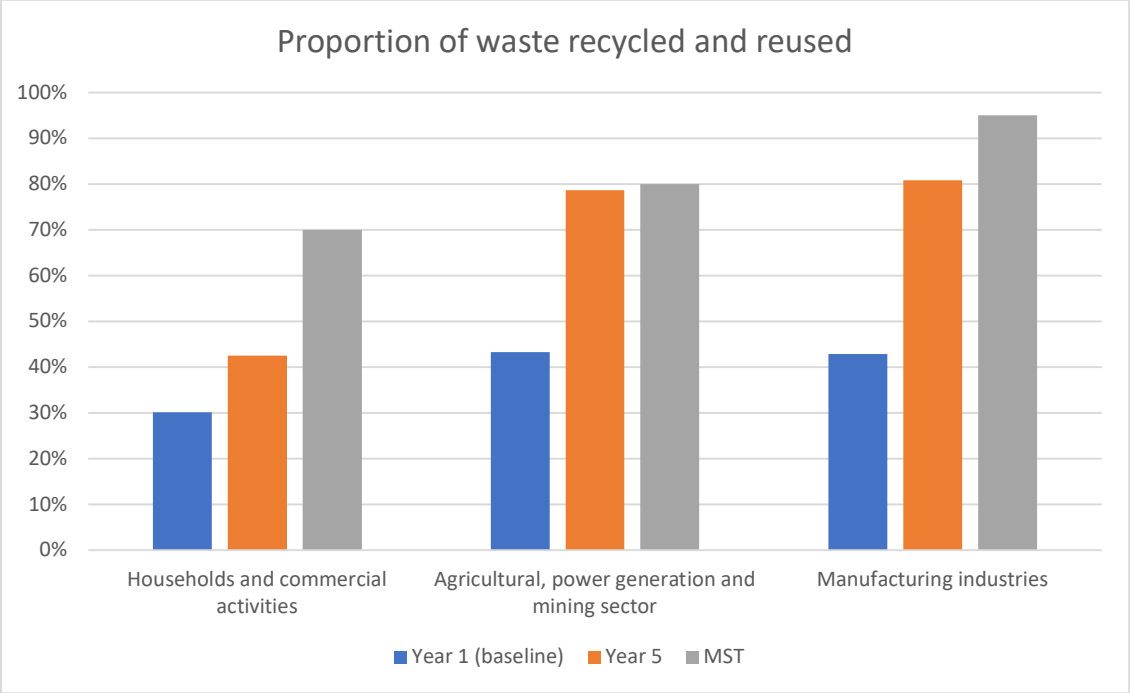

Figure E1: Example graph of proportion of waste recycled/reused by sector

Table E6: SDG 6.3.5A Fictitious Waste Recycling/Reuse Data for South Africa

Category / Sector: Waste recycling/reuse	**YEAR 1 (BASELINE)**			**YEAR 5**			
	Total mass of waste generated [Equation 1]	**Total mass of waste recycled and reused [Equation 2]**	**Proportion of waste recycled and reused [Equation 3]**	**Total mass of waste generated**	**Total mass of waste recycled and reused**	**Proportion of waste recycled and reused red < MST green ≥ MST**	**Management Sub-Target (MST)**
	(tonnes/annum)	(tonnes/annum)	Percentage	(tonnes/annum)	(tonnes/annum)	Percentage	
Households and commercial activities	599 667	180 513	47%	629 900	268 051	43%	70%
Agricultural, power generation and mining sector	1 426 010	617 197	50%	1 205 202	948 650	79%	80%
Manufacturing industries	750 890	322 162	83%	605 900	490 216	81%	80%

E11 COMMENTS AND LIMITATIONS

Data collection in relation to waste recycling and reuse is 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 waste 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.

E12 IMPLEMENTATION CALENDAR

Table E7 describes how reporting on this indicator will be improved over time:

Table E7: Improvement in the Availability of Data and Information for Indicator 6.3.5A

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 6.3.5A *"Proportion of waste recycled and reused."*	Calculation of total masses of waste recycled and reused, using existing data from municipalities and private waste recyclers and reusers by location. These estimates should be aggregated into local municipalities, and then aggregated into district municipalities and provinces. Estimation of total masses of waste recycled and reused by the informal sector, using surveys from informal waste workers (waste pickers). Where available; actual masses should be used, as recorded on: • waste manifests of receiving processing facilities, • waste manifests of reuse applications,	Refined estimation of total masses of waste recycled and reused, including improved measurement of waste received at waste depots, recycling facilities, and reuse end users. Inclusion of total masses more waste streams, using survey/spatial data to calculate mass based on volume of waste on land.	Further refined estimation of total masses of waste recycled and reused, using more measured data on recycling and reuse streams

	• SAWIS • Sales records in the informal sector. Where appropriate, masses should be inferred/extrapolated for similar activities (e.g. similar-sized businesses in the same local municipality).		
	Mid 2024	End 2025	Data collection on an annual basis to be reported on annually

Table E8 contains a summary of due dates and responsibilities for key implementation activities that apply to the roll-out of the Indicator methodology.

Table E8: Key Implementation Activities and Due Dates to be Completed for Indicator 6.3.5A

Implementation Activities		Due Date	Responsibility
1	Methodology Finalised	June 2023	DWS, DFFE
2	National database of available data and estimated data (baseline)	June 2024	DWS, DFFE
3	National database with all data captured	December 2025	DWS,DFFE
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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