
Solid Waste Management in Camps

Operational Plan v1

Cox's Bazar, Bangladesh

1st July 2019

Objective

The Solid Waste Management Operational Plan provides detailed guidance on Solid Waste Management (SWM) in Ukhaia and Teknaf refugee camps. It initiates a process to improve the quality of existing operations through the harmonisation of approaches, by defining responsibilities and minimum standards and analysing gaps to be resourced. The Operational Plan is designed with an understanding of the local context, allowing for the possible extension of host community approaches into the camp.

Strategic Principles

The Water, Sanitation and Hygiene (WASH) Strategy provides strategic principles which have been updated in accordance with the latest approaches taken by the WASH Sector and partners. The principles seek to provide overall guidance on the activities of partners which are further elaborated in the Structure of Collection, Agency Approach, Community Approach and corresponding Technical Notes.

1. Operations are, or participate in, full chain solid waste management systems defined as the collection, transport, disposal, reuse, recycling and the corresponding behavioural change activities.
2. Waste is separated at source.
3. Operations seek to reduce, reuse, recover and recycle as much of the waste stream as possible, where possible providing income generating activities and private sector engagement.
4. Waste disposal minimizes environmental impact.
5. The Area Focal Agency and corresponding Camp Focal Agency is responsible for ensuring the quality of SWM in each camp.

Waste Characterisation & Generation

To date five waste characterisation studies have taken place covering different areas of the camp and working to slightly different methodologies. The below summarises the results.

	Organic	Inert*	Recyclable**	Other	Kg/cap/day	Volume in L
IFRC ¹	53%	28%	7%	12%	0.110	0.55
TdH ²	66%	15%	9%	10%	0.087	-
DSK ³	83%		9%	8%	0.152	-
NGO-F ^{4***}	89%		11%		0.149	-
Oxfam ⁵	62%	10%	9%	19%	0.174	-

* Inert is defined as soil, ashes, bones etc.

** Recyclable is defined as only cardboard, PET plastic & metal

*** Results exclude two RCs which have significantly higher waste generation

¹ <https://drive.google.com/open?id=1OGtNjSvpdicKwdvpMbgY3Lk76CdZD9IH>

² https://drive.google.com/open?id=14blm2gSi_qQN1exbE7NuY58Jr-AfJL0

³ https://drive.google.com/open?id=1IXSI_zESOuwBjkowNKLkdnm7RMaSSQbN

⁴ <https://drive.google.com/open?id=1h6lkWF70OkhyfyXDfyJ7JONP-iu3G5Gy>

⁵ <https://drive.google.com/open?id=10x5f3qXGoYbCKUm8f5YOb6sVRhOamcSR>

Although varying in places the results give a relatively consistent characterisation which can be used to plan SWM operations:

Organic	60%
Inert	21%
Recyclable	9%
Other	10%
Kg/cap/day	0.13
Volume in L	0.55

The following approaches have been used to calculate these figures:

- Organic – average of three figures available
- Inert – remaining percentage from organic, recyclable and other
- Recyclable – using consistent results provided
- Other – when excluding the highest figure it uses consistent figures provided
- Weight – average of all figures
- Volume – IFRC value

The above figures do not include markets, distribution centres or other locations generating waste such as learning centres, health facilities etc. Two studies have been conducted on this concluding - IFRC estimates each shop produces 0.2kg/day with a volume of 2L and Oxfam through Arup estimates each shop produces 0.3kg/day. UNDP estimates there are 5,805 shops. Therefore the total amount of waste generated by the camp each day can be considered as 120ton and 512m3 based upon:

	Amount	Weight	Weight total	Volume	Volume total
Domestic	910,000	0.13kg/cap	118.3 ton	0.55L/cap	500.5m3
Commercial	5,805	0.25kg/shop	1.5 ton	2L/shop	11.6m3
Total	-	-	119.8 ton	-	512.1m3

For further information on recycling and value chain analysis is available through the [UNDP report](#).

Structure of Collection

Solid waste management uses three levels defined as primary collection, secondary collection and disposal. Disposal implies landfill, incineration or similar methods, as well as recycling, composting or other forms of reuse and value chain. The below structure of collection is in reference to the Agency Approach to solid waste disposal which is separate from the Community Approach.

Primary Collection

- Household bin - temporary storage, located inside a house with a volume expressed in litres
 - Small capacity bins commonly of 10-20L with a lid and colour coded.

Secondary Collection

- Communal pit – temporary storage, located at group of houses level, fixed to the ground, commonly made from concrete/bamboo/metal/hole in ground and with a volume expressed in m³ normally in the range of 1 - 2m².
 - Communal pits receive waste directly from houses as well as from shared HH bins. They should be located on roads allowing for collection by manual or mechanical vehicle. The material and design can vary but should provide adequate storage capacity, minimise vectors and be repairable.
- Shared HH bin – temporary storage, located at group of houses level, not fixed to the ground, commonly made from plastic and with a volume expressed in litres normally in the range of 70 – 120L.
 - Shared HH bins should have a lid and be colour coded. At least the organic bin should have holes drilled into the sides and bottom for drainage and aeration. Bins should be secured to avoid theft.

Disposal

- Value chain – including recycling, composting or other approaches to minimise the amount of waste costing money to dispose of, as opposed to generating money from its disposal.
 - Composting can be undertaken at disposal or communal level depending upon where the greatest value and cost reduction can be achieved.
 - Recycling should be undertaken throughout each stage of collection with a final separation of waste at disposal site.
- Final disposal – final disposal, a fixed location, a process including burying, constructed landfill, temporary storage, burning or incineration.
 - A site should only be considered as final disposal when it meets environmental standards.

Agency Approach

The response to date has been characterised by solid waste projects which have varied in approach, quality, cost and therefore outcome. The SWM Operational Plan is designed to standardise approaches in the camp whilst allowing space for variations based upon necessary and defined differences. Focus is currently placed on household waste collection, expanding to institutions and markets. The Operational Plan aims to achieve the Strategic Principles whilst working within operational limits presented by the context and scale of response. Operational limits include:

- Organic component of the waste stream accounting for at least 60%
- Scale of the camp meaning distances between points can be significant
- Space limitations in and around the camp
- Private sector engagement in recycling occurs but in a limited nature because due to distances and a lack of centralisation
- Lack of clarity over longer term management meaning projects should not include a high level of complexity or significant on-going operation and maintenance costs

Working within these limits a number of conclusions can to be drawn:

- The organic component is large enough, and distances long enough, that transporting it out of the camp is commonly seen as prohibitively expensive. Seeking reuse through composting or other approaches located between the household and location of reuse would be cost effective and could produce value from the waste.
- The recyclable component already provides limited economic opportunities and should be made safe and emphasised where possible.
- Waste streams with the possibility for reuse as construction materials or through upcycling should be developed.
- Landfill is required as there are certain waste streams which cannot be addressed through the above approaches. Given space constraints the amount of waste going to landfill should be minimised:
 - Through collaboration with UN agencies, NGOs and other actors, minimise the quantity of materials entering the camp and reduce the amount which do not have a value chain.
 - Focus efforts on the effective segregation of waste at household level, reinforced at each level of collection.
 - Blend aspects of inert into the organic stream which will be composted, unless it is found that this reduces the quality of compost and effects resale value.
 - Increase the types of waste streams which are recyclable i.e. glass
 - Where capacity exists and there is longer term support, consider incinerating materials which can burn cleanly and fuel waste to value projects.

Therefore following process is defined for household waste collection systems in the camp:

- 1) Households to segregate waste into organic and inorganic bins
- 2) Households transport waste to their nearest communal pit or shared HH bin
- 3) Waste in shared HH bins is transport to communal pits with road access
- 4) Push carts or vehicles move waste from communal pits to disposal sites at camp or multi camp level
- 5) Disposal sites, and selected other sites, perform basic processing of waste to allow for composting, recycling and separation of waste destined for final disposal including landfill

Technical Notes on the Agency Approach

The following technical notes are made on the Agency Approach and process for waste collection:

Primary Collection

- Waste is segregated at HH level to enable efficient disposal, community engagement and value chain. Community mobilisation through HP, CwC, C4D and other mechanisms is required.
- Bins are colour coded green for organic and red for inorganic.
- Waste is separated as organic, including inert where this is directly compostable, and inorganic. This approach maximises the streams which can be composted and reduces the amount going to landfill.
- Community moves waste from HH to Communal Pit or Shared HH bin.

Secondary Collection

- Where access for a push cart is possible install segregated communal pits.
- Communal pits of 1.5m³ are sited within the camp such that they are at maximum 200m from the further shelter or per 180 households. Communal pits of 1m³ are sited within the camp such that they are at maximum 200m from the furthest shelter or per 120 households. Where the use of the maximum distance forms a barrier to disposal, shorter distances should be used and lessons learnt shared.
 - A communal pit is 1.5m³.
 - Using 0.55L/family/day, a family of five and a three day collection cycle, 8.25L is generated.
 - A communal pit emptied every three days could serve at maximum 182 shelters.
 - An average shelter is 6m long, has 1.5m access routes between shelters, which exist on both sides of a road and in two layers i.e. for every 7.5m of road there four shelters with 20 people generating 33L of waste per three day collection cycle.
 - Dividing 182 shelters into the given layout of four-shelter sets, 46 sets could share one communal pit
 - Assuming that the 46 sets would extend in either direction from the communal pit and at 7.5m per shelter, the maximum distance to the pit would be 173m rounded to 200m.
 - Communal pits of 1m³ are calculated as per the above and scaled down
- Communal pits should be split unequally into two sections of 60% organic and 40% inorganic.
- Communal pits serving larger or smaller populations, or acting as a collection point for shared HH bins in areas inaccessible to a push cart, should have their volume scaled accordingly, however the maximum distance retained.
- Communal pits and shared HH bins are colour coded green for organic and red for inorganic.
- Ideally a communal pit should be 15m from shelter⁶, water sources, public buildings or similar however in places where this is not possible 5m or less is possible. Where sub-optimal distances are maintained community consultation should be conducted and cleaning routines increased.
- The siting of communal pits and shared HH bins should be undertaken in consultation with community members.

⁶ Sphere 2018 pg. 128

- As road projects are implemented through the camp, planning for additional communal pits should be undertaken.
- All pits are to be constructed from durable materials and rebuilt when this is not currently the case.
- Pits should include a lid to avoid filling with water and as required control for surface water drainage.
- Pits are to be emptied 2-3 times per week where the frequency and schedule is discussed with the community, balancing between their preferences and cost.
- The maintenance and repair of pits on a quarterly basis is important to retain minimal sanitary conditions within the camp. Pits after each collection and bins at minimum each quarter, should be cleaned with chlorine, brushes and water and repair works conducted.
- Where pits are not possible two bins for segregated waste should be provided at a ratio of 1:20 HH. The ratio is based upon the volume of waste generated per day given by the IFRC⁷ at 0.55L:
 - $0.55L \times 5 \text{ people} = 2.75L/HH/day$
 - $2.75L \times 3 \text{ days} = 8.25L$
 - $8.25L \times 20HH = 165L \text{ divided by two bins} = 82.5L$
- The calculation uses a lower number of days of collection and assumes an even split in volume between organic and inorganic. If it is found that this is adequate the ratio can be lowered to 1:15 or 1:10, the frequency of collection increased or the size of bins increased.
- Transportation of waste from bins and pits should be undertaken by covered push carts or vehicles.
- Poor quality segregation should be noted by the collection team and shared with behaviour change teams. As required additional labour should be used to improve the quality of segregation during transport or at disposal site.

Disposal

- Waste routes within the camp should be defined so each actor is familiar with where they should transport waste to and to where it will be disposed.
- Existing facilities should be checked, upgraded where necessary and centralised as much as possible. Facilities no longer required should be closed and the land returned.
- As the Camp Focal Agency (CFA) and corresponding Area Focal Agency (AFA) takes ultimate responsibility for SWM within the camp they should operate the disposal site. Where capacity is limited the AFA can designate this role to another partner, UN agency or development partner whilst remaining accountable.
- Organisations not listed in the point above are encouraged to transport waste and undertake complementary composting and reduce, reuse and recycling projects however they are prohibited from burying, landfilling, burning or undertaking any other final disposal method.
- Prioritisation of Waste to Value and Waste to Energy projects should be encouraged and include co-composting and bio-gas where energy is required.
- Composting should be primarily operated at the disposal site however can be devolved to a community level where it would benefit a market or community based approach and lower transportation costs.
- Market driven approaches to composting should be adopted potentially through community based groups supported by partners.

⁷ IFRC, Solid Waste Management Feasibility Study, pg. 24

- Private sector engagement in recycling should be primarily operated at the disposal site however it can be devolved to a community level where it would provide equitable success and lower transportation costs.
- Final disposal sites within close proximity of the camp should be identified by UN agencies, development partners and GoB to allow for longer term storage capacity.

Resources & Labour

- AFAs through their CFA should provide the backbone of service delivery.
- Where possible the AFA should conserve resources by providing space for whole blocks to be managed by non-AFA funded partners for all aspects of programming except final disposal which remains solely the responsibility of the CFA or their designated agency.
- Labour should be engaged at 2.5 per 1,000 refugees. AFAs should ensure that this level is maintained and provide an immediate resource injection if below 1 per 1,000 refugees. Between 1 and until 2.5 per 1,000 refugees the AFA and WASH Sector should advocate for additional resources. Labour above 3 per 1,000 refugees should be reallocated.
- Labour is to be paid a single standard rate of 50 BDT per hour or an average hourly basis of 50 BDT if paid weekly or monthly. If the labour is not recruited on an hourly basis the weekly or monthly rate should be expressed with a per hour calculation in the agreement signed between the labourer and the hiring agency.
- Hours of work should not be less than 4 hours per day with at maximum five working days per week. Total hours per week should not exceed 40.
- Supervisory staff should also comply with the above and have a per hour salary of between 60 and 72 BDT.
- All staff should be adequately trained on their role and provided with appropriate PPE.

Community Engagement

Community engagement is critical to ensure that public health risks mitigated through the Agency Approach are successful, to involve the communities in decision making and to strengthen communication and participation. The following⁸ should be considered when engaging with the community on the Agency Approach:

- Awareness of attitudes and behaviours brought to the community
- The diversity of communities in terms of their structures and dynamics, including marginalised people
- Building upon local knowledge and skills
- Encouraging and acting upon feedback
- Supporting collaboration and coordination between stakeholders
- Advocating for diverse community concerns

Community engagement should take place at each step of the programme cycle. The following are considered the minimum number of stages during the programme cycle at which the community should be engaged, as well as some topics to discuss:

- 1) Needs assessment & analysis

⁸ <https://oxfamlibrary.openrepository.com/bitstream/handle/10546/620611/gd-introduction-community-engagement-wash-170119-en.pdf>

- a. Assessment, focus group discussions and key informant interviews
- 2) Planning
 - a. Introduction to approach
 - b. Options for segregation at household level
 - c. Siting of pits
 - d. Frequency of collection
 - e. Methods of disposal including community groups
 - f. Labour rates and protective equipment
- 3) Implementation & monitoring
 - a. Regular feedback on implementation
 - b. Participation including the selection and rotation of labourers
 - c. Perceptions of labourers
 - d. Capacity building of labourers and community groups
- 4) Evaluation
 - a. Impact evaluation

SWM projects in collaboration with Protection or other partners should conduct perception surveys on those involved in waste collection and processing in case they are stigmatised within the community. Appropriate community consultation should be provided to mitigate potential harm, reinforced through the sustained use of equipment and clothing to maintain cleanliness.

Community engagement should be considered for value chain activities with specific focus on composting and recycling. The use of compost, as the largest part of the waste stream, should be planned for, with the potential for community led, partner supported, projects to increase the quality, market demand the availability for compost.

Community engagement should also be improved through accountability mechanisms where the following are studied:

- Lessons learnt to adapt the Operational Plan to what is working at field level.
- Improvements within the complaints and response mechanism allowing for refugees to communicate with WASH actors, including where improvements in solid waste programming are required.
- Cost per hour of labour is standardised and communicated at the outset of recruit to refugees. Partners should endeavour to provide more valuable forms of labour to refugees including the provision of longer contracts to highly vulnerable families, opportunities to progress within an organisation and variety in the types of work undertaken.
- Pilot strategies which could provide complementary benefits to refugees should be undertaken. This could include keyhole or other types of compressed land usage agriculture, reuse and value chain recycling programmes or any positive behaviour initiative brought forward by the community.
- Build connections between CiCs, partners and communities on the development of solid waste management within the camp.

Behaviour Change

Through regular community engagement and dedicated hygiene promotion, behaviour change is required to achieve the Agency Approach. Based upon current practices, there are two focuses for behaviour change – correct segregation of waste at household level and disposal of waste into pits or bins. Existing approaches including RANAS and Communication for Development should be employed and include basic behaviour change steps such as:

- 1) Assess and prioritise public health risks
- 2) Learn about behaviours and practices in relation to the risks
- 3) Determine barriers and motivators
- 4) Design activities to change behaviour
- 5) Monitor and adjust

Monitoring can be undertaken by partners as well as through large scale representative assessments.

Behaviour change approaches should be periodically reviewed to ensure they are increasingly attuned to existing and changes in community attitudes, barriers and motivators.

Community Approach

In addition to the Agency Approach a Community Approach is required to share the responsibility for waste collection with those generating the waste as well as to reinforce behaviour change. The objective of the Community Approach is to organise block or camp-level cleaning activities involving the CiC and associated staff, UN and NGO agencies, community based organisations, religious groups, volunteer networks, households and other relevant groups. Cleaning activities should occur at least quarterly and at most monthly, involve no paid labour and take place as a coordinated activity between WASH, SMS and other relevant Sectors. This could involve the Core Facilitator Team of Hygiene Promotion, Site Management Volunteers, Communication 4 Development Volunteers and any other interested group.

The approach to cleaning campaigns should remain flexible to what is working at field level in a given block or camp. Community consultation should take place prior to each clean up with the community identifying locations that they would like to see cleaned. The consultation should be attended by camp authorities as part of a wider engagement between civil groups and authorities. Waste collected during cleaning campaigns should be segregated where possible and brought to temporary collection points where labours under the Agency Approach transport it to disposal sites. Volunteers working on clean up campaigns should be provided with protective equipment, cleaning tools and resources to improve the impact of the i.e. banners, megaphones etc. Waste deposits in locations considered too dangerous for safe collection by the agency or community should be addressed under the Agency Approach. Where relevant, deeper levels of community engagement through site visits or similar could be conducted with recycling, composting, gardening or other waste to value projects.

Institutional Engagement & Markets

Capacity should be developed for the provision of service delivery to institutions and markets so that environmental effects are minimised and the cost to institutions reduced through the exclusion of profit making private sector waste disposal businesses. The needs of different institutions and market areas should be studied and accounted for in the planning for SWM systems at camp level. Distribution sites and other locations where materials enter the camp should be reviewed so that packaging and similar sources of waste are removed prior to entry. For high volume sites such as distribution centres, specific recycling points should be setup by the implementing agency. Hospitals, clinics and other sites producing waste streams which could pose increased risks to public health or the environment including toxic, hazardous, sharps, animal or human organic, are requested to provide their own solid waste solutions. As required, the WASH Sector should provide advice on the solutions. If a point is reached where the segregation of waste streams from hospitals is of a high enough reliability to not pose additional risks then re-inclusion can be considered.

Health & Safety

Agencies involved in waste collection, transportation and disposal should conduct their own risk assessment on the specific issues associated with each role and site. The following is provided as a minimum guidance across all positions.

Labour

All labourers whether paid or voluntary should be provided with thick rubber gloves and ideally boots and masks when dealing with waste with the exception of composted and cleaned recyclable materials. As required overalls and vaccines for tetanus, hepatitis B and cholera⁹ should be provided.

It is mandatory for the recruiting agency to provide adequate training on how to safely undertake each role. Specific information should be provided to all staff irrespective of their role on how to identify and address waste which could pose additional risks including faeces, sharps, medical waste and metals. Spaces for workers to clean tools, carts and undertake personal hygiene requirements with soap and water should be made available at the end of each shift.

The selection of labour should prioritise vulnerable households and aim to engage 50% woman and 15% of people with disabilities in both labourer and supervisory positions. Households with another contributing member engaged in paid work should be excluded to ensure opportunities for vulnerable households are more equitably distributed. When women are engaged and it could form a potential driver for protection concerns, adequate resources and community consultation should be undertaken to mitigate risks.

Site

Disposal sites including value chain and final disposal should be accessible only by labourers required to be there. Access and site safety should be maintained by the implementing agency and include fencing in all locations. Where necessary, community engagement should be undertaken to ensure children do not enter. Sites should maintain a level of cleanliness to ensure they do not promote the breeding of vectors. Medical kits should be available as per the specific nature of risks present in the site.

⁹ Current sanitation practices do not adequately contain feces and therefore workers should be vaccinated for cholera if they are in contact with areas with increased risk of infection.

Annex 1 - Data

The follow are ways to monitor the success of SWM projects:

- How many HHs have segregated waste bins?
- Do all HHs have a communal pit within 200m of the house on or shared HH bin at 1:20 HH?
- Is waste well segregated?
- Do all camps have at least 1 and ideally 2.5 labourers per 1,000 refugees?
- Are all staff paid at least 50 BDT per hour?
- Does collection occur 2-3 times per week?
- Are pits and bins cleaned and maintained?
- Are all waste routes within the camp mapped?
- The volume of waste processed each month through a disposal site:
 - Organic into compost
 - Recyclables
 - Final disposal
- Do all camps have reuse projects adequate to the amount of waste generated?

Annex 2 - Actions

Given the range of projects each Camp and partner will have a different set of actions however there are some actions which are more common:

- Define waste flows for all camps
- Distribute segregated bins to all HHs
- Map Communal Pits, install in missing locations, upgrade and repair
- Re-locate and add Shared HH Bins in areas not accessible by carts
- Standardise labour per hour payment, achieve minimum number of labourers and increase health and safety
- Review, consolidate, upgrade and as required construct disposal sites for each camp or group of camps
- Develop a behaviour change campaign and conduct a baseline assessment
- Change all clean up campaigns to be voluntary