



# CLEAN CONSTRUCTION FOR INDIA

OVERVIEW, LESSONS LEARNED, & OUTCOMES

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# DUST POLLUTION CONTROL REQUIREMENTS

BY DELHI POLLUTION CONTROL COMMITTEE (DPCC)

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1. All projects (plot area > 500m<sup>2</sup>) for construction for civil structures to register at DPCC web portal.

2

2. To self-monitor the activities directed for compliance and take necessary steps for improvement

3

3. The project to carry out self-audit for compliance provided on the Portal and upload self-declaration fortnightly.

4

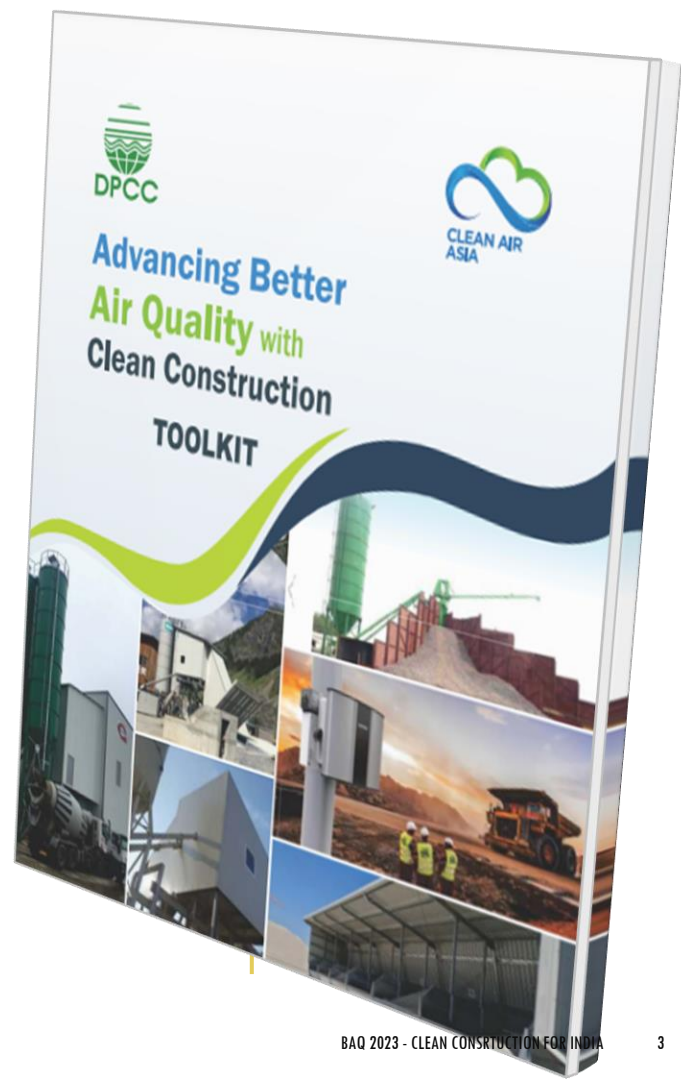
4. Video fencing provision with remote connectivity of the projects (in NCR and plot > 500 sqm) is part of portal.

5

5. PM2.5 and PM10 sensors to be installed at the project site and linked to a live Dashboard on the Web portal.

# CLEAN CONSTRUCTION TOOLKIT

Developed by Clean Air Asia (CAA) for DPCC



# 14 POINTS GUIDELINE



**1.** Dust/wind breaking wall of appropriate height



**2.** Installation of Anti Smog Guns



**3.** Green Net Scaffolding around Construction area



**4.** Provision of Wheel washing & Cleaning for Vehicles



**5.** Carriage of Vehicles carrying materials to be fully covered



**6.** Construction materials & debris to be stored on site & not to be spilled on public roads.



**7.** No loose soil, sand, C&D waste to be left uncovered.

# 14 POINTS GUIDELINE



**8.** No grinding & cutting in open areas. Wet jet to be used.



**9.** Unpaved surfaces and areas with Loose soil to be sprinkled with water



**10.** Roads leading to or at construction site to be blacktopped



**11.** C&D waste to be recycled on site or sent to recycling facility



**12.** All workers to be provided with Dust masks.



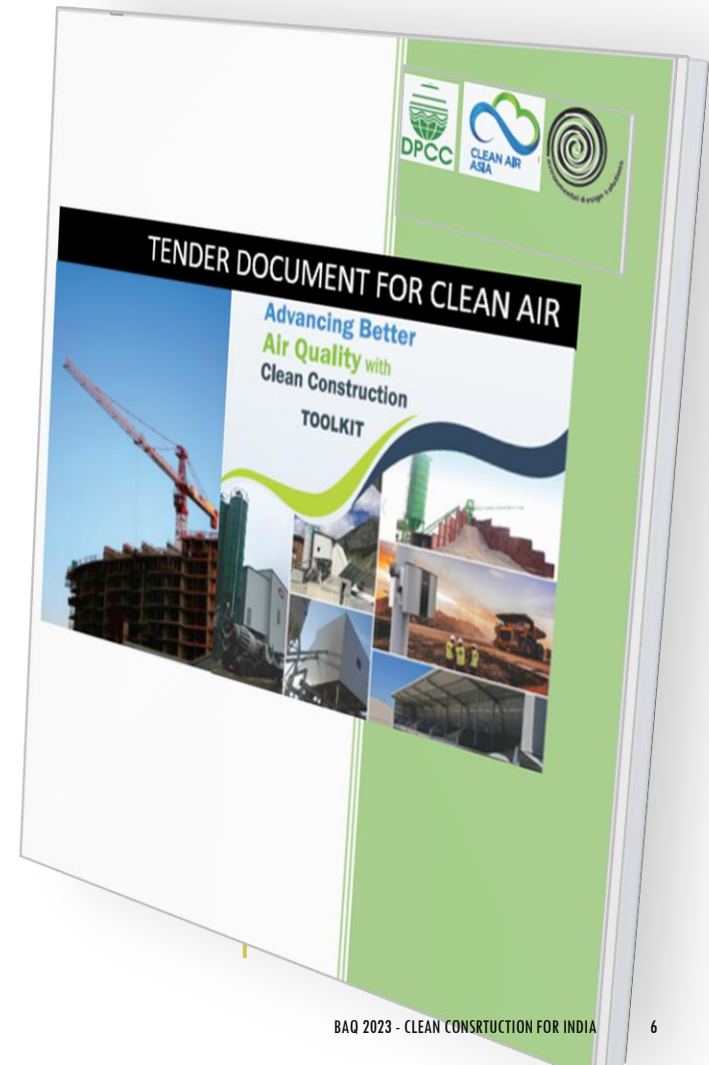
**13.** Arrangement for Medical Help to be made on Construction sites.



**14.** Dust mitigation measures to be displayed at Construction site for public viewing.

# CLEAN CONSTRUCTION TOOLKIT

Standard Clauses for Procurement  
and Tendering



First Draft

# TOOLKIT: CLAUSES FOR TENDER

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Pre-Construction & Demolition of existing infrastructure

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C&D waste storage and management

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Construction Vehicles, Equipment and Machinery

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Wheel washing

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Anti-smog Gun

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Sedimentation basin

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Construction materials storage

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Grinding and cutting inside close space

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Water sprinkled on unpaved surface and hard road surface

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Dust mitigation measure display

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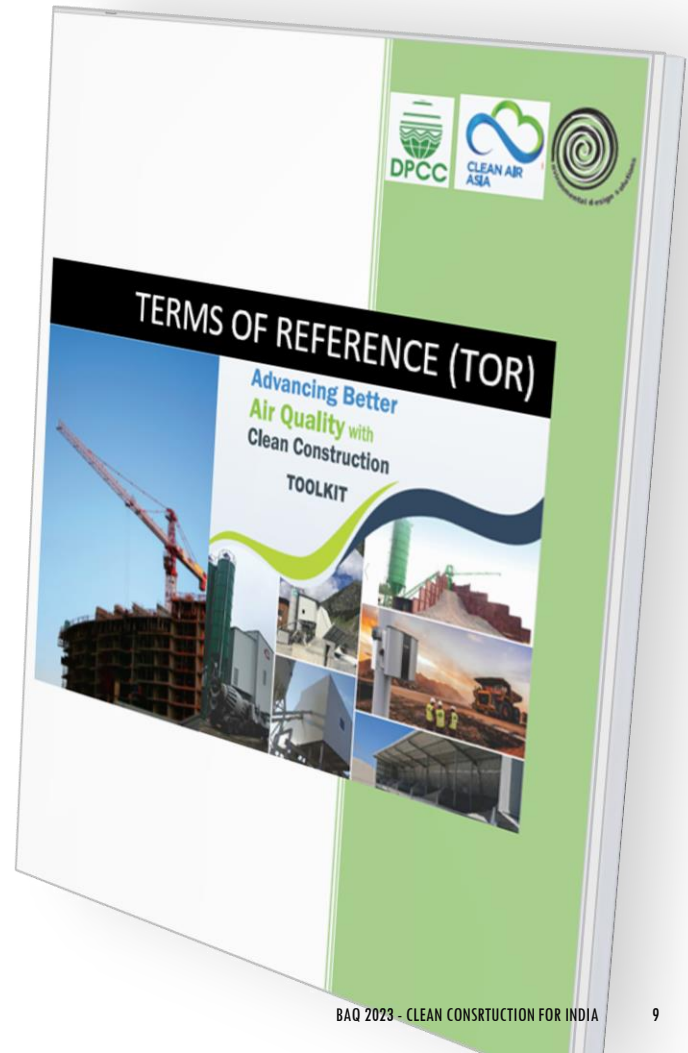
Spill prevention plan

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# CLEAN CONSTRUCTION TOOLKIT

Standard Terms of Reference



First Draft

# TOOLKIT: CLAUSES FOR TENDER



Scope



Responsibilities



Implementation  
Plan



Monitoring &  
Reporting



Timeline



Record  
Keeping



Training

# TOOLKIT: MONITORING CHECKLIST

General

Air Pollution Control

Soil and Water Management

Noise Control






Vegetation Management

Waste Management and Storage of Hazardous Materials


Resource Conservation

Emergency Preparedness and Response

Workers Health Safety

Inspected by:							
Inspection date:		Time:					
Location/chainage:							
Rain in the last 24hrs (mm)?		Weather conditions (Tick one of the following icons):					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Environmental Protection Measure	Compliance biweekly check?		Description of Action (If required)	Action Rating				Completion Signoff
	Yes	No		1	2	3	4	
<b>General</b>								
The site is generally in a tidy condition	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The site is barricaded properly	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All materials and equipment are contained within the project boundary	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All works are undertaken within the project boundary	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Designated haulage routes and access points are being used	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Air Pollution Control</b>								



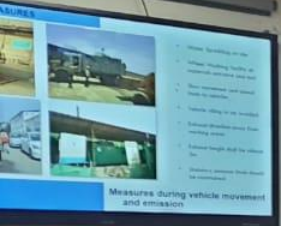
# STAKEHOLDER CONSULTATION AND TRAINING OF CONSTRUCTION MANAGERS



CLEAN CONSTRUCTION BEST PRACTICES


dpc New Delhi | 25th Sep 2023 eds







# What are the measures to control construction dust?



# DUST CONTROL MEASURES



- Site Barricading
- Water spraying and Anti smog gun
- Removal of materials from the site after finishing task.
- Removal of Asbestos materials
- Crushing of materials off-site
- Removal of biological materials

**Control measures for demolition**

# DUST CONTROL MEASURES



- ASG sand dust suppressant
- Demarcation of CW areas
- Demarcation of loading/unloading activities
- Prohibiting open C&D stores
- Water sprinkling/fine spray from nozzles
- Label all waste storage areas
- Reuse/Recycle of materials
- Centralized C&D Waste storage

**Measures during C&D storage and removal**

# DUST CONTROL MEASURES



- Material handling operations
- Clean and dust free handling areas
- Vehicle loading measures
- Reduce dust generation by using water removal of materials from the site.
- Water sprinkling at site
- Minimum drop height from chutes, skips and conveyors vehicles.

**Measures during material handling**

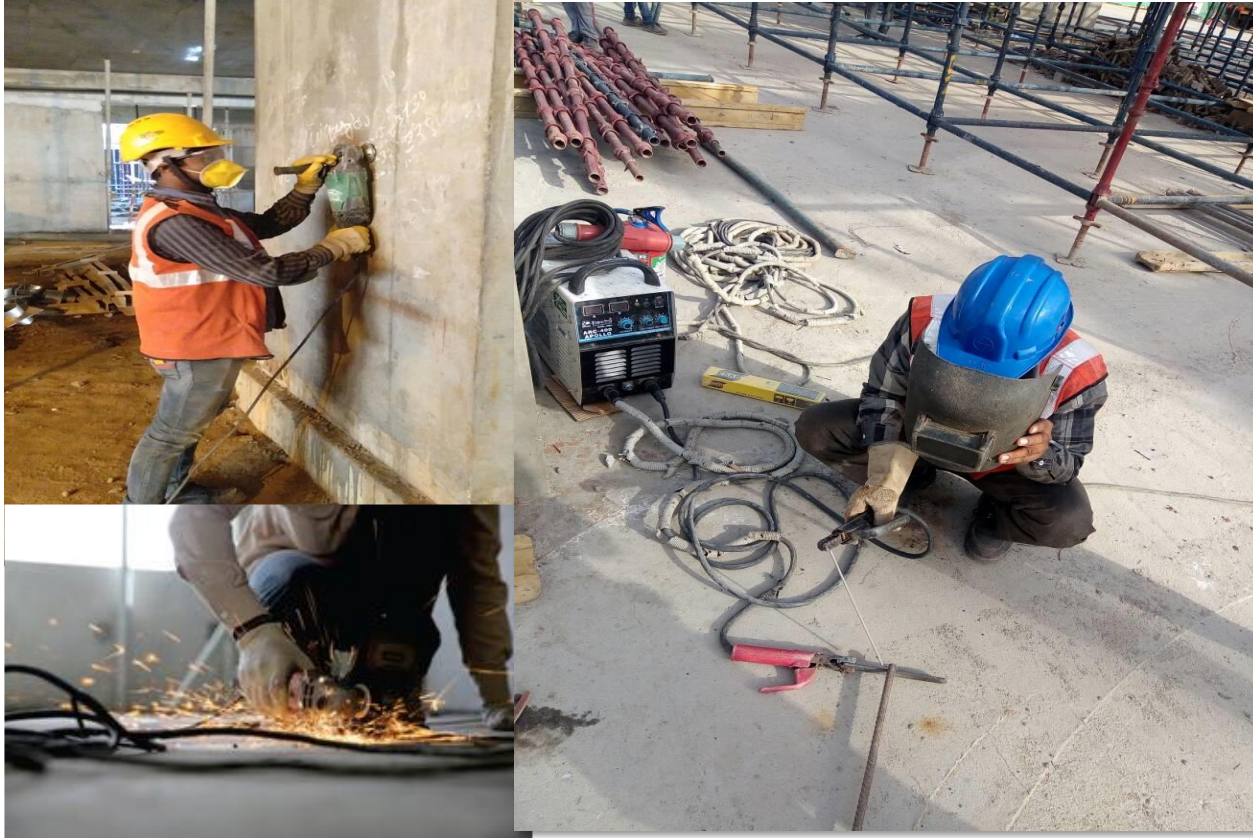
# DUST CONTROL MEASURES



- Covered Materials storage
  - Bulk Cement
  - Fine Aggregate
- Measures for Accidental spillage when filling
- Location of Materials Storage
- Protection of stockpiles from wind erosion
- Wet handling methods for cleaning

**Measures during Materials Storage**

# DUST CONTROL MEASURES



- Silica free materials for Façade cleaning
- Local Exhaust ventilation
- Spraying water over cut/grinded materials
- Vacuum cleaning for painting and decorating
- Dust suppression/collection equipment fitted in sanding & cutting machinery.
- Avoid dry sweeping during cleaning process


**Measures during Operations**

# DUST CONTROL MEASURES



- Water Sprinkling on site
- Wheel Washing facility at materials entrance and exit
- Slow movement and speed limits to vehicles
- Vehicle idling to be avoided
- Exhaust direction away from working areas
- Exhaust height shall be atleast 3m
- Statutory emission limits should be maintained

**Measures during vehicle movement and emission**



# Case Studies and Examples of Clean Construction Practices





# SITE BARRICADING/ WIND BREAK WALL



# USE OF ANTI SMOG GUN

# ANTI-SMOG GUNS

Sl .No.	Built-up Area	No of Anti –Smog Gun Required
1	5,000 -10,000 sqm	1
2	10,000 – 15,000 sqm	2
3	15,000- 20,000 sqm	3
4	Above 20,000 sqm	Minimum 4

- Suggested number of Anti-Smog Guns to be installed based on project size  
As per CAQM direction dated 02/11/2022
- ASG water spray distance to be in range of of 20-50 meter to suppress the dust.
- Avoid the use of treated sewage water in Anti-Smog Guns

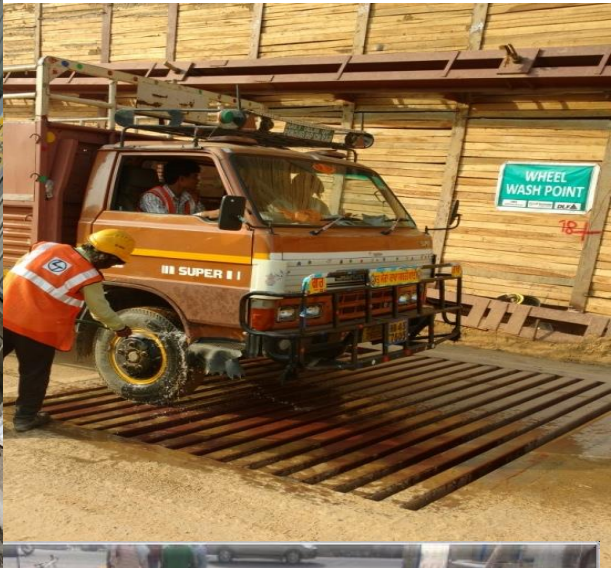


**WATER SPRINKLING ON SITE**

# WATER SPRINKLING AT SITE



# WHEEL WASHING



# WHEEL WASHING



29/04/2022 05:38 PM

# STACK HEIGHT OF DIESEL GENERATION SETS







A-10=71

STOP FOR TIRE WASH

10  
KM/H

SPEED LIMIT  
गति सीमा

**DANGER**  
DO NOT ENTER  
Construction area  
Authorized personnel only  
Safety gear required beyond this point

**K.K.BI**

PLOT No:2, VASANT  
NE

**COVERED VEHICLES**

# COVERED VEHICLES CARRYING MATERIALS



Covering vehicles carrying dusty goods and assigning a speed limit



**COVERED CONSTRUCTION AREA**

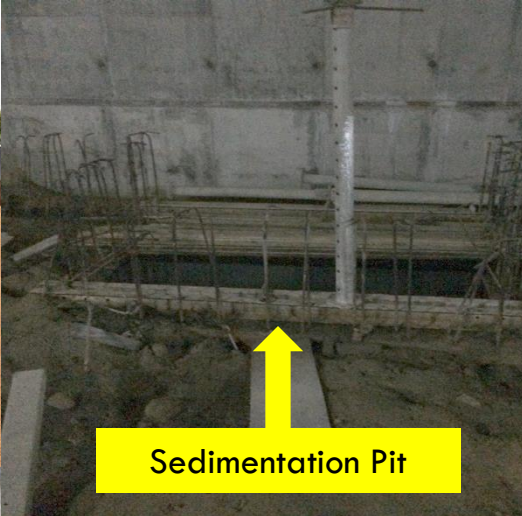
# COVERED BUILDING DURING CONSTRUCTION



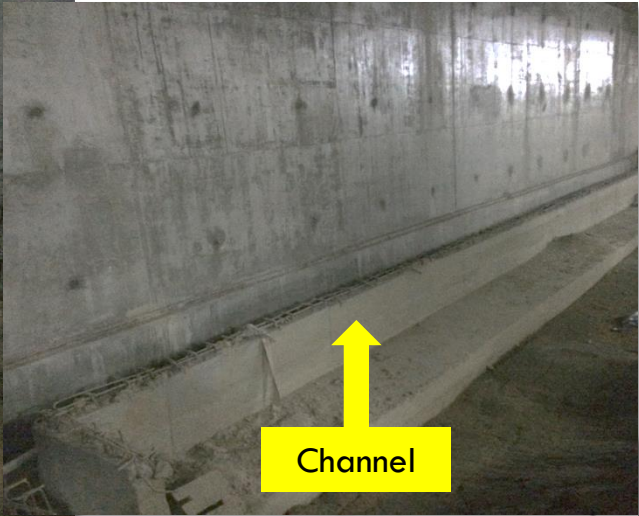


# WET JET CUTTING

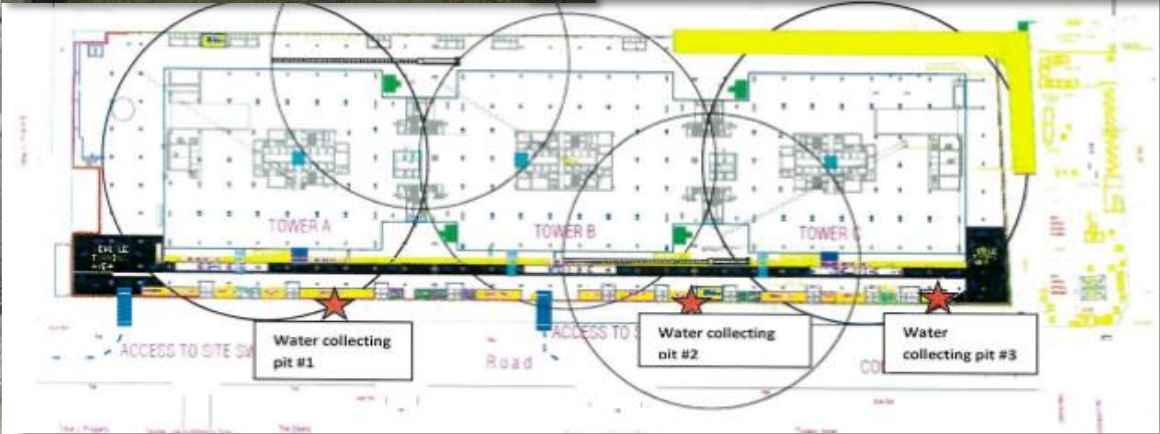
# STORM WATER MANAGEMENT



Sedimentation Pit



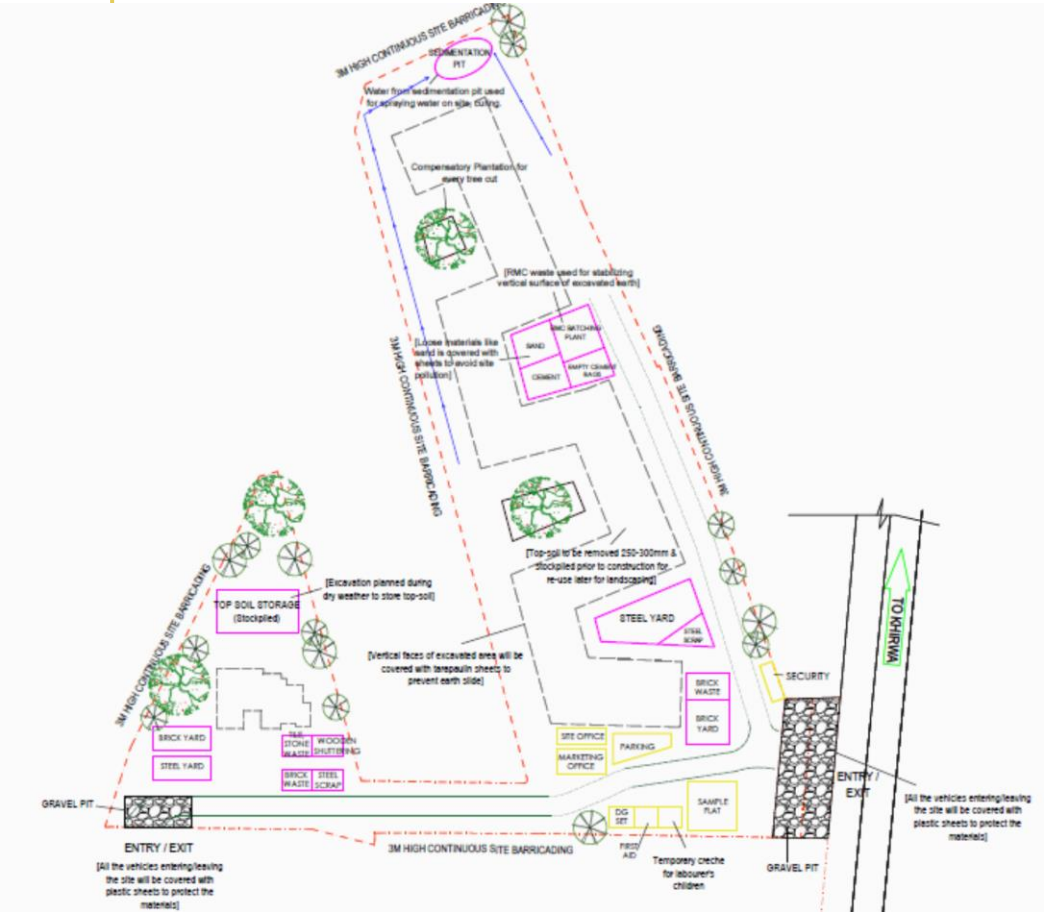
Channel



A photograph of a construction waste management site. The scene is dimly lit, showing a large area filled with various types of construction waste, including wooden planks, metal scraps, and other debris. In the foreground, there are several large piles of waste. In the background, there are corrugated metal walls or fences. A sign on the left wall reads "HALIDE SCRAP". Another sign on the right wall reads "STEEL SCRAP". The overall atmosphere is one of organized chaos, typical of a construction site's waste disposal area.

# Construction Waste Management

# SITE LOGISTIC PLAN



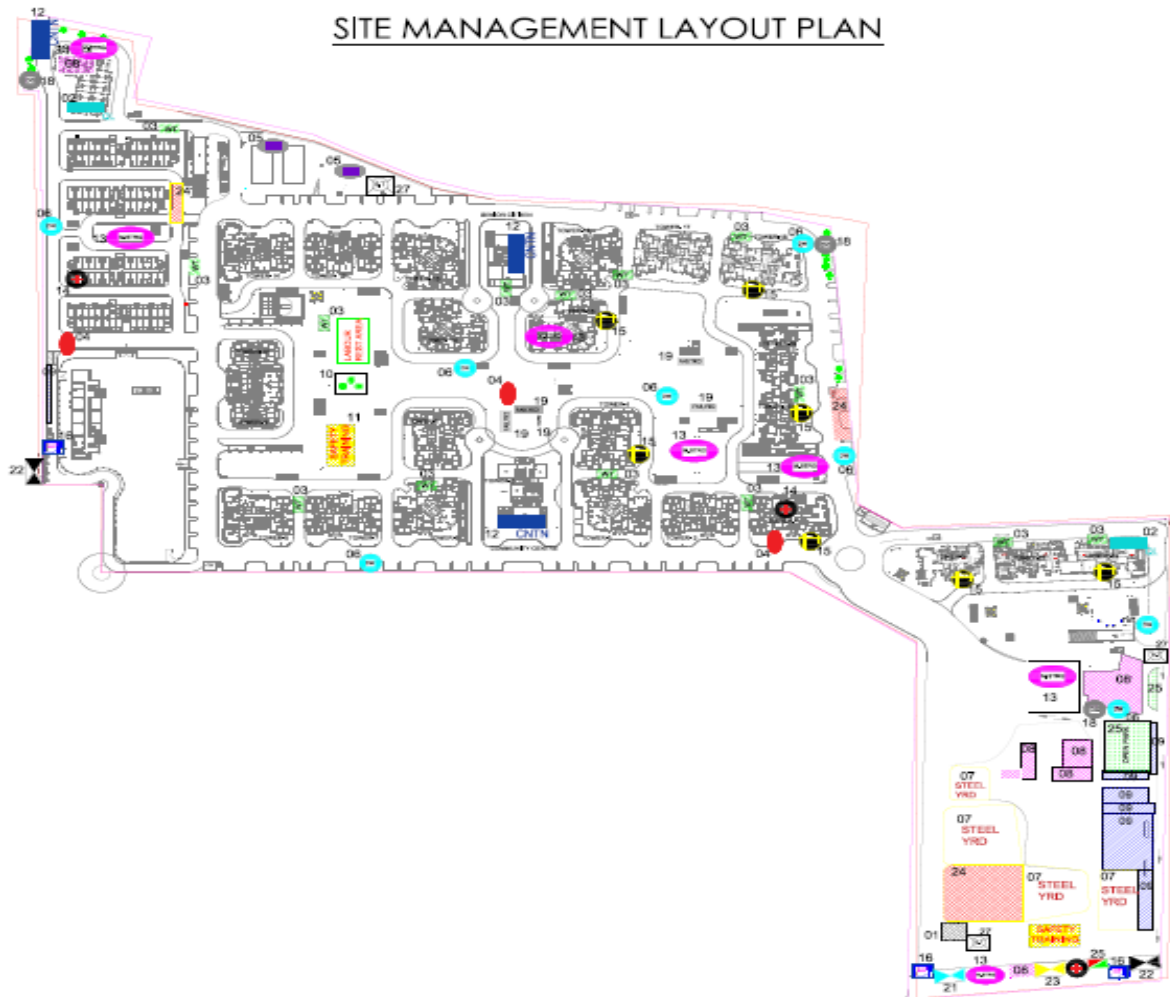
Provide a site logistics plan highlighting the below categories and it should be pasted on site :

1. Site barricading
2. Main entry/exit – with wheel washing facility
3. Truck movt. Path with arrows
4. Site office
5. Drainage channel and sedimentation tank.  
Temporary drainage layout.
6. Topsoil storage
7. Construction material storage yard
8. Construction waste storage yard
9. Labour resting area, drinking water area and toilets
10. All measures for Air pollution prevention



# SITE MANAGEMENT PLAN

## SITE MANAGEMENT LAYOUT PLAN



ITEM NO.	SYMBOL	NAME	LOCATION/LEVEL
01		WHEEL WASHING FACILITY	GROUND FLOOR
02		QUALITY MONITORING LAB	G.F - EWS-BLK-TOWER#23
03		CONSTRUCTION WATER TANK	G.F.#, 6, 8, 15, 16, 18, 22, 23 NTA 12, 21 or 02
04		AMBULANCE POST	G.F - T-1 & NTA 4
05		MOBILE TOILETS FOR LABOURS	G.F - NTA 11 & 12
06		DRINKING WATER FACILITY	G.F - EWS B/L T-1, 7, 20, 23, 14 & DLF-801
07		STEEL YARD	GROUND FLOOR
08		SITE OFFICE	GROUND FLOOR
09		STAFF VEHICLE PARKING	GROUND FLOOR
10		EMERGENCY ASSEMBLY POINT	GROUND FLOOR
11		SAFETY PARK / TRAINING FACILITY	GROUND FLOOR
12		STAFF & WORKERS CANTEEN	G.F - COMM & CNTR & SICTZ
13		MATERIAL STORAGE AREA	G.F - T-1, NTA 20, P/ EWS-BLK-553
14		FIRST AID ROOM	T-1, P/14 & EWS-BLK-2
15		TOWER CRANE	T-1-A, 15, 18, 20, 21&
16		GUARD ROOM	AT GATE - 1, 2 & 3
17		TREE WITH GUARD	GROUND FLOOR
18		DG WITH STACK	G.F - EWS - BLK 5, T & DLF SITE OFFICE
19		STEEL FABRICATION YARD	G.F - NTA 4 & 5
20		LABOUR REST AREA	GROUND FLOOR
21		MATERIAL ENTRY GATE	GROUND FLOOR
22		STAFF ENTRY GATE	GROUND FLOOR
23		LABOUR ENTRY GATE	GROUND FLOOR
24		SCRAP YARD	GROUND FLOOR
25		GREEN BELT AREA	GROUND FLOOR
26		SAFETY & MEDICAL INDUCTION	GROUND FLOOR
27		SEDIMENTATION TANK	GROUND FLOOR

# MATERIAL STORAGE ON SITE



Assign a designated storage yard with tag for different construction materials.

# MATERIAL STORAGE ON SITE



# COVERED DEBRIS YARD



# CONSTRUCTION WASTE SEGREGATION



Segregate all waste at source to avoid contamination and dispose of the waste in order to divert it from landfill by recycling or reuse on site.

Provide designated waste yard for each type of construction waste

# CONSTRUCTION WASTE SEGREGATION



Diverted/Recycled Material description	Diversion/recycling Hauler or Location	Quantity of waste (tons)
Rubble	Excavated rubble dumped adjacent site for the reuse and reused the same for filling and plumb concrete	34560
Concrete	Reused for backfilling.	2400
Steel	Sent for recycling.	1356.25
Masonry	Reused for backfilling.	600
Gypsum	Reused for backfilling.	13.5
Granite	Reused for backfilling.	303.75
Kotta stone	Reused for backfilling.	112.5
Ceramic tile ,floor and dado tile	Reused for backfilling.	41.5
Non toughened glass (KT + CLEAR)	Sent for recycling.	174
Aluminum louvers	Sent for recycling.	1.84
Aluminum frame work	Sent for recycling.	2723
Paint cans	Sent for recycling	1.63
packaging material- cardboard	Sent for recycling.	1631.10
Paint cans	Sent to factory for reuse	1.63
Kalzip roofing	Sent for recycling.	3.75
Wood	Sent for recycling	534
Electric cables	Sent for recycling	662
Total Construction waste diverted from Landfill		45118.82(tons)
Landfill Material	Landfill Hauler Location	Quantity (tons)
Toughened glass	landfill	3.48
Gypsum	landfill	8019
Wood	landfill	320.4
Miscellaneous Garbage	landfill	1742
Total Construction waste sent to Landfill		12071.48(tons)
Total Construction Waste		55203.70 (tons)
Percentage of waste diverted from landfill		81.73% (tons)



# HEALTH & SAFETY OF WORKERS

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# WORKERS SAFETY, SANITATION AND HEALTH





# PPE COMPLIANCE AND STANDARDS



PPE set up model is at site for safety awareness to workers



Basic PPE is mandatory to access the Site.

## Task Specific PPE



# WORKERS SAFETY KITS



Provision of safety gears:

- Helmet
- Jacket
- Masks
- Boots
- Gloves
- Safety harness

Use of caution tape, safety nets  
Installation of safety signage's

# SAFETY SIGNAGES FOR WORKERS



# SAFETY PRECAUTIONS FOR WORKERS



Scaffolding with platforms for easy and safe access by workers

Safe passage for workers at site during construction

Safety Net for Workers at the site during construction



# FIRST AID MEDICAL FACILITY



# WORKERS SAFETY, SANITATION AND HEALTH



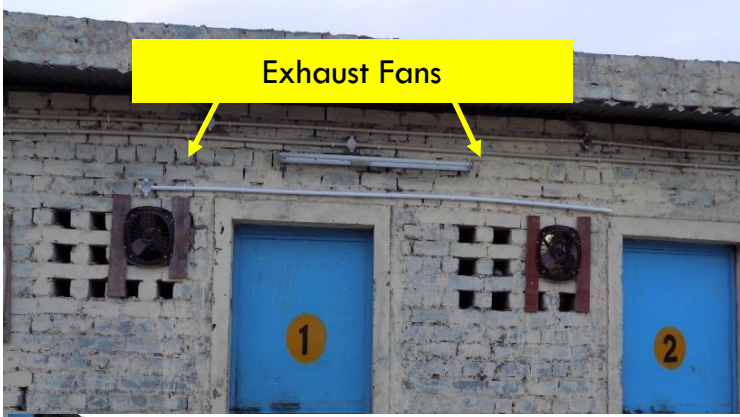
Provision of clean drinking water on site, for the workers

# WORKERS SAFETY, SANITATION AND HEALTH



Provision of adequate toilets and hygiene for site workers.

# WORKERS LIVING PLACE AND SANITATION





- The toolkit has been added to the DPCC guidelines
- The checklist is being added to the online monitoring and reporting system
- The Standard Clauses for Procurement and Tendering and the Standard Terms of Reference are being incorporated in public procurement (construction tenders)

# Thank You

