# BEFORE THE NATIONAL GREEN TRIBUNAL,
# PRINCIPAL BENCH, NEW DELHI
## Original Application No. 198/2023

**IN THE MATTER OF:**

**Harpal Singh Rana & Anr.** **...APPLICANT**

**VERSUS**

**State of Uttarakhand & Ors.** **...RESPONDENTS**

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10/8/23

(A.K. Agrawal)

**Chairman, CGWA**

Place: New Delhi

Dated: 10/08/2023

ए.के. अग्रवाल / A. K. Agrawal
अध्यक्ष / Chairman
केन्द्रीय भूमि जल प्राधिकरण / Central Ground Water Authority
जल, संसाधन, नदी विकास एवं गंगा संरक्षण विभाग
Deptt. of Water Resources, River Development & Ganga Rejuvenation
जल शक्ति मंत्रालय / Ministry of Jal Shakti
भारत सरकार / Government of India

# ACTION TAKEN REPORT ON BEHALF OF MINISTRY OF JAL SHAKTI (MOJS) IN COMPLIANCE TO HON'BLE NGT, PB, ORDER DATED 17.03.2023 IN THE MATTER OF HARPAL SINGH RANA VS. STATE OF UTTARAKHAND & ORS. (O.A. No. 198/2023)

## INTRODUCTION

Hon'ble NGT has taken cognizance of application by Shri Harpal Singh Rana against undue wastage of water by way of discharge during construction of Metro Rail at Delhi, Jaipur and Mumbai.

## NGT ORDER

The Hon'ble NGT disposed off the Application and was pleased to pass an order dated 17.03.2023 with following directions:-

> *2. Considering the above, we direct that a joint Committee of CPCB, Secretary, Ministry of Jal Shakti and Metro Rail Corporations may consider the issue and take requisite remedial measures. Secretary, MoJS will be the nodal agency for coordination and compliance. The Committee may meet within one week, interact with concerned authorities and stakeholders and taking stock of the factual position, prepare and execute an action plan for remedial measures in the matter. It may lay down necessary SOP to ensure proper utilisation of water and installation of Rain Water Harvesting systems (RWHS) to harness rain water. An action taken report may be filed before the Registrar General of this Tribunal within three months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF within two months.*

## ACTION TAKEN

1. In pursuance to the Order dated 17.03.2023 passed by Hon'ble NGT, Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti issued an **Order dated 20.04.2023** regarding Constitution of a joint team of the officers of CGWA, CPCB and Metro Rail

Corporations of Jaipur, Delhi & Mumbai to look into the matter of undue wastage of water during the construction of the metro rail and submit the report with remedial suggestions/recommendations. A copy of MoJS Order dated 20.04.2023 regarding constitution of the Joint Committee is enclosed as **Annexure-R1 at pgs. 6-8.** According to the said Order, the composition of the team shall be as under:

i. *Member Secretary, Central Ground Water Authority (CGWA) – Chairman*
ii. *Representative of Central Pollution Control Board (CPCB) (not below the level of Director of Government of India) – Member*
iii. *Representatives of Metro Rail Corporations of Jaipur, Delhi, Mumbai (not below the level of Director of Government of India) – Member*

The Terms of Reference of the team shall be as under:

- *To check the status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites.*
- *To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not.*
- *To suggest remedial measures including preparation of draft SoP (for proper utilization of water and installation of Rain Water Harvesting system) and prepare an action plan for implementation.*

2. A meeting of committee was convened on 09.05.2023 under the chairmanship of Member Secretary, CGWA to interact with nominated members of the committee and to have preliminary information about status of Metro Projects in 3 cities. Accordingly, the committee visited Delhi, Jaipur and Mumbai, held discussions with Metro Project officials (DMRC, JMRC, MMRC and MMRDA). Following sites were visited-:

| City | Date(s) of Visit | Sites Visited |
|---|---|---|
| Delhi (**DEL**) | 15.05.2023 | D. EL-1 Ghantaghar UG Station (under construction)<br>E. EL-2 Pushbanga UG Station (under construction)<br>F. EL-3 Mundka elevated station and nearby elevated track (Operational) |
| Jaipur (**JPR**) | 16.05.2023 | J. PR-1 Mansarovar Depot (Operational)<br>K. PR-2 Mansarovar elevated Metro Station (Operational)<br>L. PR-3 Ramnagar elevated Metro Station<br>M. PR-4 Badi Chopad UG Metro Station (Operational) |
| Mumbai (**MUM**) | 18.05.2023 & 19.05.2023 | M. UM-1 CSMTMetro UG Station (under construction) – Line 3<br>N. UM-2 Vidhan Bhawan UG Station (under construction) – Line 3<br>O. UM-3 Vidhan Bhawan Metro Ancillary Building - Line 3<br>P. UM-4 Marol Naka elevated station– Line 1 |

3. On the basis of the inspections, city-wise observations and findings of the Committee is compiled in the Joint Committee Report enclosed as **Annexure-R2 at pgs. 9 to 107.**

4. As directed vide NGT Order dated 17.03.2023, Ministry of Jal Shakti has issued an SOP for proper utilization of water and rainwater management in metro projects enclosed as **Annexure-R3 at pgs 108-111.**

5. Vide letters dated 31.07.2023, Central Ground Water Authority has issued the SOP to 13 Metro Corporations with a copy to the Urban Development Department of the respective State Governments, requesting to ensure its implementation and for issuing suitable directions to the concerned authorities / line departments for immediate action to implement the scheme of artificial recharge of ground water / rain water harvesting in Metro Projects.

**List of Metro Corporations-:**

| S.no | Name of State | Metro Corporations currently functioning in the State |
|---|---|---|
| 1. | Telangana | Hyderabad Metro Rail |
| 2. | Uttar Pradesh | Uttar Pradesh Metro Rail Corporation (Presently are running metro in Lucknow , Kanpur, Ghaziabad , Noida & Greater Noida cities of UP |
| 3. | Gujarat | Gujarat Metro Rail Corporation Limited (GMRC) |
| 4. | Rajasthan | Jaipur Metro rail Corporation |
| 5. | Maharashtra | Maharashtra Metro Rail Corporation Limited (MAHA-METRO) |
| 6. | Bihar | Patna Metro Rail Corporation (Under Construction) |
| 7. | Haryana | Rapid MetroRail Gurgaon Limited (Haryana Mass Rapid Transport Corporation Limited (HMRTC)) |
| 8. | NCT Delhi | Delhi Metro Rail Corporation (DMRC) |
| 9. | Kerala | Kochi Metro Rail Limited |
| 10. | Karnataka | Bangalore Metro Corporation limited |
| 11. | Tamil Nadu | Chennai Metro Rail Limited (CMRL) |
| 12. | West Bengal | Metro Railway, Kolkata |
| | | Kolkata Metro Rail Corporation Limited (Implementing the East West Metro Corridor) |
| 13. | Madhya Pradesh | Madhya Pradesh Metro Rail Corporation Limited |

The copy of the letters sent to Metro Corporations is enclosed as **Annexure-R4 at pgs. 112-138.**

6. D.O. Letters dated 09.08.2023 by Chairman, CGWA have also been issued to **Secretary, Railway Board, Ministry of Railways** and **Secretary, Ministry of Housing and Urban Affairs** to issue further necessary directions in this regard. The copy of D.O. Letters to Secretary, Railway Board and Secretary, Ministry of Housing and Urban Affairs are enclosed as **Annexures-R5 and R-6 at pgs139-140.**

The above is submitted for perusal of Hon'ble NGT and the present Report may kindly be taken on record.

10/08/23

(A.K. Agrawal)

**Chairman, CGWA**

Place: New Delhi

Dated: 10/08/2023

ए.के. अग्रवाल / A. K. Agrawal
अध्यक्ष / Chairman
केन्द्रीय भूमि जल प्राधिकरण / Central Ground Water Authority
जल, संसाधन, नदी विकास एवं गंगा संरक्षण विभाग
Deptt. of Water Resources, River Development & Ganga Rejuvenation
जल शक्ति मंत्रालय / Ministry of Jal Shakti
भारत सरकार / Government of India

**Annexure R-1**
16

I/82975/2023

**By-Email**

**T-39011/1/2023-GW Section-MOWR**
भारत सरकार
**Government of India**
जल शक्ति मंत्रालय
**Ministry of Jal Shakti**
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
**D/o WR, RD & GR**
**(भूजल अनुभाग / Ground Water Section)**
****

Shram Shakti Bhawan, Rafi Marg
New Delhi, Dated:20/04/2023

**ORDER**

**Subject: Constitution of a joint team of the officers of CGWA, CPCB and , Metro Rail Corporations of Jaipur, Delhi & Mumbai to look into the matter of undue wastage of water during the construction of the metro rail - reg.**

The Hon'ble NGT in the matter of O.A. No. 198/2023, Harpal Singh Rana and another Vs State of Uttarakhand & Ors vide its Order dated 17.03.2023 has directed the Ministry of Jal Shakti to constitute a Joint Committee of CPCB, Ministry of Jal Shakti and Metro Rail Corporations to consider the issue of the undue water wastage during the construction of the Metro Rail.

**2.** In compliance to the directions of the Hon'ble NGT, a team of the following officers is hereby constituted/formed to look in to the matter by visiting constructions sites of these Metro Rail i.e. Jaipur, Delhi & Mumbai and submit the report with remedial suggestions/ recommendations. The composition of the team shall be as under:

| | | |
|---|---|---|
| 1. | Member Secretary, Central Ground Water Authority (CGWA) | Chairman |
| 2. | Representative of Central Pollution Control Board (CPCB) (not below the level of Director of Government of India). | Member |
| 3. | Representatives of Metro Rail Corporations of Jaipur, Delhi, Mumbai (not below the level of Director of Government of India). | Member |

Note: The team may co-opt any other member if required on non-remunerative basis.

**3.** The **Terms of Reference** of the team shall be as under:

i. To check the status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites.

ii. To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not.

iii. To suggest remedial measures including preparation of draft SoP (for proper utilization of water and installation of Rain Water Harvesting system) and prepare an action plan for implementation.

**4 .** The team shall meet on regular basis and submit the report within one month from issuance of this order.

**5 .** Expenditure on account of TA/DA to official Members of the Committee will be met from the source from which they draw their salaries.

**6 .** This issues with the approval of Secretary(WR, RD & GR), Ministry of Jal Shakti.

Yours sincerely,

(**Rajendra Kumar Sahu)**
Under Secretary to the Govt. of India
Ph: 011-23716928
Email: **gwdesk-mowr@nic.in**

To

i. Chairman, CGWA (*chmn-cgwb@nic.in*)
ii. Member Secretary, CPCB( *mscb.cpcb@nic.in*)
iii. CMD, DMRC, New Delhi.
iv. CMD, JMRC, Jaipur.
v. CMD, MMRCL, Mumbai.

Copy to:

i. PPS to Secretary, DoWR, RD & GR, MoJS

ii. PPS to Special Secretary, DoWR, RD & GR, MoJS
iii. PPS to JS(A,GW & IC), DoWR,RD & GR, MoJS
iv. TS to Chairman, CGWA

**REPORT OF THE JOINT COMMITTEE CONSTITUTED TO LOOK INTO THE MATTER OF UNDUE WASTAGE OF WATER DURING CONSTRUCTION OF METRO RAIL IN DELHI, JAIPUR AND MUMBAI IN COMPLIANCE TO THE DIRECTION OF HON'BLE NGT IN THE MATTER, OA NO. 198/2023 – HARPAL SINGH RANA AND ANOTHER *VS* STATE OF UTTARAKHAND & ORS**

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# REPORT OF THE JOINT COMMITTEE CONSTITUTED TO LOOK INTO THE MATTER OF UNDUE WASTAGE OF WATER DURING CONSTRUCTION OF METRO RAIL IN DELHI, JAIPUR AND MUMBAI IN COMPLIANCE TO THE DIRECTION OF HON'BLE NGT IN THE MATTER, OA NO. 198/2023 – HARPAL SINGH RANA AND ANOTHER *VS* STATE OF UTTARAKHAND & ORS

## A. BACKGROUND/ INTRODUCTION

### A-1: HON'BLE NGT DIRECTIVES

In Original Application No. 198/2023 in Hon'ble NGT, the complainant has raised issue of wastage of water in Metro Projects. Grievance in the application is against undue wastage of water by way of discharge during construction of Metro Rail at Delhi, Jaipur and Mumbai.

Hon'ble NGT, Principal Bench, New Delhi, vide Order dated 17.03.2023 disposed of the matter with the following direction-:

> *"Considering the above, we direct that a joint Committee of CPCB, Secretary, Ministry of Jal Shakti and Metro Rail Corporations may consider the issue and take requisite remedial measures. Secretary, MoJS will be the nodal agency for coordination and compliance. The Committee may meet within one week, interact with concerned authorities and stakeholders and taking stock of the factual position, prepare and execute an action plan for remedial measures in the matter. It may lay down necessary SOP to ensure proper utilisation of water and installation of Rain Water Harvesting systems (RWHS) to harness rain water. An action taken report may be filed before the Registrar General of this Tribunal within three months by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF within two months. If found necessary, the Registrar General of this Tribunal may place the matter before the Bench for further directions."*

### A-2: CONSTITUTION OF COMMITTEE AND TOR

In pursuance to the directives of Hon'ble NGT, a Committee under the Chairmanship of Chairman, Central Ground Water Board (CGWB) was constituted by MoJS vide Order Dated 20.04.2023 (**Appendix: A**) with the following members.

| S. No. | Committee Position | Representation | Nominated Officers |
|---|---|---|---|
| **1.** | **Chairman** | Member Secretary, CGWA | **Sh A K Agrawal** |
| **2.** | Member | Representative of Central Pollution Control Board (**CPCB**) (not below the level of Director of Government of India). | Sh. P.K. Mishra, Divisional Head, WQMI |
| **3.** | Member | Representatives of Metro Rail Corporations of Jaipur, Delhi, Mumbai (not below the level of Director of Government of India). | • Sh. Akhilesh Kumar Saxena, Director (Project), JMRC<br>• Sh. Vikash Singhal, Sr. DGM/Env, DMRC<br>• Sh. Shantaram Dalvi, Sr. Dy. General Manager (Civil), MMRCL |

ToR of the committee are as following.

**TOR-1**: To check the status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites.

**TOR-2**: To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not.

**TOR-3**: To suggest remedial measures including preparation of draft SoP (for proper utilization of water and installation of Rain Water Harvesting system) and prepare an action plan for implementation.

### A-3: MEETING OF COMMITTEE ON 09.05.2023

A meeting of committee was convened on 09.05.2023 under the chairmanship of Member Secretary, CGWA to interact with nominated members of the committee and to have preliminary information about status of Metro Projects in 3 cities. Minutes of the meeting are enclosed as **Appendix-B**.

It emerged from the discussions that **Metro projects are exempted from Environmental Clearance** as per **EIA notification, 2006 (Appendix-C)**. However, as per requirement of funding agencies, the Metro Projects do get the Environmental Impact Assessment done through accredited agencies. Officials from metro projects informed that water for construction purpose has to be of potable quality as per BIS norms (**IS:456-2000**). The visits for inspection of projects in the three cities was planned in the meeting as following.

| Date | Plan |
|---|---|
| 15/05/2023 | Meeting with Metro Project officials and site visits to Delhi Metro Projects |
| 16/05/2023 | Meeting with Metro Project officials and site visits to Jaipur Metro Projects |
| 18/05/2023 & 19/05/2023 | Meeting with Metro Project officials and site visits to Mumbai Metro Projects |

Accordingly, the committee visited Delhi, Jaipur and Mumbai, held discussions with Metro Project officials (DMRC, JMRC, MMRC and MMRDA). Following sites (**Table A-1**) were visited.

**Table A-1: Metro Project Sites visited**

| City | Date(s) of Visit | Sites Visited |
|---|---|---|
| Delhi (**DEL**) | 15.05.2023 | **DEL-1** Ghantaghar UG Station (under construction)<br>**DEL-2** Pushbanga UG Station (under construction)<br>**DEL-3** Mundka elevated station and nearby elevated track (Operational) |
| Jaipur (**JPR**) | 16.05.2023 | **JPR-1** Mansarovar Depot (Operational)<br>**JPR-2** Mansarovar elevated Metro Station (Operational)<br>**JPR-3** Ramnagar elevated Metro Station<br>**JPR-4** Badi Chopad UG Metro Station (Operational) |
| Mumbai (**MUM**) | 18.05.2023 & 19.05.2023 | **MUM-1** CSMT Metro UG Station (under construction) – Line 3<br>**MUM-2** Vidhan Bhawan UG Station (under construction) – Line 3<br>**MUM-3** Vidhan Bhawan Metro Ancillary Building – Line 3<br>**MUM-4** Marol Naka elevated station – Line 1 |

## A-4: LAYOUT OF PRESENTATION OF OBSERVATIONS, CONCLUSIONS AND SUGGESTIONS OF COMMITTEE AS PER TOR

**Section-B summarizes** City-wise **Observations/ Findings** of the Committee, which includes **summary** of observations based on the site visits. Abbreviated names of the Cities in this report have been used for convenience: Delhi-**DEL**; Jaipur-**JPR**; Mumbai-**MUM**.

**Section-C** summarizes salient conclusions based on the observation from visits as per **ToR-1 & 2,** followed by suggestions, draft SOP and its action plan as per **ToR-3** (**Section-D**).

## B. CITY-WISE OBSERVATIONS FROM THE VISITS

Matrix summarizing the site-wise observations on some key aspects is enclosed as **Appendix-D**. Same are summarized in this section.

### B-1: DELHI (DEL)

Part of Phase-IV (Jankipuram West – R K Ashram) is under construction. There are 7 underground stations proposed, out of which water table is expected to be encountered at 5 stations. DMRC is getting supply of water for construction from Delhi Jal Board. Tubewells will be constructed for dewatering purpose at 5 locations for which DMRC has obtained NOC from Delhi District Advisory Committee (**Appendix-E**). DMRC has agreement with New Delhi Municipal Corporation (**NDMC**) for diverting dewatered groundwater through pipeline network to nearby Roshanara Bagh. The water will be utilized for rejuvenation of dry water bodies within the park. Further, DMRC has obtained in-principle permissions from Northern Railways and CPWD for supply of dewatered water. Copies of agreements are enclosed (**Appendix-F**).

**(i)** **Three sites** were visited upon.

**DEL-1:** Ghantaghar UG Station (under construction) of Phase

**DEL-2:** Pulbangash UG Station (under construction)

**DEL-3** Mundka elevated station and nearby elevated track (Operational)

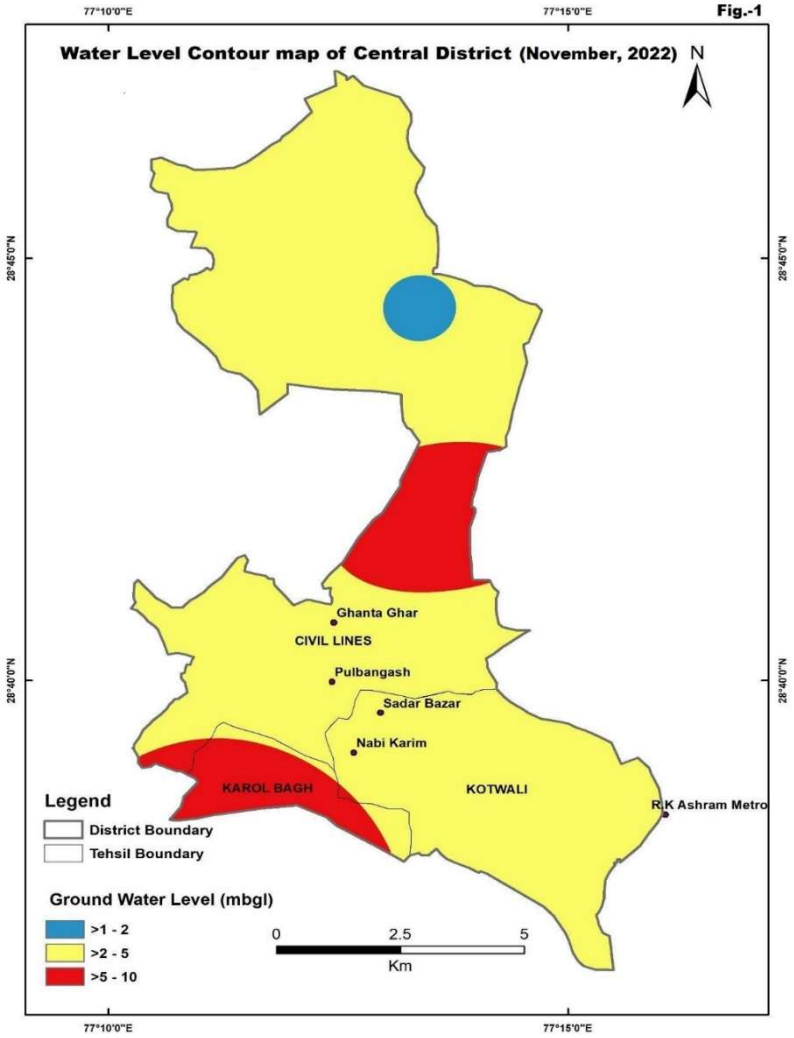
**(ii)** At Ghantaghar and Pul Bangash underground stations (under construction), the construction activity has not yet reached water table. As per CGWB data, water level in the area is around 5 mbgl (**Fig.-1**) Diaphragm wall work is in progress to prevent seepage from sides. Total depth of retaining wall will be around 17m.

**(iii)** Water supplied by DJB is further treated by RO at batching plant and RO reject is utilized for dust suppression, wheel wash etc. (transported to construction sites by tankers). At present, RO reject quantum is sufficient for these purposes. However, as submitted by Metro authorities, in case of additional requirement, STP treated water will be utilized.

**(iv)** RWH system will be installed at elevated stations in Phase-IV under implementation.

**(v)** Mundka metro station (elevated) is on already operational line (Phase-III). In elevated stretches, DMRC has installed arrangements to bring down rainwater from viaduct through downpipes running along the piers and discharge into RWH pits on the median. There is common RWH pit between 2 piers to divert the water from either

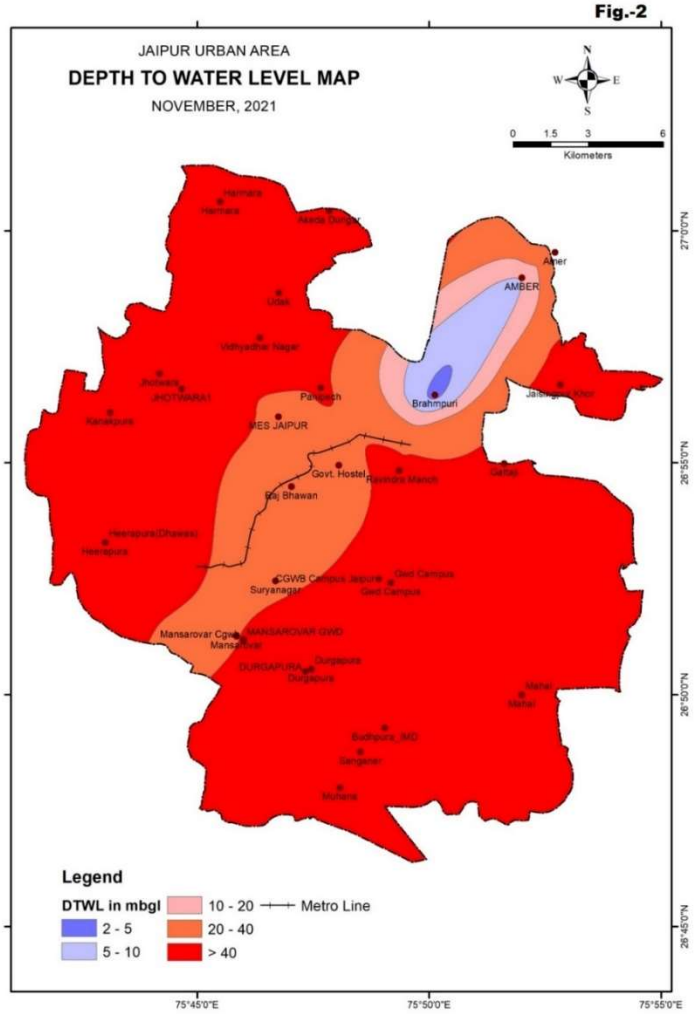
side. Dimension of pits is in accordance with maximum hourly peak rainfall (considered as 25mm). However, there are limitations in maintenance of the system. As reported, theft and breakage of PVC pipes are commonplace. The median and RWH pits are maintained by PWD. As informed by DMRC officials, PWD has fixed cleaning target of 20% pits on annual basis.




## B-2: JAIPUR (JPR)

Presently, **no metro project is in construction stage in Jaipur**. Phase-1 (1A and 1B) is operational, with 9.13 Km elevated and 2.51 Km underground sections. There are total 11 stations (8 elevated and 3 underground). As per CGWB data, water levels in Jaipur city are deeper than 20mbgl (**Fig.-2**). In the underground section of Metro project, water levels are deeper than the base level. Water table was therefore not intersected during construction and afterwards.

Fig.-2




i. **Four sites** were visited.

**JPR-1** Mansarovar Depot

**JPR-2** Mansarovar Metro Station (Elevated)

**JPR-3** Ramnagar Metro Station (Elevated)

**JPR-4** Chhoti Chopad Metro Station (Underground)

ii. There is presently no metro construction site in Jaipur. All visited sites are in operational phase.

iii. At Mansarovar Depot, fresh water requirement is 25 KLD for drinking, flushing, cleaning, fire-fighting system, cooling towers, which is met from TW. Recycled water of 6 KLD from Auto Coach Wash plant and ETP is used for washing of trains and in horticulture uses of Depot. On an average 3 coaches are washed at the depot every day (half an hour each). JMRC has installed RWH system in Depot premises.

iv. JMRC has installed Rainwater Harvesting (**RWH**) in elevated Metro section/ stations**.** At Mansarovar and Ramnagar Metro stations (the visited sites), rainwater harvesting rainwater system has been installed. Rainwater is brought down from viaduct through downpipes to settling chamber at the base of pier and then discharged into filter chamber having recharge well at the centre. There is common filter chamber/ recharge well between 2 piers to recharge the water from either side. The system has been designed considering peak hourly rainfall.

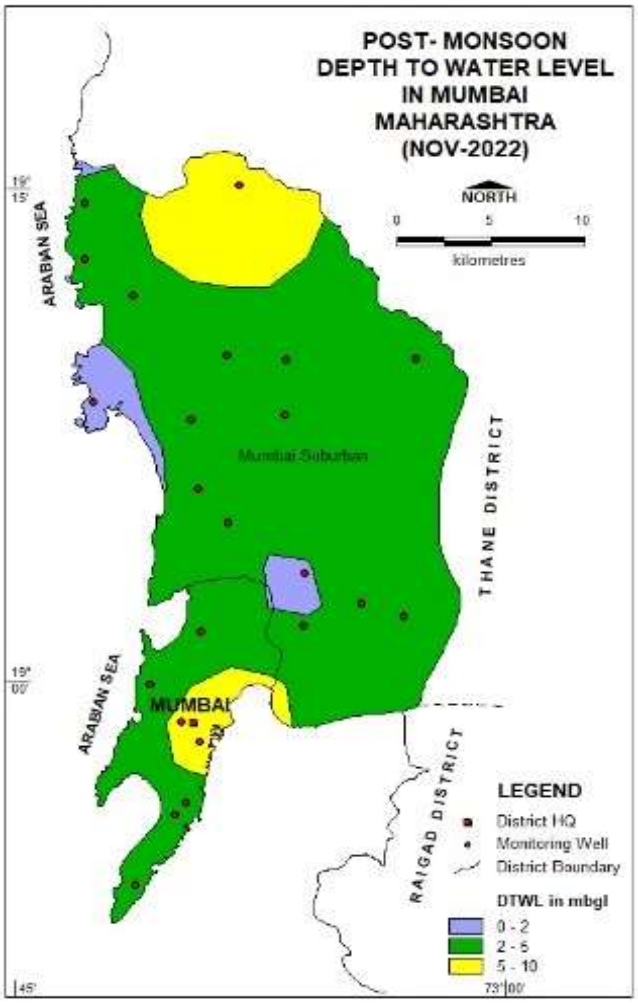
**v.** Out of 11 stations, 5 have TW supply, 5 have both TW and PHED supply and 1 has PHED supply only. JMRC had earlier obtained NOC for groundwater extraction from District Administration as the city was notified by CGWA. However, JMRC did not obtain NOC from CGWA after notification of MoJS guidelines.

**vi.** Entire wastewater from station is being discharged into Nagar Nigam sewer line.

### B-3: MUMBAI (MUM)

In Mumbai, total 145 Km metro network is under construction, out of which 33.5 Km is underground section. Around 50-60% work has been completed. Groundwater levels in Mumbai are very shallow (2-5 mbgl, **Fig.-3**) and therefore water table gets intersected during underground construction, as well as during piling work for erecting piers in elevated sections. The underground section is being implemented by MMRC and funded by JICA and is being executed by Mumbai Metro Rail Corporation (**MMRC**). Elevated sections are being implemented by MMRDA and the funding agency is Asian Development Bank (**ADB**). ADB carries out bi-annual environmental monitoring of the project. The link to reports is *https://www.adb.org/sites/default/files/project-documents/49469/49469-007-emr-en_18.pdf*. In addition, 46.5 Km elevated sections on different lines are already operational (Line-1 since 2014, Line 2A since April, 2022 and Line-7 since January, 2023). Line-1 is being operated and maintained on PPP model.

**Fig.-3**



**Four sites** were visited.

**MUM-1** CSMT Metro UG Station (under construction) – Line 3

**MUM-2** Vidhan Bhawan UG Metro Station (under construction) – Line 3

**MUM-3** Vidhan Bhawan Metro Ancillary Building – Line 3

**MUM-4** Marol Naka elevated Metro Station (Operational) – Line 1

**i.** Water for construction is supplied by MCGM (Municipal Corporation of Greater Mumbai) as per actual requirement. For construction, the quality of water has to be potable as per BIS Norms (IS:456-2000). The water is entirely consumed in construction/ curing. It may be pertinent to mention that fresh water in Mumbai is sourced from outside surface reservoirs.

**ii.** Chhatrapati Shivaji Maharaj Terminus Metro Mumbai (**CSMT**) underground station along with crossover is to be constructed down to 25m depth. The construction has been completed. Since water level is shallow, seepage from sides was controlled by constructing a watertight retaining wall structures of secant pile with struts. It was observed that there was no seepage through the retaining walls. Very meagre seepage from bottom, mixed with fine excavated material was observed, which gives it the appearance of muck. In order to utilized the seepage water, suspended solid of the muck is settled in settling pit. Part of the water thus obtained is used in wheel-wash, dust suppression and gardening, and remaining is discharged into MCGM's storm water drains as per agreement. Wastage or spillage of water was not noticed near or around the site.

**iii.** Although groundwater levels are shallow in Mumbai, hard rock (basalt) is encountered at 8-10m, which has low water-bearing capacity, limiting the scope of seepage during underground construction.

**iv.** Work at Vidhan Bhawan underground station is almost complete. No wastage of water was noticed at the site. The ancillary building of Vidhan Bhawan station has water tanks for different purposes. There are 2 Tanks of 10 KL capacity for firefighting (require only top up), 2 tanks of 6.5 KL for chilling/ cooling and 2 tanks of 4 KL capacity for staff and passengers. Source of water is MCGM.

**v.** Since water levels are shallow in Mumbai, artificial recharge is not practicable. As reported by MMRDA, wherever feasible, rainwater harvesting system have been installed for utilization of rainwater. At Marol Naka station (Line-1), downpipes bring rainwater from viaduct to median for use in greenbelt on it. As informed by MMRDA, which is constructing elevated sections and other related facilities, metro depots have internal stormwater drains which can collect 100% run-off generated at one day normal rainfall from roof and non-roof areas. The internal SWD network is connected to municipal stormwater network. Run-off generated from station roofs and viaducts is channelized through "U" shaped channel and closed conduits. Wherever possible (if alignment is on service road) the run-off pipes are connected to existing stormwater drains. Otherwise (if alignment is on road median), run-off is diverted to median of alignments for irrigation of landscape works and overflow is let-off on roads.

## C. SALIENT OBSERVATIONS FROM SITE VISITS (AS PER TOR 1 & 2)

**ToR-1 & 2** of the Committee state the following.

***ToR – 1:*** *To check the status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites.*

***ToR – 2:*** *To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not.*

Matrix summarizing the site-wise observations on some key aspects is enclosed as **Appendix-C**. Salient collective observations and conclusions are summarized here.

**ToR – 1:** To check the Status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites

**(a)** **Metro projects** are **exempted** from Environmental Clearance as per **EIA notification, 1994** (**Appendix-C**).

**(b)** As per BIS norms (**BIS:456-2000**), water for **construction/ curing purposes has to be potable**.

**(c)** In Delhi, water for construction purpose is being partly met from DJB supply and partly from *in-situ* TWs. DMRC has obtained permission for TW construction from DJB. At the under-construction underground stations in Delhi, construction has not touched water table yet. RO reject water from batching plant – supply water is being treated before use in construction – is being used for wheel-wash, dust suppression etc. No wastage of water could be noticed around the sites. On encountering water table, the dewatered water is proposed to be diverted to nearby Roshan Ara bagh through pipelines for water bodies in the park (Agreement: **Appendix-F**)

**(d)** There was no construction going on in Jaipur. However, as reported, groundwater from *in-situ* TWs was used for construction of Phase-1A and 1B.

**(e)** In Mumbai, entire water for construction is supplied by MCGM as per actual requirement and entire water is consumed without any wastage. It may be pertinent to mention that potable water in Mumbai is sourced from surface reservoirs situated outside Mumbai. At underground construction site visited (Chhatrapati Shivaji Terminus), seepage from sides has been controlled by retaining wall. Only meagre seepage from bottom was observed, which has appearance of muck. Solid suspended particles of muck are separated in settling tank and water is used for wheel-wash, dust suppression etc. Remaining water is discharged into MCGM storm water drains as per agreement between the two agencies. In order to reduce water requirement for curing, MMRDA uses Hessian cloth and curing compound. No wastage of water could be noticed at under-constructions sites in Mumbai. As per estimates provided by MMRDA, approximated total water requirement per Km length of project is 20850m3 over an approximate 3-year construction period for 145 Km. This translates into 48 Km and around 10 Lakh litre in a year.

**(f)** Metro stations of Mumbai Metro Line 7 have been awarded the coveted Platinum rating by Indian Green Building Council (**IGBC**).

**ToR – 2:** To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not

**(g)** In **Delhi** metro projects, water for construction/ operation & maintenance of stations and depots is partly met through tubewells (**TWs**). DMRC has obtained **permission for TWs** from Delhi District Advisory Committee (groundwater in Delhi is regulated by State). At construction sites, RO Reject water is being used for wheel-wash, dust suppression etc. In case of increased demand in future, STP treated water will be used for such purposes. **Rainwater** from elevated stations and tracks is diverted to recharge pits on the medians.

**(h)** In **Jaipur Metro**, out of 11 stations 5 have TW supply, 5 have both TW and PHED supply and 1 has PHED supply only. Entire wastewater generated at stations from usage by staff/ passengers is discharged into Nagar Nigam sewer drain. At Mansarovar depot, the requirement of washing/ maintenance/ horticulture in depot premises is partly met by fresh water from tubewell and partly from ETP treated water and Auto coach wash plant recycled water, and. Total average fresh water requirement at depot is 25 KLD. JMRC had earlier obtained **NOC for groundwater** extraction from District Administration as the city was notified by CGWA. However, JMRC did not obtain NOC from CGWA after notification of MoJS guidelines, which did away with concept of 'Notified Area', requiring all groundwater users to obtain NOC from CGWA. JMRC has been advised to obtain NOC from CGWA at the earliest. As regard to **RWH** system, Rainwater from elevated stations and tracks is diverted to recharge wells on the medians. However, recharge system is not well maintained. Thefts/ breakage of pipes is also very common.

**(i)** In **Mumbai**, entire construction and operational water needs are met with supply from MCGM, which sources freshwater from surface reservoirs located outside Mumbai. Hence, **NOC for groundwater is not required** by MMRC and MMRDA. Use of fresh water for curing has been minimized by MMRDA, using Hessian clothing and curing compounds. The sewage and effluent generated in Metro Train Depots is re-used for landscaping and toilet flushing purposes. Typically, in Metro Train Depots, it is estimated that 15-20% of total freshwater is required for domestic purposes whereas 45-50% of water is required for train maintenance purposes. In Mumbai Metro Train depots 100% of Sewage and Effluent generated is treated and re-used for landscaping and toilet flushing. Metro Line 7 stations of Mumbai Metro have been awarded the coveted Platinum rating by Indian Green Building Council (**IGBC**). Groundwater table in Mumbai City and MMR region is very shallow (2-3.5 mbgl). Hence, ground water recharge is not practicable. For management of stormwater in depots, internal stormwater drains are laid which can collect 100% run-off generated at one day normal rainfall from roof and non-roof areas. The internal SWD network is connected to municipal stormwater network. The run-off generated from station roofs and viaducts is channelized through "U" shaped channel and closed conduits. Wherever possible (if alignment is on service road) the run-off pipes are connected to existing stormwater drains otherwise (if alignment is on road median) run-off is diverted to median of alignments for irrigation of landscape works and overflow is let-off on roads.

## D. SUGGESTIONS OF THE COMMITTEE AND SOP FOR PROPER UTILIZATION OF WATER IN METRO PROJECTS (AS PER TOR-3)

***ToR – 3:*** To suggest remedial measures including preparation of draft SoP (for proper utilization of water and installation of Rain Water Harvesting system) and prepare an action plan for implementation.

### I. Suggestions

It is observed that the projects visited have been making efforts for minimizing usage as well as to reduce wastage of water. As such, there does not appear any need for remedial measures. However, based on the observations, following suggestions are offered.

**(a)** Metro projects may fix targets for reduction in water requirement in in the part of construction curing through different available techniques, such as deployed by MMRDA, using curing compounds and hessian clothing, so far same is ascertained by their professionals without compromising on structural requirements.

**(b)** DMRC has planned to use dewatered groundwater in rejuvenation of water bodies in Roshan Ara bagh. Likewise, in Mumbai project, MMRC, in their future projects (as present projects in their hand are at advanced stage of completion) may contemplate making modification in agreement with MCGM/ local agency for gainful utilization of seepage/ dewatered groundwater, which is presently being discharged into storm water drains of MCGM as per agreement.

**(c)** DMRC may ensure that quality of dewatered water being diverted to Roshan Ara Bagh is suitable for the purpose for which is intended.

**(d)** JMRC is advised to obtain groundwater NOC from CGWA at the earliest.

**(e)** For maintenance of depots and stations, treated water may be used. Wherever feasible, sewage may be tapped from main sewer line passing nearby and treatment may be made with available techniques. Wastewater may again be recycled and reused.

**(f)** The medians having RWH system in Delhi are maintained by DMRC. 20% of recharge pits are cleaned every year, which is too less a frequency. Thefts/ breakages of pipes is also very common likelihood. RWH system at medians may be maintained more frequently. In case of thefts/ breakage of downpipes/ chamber slabs, same may be replaced immediately. Environmental concerns far outweigh physical damages.

**(g)** Caution may be applied in the elevated stretches having chances of oil/ grease mixing with rainwater. In such stretches, recharge may be avoided.

**(h)** Quantification of seepage/ dewatering need to be done in order to make proper assessment of gainful utilization of groundwater.

### II. SOP for Proper Management of Water in Metro Projects

SOP is enclosed as **Annexure-I**

### III. Action Plan for Implementation

The SOP may be circulated among all Metro Rail Corporations/ Organisations executing Metro Projects along with advisory to follow the same.

## Annexure-I

### SOP FOR PROPER UTILIZATION OF WATER AND RAINWATER MANAGEMENT IN METRO PROJECTS

Water management in metro projects is a crucial aspect of ensuring sustainable and efficient operation. Integrating sustainable water management practices into metro projects can help reduce water consumption, minimize environmental impact, and ensure the long-term efficiency and sustainability of the system. Here are some considerations and practices related to water management in metro projects during execution phase.

**A. WATER MANAGEMENT DURING CONSTRUCTION PHASE**

**I. Underground Construction (Stations/ Tunnels)**

**(i)** 'Fresh water' requirement for construction/ curing may be estimated prior to physical execution so that wastage of fresh water may be minimized.

**(ii)** Underground metro projects can have several potential impacts on groundwater, which depend on various factors such as the project's depth, construction methods, hydrogeological conditions, and the surrounding environment. To mitigate the potential impacts on groundwater, thorough hydrogeological investigations and monitoring programs should be conducted before, during, and after the construction of underground metro projects. The implementing agency must take into account **hydrogeological set up** of the area, prior to taking up actual execution of work. This will include understanding the sub-surface geology, water levels, groundwater flow direction etc. of the area. These assessments help identify potential risks and allow for the implementation of appropriate measures to protect groundwater resources, maintain water quality, and ensure the long-term sustainability of the project.

**(iii)** Wherever water table is encountered, behaviour/ pattern of groundwater flow and likely impact of construction activity and permanent underground construction on prevailing groundwater regime must be studied. Metro tunnels may intersect or pass through aquifers. Construction activities can disrupt these aquifers, affecting their ability to store and transmit groundwater and affect their hydraulic connectivity. This interference may alter the flow and distribution of groundwater. Proper engineering techniques, such as grouting and tunnel lining, should be employed to minimize the potential interference with aquifers and preserve their hydrogeological properties.

**(iv)** There could be situations where the construction of structures (tunnels/ stations) act as sub-surface barriers to groundwater flow, creating build-up of groundwater column against the barrier on upstream side, imposing threat to buildings in the vicinity. Metro Corporations may seek technical advice from Universities/ Professional Consultants/ Central Ground Water Board/ WAPCOS/ State GW Department etc. in such situations and take up appropriate mitigation measures.

**(v)** Quantification of expected quantum of dewatering should be part of hydrogeological study for proper planning for gainful utilization of dewatered water.

**(vi)** Construction activities, particularly tunnelling and drilling, may introduce contaminants into the groundwater. These contaminants may include construction-related chemicals, fuels, lubricants, and other substances. If not properly managed, they can infiltrate the groundwater and cause water quality issues. Maintaining water

quality within and around the metro project area is vital to protect public health and the environment. Proper safeguards, such as using appropriate construction materials, implementing containment measures, and monitoring groundwater quality, should be put in place to prevent contamination. Measures like sedimentation basins, oil-water separators, and water treatment systems can be employed to remove pollutants and contaminants from construction runoff and wastewater generated during metro operations.

**(vii)** Piezometers along with automatic water level recorders should be installed along the metro alignment for continuous monitoring of water level behaviour in the vicinity of metro constructions during such periods. In the event of likely long-term deviation from normal pattern, the build-up of groundwater may be channelized or redirected to other locations through appropriate engineering measures. This can help manage groundwater levels and prevent excessive pressure against the tunnel walls. A few indicative methods that can be used to redirect the groundwater away from the metro tunnels are following.

(a) Dewatering Wells: Dewatering wells can be installed strategically around the metro tunnels to lower the groundwater levels. These wells are equipped with pumps that extract groundwater, effectively lowering the water table and reducing hydrostatic pressure against the tunnels.

(b) Drainage Systems: Installing a network of drainage systems, such as perforated pipes or weep holes, along the tunnel walls can provide a pathway for groundwater to flow and be collected. These drainage systems can be designed to lead the collected groundwater to designated discharge points.

(c) Pumping Systems: In cases where the groundwater level needs to be actively managed, pumping systems can be employed to extract excess groundwater from the area surrounding the metro tunnels. These pumps can redirect the water to appropriate locations.

(d) Permeable Backfill: Using permeable backfill material around the tunnels can allow groundwater to flow more easily through the surrounding soil, reducing the build-up of pressure against the tunnel walls. This can involve the use of granular materials or geo-composite drainage layers that facilitate the movement of water away from the tunnels.

It may be ensured that channelized groundwater is gainfully utilized as far as possible. It's important to note that the specific measures employed to manage groundwater around metro tunnels may vary depending on site-specific conditions, including the hydrogeological characteristics of the area, groundwater flow patterns, and the local regulatory requirements. A comprehensive hydrogeological study and proper engineering design are crucial to determine the most effective and sustainable methods for channelizing groundwater away from metro tunnels while ensuring the stability and safety of the tunnel structure.

**(viii)** NOC for groundwater dewatering/ extraction must be obtained from CGWA/ respective SGWA as mandated under Ministry of Jal Shakti guidelines for infrastructure projects involving dewatering (available on CGWA website https://cgwa-noc.gov.in).

**(ix)** Projects may fix targets for reduction in water requirement in construction/ curing through different available techniques (curing compounds/ hessian clothing for wrapping etc.).

**(x)** During rains, arrangements may be made to divert rainwater from the construction to nearby rainwater harvesting channels, if possible/ feasible. This arrangement would also be useful during operational phase.

**II. Elevated Construction**

**(i)** Fresh water requirement for construction/ curing may be estimated prior to execution so that wastage of fresh water may be minimized.

**(ii)** Wherever water table is expected to be encountered during construction work (it may be small quantity), same may be gainfully utilized/ properly discharged, instead of letting it flow on ground.

**(iii)** RWH system may be inbuilt into the plans of metro stations. For elevated tracks, wherever feasible, arrangement may be in place for diverting rainwater from viaduct to RWH system on medians/ greenbelt below the elevated metro track. Recharge system may not be required where water levels are very shallow and may be completely avoided in stretches having chances of oil/ grease/ chemicals mixing into the rainwater.

**B. Water Management During Operational Phase**

**(i)** Along underground sections, water level data being received from installed piezometers must be continuously and religiously monitored. Metro Corporations are required to get regular studies conducted by professional agencies/ academic institutions. In the event undesirable effect on groundwater regime - such as build-up of groundwater column against the construction - is noticed, and the cause is established as Metro construction, mitigation measures like pumping out groundwater and its gainful utilization may be adopted. Metro Corporations may seek technical advice from Universities/ Professional Consultants/ Central Ground Water Board/ WAPCOS/ State GW Department in such situations.

**(ii)** In case of use of groundwater/ construction of tubewells by the Metro Corporation for operation/ maintenance of stations, groundwater NOC must be obtained from CGWA/ respective SGWA as mandated by Ministry of Jal Shakti Guidelines for infrastructure projects (available on CGWA website https://cgwa-noc.gov.in).

**(iii)** Channelization of wastewater for reuse may be considered in large facilities like car depots.

**(iv)** Metro Projects should make all efforts to reduce fresh water usage for operation/ maintenance of Depots/ Metro Stations and also to minimize wastage.

**(v)** Metro projects create additional constructions, which can lead to some increased surface runoff during rainfall events. Proper stormwater management techniques can help mitigate the impact of stormwater runoff, reduce erosion, and prevent flooding.

**(vi)** Bureau of Indian Standards (**BIS**) has a dedicated Committee – **Ground Water and Related Investigations Sectional Committee, WRD 03**. The Committee, in consultation with experts have developed BIS standard **IS 15797:2008** for Roof Top

Rainwater Harvesting - Guidelines (enclosed as **Appendix-G**). Same should be used for implementing RWH at elevated metro stations and elevated tracks.

**(vii)** RWH system at medians/ greenbelt below the track may be maintained more frequently. In case of thefts/ breakage of downpipes/ chamber slabs, same may be replaced immediately. The environmental concerns far outweigh physical damages.

**(viii)** Caution may be applied in the stretches with chances of oil/ grease mixing with rainwater. In such stretches, recharge may be avoided.

**(ix)** Native tree plantation should be encouraged near project areas/ on medians. This would help in formation of macropores, thereby increasing recharging capacity of aquifers.

**(x)** Metro projects should always aim at coveted rating such as Gold of Platinum rating by IGBC or equivalent standard awards.

# PHOTOGRAPHS OF VISIT TO DELHI METRO PROJECTS



# PHOTOGRAPHS OF VISIT TO JAIPUR METRO PROJECT

**ETP for Water Reuse at Mansarovar Metro Depot, Jaipur**


**RWH System at Ramnagar Metro Station, Jaipur - Downpipes from viaduct and recharge well on median between two pillars**

# PHOTOGRAPHS OF VISIT TO MUMBAI METRO PROJECT


**By-Email**

**T-39011/1/2023-GW Section-MOWR**
भारत सरकार
**Government of India**
जल शक्ति मंत्रालय
**Ministry of Jal Shakti**
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
**D/o WR, RD & GR**
**(भूजल अनुभाग / Ground Water Section)**
****

Shram Shakti Bhawan, Rafi Marg
New Delhi, Dated:20/04/2023

**ORDER**

**Subject: Constitution of a joint team of the officers of CGWA, CPCB and , Metro Rail Corporations of Jaipur, Delhi & Mumbai to look into the matter of undue wastage of water during the construction of the metro rail - reg.**

The Hon'ble NGT in the matter of O.A. No. 198/2023, Harpal Singh Rana and another Vs State of Uttarakhand & Ors vide its Order dated 17.03.2023 has directed the Ministry of Jal Shakti to constitute a Joint Committee of CPCB, Ministry of Jal Shakti and Metro Rail Corporations to consider the issue of the undue water wastage during the construction of the Metro Rail.

**2.** In compliance to the directions of the Hon'ble NGT, a team of the following officers is hereby constituted/formed to look in to the matter by visiting constructions sites of these Metro Rail i.e. Jaipur, Delhi & Mumbai and submit the report with remedial suggestions/ recommendations. The composition of the team shall be as under:

| | | |
|---|---|---|
| 1. | Member Secretary, Central Ground Water Authority (CGWA) | Chairman |
| 2. | Representative of Central Pollution Control Board (CPCB) (not below the level of Director of Government of India). | Member |
| 3. | Representatives of Metro Rail Corporations of Jaipur, Delhi, Mumbai (not below the level of Director of Government of India). | Member |

Note: The team may co-opt any other member if required on non-remunerative basis.

**3.** The **Terms of Reference** of the team shall be as under:

i. To check the status of utilization of groundwater including wastage (if any) in ongoing construction works at the sites of Metro rail in Jaipur, Delhi & Mumbai by visiting sites.

ii. To check whether the groundwater regulation guidelines notified on 24.9.2020 and subsequent amendment notified on 29.3.2023 by this Ministry are being followed or not.

iii. To suggest remedial measures including preparation of draft SoP (for proper utilization of water and installation of Rain Water Harvesting system) and prepare an action plan for implementation.

**4 .** The team shall meet on regular basis and submit the report within one month from issuance of this order.

**5 .** Expenditure on account of TA/DA to official Members of the Committee will be met from the source from which they draw their salaries.

**6 .** This issues with the approval of Secretary(WR, RD & GR), Ministry of Jal Shakti.

Yours sincerely,

**Signed by Rajendra Kumar Sahu**
**Date: 24.04.2023 19:39:01**
**Reason: Approved**

(Rajendra Kumar Sahu)
Under Secretary to the Govt. of India
Ph: 011-23716928
Email: **gwdesk-mowr@nic.in**

To

i. Chairman, CGWA (*chmn-cgwb@nic.in*)
ii. Member Secretary, CPCB( *mscb.cpcb@nic.in*)
iii. CMD, DMRC, New Delhi.
iv. CMD, JMRC, Jaipur.
v. CMD, MMRCL, Mumbai.

Copy to:

i. PPS to Secretary, DoWR, RD & GR, MoJS

ii. PPS to Special Secretary, DoWR, RD & GR, MoJS
iii. PPS to JS(A,GW & IC), DoWR,RD & GR, MoJS
iv. TS to Chairman, CGWA

**Appendix-B**

## Minutes of Joint Committee Meeting held on 09/05/2023 AT 1430 hrs. at CGWA, Jamnagar house New Delhi as per the directives of Hon'ble NGT in the matter of OA No. 198/2023

| | |
|---|---|
| In Chair | : Shri A.K. Agrawal, Member Secretary/Chairman of Joint committee |
| **Attended by** | |
| Committee Members | 1. Shri P.K. Mishra, Member from CPCB<br>2. Shri Akhilesh Kumar Saxena, Member from JMRC<br>3. Shri S.G. Dalvi, Member from MMRC<br>4. Shri Vikash Singhal, Member from DMRC |
| Regional Offices | 1. Shri P.K. Tripathi, RD, CGWB, WR (through VC)<br>2. Shri N. Varadaraj, RD, CGWB,CR (through VC)<br>3. Shri K. S. Mohiddin, HOO, SUO, New Delhi |
| CGWA | 1. Dr. B.R. Lamsoge, HOO<br>2. Shri S.K. Mohiddin, OIC, SUO, Delhi<br>3. Dr. Vikas Ranjan, Sc-D<br>4. Shri Vinod Kumar Dhaundiyal, Administrator<br>5. Miss Aditi Arora, YP, Legal |
| DMRC | Shri Piyush Gupta, DMRC |

At the outset, Member, CGWA welcomed all the members of Joint Committee and impressed that as per NGT order and TOR given by the MoJS, Joint Committee will come forward and prepare SOP to stop wastage of water.

The representations from DMRC, JMRC & MMRC informed that Metro Projects are exempted from Environmental clearance as per MOEF notification S.O. 1533(E) dated 14th September, 2006. DMRC, JMRC and MMRC were asked to keep yearly related documents viz. Water requirement, Site plan/map of metro construction showing excavation/DTWL/WT along with water disposal plan, if any, Environmental clearance/permission obtained, if any and CTE for metro construction.

water requirement for construction of metro project, source of water required for project, dewatering, expected wastage of water and remedial measures to minimize wastage thereto and provision of Rain Water Harvesting were discussed during the meeting.

**Actionable Points-**

- The Committee will visit the sites for inspection.
- RWH system at metro stations may be inspected.
- Necessary permissions sought by metro rail corporations may be sought.
- An SOP may be prepared suggesting the remedial measures for elevated and underground metro.
- Activities resulting in discharge of water in operational and construction phases may be identified.
- Details regarding disposal and utilization of waste water may be sought from the metro rail corporations.
- Site visit may be conducted from 15th onwards.

The meeting ended with thanks to the Chair.

**(Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii)**
**MINISTRY OF ENVIRONMENT AND FORESTS**
**New Delhi 14th September, 2006**
**Notification**

S.O. 1533(E). - Whereas, a draft notification **under sub-rule (3) of Rule 5 of the Environment (Protection) Rules, 1986 for imposing** certain restrictions and prohibitions on new projects or activities, or on the expansion or modernization of existing projects or activities based on their potential environmental impacts as indicated in the Schedule to the notification, being undertaken in any part of India[1], unless prior environmental clearance has been accorded in accordance with the objectives of National Environment Policy **as approved by the Union Cabinet on 18th May, 2006** and the procedure specified in the notification, by the Central Government or the State or Union territory Level Environment Impact Assessment Authority (SEIAA), to be constituted by the Central Government in consultation with the State Government or the Union territory Administration concerned under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 for the purpose of this notification, was published in the Gazette of India ,Extraordinary, Part II, section 3, sub-section (ii) vide number S.O. 1324 (E) dated the 15th September ,2005 inviting objections and suggestions from all persons likely to be affected thereby within a period of sixty days from the date on which copies of Gazette containing the said notification were made available to the public;

And whereas, copies of the said notification were made available to the public on 15th September, 2005;

And whereas, all objections and suggestions received in response to the above mentioned draft notification have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 and in supersession of the notification number S.O. 60 (E) dated the 27th January, 1994, except in respect of things done or omitted to be done before such supersession, the Central Government hereby directs that on and from the date of its publication the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to this notification entailing capacity addition with change in process and or technology shall be

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment

Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified hereinafter in this notification.

_____

[1]Includes the territorial waters

**2. Requirements of prior Environmental Clearance (EC):**- The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

(i) All new projects or activities listed in the Schedule to this notification;

(ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

(iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

**3. State Level Environment Impact Assessment Authority:- (1)** A State Level Environment Impact Assessment Authority hereinafter referred to as the SEIAA shall be constituted by the Central Government under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 comprising of three Members including a Chairman and a Member – Secretary to be nominated by the State Government or the Union territory Administration concerned.

(2) The Member-Secretary shall be a serving officer of the concerned State Government or Union territory administration familiar with environmental laws.

(3) The other two Members shall be either a professional or expert fulfilling the eligibility criteria given in Appendix VI to this notification.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(4) One of the specified Members in sub-paragraph (3) above who is an expert in the Environmental Impact Assessment process shall be the Chairman of the SEIAA.

(5) The State Government or Union territory Administration shall forward the names of the Members and the Chairman referred in sub- paragraph 3 to 4 above to the Central Government and the Central Government shall constitute the SEIAA as an authority for the purposes of this notification within thirty days of the date of receipt of the names.

(6) The non-official Member and the Chairman shall have a fixed term of three years (from the date of the publication of the notification by the Central Government constituting the authority).

[I] "(7) All decisions of the SEIAA shall be taken in a meeting and shall ordinarily be unanimous:

Provided that, in case a decision is taken by majority, the details of views, for and against it, shall be clearly recorded in the minutes and copy thereof sent to MoEF."

**4. Categorization of projects and activities:-**

(i) All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.

(ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification;

(iii) All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities as specified in sub paragraph (ii) of paragraph 2, or change in product mix as specified in sub paragraph (iii) of paragraph 2, but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, *will* require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification. [II] "In the absence of a duly constituted SEIAA

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

or SEAC, a Category 'B' project shall be considered at Central Level as a Category 'B' project;"

**5. Screening, Scoping and Appraisal Committees**:-

The same Expert Appraisal Committees (EACs) at the Central Government and SEACs (hereinafter referred to as the (EAC) and (SEAC) at the State or the Union territory level shall screen, scope and appraise projects or activities in Category 'A' and Category 'B' respectively. EAC and SEAC's shall meet at least once every month.

(a) The composition of the EAC shall be as given in Appendix VI. The SEAC at the State or the Union territory level shall be constituted by the Central Government in consultation with the concerned State Government or the Union territory Administration with identical composition;

(b) The Central Government may, with the prior concurrence of the concerned State Governments or the Union territory Administrations, constitutes one SEAC for more than one State or Union territory for reasons of administrative convenience and cost;

(c) The EAC and SEAC shall be reconstituted after every three years;

(d) The authorised members of the EAC and SEAC, concerned, may inspect any site(s) connected with the project or activity in respect of which the prior environmental clearance is sought, for the purposes of screening or scoping or appraisal, with prior notice of at least seven days to the applicant, who shall provide necessary facilities for the inspection;

(e) The EAC and SEACs shall function on the principle of collective responsibility. The Chairperson shall endeavour to reach a consensus in each case, and if consensus cannot be reached, the view of the majority shall prevail.

**6. Application for Prior Environmental Clearance (EC):-**

An application seeking prior environmental clearance in all cases shall be made in the prescribed Form 1 annexed herewith and Supplementary Form 1A, if applicable, as given in Appendix II, after the identification of prospective site(s) for the project and/or activities to which the application relates, before commencing any construction activity, or preparation of land, at the site by the applicant. The applicant shall furnish, along with the application, a copy

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

of the pre-feasibility project report except that, in case of construction projects or activities (item 8 of the Schedule) in addition to Form 1 and the Supplementary Form 1A, a copy of the conceptual plan shall be provided, instead of the pre-feasibility report.

**7. Stages in the Prior Environmental Clearance (EC) Process for New Projects:-**

**7(i)** The environmental clearance process for new projects will comprise of a maximum of four stages, all of which may not apply to particular cases as set forth below in this notification. These four stages in sequential order are:-

- Stage (1) Screening (Only for Category 'B' projects and activities)
- Stage (2) Scoping
- Stage (3) Public Consultation
- Stage (4) Appraisal

I. **Stage (1) - Screening**:

In case of Category 'B' projects or activities, this stage will entail the scrutiny of an application seeking prior environmental clearance made in Form 1 by the concerned State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project . The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests shall issue appropriate guidelines from time to time.

II. **Stage (2) - Scoping**:

(i) "Scoping": refers to the process by which the Expert Appraisal Committee in the case of Category 'A' projects or activities, and State level Expert Appraisal Committee in the case of Category 'B1' projects or activities, including applications for expansion and/or modernization and/or change in product mix of existing projects or activities, determine detailed and comprehensive Terms Of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. The Expert Appraisal Committee or State level Expert Appraisal Committee

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

concerned shall determine the Terms of Reference on the basis of the information furnished in the prescribed application Form1/Form 1A including Terns of Reference proposed by the applicant, a site visit by a sub- group of Expert Appraisal Committee or State level Expert Appraisal Committee concerned only if considered necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, Terms of Reference suggested by the applicant if furnished and other information that may be available with the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. All projects and activities listed as Category 'B' in Item 8 of the Schedule (Construction/Township/Commercial Complexes /Housing) shall not require Scoping and will be appraised on the basis of Form 1/ Form 1A and the conceptual plan.

(ii) The Terms of Reference (TOR) shall be conveyed to the applicant by the Expert Appraisal Committee or State Level Expert Appraisal Committee as concerned within sixty days of the receipt of Form 1. In the case of Category A Hydroelectric projects Item 1(c) (i) of the Schedule the Terms of Reference shall be conveyed along with the clearance for pre-construction activities .If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies**.** The approved Terms of Reference shall be displayed on the website of the Ministry of Environment and Forests and the concerned State Level Environment Impact Assessment Authority.

(iii) Applications for prior environmental clearance may be rejected by the regulatory authority concerned on the recommendation of the EAC or SEAC concerned at this stage itself. In case of such rejection, the decision together with reasons for the same shall be communicated to the applicant in writing within sixty days of the receipt of the application.

III. **Stage (3) - Public Consultation**:

(i) "Public Consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category B1 projects or activities shall undertake Public Consultation, except the following:-

(a) modernization of irrigation projects (item 1(c) (ii) of the Schedule).

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(b) all projects or activities located within industrial estates or parks (item 7(c) of the Schedule) approved by the concerned authorities, and which are not disallowed in such approvals.

(c) expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land.

III "(cc) maintenance dredging provided the dredged material shall be disposed within port limits.";

III "(d) All Building or Construction projects or Area Development projects (which do not contain any category 'A' projects and activities) and Townships (item 8(a) and 8(b) in the Schedule to the notification)."

e) all Category 'B2' projects and activities.

f) all projects or activities concerning national defence and security or involving other strategic considerations as determined by the Central Government.

(ii) The Public Consultation shall ordinarily have two components comprising of:-

(a) a public hearing at the site or in its close proximity- district wise, to be carried out in the manner prescribed in Appendix IV, for ascertaining concerns of local affected persons;

(b) obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.

(iii) the public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) concerned in the specified manner and forward the proceedings to the regulatory authority concerned within 45(forty five ) of a request to the effect from the applicant.

(iv) in case the State Pollution Control Board or the Union territory Pollution Control Committee concerned does not undertake and complete the public hearing within the specified period, and/or does not convey the proceedings of the public hearing within the prescribed period directly to the regulatory authority concerned as above, the regulatory

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

authority shall engage another public agency or authority which is not subordinate to the regulatory authority, to complete the process within a further period of forty five days,.

(v) If the public agency or authority nominated under the sub paragraph (iii) above reports to the regulatory authority concerned that owing to the local situation, it is not possible to conduct the public hearing in a manner which will enable the views of the concerned local persons to be freely expressed, it shall report the facts in detail to the concerned regulatory authority, which may, after due consideration of the report and other reliable information that it may have, decide that the public consultation in the case need not include the public hearing.

(vi) For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) or the Union territory Pollution Control Committee (UTPCC) shall invite responses from such concerned persons by placing on their website the Summary EIA report prepared in the format given in Appendix IIIA by the applicant along with a copy of the application in the prescribed form, within seven days of the receipt of a written request for arranging the public hearing. Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site*.* The regulatory authority concerned may also use other appropriate media for ensuring wide publicity about the project or activity. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing. All the responses received as part of this public consultation process shall be forwarded to the applicant through the quickest available means.

(vii) After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation.

**IV. Stage (4) - Appraisal**:

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(i) Appraisal means the detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of environmental clearance. This appraisal shall be made by Expert Appraisal Committee or State Level Expert Appraisal Committee concerned in a transparent manner in a proceeding to which the applicant shall be invited for furnishing necessary clarifications in person or through an authorized representative. On conclusion of this proceeding, the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.

(ii) The appraisal of all projects or activities which are not required to undergo public consultation, or submit an Environment Impact Assessment report, shall be carried out on the basis of the prescribed application Form 1 and Form 1A as applicable, any other relevant validated information available and the site visit wherever the same is considered as necessary by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iii) The appraisal of an application be shall be completed by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents or the receipt of Form 1 and Form 1 A, where public consultation is not necessary and the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days .The prescribed procedure for appraisal is given in Appendix V ;

**7(ii). Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects**:

All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product –mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance.

**8. Grant or Rejection of Prior Environmental Clearance (EC):**

(i) The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, and where Environment Impact Assessment is not required, within one hundred and five days of the receipt of the complete application with requisite documents, except as provided below.

(ii) The regulatory authority shall normally accept the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned. In cases where it disagrees with the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, the regulatory authority shall request reconsideration by the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned within forty five days of the receipt of the recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned while stating the reasons for the disagreement. An intimation of this decision shall be simultaneously conveyed to the applicant. The Expert Appraisal Committee or State Level Expert Appraisal Committee concerned, in turn, shall consider the observations of the regulatory authority and furnish its views on the same within a further period of sixty days. The decision of the regulatory authority after considering the views of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be final and conveyed to the applicant by the regulatory authority concerned within the next thirty days.

(iii) In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified in sub-paragraphs (i) or (ii) above, as applicable, the

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned.

(iv) On expiry of the period specified for decision by the regulatory authority under paragraph (i) and (ii) above, as applicable, the decision of the regulatory authority, and the final recommendations of the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned shall be public documents.

(v) Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons.

(vi) Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

**9. Validity of Environmental Clearance (EC):**

The "Validity of Environmental Clearance" is meant the period from which a prior environmental clearance is granted by the regulatory authority, or may be presumed by the applicant to have been granted under sub paragraph (iv) of paragraph 7 above, to the start of production operations by the project or activity, or completion of all construction operations in case of construction projects (item 8 of the Schedule), to which the application for prior environmental clearance refers. The prior environmental clearance granted for a project or activity shall be valid for a period of ten years in the case of River Valley projects (item 1(c) of the Schedule), project life as estimated by Expert Appraisal Committee or State Level Expert Appraisal Committee subject to a maximum of thirty years for mining projects and five years in the case of all other projects and activities. However, in the case of Area Development projects and Townships [item 8(b)], the validity

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

period shall be limited only to such activities as may be the responsibility of the applicant as a developer. This period of validity may be extended by the regulatory authority concerned by a maximum period of five years provided an application is made to the regulatory authority by the applicant within the validity period, together with an updated Form 1, and Supplementary Form 1A, for Construction projects or activities (item 8 of the Schedule). In this regard the regulatory authority may also consult the Expert Appraisal Committee or State Level Expert Appraisal Committee as the case may be.

**10. Post Environmental Clearance Monitoring:**

[IV] "(i)(a) In respect of Category 'A' project, it shall be mandatory for the project proponent to make public the environment clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the district or State where the project is located and in addition, this shall also be displayed in the project proponent's website permanently.

(b) In respect of Category 'B' projects, irrespective of its clearance by MoEF / SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environment clearance and the details of the MoEF website where it is displayed.

(c) The Ministry of Environment and Forests and the State/Union Territory Level Environmental Impact Assessment Authorities (SEIAAs), as the case may be, shall also place the environmental clearance in the public domain on Governmental portal.

(d) The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.";

[IV] (ii) It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year.

[IV] (iii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

concerned regulatory authority. The latest such compliance report shall also be displayed on the web site of the concerned regulatory authority.

**11. Transferability of Environmental Clearance (EC):**

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor, or by the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period. No reference to the Expert Appraisal Committee or State Level Expert Appraisal Committee concerned is necessary in such cases.

**12. Operation of EIA Notification, 1994, till disposal of pending cases:**

From the date of final publication of this notification the Environment Impact Assessment (EIA) notification number S.O.60 (E) dated 27th January, 1994 is hereby superseded, except in suppression of the things done or omitted to be done before such suppression to the extent that in case of all or some types of applications made for prior environmental clearance and pending on the date of final publication of this notification, the Central Government may relax any one or all provisions of this notification except the list of the projects or activities requiring prior environmental clearance in Schedule I , or continue operation of some or all provisions of the said notification, for a period not exceeding one year from the date of issue of this notification.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**SCHEDULE**

**(See paragraph 2 and 7)**

**LIST OF PROJECTS OR ACTIVITIES REQUIRING PRIOR ENVIRONMENTAL CLEARANCE**

| Project or Activity | | Category with threshold limit | | Conditions if any |
|---|---|---|---|---|
| | | A | B | |
| 1 | | Mining, extraction of natural resources and power generation (for a specified production capacity) | | |
| (1) | (2) | (3) | (4) | (5) |
| [v] "1(a) | (i) Mining of minerals. | ≥ 50 ha. of mining lease area in respect of non-coal mine lease.<br><br>> 150 ha of mining lease area in respect of coal mine lease.<br><br>Asbestos mining irrespective of mining area | <50 ha ≥ 5 ha .of mining lease area in respect of non-coal mine lease.<br><br>≤ 150 ha ≥ 5 ha of mining lease area in respect of coal mine lease. | General Condition shall apply<br>Note:<br>Mineral prospecting Is exempted.”; |
| | (ii) Slurry pipelines (coal lignite and other ores) passing through national parks / sanctuaries / coral reefs, ecologically sensitive areas. | All projects. | | |
| 1(b) | Offshore and onshore oil and gas exploration, development & production | All projects | | Note<br>Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey |
| 1(c) | River Valley pojects | (i) ≥ 50 MW hydroelectric power generation;<br>(ii) ≥ 10,000 ha. of culturable command area | (i) < 50 MW ≥ 25 MW hydroelectric power generation;<br>(ii) < 10,000 ha. of culturable command area | [v] “General Condition shall apply.<br>Note: Irrigation projects not involving submergence or inter-state domain shall be appraised by the SEIAA as Category ‘B’ Projects.”; |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|
| 1(d) | Thermal Power Plants | [v] " ≥ 500 MW (coal / lignite / naphtha & gas based); ≥ 50 MW (Pet coke diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW (based on biomass or non hazardous municipal waste as fuel).”; | < 500 MW (coal / lignite / naphtha & gas based); <50 MW ≥ 5MW (Pet coke, diesel and all other fuels including refinery residual oil waste except biomass); ≥ 20 MW > 15 MW (based on biomass or non hazardous municipal waste as fuel).”; | [v] “General Condition shall apply. Note: (i) Power plant up to 15 MW, based on biomass and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (ii) Power plant up to 15 MW, based on non-hazardous municipal waste and using auxiliary fuel such as coal / lignite / petroleum products up to 15% are exempt. (iii) Power plants using waste heat boiler without any auxiliary fuel are exempt.”; |
| 1(e) | Nuclear power projects and processing of nuclear fuel | All projects | | |
| 2 | | Primary Processing | | |
| 2(a) | Coal washeries | ≥ 1 million ton/annum throughput of coal | <1million ton/annum throughput of coal | General Condition shall apply (If located within mining area the proposal shall be appraised together with the mining proposal) |
| 2 (b) | Mineral beneficiation | ≥ 0.1million ton/annum mineral throughput | < 0.1million ton/annum mineral throughput | General Condition shall apply (Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance) |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| 3 | | Materials Production | | |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 3(a) | Metallurgical industries (ferrous & non ferrous) | a)Primary metallurgical industry<br><br>All projects<br><br>b) Sponge iron manufacturing<br>≥ 200TPD<br><br>c) Secondary metallurgical processing industry<br><br>All toxic and heavy metal producing units<br>≥ 20,000 tonnes /annum | Sponge iron manufacturing<br><200TPD<br><br>Secondary metallurgical processing industry<br><br>i.)All toxic and heavy metal producing units<br><20,000 tonnes /annum<br><br>ii.)All other non –toxic secondary metallurgical processing industries<br><br>>5000 tonnes/annum | [V] "General condition shall apply.<br>Note:<br>(i) The recycling industrial units registered under the HSM Rules, are exempted.<br>(ii) In case of secondary metallurgical processing industrial units, those projects involving operation of furnaces only such as induction and electrical arc furnace, submerged arc furnace, and cupola with capacity more than 30,000 tonnes per annum (TPA) would require environmental clearance.<br>(iii) Plant / units other than power plants (given against entry no. 1(d) of the schedule), based on municipal solid waste (non-hazardous) are exempted." |
| 3( b) | Cement plants | ≥ 1.0 million tonnes/annum production capacity | <1.0 million tonnes/annum production capacity. All Stand alone grinding units | General Condition shall apply |
| 4 | | Materials Processing | | |
| (1) | (2) | (3) | (4) | (5) |
| 4(a) | Petroleum refining industry | All projects | - | - |
| 4(b) | Coke oven plants | ≥2,50,000 tonnes/annum | <2,50,000 & ≥25,000 tonnes/annum | [V] "General Condition shall apply." |
| 4(c ) | Asbestos milling and asbestos based products | All projects | - | - |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|
| 4(d) | Chlor-alkali industry | ≥300 TPD production Capacity or a unit located out side the notified industrial area/ estate | [v] "(i) All projects irrespective of the size, if located in a Notified Industrial Area/ Estate. (ii) <300 tonnes per day (TPD) and located outside a Notified Industrial Area/ Estate." | [v] "General as well as specific condition shall apply. No new Mercury Cell based plants will be permitted and existing units converting to membrane cell technology are exempted from this notification." |
| 4(e) | Soda ash Industry | All projects | - | - |
| 4(f) | Leather/skin/hide processing industry | New projects outside the industrial area or expansion of existing units out side the industrial area | All new or expansion of projects located within a notified industrial area/ estate | [v] "General as well as specific condition shall apply." |
| 5 | | Manufacturing / Fabrication | | |
| 5(a) | Chemical fertilizers | [v] "All projects except Single Super Phosphate." | [v] "Single Super Phosphate." | - |
| 5(b) | Pesticides industry and pesticide specific intermediates (excluding formulations) | All units producing technical grade pesticides | - | - |
| 5(c) | Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics) | All projects - | - | - |
| 5(d) | Manmade fibers manufacturing | Rayon | Others | General Condition shall apply |
| 5(e) | Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes) | Located out side the notified industrial area/ estate - | Located in a notified industrial area/ estate | [v] "General as well as specific condition shall apply." |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|
| 5(f) | Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates) | Located out side the notified industrial area/ estate | Located in a notified industrial area/ estate | [v] "General as well as specific condition shall apply." |
| 5(g) | Distilleries | (i)All Molasses based distilleries<br>(ii) All Cane juice/ non-molasses based distilleries ≥30 KLD | All Cane juice / non-molasses based distilleries – <30 KLD | General Condition shall apply |
| 5(h) | Integrated paint industry | - | All projects | General Condition shall apply |
| 5(i) | Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp with out bleaching | Pulp manufacturing and<br>Pulp& Paper manufacturing industry | Paper manufacturing industry without pulp manufacturing | General Condition shall apply |
| 5(j) | Sugar Industry | - | ≥ 5000 tcd cane crushing capacity | General Condition shall apply |
| 5(k) | [v] Omitted | | | |
| 6 | | Service Sectors | | |
| 6(a) | Oil & gas transportation pipe line (crude and refinery/ petrochemical products), passing through national parks / sanctuaries /coral reefs / ecologically sensitive areas including LNG Terminal | All projects | | - |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|
| **6(b)** | **Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)** | **-** | **All projects** | **General Condition shall apply** |
| **7** | | **Physical Infrastructure including Environmental Services** | | |
| **7(a)** | **Air ports** | **[v] "All projects including airstrips, which are for commercial use."** | **-** | **[v] "Note: Air strips, which do not involve bunkering/ refueling facility and or Air Traffic Control, are exempted."** |
| **7(b)** | All ship breaking yards including ship breaking units | All projects | - | - |
| **7©** | **Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.** | **If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area.**<br><br>**Industrial estates with area greater than 500 ha. and housing at least one Category B industry.** | **Industrial estates housing at least one Category B industry and area <500 ha.**<br><br>**Industrial estates of area> 500 ha. and not housing any industry belonging to Category A or B.** | **[v] "Genral as well as special conditions shall apply.**<br><br>**Note:**<br>**1. Industrial Estate of area below 500 ha. and not housing any industry of Category 'A' or 'B' does not require clearance.**<br>**2. If the area is less than 500 ha. but contains building and construction projects > 20,000 Sq. mts. And or development area more than 50 ha it will be treated as activity listed at serial no. 8(a) or 8(b) in the Schedule, as the case may be."** |
| **7(d)** | **Common hazardous waste treatment, storage and disposal facilities (TSDFs)** | **All integrated facilities having incineration &landfill or incineration alone** | **All facilities having land fill only** | **General Condition shall apply** |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|
| 7(e) | [V] "Ports, harbours, break waters, dredging." | ≥ 5 million TPA of cargo handling capacity (excluding fishing harbours) | < 5 million TPA of cargo handling capacity and/or ports/ harbours ≥10,000 TPA of fish handling capacity | [V] "General Condition shall apply.<br>Note:<br>1. Capital dredging inside and outside the ports or harbors and channels are included;<br>2. Maintenance dredging is exempt provided it formed part of the original proposal for which Environment Management Plan (EMP) was prepared and environmental clearance obtained." |
| 7(f) | Highways | i) New National High ways; and<br>ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State. | [V] " i) All State Highway Project; and<br>ii) State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas." | General Condition shall apply.<br>Note:<br>Highways include expressways." |
| 7(g) | Aerial ropeways | [V(xvi)(a)] "(i) All projects located at altitude of 1,000 mtr. And above.<br>(ii) All projects located in notified ecologically sensitive areas." | [V(xvi)(b)] "All projects except those covered in column (3)." | General Condition shall apply |
| 7(h) | Common Effluent Treatment Plants (CETPs) | | All projects | General Condition shall apply |
| 7(i) | Common Municipal Solid Waste Management Facility (CMSWMF) | | All projects | General Condition shall apply |
| 8 | | Building /Construction projects/Area Development projects and Townships | | |
| 8(a) | Building and Construction projects | | ≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area# | #(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area) |
| 8(b) | Townships and Area Development projects. | | Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++ | ++All projects under Item 8(b) shall be appraised as Category B1 |

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I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**Note:-**

**V(xvii) "General Condition (GC):**
Any project or activity specified in Category 'B' will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as identified by the Central Pollution Control Board from time to time, (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleshwar Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley, and (iv) inter-State boundaries and international boundaries:

Provided that the requirement regarding distance of 10 km of the inter-State boundaries can be reduced or completely done away with by an agreement between the respective States or U.Ts sharing the common boundary in case the activity does not fall within 10 kilometres of the areas mentioned at item (i), (ii) and (iii) above."

**Specific Condition (SC):**
If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed industrial housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

**[No. J-11013/56/2004-IA-II (I)]**
**(R.CHANDRAMOHAN)**
**JOINT SECRETARY TO THE GOVERNMENT OF INDIA**

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**APPENDIX I**

**(See paragraph – 6)**

**FORM 1**

[VI(a)] **"(I) Basic Information**

| Serial Number | Item | Details |
|---|---|---|
| 1. | Name of the project/s | |
| 2. | S. No. in schedule | |
| 3. | Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled | |
| 4. | New/Expansion/Modernization | |
| 5. | Existing Capacity/Area etc. | |
| 6. | Category of Project i.e. 'A' or 'B' | |
| 7. | Does it attract the general condition? If' Yes, please specify. | |
| 8. | Does it attract the specific condition? If' Yes, please specify. | |
| 9. | Location | |
| | Plot/Survey/Khasra No. | |
| | Village | |
| | Tehsil | |
| | District | |
| | State | |
| 10. | Nearest railway station/airport along with distance in kms. | |
| 11. | Nearest Town, city, District Headquarters along with distance in kms. | |
| 12. | Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given) | |
| 13. | Name of the applicant | |
| 14. | Registered Address | |
| 15. | Address for correspondence: | |
| | Name | |
| | Designation (Owner/Partner/CEO) | |
| | Address | |
| | Pin Code | |
| | E-mail | |
| | Telephone No. | |
| | Fax No. | |
| 16 | Details of Alternative Sites examined, if any. Location of these sites should be shown on a topo sheet. | Village-District-State<br>1.<br>2.<br>3. |
| 17. | Interlinked Projects | |
| 18 | Whether separate application of interlinked project has been submitted? | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | |
|---|---|---|
| 19. | If yes, date of submission | |
| 20. | If no, reason | |
| 21. | Whether the proposal involves approval/ clearance under: If yes, details of the same and their status to be given.<br>(a) The Forest (Conservation) Act, 1980 ?<br>(b) The Wildlife (Protection) Act, 1972 ?<br>(c) The C.R.Z. Notification, 1991 ? | |
| 22. | Whether there is any Government Order/Policy relevant/ relating to the site ? | |
| 23. | Forest land involved (hectares) | |
| 24. | Whether there is any litigation pending against the project and/or land in which the project is propose to be set up ?<br>(a) Name of the Court.<br>(b) Case No.<br>(c) Orders/directions of the Court, if any and its relevance with the proposed project. | |

**(II) Activity**

**1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities /rates, wherever possible) with source of information data |
|---|---|---|---|
| 1.1 | Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan) | | |
| 1.2 | Clearance of existing land, vegetation and buildings? | | |
| 1.3 | Creation of new land uses? | | |
| 1.4 | Pre-construction investigations e.g. bore houses, soil testing? | | |
| 1.5 | Construction works? | | |
| 1.6 | Demolition works? | | |
| 1.7 | Temporary sites used for construction works or housing of construction workers? | | |
| 1.8 | Above ground buildings, structures or earthworks including linear structures, cut And fill or excavations | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | | |
|---|---|---|---|
| 1.9 | Underground works including mining or tunneling? | | |
| 1.10 | Reclamation works? | | |
| 1.11 | Dredging? | | |
| 1.12 | Offshore structures? | | |
| 1.13 | Production and manufacturing processes? | | |
| 1.14 | Facilities for storage of goods or materials? | | |
| 1.15 | Facilities for treatment or disposal of solid waste or liquid effluents? | | |
| 1.16 | Facilities for long term housing of operational workers? | | |
| 1.17 | New road, rail or sea traffic during construction or operation? | | |
| 1.18 | New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc? | | |
| 1.19 | Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements? | | |
| 1.20 | New or diverted transmission lines or pipelines? | | |
| 1.21 | Impoundment, damming, culverting, realignment or other changes to the ydrology of watercourses or aquifers? | | |
| 1.22 | Stream crossings? | | |
| 1.23 | Abstraction or transfers of water form ground or surface waters? | | |
| 1.24 | Changes in water bodies or the land surface affecting drainage or run-off? | | |
| 1.25 | Transport of personnel or materials for construction, operation or decommissioning? | | |
| 1.26 | Long-term dismantling or decommissioning or restoration works? | | |
| 1.27 | Ongoing activity during decommissioning which could have an impact on the environment? | | |
| 1.28 | Influx of people to an area in either temporarily or permanently? | | |
| 1.29 | Introduction of alien species? | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | | |
|---|---|---|---|
| 1.30 | Loss of native species or genetic diversity? | | |
| 1.31 | Any other actions? | | |

**2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities /rates, wherever possible) with source of information data |
|---|---|---|---|
| 2.1 | Land especially undeveloped or agricultural land (ha) | | |
| 2.2 | Water (expected source & competing users) unit: KLD | | |
| 2.3 | Minerals (MT) | | |
| 2.4 | Construction material – stone, aggregates, sand / soil (expected source – MT) | | |
| 2.5 | Forests and timber (source – MT) | | |
| 2.6 | Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW) | | |
| 2.7 | Any other natural resources (use appropriate standard units) | | |

**3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities /rates, wherever possible) with source of information data |
|---|---|---|---|
| 3.1 | Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies) | | |
| 3.2 | Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases) | | |
| 3.3 | Affect the welfare of people e.g. by changing living conditions? | | |
| 3.4 | Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc., | | |
| 3.5 | Any other causes | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**4. Production of solid wastes during construction or operation or decommissioning (MT/month)**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 4.1 | Spoil, overburden or mine wastes | | |
| 4.2 | Municipal waste (domestic and or commercial wastes) | | |
| 4.3 | Hazardous wastes (as per Hazardous Waste Management Rules) | | |
| 4.4 | Other industrial process wastes | | |
| 4.5 | Surplus product | | |
| 4.6 | Sewage sludge or other sludge from effluent treatment. | | |
| 4.7 | Construction or demolition wastes | | |
| 4.8 | Redundant machinery or equipment | | |
| 4.9 | Contaminated soils or other materials | | |
| 4.10 | Agricultural wastes | | |
| 4.11 | Other solid wastes | | |

**5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 5.1 | Emissions from combustion of fossil fuels from stationary or mobile sources. | | |
| 5.2 | Emissions from production processes | | |
| 5.3 | Emissions from materials handling including storage or transport | | |
| 5.4 | Emissions from construction activities including plant and equipment | | |
| 5.5 | Dust or odours from handling of materials including construction materials, sewage and waste | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | | |
|---|---|---|---|
| 5.6 | Emissions from incineration of waste | | |
| 5.7 | Emissions from burning of waste in open air (e.g. slash materials, construction debris) | | |
| 5.8 | Emissions from any other sources | | |

**6. Generation of Noise and Vibration, and Emissions of Light and Heat:**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 6.1 | From operation of equipment e.g. engines, ventilation plant, crushers | | |
| 6.2 | From industrial or similar processes | | |
| 6.3 | From construction or demolition | | |
| 6.4 | From blasting or piling | | |
| 6.5 | From construction or operational traffic | | |
| 6.6 | From lighting or cooling systems | | |
| 6.7 | From any other sources | | |

**7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 7.1 | From handling, storage, use or spillage of hazardous materials | | |
| 7.2 | From discharge of sewage or other effluents to water or the land (expected mode and place of discharge) | | |
| 7.3 | By deposition of pollutants emitted to air into the land or into water | | |
| 7.4 | From any other sources | | |
| 7.5 | Is there a risk of long term build up of pollutants in the environment from these sources? | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 8.1 | From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances | | |
| 8.2 | From any other causes | | |
| 8.3 | Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)? | | |

**9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality**

| S.No. | Information/Checklist confirmation | Yes/No | Details thereof (with approximate quantities/rates, wherever possible) with source of information data |
|---|---|---|---|
| 9.1 | Lead to development of supporting. lities, ancillary development or development stimulated by the project which could have impact on the environment e.g.:<br>• Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)<br>• housing development<br>• extractive industries<br>• supply industries<br>• other | | |
| 9.2 | Lead to after-use of the site, which could have an impact on the environment | | |
| 9.3 | Set a precedent for later developments | | |
| 9.4 | Have cumulative effects due to proximity to other existing or planned projects with similar effects | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**(III) Environmental Sensitivity**

| S.No. | Areas | Name/ Identity | Aerial distance (within 15 km.) Proposed project location boundary |
|---|---|---|---|
| 1 | Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value | | |
| 2 | Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests | | |
| 3 | Areas used by protected, important or sensitive species of flora or fauna for breeding, esting, foraging, resting, over wintering, migration | | |
| 4 | Inland, coastal, marine or underground waters | | |
| 5 | State, National boundaries | | |
| 6 | Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas | | |
| 7 | Defence installations | | |
| 8 | Densely populated or built-up area | | |
| 9 | Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, community facilities)* | | |
| 10 | Areas containing important, high quality or scarce Resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)* | | |
| 11 | Areas already subjected to pollution or environmental damage. *(those where existing legal environmental standards are exceeded)* | | |
| 12 | Areas susceptible to natural hazard which could cause the project to present environmental Problems (*earthquakes, subsidence, landslides, erosion, Flooding or extreme or adverse climatic conditions*) | | |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**(IV). Proposed Terms of Reference for EIA studies**

VI(b) "I hereby given undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost."

Date: _____

Place: _____

Signature of the applicant
With Name and Full Address
(Project Proponent/Authorised Signatory)

NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z. map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z. (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Sinmultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z. Notification, 1991 for the activities to be located in the CRZ.
2. The projects to be located within 10 km of the National Prks, Sancturies, Biosphere Reserves, Migratory Corridors of Wile Animals, the project proponenet shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)."
3. All correspondence with the Ministry of Environment & Forests including aubmission of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC Meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being and authorized signatory for the specific project."

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**APPENDIX II**
**(See paragraph 6)**

**FORM-1 A (only for construction projects listed under item 8 of the Schedule)**

**CHECK LIST OF ENVIRONMENTAL IMPACTS**

**(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)**

1. **LAND ENVIRONMENT**

**(Attach panoramic view of the project site and the vicinity)**

1.1. Will the existing landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Master Plan / Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing landuse, disturbance to the local ecology).

1.4. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).

1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)

1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

1.7. Give details regarding water supply, waste handling etc during the construction period.

1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)

1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

## 2. WATER ENVIRONMENT

2.1. Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)

2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)

2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)

2.11. How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)

2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)

2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)

2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

**3. VEGETATION**

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with it's unique features, if any)

3.2. Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

**4. FAUNA**

4.1. Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

4.2. Any direct or indirect impacts on the avifauna of the area? Provide details.

4.3. Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

**5. AIR ENVIRONMENT**

5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.

5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.

5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.

**6. AESTHETICS**

6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

6.4. Are there any anthropological or archaeological sites or artefacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

**7. SOCIO-ECONOMIC ASPECTS**

7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

7.2. Give details of the existing social infrastructure around the proposed project.

7.3. Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

**8. BUILDING MATERIALS**

8.1. May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

8.3. Are recycled materials used in roads and structures? State the extent of savings achieved?

8.4. Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

**9. ENERGY CONSERVATION**

9.1. Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

9.2. What type of, and capacity of, power back-up to you plan to provide?

9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

9.5. Does the layout of streets & buildings maximise the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.

9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

creation of heat island & inversion effects?

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

9.11. If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.

9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

9.13. To what extent the non-conventional energy technologies are utilised in the overall energy consumption? Provide details of the renewable energy technologies used.

**10. Environment Management Plan**

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**APPENDIX III**

**(See paragraph 7**

**GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSENT DOCUMENT**

| S.NO | EIA STRUCTURE | CONTENTS |
|---|---|---|
| | | |
| 1. | Introduction | • Purpose of the report<br><br>• Identification of project & project proponent<br><br>• Brief description of nature, size, location of the project and its importance to the country, region<br><br>• Scope of the study – details of regulatory scoping carried out (As per Terms of Reference) |
| 2. | Project Description | • Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effects. Details should be provided to give clear picture of the following:<br><br>• Type of project<br><br>• Need for the project<br><br>• Location (maps showing general location, specific location, project boundary & project site layout)<br><br>• Size or magnitude of operation (incl. Associated activities required by or for the project<br><br>• Proposed schedule for approval and implementation<br><br>• Technology and process description<br><br>• Project description. Including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose<br><br>• Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope)<br><br>• Assessment of New & untested technology for the risk of technological failure |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | |
|---|---|---|
| 3. | Description of the Environment | • Study area, period, components & methodology<br><br>• Establishment of baseline for valued environmental components, as identified in the scope<br><br>• Base maps of all environmental components |
| 4. | Anticipated Environmental Impacts & Mitigation Measures | • Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project<br><br>• Measures for minimizing and / or offsetting adverse impacts identified<br><br>• Irreversible and Irretrievable commitments of environmental components<br><br>• Assessment of significance of impacts (Criteria for determining significance, Assigning significance)<br><br>• Mitigation measures |
| 5. | Analysis of Alternatives (Technology & Site) | • In case, the scoping exercise results in need for alternatives:<br><br>• Description of each alternative<br><br>• Summary of adverse impacts of each alternative<br><br>• Mitigation measures proposed for each alternative and<br><br>• Selection of alternative |
| 6. | Environmental Monitoring Program | • Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules) |
| 7. | Additional Studies | • Public Consultation<br><br>• Risk assessment<br><br>• Social Impact Assessment. R&R Action Plans |
| 8. | Project Benefits | • Improvements in the physical infrastructure<br><br>• Improvements in the social infrastructure |

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

| | | |
|---|---|---|
| | | • Employment potential –skilled; semi-skilled and unskilled<br>• Other tangible benefits |
| 9. | Environmental Cost Benefit Analysis | If recommended at the Scoping stage |
| 10. | EMP | • Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA |
| 11 | Summary & Conclusion (This will constitute the summary of the EIA Report ) | • Overall justification for implementation of the project<br>• Explanation of how, adverse effects have been mitigated |
| 12. | Disclosure of Consultants engaged | • The names of the Consultants engaged with their brief resume and nature of Consultancy rendered |

**APPENDIX III A**

**(See paragraph 7)**

**CONTENTS OF SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT**

The Summary EIA shall be a summary of the full EIA Report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following Chapters of the full EIA Report: -

1. Project Description
2. Description of the Environment
3. Anticipated Environmental impacts and mitigation measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

## APPENDIX IV

**(See paragraph 7)**

## PROCEDURE FOR CONDUCT OF PUBLIC HEARING

1.0 The Public Hearing shall be arranged in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site(s) or in its close proximity District -wise, by the concerned State Pollution Control Board (SPCB) or the Union Territory Pollution Control Committee (UTPCC).

2. 0 **The Process:**

2.1 The Applicant shall make a request through a simple letter to the Member Secretary of the SPCB or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. In case the project site is covering more than one District or State or Union Territory, the public hearing is mandated in each District, State or Union Territory in which the project is located and the applicant shall make separate requests to each concerned SPCB or UTPCC for holding the public hearing as per this procedure.

2.2 The Applicant shall enclose with the letter of request, at least 10 hard copies and an equivalent number of soft (electronic) copies of the draft EIA Report with the generic structure given in Appendix III including the Summary Environment Impact Assessment report in English and in the official languageof the state/local language, prepared strictly in accordance with the Terms of
Reference communicated after Scoping (Stage-2). Simultaneously the applicant shall arrange to forward copies, one hard and one soft, of the above draft EIA Report along with the Summary EIA report to the following authorities or offices, within whose jurisdiction the project will be located:

(a) District Magistrate/District collector/Deputy commissioner/s
(b) Zila Parishad or Municipal Corporation or Panchayats Union
(c) District Industries Office
(d) Urban Local Bodies (ULBs) / PRIs Concerned / Development authorities.
(d) Concerned Regional Office of the Ministry of Environment and Forests

2.3 On receiving the draft Environmental Impact Assessment report, the abovementioned authorities except the Regional Office of MoEF, shall arrange to widely publicize it within their respective jurisdictions requesting the interested persons to send their comments to the concerned regulatory authorities. They shall also make available the draft EIA Report for inspection electronically or otherwise to the public during normal office hours till the Public Hearing is over.

2.4 The SPCB or UTPCC concerned shall also make similar arrangements for giving publicity about the project within the State/Union Territory and make available the Summary of the draft Environmental Impact Assessment report (Appendix III A) for

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

inspection in select offices or public libraries or any other suitable location etc. They shall also additionally make available a copy of the draft Environmental Impact Assessment report to the above five authorities/offices as given in para 2.2.

**3.0 Notice of Public Hearing**:

3.1 The Member-Secretary of the concerned SPCB or UTPCC shall finalize the date, time and exact venue for the conduct of public hearing within 7(seven) days of the date of receipt of the draft Environmental Impact Assessment report from the project proponent, and advertise the same in one major National Daily and one Regional vernacular Daily / Official State Language. A minimum notice period of 30(thirty) days shall be provided to the public for furnishing their responses;

3.2 The advertisement shall also inform the public about the places or offices where the public could access the draft Environmental Impact Assessment report and the Summary Environmental Impact Assessment report before the public hearing**.** In places where the newspapers do not reach, the Competent Authority should arrange to inform the local public about the public hearing by other means such as by way of beating of drums as well as advertisement / announcement on radio / television.

3.3 No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency situation occurs and then only on the recommendation of the concerned District Magistrate/District collector/Deputy Commissioner, the postponement shall be notified to the public through the same National and Regional vernacular dailies and also prominently displayed at all the identified offices by the concerned SPCB or Union Territory Pollution Control Committee;

3.4 In the above exceptional circumstances, fresh date, time and venue for the public consultation shall be decided by the Member – Secretary of the concerned SPCB or UTPCC only in consultation with the District Magistrate/District collector/Deputy Commissioner and notified afresh as per procedure under 3.1 above.

**4.0 Supervision and Presiding over the Hearing:**

4.1 The District Magistrate/District collector/Deputy Commissioner or his or her representative not below the rank of an Additional District Magistrate assisted by a representative of SPCB or UTPCC**,** shall Supervise and preside over the entire public hearing process.

**5.0 Videography**

5.1 The SPCB or UTPCC shall arrange to video film the entire proceedings. A copy of the videotape or a CD shall be enclosed with the public hearing proceedings while Forwarding it to the Regulatory Authority concerned.

**6.0 Proceedings**

6.1 The attendance of all those who are present at the venue shall be noted and annexed with the final proceedings.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

6.2 There shall be no quorum required for attendance for starting the proceedings.

6.3 A representative of the applicant shall initiate the proceedings with a presentation on the project and the Summary EIA report.

6.4 Persons present at the venue shall be granted the opportunity to seek information or clarifications on the project from the Applicant. The summary of the public hearing proceedings accurately reflecting all the views and concerns expressed shall be recorded by the representative of the SPCB or UTPCC and read over to the audience at the end of the proceedings explaining the contents in the local/vernacular language and the agreed minutes shall be signed by the District Magistrate/District collector/Deputy Commissioner or his or her representative on the same day and forwarded to the SPCB/UTPCC concerned**.**

6.5 A Statement of the issues raised by the public and the comments of the Applicant shall also be prepared in the local language or the Official State language, as the case may be, and in English and annexed to the proceedings:

6.6 The proceedings of the public hearing shall be conspicuously displayed at the office of the Panchyats within whose jurisdiction the project is located, office of the concerned Zila Parishad, District Magistrate/District collector/Deputy Commissioner, and the SPCB or UTPCC . The SPCB or
UTPCC shall also display the proceedings on its website for general information. Comments, if any, on the proceedings which may be sent directly to the concerned regulatory authorities and the applicant concerned.

7.0 **Time period for completion of public hearing**

7.1 The public hearing shall be completed within a period of 45 (forty five) days from date of receipt of the request letter from the Applicant. Thereafter the SPCB or UTPCC concerned shall sent the public hearing proceedings to the concerned regulatory authority within 8(eight) days of the completion of the public hearing.Simultaneously, a copy will also be provided to the project proponent.The applicant may also directly forward a copy of the approved public hearing proceedings to the regulatory authority concerned along with the final Environmental Impact Assessment report or supplementary report to the draft EIA report prepared after the public hearing and public consultations incorporating the concerns expressed in the public hearing along with action plan and financial allocation, item-wise, to address those concerns.”.

7.2 If the SPCB or UTPCC fails to hold the public hearing within the stipulated 45(forty five) days, the Central Government in Ministry of Environment and Forests for Category ‘A’ project or activity and the State Government or Union Territory Administration for Category ‘B’ project or activity at the request of the SEIAA, shall engage any other agency or authority to complete the process, as per procedure laid down in this notification.

**APPENDIX –V**

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**(See paragraph 7)**

**PROCEDURE PRESCRIBED FOR APPRAISAL**

1. The applicant shall apply to the concerned regulatory authority through a simple communication enclosing the following documents where public consultations are mandatory:

- Final Environment Impact Assessment Report [20(twenty) hard copies and 1 (one) soft copy)]
- A copy of the video tape or CD of the public hearing proceedings
- A copy of final layout plan (20 copies)
- A copy of the project feasibility report (1 copy)

2. The Final EIA Report and the other relevant documents submitted by the applicant shall be scrutinized in office within 30 days from the date of its receipt by the concerned Regulatory Authority strictly with reference to the TOR and the inadequacies noted shall be communicated electronically or otherwise in a single set to the Members of the EAC /SEAC enclosing a copy each of the Final EIA Report including the public hearing proceedings and other public responses received along with a copy of Form -1or Form 1A and scheduled date of the EAC /SEAC meeting for considering the proposal.

3. Where a public consultation is not mandatory, the appraisal shall be made on the basis of the prescribed application Form 1 and EIA report, in the case of all projects and activities other than Item 8 of the Schedule. In the case of Item 8 of the Schedule, considering its unique project cycle, the EAC or SEAC concerned shall appraise all Category B projects or activities on the basis of Form 1, Form 1A and the conceptual plan and make recommendations on the project regarding grant of environmental clearance or otherwise and also stipulate the conditions for environmental clearance."

4. Every application shall be placed before the EAC/SEAC and its appraisal completed within 60 days of its receipt with requisite documents / details in the prescribed manner.

5. The applicant shall be informed at least 15 (fifteen) days prior to the scheduled date of the EAC /SEAC meeting for considering the project proposal.

6. The minutes of the EAC /SEAC meeting shall be finalised within 5 working days of the meeting and displayed on the website of the concerned regulatory authority. In case the project or activity is recommended for grant of EC, then the minutes shall clearly list out the specific environmental safeguards and conditions. In case the recommendations are for rejection, the reasons for the same shall also be explicitly stated.

**Note:** The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) vide notification number S.O. 1533 (E), dated 14th September, 2006 and amended vide S.O. 1737 (E), dated the 11th October, 2007.

**APPENDIX VI**

**(See paragraph 5)**

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**COMPOSITION OF THE SECTOR/ PROJECT SPECIFIC EXPERT APPRAISAL COMMITTEE (EAC) FOR CATEGORY A PROJECTS AND THE STATE/UT LEVEL EXPERT APPRAISAL COMMITTEES (SEACs) FOR CATEGORY B PROJECTS TO BE CONSTITUTED BY THE CENTRAL GOVERNMENT `**

1. The Expert Appraisal Committees (EAC(s) and the State/UT Level Expert Appraisal Committees (SEACs) shall consist of only professionals and experts fulfilling the following eligibility criteria:

**Professional:** The person should have at least (i) 5 years of formal University training in the concerned discipline leading to a MA/MSc Degree, or (ii) in case of Engineering /Technology/Architecture disciplines, 4 years formal training in a professional training course together with prescribed practical training in the field leading to a B.Tech/B.E./B.Arch. Degree, or (iii) Other professional degree (e.g. Law) involving a total of 5 years of formal University training and prescribed practical training, or (iv) Prescribed apprenticeship/article ship and pass examinations conducted by the concerned professional association (e.g. Chartered Accountancy ),or (v) a University degree , followed by 2 years of formal training in a University or Service Academy (e.g. MBA/IAS/IFS). In selecting the individual professionals, experience gained by them in their respective fields will be taken note of.

**Expert:** A professional fulfilling the above eligibility criteria with at least 15 years of relevant experience in the field, or with an advanced degree (e.g. Ph.D.) in a concerned field and at least 10 years of relevant experience.

**Age:** Below 70 years. However, in the event of the non-availability of /paucity of experts in a given field, the maximum age of a member of the Expert Appraisal Committee may be allowed up to 75 years

2. The Members of the EAC shall be Experts with the requisite expertise and experience in the following fields /disciplines. In the event that persons fulfilling the criteria of “Experts” are not available, Professionals in the same field with sufficient experience may be considered:

- **Environment Quality Experts**: Experts in measurement/monitoring, analysis and interpretation of data in relation to environmental quality

- **Sectoral Experts in Project Management**: Experts in Project Management or Management of Process/Operations/Facilities in the relevant sectors.

- **Environmental Impact Assessment Process Experts**: Experts in conducting and carrying out Environmental Impact Assessments (EIAs) and preparation of Environmental Management Plans (EMPs) and other Management plans and who have wide expertise and knowledge of predictive techniques and tools used in the EIA process

- **Risk Assessment Experts**

- **Life Science Experts in floral and faunal management**

- **Forestry and Wildlife Experts**

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

• **Environmental Economics Expert with experience in project appraisal**

3. The Membership of the EAC shall not exceed 15 (fifteen) regular Members. However the Chairperson may co-opt an expert as a Member in a relevant field for a particular meeting of the Committee.

4. The Chairperson shall be an outstanding and experienced environmental policy expert or expert in management or public administration with wide experience in the relevant development sector.

5. The Chairperson shall nominate one of the Members as the Vice Chairperson who shall
preside over the EAC in the absence of the Chairman /Chairperson.

6. A representative of the Ministry of Environment and Forests shall assist the Committee as its Secretary.

7. The maximum tenure of a Member, including Chairperson, shall be for 2 (two) terms of 3 (three) years each.

8. The Chairman / Members may not be removed prior to expiry of the tenure without cause and proper enquiry.

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**I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b) , (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII** of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

**Appendix-D**

## Observations from Inspection Visits

| Phase | Project | Delhi Metro | Jaipur Metro | Mumbai Metro |
|---|---|---|---|---|
| **Construction Phase** | Execution Agency | DMRC | JMRC, Govt of Rajasthan | MMRC (UG Section) and MMRDA (Elevated section) |
| | Phases under construction/ implementation | Parts of Phase-IV: 65 Km (27 Km UG); 26 elevated and 18 UG stations | Presently, no construction is going on. | Line-3 (33.5 Km UG), Line 2-B, 4, 4-A, 5, 6, 7A, 9 (111.5 Km elevated (around 50%-60% work completed) |
| | Phases proposed/ Planned | Parts of Phase-IV: 44 Km (Rithala-Narela, Inderlok-Indraprastha, Lajpat Nagar-Saket G Blk); 27 elevated and 8 UG Stations | Phase 1C & 1D (1.94 Km Elev & 2.26 Km UG | Line 8, 13, 14 (Elevated 103 Km, DPR under preparation); 10, 11, 12 (Elevated 42.6 Km, Under Tendering) |
| | UG/Elevated/Both | Both | Both | Both (UG by MMRC and Elevated by MMRDA) |
| | Water Supply for Construction/ Curing | Water is sourced from DJB through tankers which transport the same from DJB authorised TWs to site. (as per BIS, IS 456:2000, the water to be used for construction activity is to be potable) | From TWs in Ph-1A and 1B and part supply from TW and PHED in proposed projects (as per BIS, IS 456:2000, the water to be used for construction activity is to be potable). | From BMMC as per actual requirement and entirely consumed in costruction/ curing. For construction, the quality of water has to be potable. In Mumbai fresh water is sourced from outside reservioirs. |
| | GW NOC if using In-situ TW/ BW during construction | No ground water used and water arranged at site through tankers. | Presently, no construction is going on. | Not applicable |
| | Water Level | It varies from 5mbgl to different depths along the alignment. | more than 25mbgl (lower than maximum depth of stations) | Very shallow, 2-3 mbgl |
| | UG Project cuts Water Table (Y/N) | Yes | No | Yes |
| | Seepage Prevention Method | Diaphragm Wall | Not applicable | Retaining wall to control seepage from sidewalls. There is no seepage at the under-construction visited site (CSTM), very meagre seepage from bottom (muck). |
| | Groundwater Disposal | Agreement with different Govt agencies for utilisation of dewatered water. For example, with NDMC for diverting dewatered groundwater through pipeline network to nearby Roshanara Bagh for rejuvenation of dry water bodies within | Not applicable | Only muck in the bottom in UG Station construction Part used in wheelwash and dust suppression and remaining discharged into BMMC drains as per agreement. In elevated stretch during piling work the water is either discharged into nearest SWD or nearest pile. |
| | Recycle/ Reuse/ Conservation | RO reject from batching plants is used for wheel wash, dust suppression etc. In case of incresed demand, STP treated water will be used. | Presently, no construction is going on. | Water used in wheel wash and dust supression is reused after settling. Requirement is minimzed for curing by using Hessian cloth and Curing compound and reuse of collected water. |
| | Performance/ Procedural Adherence Audit by Third Party | --------- | No construction activity is going on presently | Mumbai Metro Rail Corporation has appointed the AECOM as General Consultant which is consortium of Padeco, Japan, LBG Inc., USA and Egis Rail, France; **Scope of work**: Design, supervision, quality control, safety and contract management of the project. |
| | **Observations of committee from visit** | Water table has not been cut yet at visited under construction UG station sites. No wastage of water has been noticed. | No construction activity is going on presently | There is no seepage through retaining walls during UG construction. Very meagre seepage from bottom. In elevated stretches, it is not feasible to manage rainwater during construction phase. |

**Contd.. Page 2**

| Phase | Project | Delhi Metro | Jaipur Metro | Mumbai Metro |
|---|---|---|---|---|
| **Operational Phase** | Phases in operation | Ph-I: 65 Km (13 Km UG); Ph-II: 125 Km (34 Km UG); Ph-III: 159 Km (21 Km UG). | Ph-1A & 1B (9.13 Km elevated and 2.51 Km UG), 8 Elevated Stn & 3 UG Stn | Line-1, 2A & 7 |
| | Maintenance Agency | DMRC | JMRC | Reliance for Line 1 and MMMOCL for Line 2A and 7. All other lines are under construction |
| | Water Use for public at stations | 16 KLD for elevated stations; UG stations have higher requirement | 8.5-50 KLD; UG stations have higher requirement | ---- |
| | Water use for maintenance of coaches at Depot(s) | 100-150 KLD for maintenance of coaches at Depot(s). 100% waste water is treated and reutilized for horticulture. | 30-40 KLD Total (Avergae 25 KLD fresh) for depot and auto coach wash. | In general, n Metro Train Depots,≈15-20% of total freshwater is required for domestic purposes and 45-50% of water is required for train maintenance purposes. In Mumbai Metro Train depots 100% of Sewage and Effluent generated is treated and re-used for landscaping and toilet flushing. |
| | Whether using Groundwater (TW/BW) | Yes | Yes, out of 11 stations, 5 have TW supply, 5 have both TW and PHED supply, and 1 has only PHED supply. At Mansarovar Depot, fresh water requirement is 25 KLD for drinking, flushing, cleaning, fire fighting system, cooling towers, which is met from TW. Recycled water of 6 KLD from Auto Coach Wash plant and ETP is used for washing of trains and horticulture uses in depot premises. | No, Water supply for stations and depots from BMMC. |
| | GW NOC if using TW/ BW during Operational Phase | Yes | NOC from State Govt (city was notified earlier). NOC from CGWA has not been obtained by JMRC after notification of MoJS guidelines | Not applicable |
| | Recycle/ Reuse | Yes, STP/ETP have been installed and treated water is utilised for horticulture purposes | Recycled water of 6 KLD from Auto Coach Wash plant and ETP is used for washing of trains and horticulture uses in depot premises; there is no recycling and reuse at stations | 100% sewage and effluent at depots will be treated and reused for toilets and lanscaping, thereby reducing fresh water requirement by up to 64%. |
| | Rainwater Management of elevated parts/ stations during Operational Phase | Rainwater from viaduct is brought down through downpipes running along the piers and discharged into RWH pit on the median at feasible locations. RWH pits have been constructed between 2 piers to divert the water from either side. The system has been desinged considering peak hourly rainfall. | Mansarovar Depot and Ramnagar and Mansorovar Metro stations visited. Water is channelized from viaduct through concealed/ open conduits/ pipes and is recharged through recharge well on median after passing through settling pit and filter. Dimension of structures have been kept with peak hourly rainfall as per norms (25mm). Wastewater from station is being discharged into Nagar Nigam sewer line. | Since WL is very shallow, AR is not practibale. In depots, internal stormwater drains are laid which can collect 100% run-off generated at one day normal rainfall from roof and non-roof areas. The internal SWD network is connected to municipal stormwater network. run-off generated from station roofs and viaducts is channelized through “U” shaped channel and closed conduits. Wherever possible (if alignment is on service road) the run-off pipes are connected to existing stormwater drains otherwise (if alignment is on road median) run-off is diverted to median of alignments for irrigation of landscape works and overflow is let-off on roads. |
| | Maintenance of RWH systems | Maintenance by DMRC, 20% pits cleaned per year. Pit are not well maintained. The frequency of cleaning should be 50% pits each year. | Maintenance by Jaipur Development Authority | Not applicable. Water levels are very shallow and rainfall his high. Wherever possible (if alignment is on service road) the run-off pipes are connected to existing stormwater drains otherwise (if alignment is on road median) run-off is diverted |
| | Limitations of RWH system maintenance | Theft/ breakage of open pipes. Lack of co-ordination between different land owning agencies on which RWH structures have been constructed by DMRC. Maintenance frequency not sufficient. | Theft/ breakage of open pipes/ choking of concealed conduits. | Theft/ breakage of open pipes/ choking of concealed conduits. |

**GOVT. OF NATIONAL CAPITAL TERRITORY OF DELHI**
**OFFICE OF THE SUB-DIVISIONAL MAGISTRATE (CIVIL LINES)**
**BURARI, DELHI**

**No. F. SDM/NGT/CL/2022/8569-80** **Dated:** 06/06/2022

## MINUTES OF MEETING OF ADVISORY COMMITTEE

## (CENTRAL DISTRICT)

A Meeting of the Advisory Committee for Ground Water Extraction was held at the office of District Magistrate Central District on **03.06.2022 at 02.30 PM.** The Meeting was Chaired by DM (Central) in conference hall of central district. The following were present in the meeting:-

1) Sh. Lalit Kumar, Naib-Tehsildar (Civil Lines)
2) Sh. Vikash Singhal, Sr. DGM/Env., DMRC
3) Sh. Anil J. Kumar, DGM/Env., DMRC
4) Sh. Vonod Shishodia, AE-III, I&FC
5) Sh. Saidul Haq, Scientist-D, CGWB
6) S. A Haider, AEE(M)18, DJB
7) Sh. Vinod Kumar, AEE(M)03, DJB
8) Sh. Ashish, Jr. Env. Eng., DPCC
9) Sh. Ramesh Kumar, JE, I&FC

The following proposals were discussed in the meeting and decision taken by the Committee is as under:-

| Sl. No. | Agency / Applicant | Proposals | Remarks of the Advisory Committee |
|---|---|---|---|
| 1. | EE (North)-I, DJB | Permission for regularization of two borewells at Kh. Nos. 53/22,23,24,25, 62/2,3,4 and 56/1,2,3,4 of Village Burari for agriculture irrigation purpose. | The DJB has forwarded and recommended the proposal. In this regard, BDO and I&FC Department have recommended and Halka patwari, Civil Lines has verified. Vide order No. 1041-61 dated 18.03.2010, Department of Environment, of GNCT of Delhi has issued direction as under: *"The permission of borewell installation for agriculture purpose may be granted to genuine agriculturists by the advisory committee under concerned Deputy Commissioner (Revenue) based on* |

| | | | |
|---|---|---|---|
| | | | *the recommendation of BDO and agriculture department/I&FC Department of GNCT of Delhi. Agriculture activity may be verified from Khasra Girdhawari documents also also basis on actual evalution".*<br>As recommended by DJB, I&FC and BDO and as verified by Patwari, the Committee has Allowed the proposal for ground water extraction through bore well for agriculture irrigation purpose subject to the condition:<br>1. Purpose of the bore well will be only for agriculture irrigation.<br>2. DJB will provide all subsurface data like strata chart, well assembly design, discharge & water level (SWL & PWL) to CGWB at oicnd-cgwb@nic.in<br>3. Initial permission for borewell will be for one year with the condition to use only in case of short supply of water and thereafter will be reviewed for further continuation.<br>4. All other relevant guidelines/orders of the Govt. must be followed. |
| 2. | EE(N)-II, DJB | Permission for regularization of bore wells at Kh. No. 528/428 of Village Burari for agriculture irrigation purpose. | The DJB has forwarded and recommended the proposal to put-up before the advisory committee. In this regard, Committee, has deferred the proposal till the recommendations of BDO, I&FC Department are obtained and field verification of agriculture activity is done by Halka patwari. |
| 3. | AEE(M)-18 | Permission for 04 Nos. of New Borring of tubewells in Various Location at Model Town, AC-18 under AEE(M)-18. | The DJB has forwarded and recommended the proposal for ground water extraction borewell. The Advisory Committee has allowed proposal subject to following conditions:-<br>1. DJB will provide all |

| | | | |
|---|---|---|---|
| | | | subsurface data like strata chart, well assembly design, discharge & water level (SWL & PWL) to CGWB at oicnd-cgwb@nic.in<br>2. Installation of Flow meters on any all bore wells to limit extraction to proposed quantum.<br>3. Daily flow meter reading must be maintained and provided to cgwb at oicnd-cgwb@nic.in half yearly.<br>4. Installation of 50 m deep Piezometer at any one location at a distance of 60 m to 75 m from existing bore well to monitor water level. Water level data thus obtained ma be shared with cgwb after every month.<br>5. Initial permission for borewell will be for one year with the condition to use only in case of short supply of water and thereafter will be reviewed for further continuation.<br>6. Borewell must not be used for private or commercial purpose. Supply of water will be through DJB. |
| 4. | AEE(M)-3 | Permission to Extract Sub Soil Water for dewatering (through borewells) for construction purpose at 1, 3 Cavalary Lane and 4 Chatra Marg Near Near Vishwavidhyalya Metro Station, Civil Lines, Delhi. | The DJB has forwarded the detailed project proposal by Young Builders Private Limited along with Impact assessment Report and recommended the proposal of dewatering through bore wells as per dewatering plan. The committee after detailed discussions and consideration has deferred the proposal as the committee had requested in last meeting dated 11.03.022 to provide any similar permission obtained by any private builder for construction purpose in any district of Delhi but the same has not been provided. |
| 5. | Sr. Dy. | Permission for dewatering at proposed | Sr. Dy. General Manager / |

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<table>
<tr><th>#</th><th>Name of Station (proposed dewatering location)</th><th>Gainful Utilization of Dewatered Water Option-I</th><th>Gainful Utilization of Dewatered Water Option-II</th></tr>
<tr><td>1.</td><td>R K Ashram</td><td>CPWD - Bhuli Bhatiari Tank (Jandhewalan)</td><td>DJB UGR Jhandewalan</td></tr>
<tr><td>2.</td><td>Nabi Karim</td><td>CPWD - Bhuli Bhatiari Tank (Jandhewalan)</td><td>DJB UGR Eidgah</td></tr>
<tr><td>3.</td><td>Sadar Bazar</td><td>Sadar Bazar Railway Station</td><td>DJB UGR Pahari Dheeraj</td></tr>
<tr><td>4.</td><td>Pul Bangash</td><td>North MCD - Waterbody (Roshanara Bagh)</td><td>DJB UGR Jeetgarh</td></tr>
<tr><td>5.</td><td>Ghanta Ghar</td><td>North MCD - Waterbody (Roshanara Bagh)</td><td>DJB UGR Jeetgarh</td></tr>
<tr><td>6.</td><td>Delhi Gate</td><td>CPWD - Shanti Van/Raj Ghat/Vijay Ghat Jheel</td><td>DJB UGR Delhi Gate</td></tr>
<tr><td>7.</td><td>New Delhi</td><td>New Delhi Railway Station</td><td>DJB UGR Ramlila Ground</td></tr>
<tr><td>8.</td><td>Delhi Sachivalaya</td><td>CPWD - Shanti Van/Raj Ghat/Vijay Ghat Jheel</td><td>DJB UGR Delhi Gate</td></tr>
<tr><td>9.</td><td>Indraprastha</td><td>Nizamuddin Railway Station UGR</td><td>Under discussion</td></tr>
</table>
</td>
<td>Environment has forwarded the proposal for Extraction of Ground Water along with Impact assessment Report and the proposal of dewatering through bore wells as per dewatering plan. The committee after detailed discussions and consideration has allowed dewatering for construction of basement by DMRC at proposed Delhi Metro Station Phase-IV.<br>Underground Metro Stations falls in jurisdiction of Central District. The proposed dewatering must go as per detailed de-watering plan. Sr. Dy. General Manager / Environment is to submit an undertaking for gainful use of water along with assurance letter from water using agency within one month from the date of issue of this letter.<br>All de-watering wells must be fitted with flow meter.<br>One Piezometer should also be constructed at each metro station to monitor change in ground water regime. This is purely provisional and will be regularised by DJB after receiving UNDERTAKING.</td>
</tr>
<tr>
<td>6.</td>
<td>Deputy Commissioner (Horticulture Department)</td>
<td>Permission for De-sealing of Tubewell/borewell for irrigation of parks.</td>
<td>The Dy. Director (Horticulture) has forwarded and recommended the proposal for de-sealing of tubewell/borewell. The advisory committee has deferred the case to the next date of committee as representative from horticulture department has not joined the meeting.</td>
</tr>
<tr>
<td>7.</td>
<td>AE-III, I&FC</td>
<td>Permission for regularization of bore wells at Kh. No. 82/6 of Village Salempur Majra Burari for agriculture irrigation purpose.</td>
<td>The DJB has forwarded and recommended the proposal. In this regard, BDO and I&FC Department have recommended and Halka patwari, Civil Lines has verified. Vide order No. 1041-61 dated 18.03.2010, Department of</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| | | | **Environment, of GNCT of Delhi has issued direction as under:**<br>***"The permission of borewell installation for agriculture purpose may be granted to genuine agriculturists by the advisory committee under concerned Deputy Commissioner (Revenue) based on the recommendation of BDO and agriculture department/I&FC Department of GNCT of Delhi. Agriculture activity may be verified from Khasra Girdhawari documents also also basis on actual evalution".***<br>As recommended by DJB, I&FC and BDO and as verified by Patwari, the Committee has **Allowed** the proposal for ground water extraction through bore well for agriculture irrigation purpose subject to the condition:<br>1. Purpose of the bore well will be only for agriculture irrigation.<br>2. DJB will provide all subsurface data like strata chart, well assembly design, discharge & water level (SWL & PWL) to CGWB at oicnd-cgwb@nic.in<br>3. Initial permission for borewell will be for one year with the condition to use only in case of short supply of water and thereafter will be reviewed for further continuation.<br>4. All other relevant guidelines/orders of the Govt. must be followed. |
| 8. | AE-III, I&FC | **Permission for regularization of bore wells at Kh. No. 16/5 of Village Salempur Majra Burari for agriculture irrigation purpose.** | The DJB has forwarded and recommended the proposal. In this regard, BDO and I&FC Department have recommended and Halka patwari, Civil Lines has verified. Vide order No. 1041-61 dated 18.03.2010, Department of Environment, of GNCT of Delhi has issued direction as under: |

| | | | |
|---|---|---|---|
| | | | *"The permission of borewell installation for agriculture purpose may be granted to genuine agriculturists by the advisory committee under concerned Deputy Commissioner (Revenue) based on the recommendation of BDO and agriculture department/I&FC Department of GNCT of Delhi. Agriculture activity may be verified from Khasra Girdhawari documents also also basis on actual evalution".*<br>As recommended by DJB, I&FC and BDO and as verified by Patwari, the Committee has **Allowed** the proposal for ground water extraction through bore well for agriculture irrigation purpose subject to the condition:<br>1. Purpose of the bore well will be only for agriculture irrigation.<br>2. DJB will provide all subsurface data like strata chart, well assembly design, discharge & water level (SWL & PWL) to CGWB at oicnd-cgwb@nic.in<br>3. Initial permission for borewell will be for one year with the condition to use only in case of short supply of water and thereafter will be reviewed for further continuation.<br>4. All other relevant guidelines/orders of the Govt. must be followed. |
| 9. | AE-III, I&FC | Permission for regularization of bore wells at Kh. No. 24/3 of Village Salempur Majra Burari for agriculture irrigation purpose. | The DJB has forwarded and recommended the proposal. In this regard, BDO and I&FC Department have recommended and Halka patwari, Civil Lines has verified. Vide order No. 1041-61 dated 18.03.2010, Department of Environment, of GNCT of Delhi has issued direction as under:<br>*"The permission of borewell installation for agriculture purpose* |

| | | | |
|---|---|---|---|
| | | | *may be granted to genuine agriculturists by the advisory committee under concerned Deputy Commissioner (Revenue) based on the recommendation of BDO and agriculture department/I&FC Department of GNCT of Delhi. Agriculture activity may be verified from Khasra Girdhawari documents also also basis on actual evalution".*<br>As recommended by DJB, I&FC and BDO and as verified by Patwari, the Committee has **Allowed** the proposal for ground water extraction through bore well for agriculture irrigation purpose subject to the condition:<br>1. Purpose of the bore well will be only for agriculture irrigation.<br>2. DJB will provide all subsurface data like strata chart, well assembly design, discharge & water level (SWL & PWL) to CGWB at oicnd-cgwb@nic.in<br>3. Initial permission for borewell will be for one year with the condition to use only in case of short supply of water and thereafter will be reviewed for further continuation.<br>4. All other relevant guidelines/orders of the Govt. must be followed. |

**This issues with approval of District Magistrate, Central District.**

Ranjan 06/06/22

**(RAJIV RANJAN) DANICS**
**Nodal Officer (Ground Water)/**
**Sub Divisional Magistrate (CIVIL LINES)**
**(Central District)**

**No. F. SDM/NGT/CL/2022/** 8569-80 **Dated:** 06/06/2022

**To**

1. **Chief Engineer Nominated by CEO Delhi Jal Board.**
2. **Supdt. Engineer (Central), Delhi Jal Board, Varunalaya, Phase-II Karol Bagh, Delhi.**

3. Executive Engineer (I) Central, Varunalaya, Phase-II, Karol Bagh, Delhi.
4. Dy. Commissioner North DMC, City S.P. Zone, Delhi.
5. Dy. Commissioner North DMC, Civil Lines Zone, Civil Lines, Delhi.
6. SDM (Kotwali), SDM (Karol Bagh)
7. Sr. Hydrogeological, Scientist, CGWB, 18/11, Jam Nagar House, New Delhi.
8. Ex. Engineers, DPCC, 5th Floor, ISBT, Kashmere Gate, Delhi.
9. Deputy General Manager/Env, Delhi Metro Rail Corporation Limited, Metro Bhawan, Fire Brigade Lane, Barakhamba Road, New Delhi.
10. AE-III, I&FC, Bharat Nagar, Delhi-110052.
11. BDO (Central).

Copy to:-

1. SDM-V (HQ) 5, Sham Nath Marg, New Delhi.
2. PA to DM (Central).
3. PA to ADM (Central).

Ranjan 06/06/22

**(RAJIV RANJAN) DANICS**
**Nodal Officer (Ground Water)/**
**Sub Divisional Magistrate (CIVIL LINES)**
**(Central District)**

NORTH DELHI MUNICIPAL CORPORATION
Office of the Director, (Hort.)
Horticulture Department, 16th Floor, Block-E-1
Dr. S.P. Mukherjee Civic Centre
New Delhi-110002.

No. Dir.Hort./HQ/2018/ 1087

Dated: 30/11/2018

Dy. General Manager/Env
Delhi Metro Rail Corporation
Delhi

**Kind Attn: Sh. Vikash Singhal**

**Sub: In-principle approval for Supplying de-watered water from DMRC construction site to Roshnara Bagh for non-potable purposes.**

Dear Sir,

In reference to your letter No. DMRC/ENV/HGS-Ph-IV/2018 dated 24.10.2018 regarding In-principle approval for supplying of de-watered water from DMRC Construction site to Roshnara Bagh for non-potable purposes.

In this regard in-principle approval has been accorded by the competent authority for supplying of de-watered water from DMRC Construction site to Roshnara Bagh for non-potable purposes and allow to laying of pipe line to Roshnara Bagh at your own cost (Free of Cost).

Thanking you

(RANBIR SINGH)
Director, Horticulture

केन्द्रीय लोक निर्माण विभाग
कच्चा पानी आपूर्ति मंडल,
4, पंडितपंत मार्ग, नई दिल्ली–1.
फोन न0 23325708, 23354338 फैक्स न0 23710692

संख्या: 63(33)/का0अभि0/क0पा0आ0मं0/1767 दिनांक 27/X/2018

To,

Sh. Vikash Singhal
Dy. General Manager/Env
Delhi Metro Rail Corporation Ltd.,
Metro Bhawan, Fire Brigade Lane,
Barakhamba Road, New Delhi-110001.

Sub:- In-principle approval for supplying de-watered water from DMRC-
(A) Construction to Shantivan/Rajghat area for horticulture purpose.
(B) Construction to Indraprastha Park for horticulture purpose.

Ref.: Your office letter no.1-DMRC/ENV/HGS-Ph-IV/266/2018/595 dated 22/09/2018.
2- DMRC/ENV/HGS-Ph-IV/266/2018/593 dated 22/09/2018.

Sir,

In response to reference and subject cited above, competent authority has approved to utilize underground surplus water produced during DMRC construction work, in areas such as Shanti Van, Raj Ghat, Delhi Chalo Park, Samata Sthal, Vijay Ghat, Ferozshah Kotla Stadium, Jai Narayan Park, I.T.O. It can also be utilized to irrigate India Gate, Rajpath and even filling water bodies at Rajpath, subject to following condition.:-

1. Estimate for augmentation for water supply line will be submitted by this office to DMRC as per their time to time requisition and amount will have to be deposited by DMRC accordingly.
2. Any Permission/ Approval for laying water supply line will be taken by DMRC from local bodies.
3. Water will be supplied free of cost and no payment in this regard shall be made to DMRC.

This for your kind information and necessary action please.

Yours Faithfully

Executive Engineer,
Unfiltered Water Supply Division,
Central Public Works Department
4, Pandit Pant Marg, New Delhi. 110001

Seen 29/X

केन्द्रीय लोक निर्माण विभाग
कच्चा पानी आपूर्ति मंडल,
4, पंडित पंत मार्ग, नई दिल्ली –1.
फोन न0 23325708, 23354338 फैक्स न023710692

संख्याः 24(6)/क0पा0आ0मं0/1627 दिनांक 18/9/2018

सेवामें,

Mr. Vikash Singhal,
Dy. General Manager/Env.,
Delhi Metro Rail Corporation Ltd.,
New Delhi 110092

विषयः– In-principle approval of supplying de-watered water from DMRC construction to CPWD Unfiltered water tank at Pusa Road.

सन्दर्भः– Your office letter no. DMRC/ENV/HGS-Ph-IV/266/2018/581 dated 17/09/2018

महोदय,

In reference and subject cited above, in principle approval for filling surplus water at Bhuli Bhatiari Tank is conveyed subject to following condition:-

1. Pipe line for supplying surplus water supply will be laid at your own cost.
2. Any Permission/ Approval for laying water supply line will be taken by your department from local bodies.
3. Any damage done during the process will be made good.
4. Water will be supplied free of cost and no payment in this regard shall be made.

This is for your kind information and necessary action please.

Yours Sincerely.

कार्यपालक अभियन्ता,
क0पा0आ0मं0, के0लो0नि0वि0,
4–6 पं0पंत मार्ग, नई दिल्ली।

प्रतिलिपिः–

1. सहायक अभियन्ता–2, क0पा0आ0मं0, के0लो0नि0वि0, नई दिल्ली को सूचनार्थ एवम् आवश्यक कार्यवाही हेतु प्रेषित है।

कार्यपालक अभियन्ता

NORTHERN RAILWAY

No. Sr. DEN/Works/DMRC/D.E.Watering
Dated:-29.11.2018

DRM's Office
New Delhi

Dy. General Manager/Env.
Delhi Metro Rail Corporation Ltd.,
New Delhi.

Sub:- In-principle approval for supplying de-watered water from DMRC construction to New Delhi, Sadar Bazzar and Hazrat Nizamuddin Railway stations.

Ref:- Your letter No. DMRC/ENV/HGS-Ph-IV/266/2018/799 dated 13.11.2018.

Competent Authority (DRM/DLI) has accorded In-principle approval to your above indicated proposal. You are requested to submit MOU along with plan please.

(R.K. Verma)
Sr. DEN/Works

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*भारतीय मानक*

# छतों पर वर्षा जल संग्रहण — मार्गदर्शी सिद्धान्त

*Indian Standard*

# ROOF TOP RAINWATER HARVESTING — GUIDELINES

ICS 13.060.10



**BUREAU OF INDIAN STANDARDS**
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*May* 2008

**Price Group 7**

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Ground Water and Related Investigations Sectional Committee had been approved by the Water Resources Division Council.

Rainwater harvesting is an option which has been adopted in many parts of the world where due to increase in population conventional water supply system has failed to meet the needs of the people. The term 'Water Harvesting' connotes collection and storage of rainwater and also other activities aimed at harvesting surface water, prevention of loss through evaporation and seepage.

Natural recharge to ground water has reduced due to shrinkage of open area consequent to increased urban activities. Ground water levels have registered a marked decline, unplanned disposal of waste has resulted in deterioration of ground water quality. In view of the gap between demand and supply there is an utmost need for adopting roof top rainwater harvesting and augmenting ground water storage.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# ROOF TOP RAINWATER HARVESTING — GUIDELINES

## 1 SCOPE

This standard lays down guidelines for roof top rainwater harvesting.

## 2 REFERENCE

The following standard contains provision, which through reference in this text constitutes provision of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard given below:

| *IS No.* | *Title* |
|---|---|
| 14476 (Part 6) : 1998 | Test pumping of water wells — Code of practice: Part 6 Special tests |

## 3 GENERAL

Roof top rainwater collection is one of the solutions for solving or reducing the problem of water availability, where there is inadequate ground water supply and surface sources are either lacking or insignificant. In this system, rainwater falling on roofs of houses and other buildings is collected through a system of pipes and semi-circular channels of galvanized iron or PVC and stored in tanks suitably located on the ground or underground for direct use or for recharging ground water aquifers. Urban housing complexes/residential buildings and institutional buildings have large roof area and are amendable for rainwater harvesting. This practice is in vogue at the individual household level in remote hilly areas with high rainfall and in some semi-arid areas in the plains.

## 4 ADVANTAGES OF ROOF TOP RAINWATER HARVESTING

a) One of the appropriate options for augmenting ground water recharge/storage in urban areas, where natural recharge has been considerably reduced due to increased urban activities and not much land is available for implementing any other artificial recharge measure. In rural areas also, roof top rainwater harvesting can supplement the domestic requirements.

b) Rainwater runoff, which otherwise flows through sewers and storm drains and is wasted, can be harvested and utilized.

c) Helps in reducing the frequent drainage congestion in urban areas where fast rate of urbanization has reduced availability of open surfaces.

d) Recharging of aquifers with harvested water improves the quality of ground water through dilution.

e) The harnessed rainwater can be utilized when needed at the time and place of scarcity.

f) The structures required for harvesting are simple, economical and Eco-friendly.

g) In coastal areas over extraction of ground water leads to saline water ingress. Therefore, recharging of ground water aquifer in such areas helps to control saline water ingress.

h) Storing of harvested water under ground through aquifer recharge, wherever feasible, is advantageous as such storage is not exposed to evaporation and pollution. Aquifers serve as a distribution system as well supplying water when required.

## 5 FACTORS DETERMINING TYPE/SYSTEM OF RAINWATER HARVESTING

**5.0** There are many factors that determine the total quantity of rainwater that can be harvested in a particular area and the system that would be appropriate for efficiently harvesting this quantity. Some of these are given in **5.1** to **5.5**.

### 5.1 Rainfall Quantity

The total volume of rainwater available from any roof top surface is a product of total rainfall and the surface area of collection. A runoff coefficient is usually applied to account for infiltration, evaporation and other losses and it varies from 0.8 to 0.95. In order to estimate the average annual/monsoon runoff from rooftop area in any location, the average annual/monsoon rainfall data for the location need to be used and using Tables 1 and 2, the water availability for flat and sloping roof can be worked out.

### 5.2 Rainfall Pattern

Rainfall pattern as well as total rainfall, will often determine the feasibility of a rainwater harvesting system. In areas where rainfall occurs regularly in most parts throughout the year, implies that the storage requirement is low and hence the system cost will be

**Table 1 Water Availability for a Given Roof Top Area and Rainfall (For Flat Roofs)**
(*Clause* 5.1)

| Sl No. | Roof Top Area $m^2$ | Rainfall, mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 100 | 200 | 300 | 400 | 500 | 600 | 800 | 1 000 | 1 200 | 1 400 | 1 600 | 1 800 | 2 000 |
| | | Water availability ($m^3$) | | | | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| i) | 20 | 1.6 | 3.2 | 4.8 | 6.4 | 8 | 9.6 | 12.8 | 16 | 19.2 | 22.4 | 25.6 | 28.8 | 32 |
| ii) | 30 | 2.4 | 4.8 | 7.2 | 9.6 | 12 | 14.4 | 19.2 | 24 | 28.8 | 33.6 | 38.4 | 43.2 | 48 |
| iii) | 40 | 3.2 | 6.4 | 9.6 | 12.8 | 16 | 19.2 | 25.6 | 32 | 38.4 | 44.8 | 51.2 | 57.6 | 64 |
| iv) | 50 | 4 | 8 | 12 | 16 | 20 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 |
| v) | 60 | 4.8 | 9.6 | 14.4 | 19.2 | 24 | 28.8 | 38.4 | 48 | 57.6 | 67.2 | 76.8 | 86.4 | 96 |
| vi) | 70 | 5.6 | 11.2 | 16.8 | 22.4 | 28 | 33.6 | 44.8 | 56 | 67.2 | 78.4 | 89.6 | 100.8 | 112 |
| vii) | 80 | 6.4 | 12.8 | 19.2 | 25.6 | 32 | 38.4 | 51.2 | 64 | 76.8 | 89.6 | 102.4 | 115.2 | 128 |
| viii) | 90 | 7.2 | 14.4 | 21.6 | 28.8 | 36 | 43.2 | 57.6 | 72 | 86.4 | 100.8 | 115.2 | 129.6 | 144 |
| ix) | 100 | 8 | 16 | 24 | 32 | 40 | 48 | 64 | 80 | 96 | 112 | 128 | 144 | 160 |
| x) | 150 | 12 | 24 | 36 | 48 | 60 | 72 | 96 | 120 | 144 | 168 | 192 | 216 | 240 |
| xi) | 200 | 16 | 32 | 48 | 64 | 80 | 96 | 128 | 160 | 192 | 224 | 256 | 288 | 320 |
| xii) | 250 | 20 | 40 | 60 | 80 | 100 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 |
| xiii) | 300 | 24 | 48 | 72 | 96 | 120 | 144 | 192 | 240 | 288 | 336 | 384 | 432 | 480 |
| xiv) | 400 | 32 | 64 | 96 | 128 | 160 | 192 | 256 | 320 | 384 | 448 | 512 | 576 | 640 |
| xv) | 500 | 40 | 80 | 120 | 160 | 200 | 240 | 320 | 400 | 480 | 560 | 640 | 720 | 800 |
| xvi) | 1 000 | 80 | 160 | 240 | 320 | 400 | 480 | 640 | 800 | 960 | 1 120 | 1 280 | 1 440 | 1 600 |
| xvii) | 2 000 | 160 | 320 | 480 | 640 | 800 | 960 | 1 280 | 1 600 | 1 920 | 2 240 | 2 560 | 2 880 | 3 200 |
| xviii) | 3 000 | 240 | 480 | 720 | 960 | 1 200 | 1 440 | 1 920 | 2 400 | 2 880 | 3 360 | 3 840 | 4 320 | 4 800 |

**Table 2 Water Availability for a Given Roof Top Area and Rainfall (For Sloping Roofs)**
(*Clause* 5.1)

| Sl No. | Roof Top Area $m^2$ | Rainfall, mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 100 | 200 | 300 | 400 | 500 | 600 | 800 | 1 000 | 1 200 | 1 400 | 1 600 | 1 800 | 2 000 |
| | | Water availability ($m^3$) | | | | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
| i) | 20 | 1.9 | 3.8 | 5.7 | 7.6 | 9.5 | 11.4 | 15.2 | 19 | 22.8 | 26.6 | 30.4 | 34.2 | 38 |
| ii) | 30 | 2.9 | 5.7 | 8.6 | 11.4 | 14.3 | 17.1 | 22.8 | 28.5 | 34.2 | 39.9 | 45.6 | 51.3 | 57 |
| iii) | 40 | 3.8 | 7.6 | 11.4 | 15.2 | 19 | 22.8 | 30.4 | 38 | 45.6 | 53.2 | 60.8 | 68.4 | 76 |
| iv) | 50 | 4.8 | 9.5 | 14.3 | 19 | 23.8 | 28.5 | 38 | 47.5 | 57 | 66.5 | 76 | 85.5 | 95 |
| v) | 60 | 5.7 | 11.4 | 17.1 | 22.8 | 28.5 | 34.2 | 45.6 | 57 | 68.4 | 79.8 | 91.2 | 102.6 | 114 |
| vi) | 70 | 6.7 | 13.3 | 20.0 | 26.6 | 33.3 | 39.9 | 53.2 | 66.5 | 79.8 | 93.1 | 106.4 | 119.7 | 133 |
| vii) | 80 | 7.6 | 15.2 | 22.8 | 30.4 | 38 | 45.6 | 60.8 | 76 | 91.2 | 106.4 | 121.6 | 136.8 | 152 |
| viii) | 90 | 8.6 | 17.1 | 25.7 | 34.2 | 42.8 | 51.3 | 68.4 | 85.5 | 102.6 | 119.7 | 136.8 | 153.9 | 171 |
| ix) | 100 | 9.5 | 19 | 28.5 | 38 | 47.5 | 57 | 76 | 95 | 114 | 133 | 152 | 171 | 190 |
| x) | 150 | 14.3 | 28.5 | 42.8 | 57 | 71.3 | 85.5 | 114 | 142.5 | 171 | 199.5 | 228 | 256.5 | 285 |
| xi) | 200 | 19 | 38 | 57 | 76 | 95 | 114 | 152 | 190 | 228 | 266 | 304 | 342 | 380 |
| xii) | 250 | 23.8 | 47.5 | 71.3 | 95 | 118.8 | 142.5 | 190 | 237.5 | 285 | 332.5 | 380 | 427.5 | 475 |
| xiii) | 300 | 28.5 | 57 | 85.5 | 114 | 142.5 | 171 | 228 | 285 | 342 | 399 | 456 | 513 | 570 |
| xiv) | 400 | 38 | 76 | 114 | 152 | 190 | 228 | 304 | 380 | 456 | 532 | 608 | 684 | 760 |
| xv) | 500 | 47.5 | 95 | 143 | 190 | 237.5 | 285 | 380 | 475 | 570 | 665 | 760 | 855 | 950 |
| xvi) | 1 000 | 95 | 190 | 285 | 380 | 475 | 570 | 760 | 950 | 1 140 | 1 330 | 1 520 | 1 710 | 1 900 |
| xvii) | 2 000 | 190 | 380 | 570 | 760 | 950 | 1 140 | 1 520 | 1 900 | 2 280 | 2 660 | 3 040 | 3 420 | 3 800 |
| xviii) | 3 000 | 285 | 570 | 855 | 1 140 | 1 425 | 1 710 | 2 280 | 2 850 | 3 420 | 3 990 | 4 560 | 5 130 | 5 700 |

correspondingly low and *vice versa*. Conversely, areas where total rainfall occurs during 1-2 months, the water collected during the monsoon has to be stored for use in remaining months throughout the year, which requires large storage structures as well as arrangement for some treatment.

### 5.3 Intensity of Rainfall

The maximum intensity of rainfall will decide the peak flow, which is to be harvested and depending upon the peak flow, the gutter size for sloping roof and diameter of drainage pipe has to be calculated.

### 5.4 Collection Surface Area

For roof top rainwater harvesting, the collection area is restricted by the size of the roof of the dwelling unit. Sometimes other surfaces such as terrace, balconies and other projections are used to supplement the roof top collection area.

### 5.5 Storage Capacity

The storage tank is usually the most expensive component of rainwater harvesting system. Hence a careful analysis is required for design of storage tank capacity.

## 6 STORAGE OF WATER IN A STORAGE TANK FOR DIRECT USE

### 6.1 Design of System Components

A roof top catchment system has three main components, namely, a roof, a guttering and first flush device and a storage tank:

a) *Roof* — In this system, only roof top is the catchment as shown in Fig. 1 and Fig. 2. The roofing should be of galvanized iron sheets (G.I.), aluminium, clay tiles, asbestos or concrete. In case of thatch-roof, it may be covered with waterproof LDPE sheeting. The roof should be smooth, made of non-toxic material sufficiently large to fill the tank with the available rainfall conditions. Existing roofs of houses and public buildings can be used for a roof top catchment system. In some cases enlarged or additional roofed structures can be built.

b) *Guttering and First-Flush Device* — Guttering is intended to protect the building by collecting the water running of the roof and direct it, via a downpipe, to the storage tank. Gutter is provided along the edge of the roof. It is fixed with a gentle slope towards down-pipe, which is meant for free flow of water to the storage tank. This may be made up of G.I. sheet, wood, bamboo or any other locally available material. The downpipe used should be at least 100 mm diameter and be provided with a 20 mesh wire screen at the inlet to prevent dry leaves and other debris from entering it. The gutter size may be worked out using any standard formula of hydraulics or using Table 3.

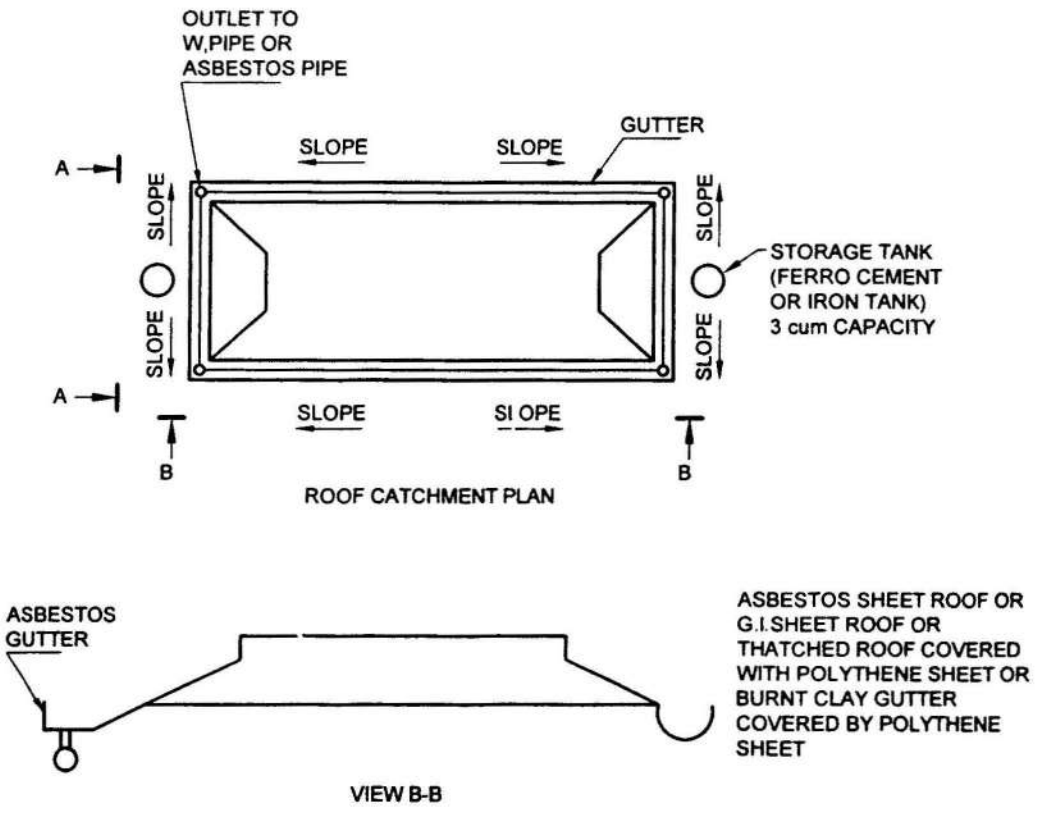
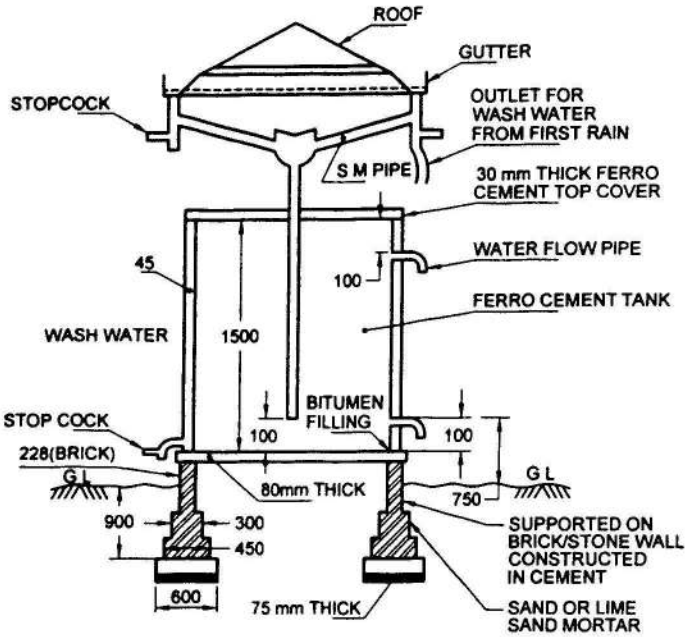
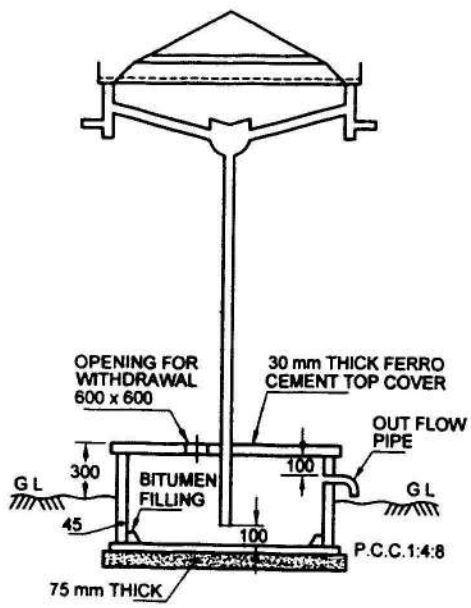



FIG. 1 RAINWATER HARVESTING SYSTEM




WATER TANK ABOVE GROUND




WATER TANK UNDER GROUND

All dimensions in millimetres.

FIG. 2 RAINWATER HARVESTING STRUCTURES

**Table 3 Diameter of Gutter and Width of G.I. Sheet**

[*Clause* 6.1(b)]

| Sl No. | Roof Top Area | | Rainfall Intensity, mm h | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $m^2$ | | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |
| | | | Diameter (*D*) of Channel and Width (*W*) of G.I. Sheet (mm) | | | | | | | | | | | | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
| i) | 10 | *D* | 20 | 23 | 26 | 28 | 30 | 32 | 33 | 35 | 36 | 39 | 41 | 43 | 45 | 47 |
| | | *W* | 51 | 56 | 60 | 64 | 67 | 70 | 72 | 74 | 77 | 81 | 84 | 88 | 91 | 93 |
| ii) | 20 | *D* | 26 | 30 | 33 | 36 | 39 | 41 | 43 | 45 | 47 | 50 | 53 | 56 | 58 | 61 |
| | | *W* | 60 | 67 | 72 | 77 | 81 | 84 | 88 | 91 | 93 | 99 | 103 | 108 | 112 | 115 |
| iii) | 30 | *D* | 30 | 35 | 39 | 42 | 45 | 48 | 50 | 52 | 54 | 58 | 62 | 65 | 68 | 71 |
| | | *W* | 67 | 74 | 81 | 86 | 91 | 95 | 99 | 102 | 106 | 112 | 117 | 122 | 127 | 131 |
| iv) | 40 | *D* | 33 | 39 | 43 | 47 | 50 | 53 | 56 | 58 | 61 | 65 | 69 | 72 | 76 | 79 |
| | | *W* | 72 | 81 | 88 | 93 | 99 | 103 | 108 | 112 | 115 | 122 | 128 | 134 | 139 | 144 |
| v) | 50 | *D* | 36 | 42 | 47 | 51 | 54 | 58 | 61 | 63 | 66 | 71 | 75 | 79 | 82 | 86 |
| | | *W* | 77 | 86 | 93 | 100 | 106 | 111 | 115 | 120 | 124 | 131 | 138 | 144 | 149 | 154 |
| vi) | 60 | *D* | 39 | 45 | 50 | 54 | 58 | 62 | 65 | 68 | 71 | 76 | 80 | 84 | 88 | 92 |
| | | *W* | 81 | 91 | 99 | 106 | 112 | 117 | 122 | 127 | 131 | 139 | 146 | 152 | 158 | 164 |
| vii) | 70 | *D* | 41 | 48 | 53 | 58 | 62 | 65 | 69 | 72 | 75 | 80 | 85 | 89 | 93 | 97 |
| | | *W* | 84 | 95 | 103 | 111 | 117 | 123 | 128 | 133 | 138 | 146 | 153 | 160 | 167 | 172 |
| viii) | 80 | *D* | 43 | 50 | 56 | 61 | 65 | 69 | 72 | 76 | 79 | 84 | 89 | 94 | 98 | 102 |
| | | *W* | 88 | 99 | 108 | 115 | 122 | 128 | 134 | 139 | 144 | 152 | 160 | 167 | 174 | 180 |
| ix) | 90 | *D* | 45 | 52 | 58 | 63 | 68 | 72 | 76 | 79 | 82 | 88 | 93 | 98 | 102 | 107 |
| | | *W* | 91 | 102 | 112 | 120 | 127 | 133 | 139 | 144 | 149 | 158 | 167 | 174 | 181 | 188 |
| x) | 100 | *D* | 47 | 54 | 61 | 66 | 71 | 75 | 79 | 82 | 86 | 92 | 97 | 102 | 107 | 111 |
| | | *W* | 93 | 106 | 115 | 124 | 131 | 138 | 144 | 149 | 154 | 164 | 172 | 180 | 188 | 194 |
| xi) | 150 | *D* | 54 | 63 | 71 | 77 | 82 | 87 | 92 | 96 | 100 | 107 | 113 | 119 | 124 | 129 |
| | | *W* | 106 | 120 | 131 | 141 | 149 | 157 | 164 | 170 | 176 | 188 | 197 | 207 | 215 | 223 |
| xii) | 200 | *D* | 61 | 71 | 79 | 86 | 92 | 97 | 102 | 107 | 111 | 119 | 126 | 132 | 138 | 144 |
| | | *W* | 115 | 131 | 144 | 154 | 164 | 172 | 180 | 188 | 194 | 207 | 218 | 228 | 237 | 246 |
| xiii) | 250 | *D* | 66 | 77 | 86 | 93 | 100 | 105 | 111 | 116 | 121 | 129 | 137 | 144 | 150 | 156 |
| | | *W* | 124 | 141 | 154 | 166 | 176 | 186 | 194 | 202 | 209 | 223 | 235 | 246 | 256 | 266 |
| xiv) | 300 | *D* | 71 | 82 | 92 | 100 | 107 | 113 | 119 | 124 | 129 | 138 | 146 | 154 | 161 | 167 |
| | | *W* | 131 | 149 | 164 | 176 | 188 | 197 | 207 | 215 | 223 | 237 | 250 | 262 | 273 | 283 |
| xv) | 400 | *D* | 79 | 92 | 102 | 111 | 119 | 126 | 132 | 138 | 144 | 154 | 163 | 172 | 179 | 186 |
| | | *W* | 144 | 164 | 180 | 194 | 207 | 218 | 228 | 237 | 246 | 262 | 276 | 290 | 302 | 313 |
| xvi) | 500 | *D* | 86 | 100 | 111 | 121 | 129 | 137 | 144 | 150 | 156 | 167 | 177 | 186 | 195 | 203 |
| | | *W* | 154 | 176 | 194 | 209 | 223 | 235 | 246 | 256 | 266 | 283 | 299 | 313 | 326 | 339 |
| xvii) | 1 000 | *D* | 111 | 129 | 144 | 156 | 167 | 177 | 186 | 195 | 203 | 217 | 230 | 242 | 253 | 263 |
| | | *W* | 194 | 223 | 246 | 266 | 283 | 299 | 313 | 326 | 339 | 361 | 381 | 400 | 417 | 433 |
| xvii) | 2 000 | *D* | 144 | 167 | 186 | 203 | 217 | 230 | 242 | 253 | 263 | 282 | 298 | 314 | 328 | 341 |
| | | *W* | 246 | 283 | 313 | 339 | 361 | 381 | 400 | 417 | 433 | 462 | 489 | 513 | 535 | 556 |
| xviii) | 3 000 | *D* | 167 | 195 | 217 | 236 | 253 | 268 | 282 | 294 | 306 | 328 | 347 | 365 | 382 | 397 |
| | | *W* | 283 | 326 | 361 | 391 | 417 | 441 | 462 | 482 | 501 | 535 | 566 | 594 | 620 | 644 |

NOTES

1 Provide minimum diameter of channel of 100 mm and width of sheet 176 mm.

2 Diameter to be limited to 300 mm and width of sheet 510 mm.

For all tanks having roof catchment, the first runoff of rainwater from the roof should be discarded. This helps keep the water potable because this first flush contains large quantities of dust, leaves and other impurities. This can also be prevented by installation of a gate valve at the end of down pipe at ground level.

c) *Tank* — Storage tank can be constructed underground or above ground. The underground tank may be of masonry or R.C.C. structure suitably lined with water proofing materials. The surface tank may be of G.I. Sheet, R.C.C., Plastic/HDP or Ferrocement Tank placed at elevation on a raised platform as shown in Fig. 3. Choice of the tank depends on locally available materials and space available. When the tank is constructed underground, at least 30 cm of the tank should remain above ground. Water

tanks using ferrocement technology come in different designs with volumes ranging between 2 $m^3$ and 200 $m^3$. For example, a free standing cylindrical tank can be built in sizes between 10 $m^3$ and 30 $m^3$, while a capacity of up to 200 $m^3$ is possible with sub-surface covered tanks. The latter is economical when the capacity exceeds 50 $m^3$.

An alternate design, avoiding framework, involves erecting a circular frame made of welded-mesh bars spaced at 15 cm and covered with chicken wire mesh (2.5 cm gauge) onto a reinforced concrete base. This is then covered on the outside with sacks or cloth and two coats of a 1.5 cm layer of mortar (1 part cement, 3 parts sand) and plastered along the inner walls to produce the tank wall. Two further coats of plaster are added, one on the outside after removing the sacks and one on the inside to provide a tank wall thickness of 5 cm. A waterproof coat of cement and water is then added to the tank's inner wall.

When the wall is complete, a wooden frame is constructed inside the tank to support the metal template made from old oil drums, which forms the mould for the domed roof. The roof is also reinforced with welded-mesh and chicken wire. For quality, the floor, walls and the roof need to be cured by moistening their surface for at least a week. This should start immediately after each component is ready.

To facilitate cleaning of the tank, an outlet pipe may be fitted and fixed in the tank at bottom level. The size of the tank will depend upon the factors such as daily demand, duration of dry spell, catchment area and rainfall.

The tank is provided with:

a) A manhole of 0.60 m × 0.60 m size with cover,
b) Vent pipe/overflow pipe of 100 mm diameter, and
c) Drain pipe of 100 mm diameter at bottom.

The withdrawal of water from the underground tank is

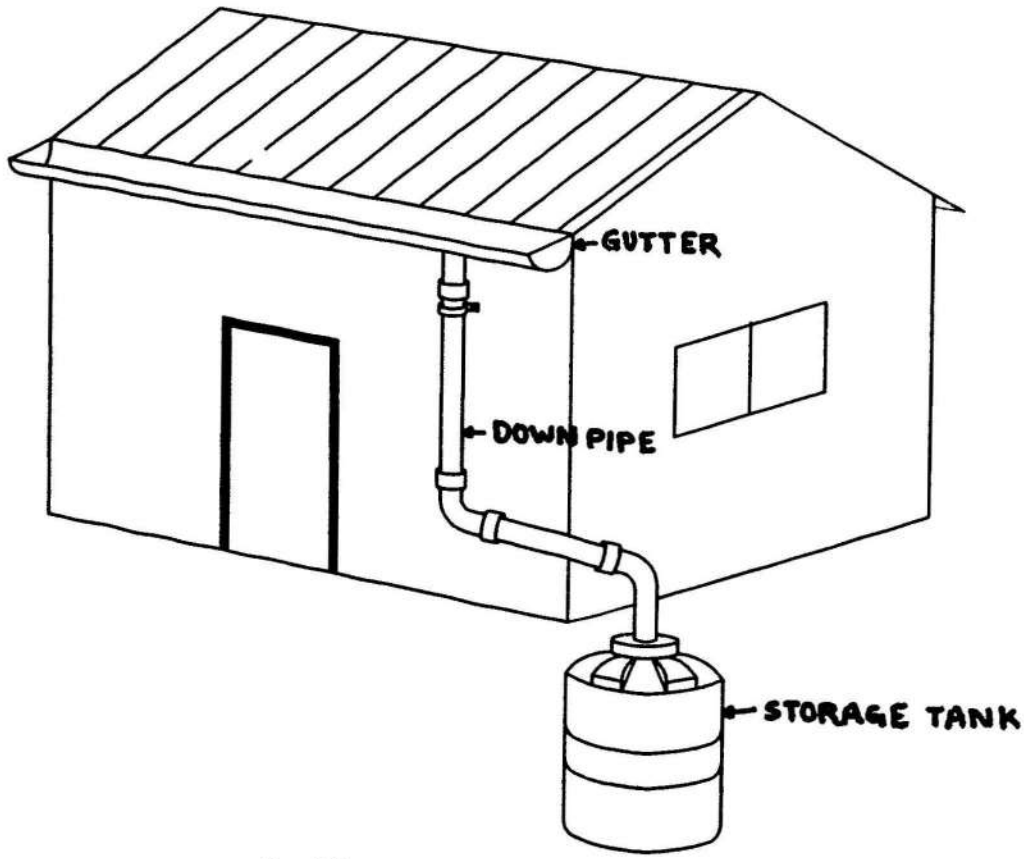



FIG. 3 STORAGE OF RAINWATER IN A HDPE TANK

done by installing a hand pump . In case of surface tank, taps may be provided. The overflow pipe should be connected to a drain/recharge pit.

Before the tank is put into use it should be thoroughly cleaned and disinfected with high dosage of chlorine. Since the water should remain stored for quite a long time, periodical disinfection of stored water is essential to prevent growth of pathogenic bacteria.

### 6.2 Site Assessment

Assessing the site conditions is the first step towards a sound system design. The five main site conditions to be assessed are:

a) Availability of suitable roof catchment,
b) Foundation characteristics of soil near the house,
c) Location of trees,
d) Estimated runoff to be captured per unit area of the roof, and
e) Availability and location of construction material.

### 6.3 Estimating the Size of the Required System

The size of the catchment area and tank should be enough to supply sufficient water for the users during the dry period. Assuming a full tank at the beginning of the dry season (and knowing the average length of the dry season and the average water use), the volume of the tank can be calculated by the following formula:

$$V = t \times n \times q$$

where

$V$ = volume of tank, in litres;
$t$ = length of the dry season (days);
$n$ = number of people using the tank; and
$q$ = consumption in litres per capita per day.

If, for example, 20 lpd ($q$) is agreed upon and a dry period of 100 days ($t$) is normally not exceeded, a storage volume of 10 $m^3$ would be required for a family of 5 members ($n$).

$V = 100\ (t) \times 5\ (n) \times 20\ (q) = 10\ 000$ litre or 10 $m^3$

The required catchment area (that is the area of the roof) can be determined by dividing the volume of the tank by the accumulated average rainfall volume (in litres) per unit area (in $m^2$) over the preceding wet months and multiplying this with the runoff coefficient, which varies from 0.8 to 0.95 depending upon type of roof.

### 6.4 General Design Features

Roof top water harvesting systems can provide good quality potable water, if the design features outlined below are taken into account:

a) The substances that go into the making of the roof should be non-toxic and chemically inert.
b) Roof surfaces should be smooth, hard and dense since they are easier to clean and are less likely to be damaged and release materials/fibres into the water.
c) Roof painting is not advisable since most paints contain toxic substances and may peel off.
d) No overhanging trees should be left near the roof.
e) Nesting of birds on the roof should be prevented.
f) All gutter ends should be fitted with a wire mesh screen to keep out leaves, etc.
g) Appropriate arrangement for discarding the first flow of rainfall should be made.
h) A hygienic soak away channel should be built at water outlets and a screened overflow pipe should be provided.
j) The storage tank should have a tight fitting roof that excludes light, a manhole cover and a flushing pipe at the base of the tank (for standing tanks).
k) There should be a reliable sanitary extraction device such as a gravity tap or a hand pump to avoid contamination of the water in the tank.
m) There should be no possibility of contaminated wastewater flowing into the tank (especially for tanks installed at ground level).
n) Water from other sources, unless it is a reliable source, should not be emptied into the tank through pipe connections or the manhole cover.

### 6.5 Management and Maintenance

Roof top catchment tanks, like all water supply systems, demand periodic management and maintenance to ensure reliable and quality water supply. If the various components of the system are not regularly cleaned, water use is not properly managed, problems are not identified or necessary repairs not performed, the roof catchment system will cease to provide reliable and good quality water.

Following is a time table of maintenance and management requirements that can provide a basis for monitoring and checking:

a) During the rainy season, the whole system (roof catchment, gutters, pipes, screens, first-

flush and overflow) should be checked before and after each rain and preferably cleaned after every dry period exceeding a month.

b) At the end of the dry season and just before the first shower of rain is anticipated, the storage tank should be scrubbed and flushed of all sediment and debris (the tank should be refilled afterwards with a few centimeters of clean water to prevent cracking). Ensure timely service (before the first rains are due) of all tank fixtures, including replacement of all worn screens and servicing of the outlet tap or hand pump.

### 6.6 Water Use Management

Control over the quantity of water abstracted from the tank is important to optimize water use. Water use should be managed so that the supply is sufficient to last through the dry season. Failure to do so will mean exhausting all the stored water. On the other hand, underutilization of the water source due to severe rationing should also be avoided.

## 7 RECHARGE OF HARVESTED RAINWATER IN AQUIFERS

**7.0** The runoff water collected from roof tops can artificially recharge and augment the depleting ground water resources especially in the urban areas, where the natural recharge has diminished considerably. The areas having depth to water table greater than 8 m below ground level and underlain by permeable strata are suitable for artificial recharge.

### 7.1 Design of Efficient Artificial Recharge Structures

The design involves consideration of data on hydrological and hydrogeological aspects and hydrometeorological parameters. The background information to be collected is as given below:

a) Layout plan of the area.
b) Demarcation of the roof, paved and open areas.
c) Delineation of storm water drains and flow of storm water.
d) Details of the existing ground water abstraction structures in and around the vicinity of the project site.
e) Computation of the runoff for recharge.

Apart from the above mentioned parameters, selection of appropriate recharge structure depends on the availability of space for construction of recharge structures and invert levels of storm water drains at inlets to recharge structures. While preparing the recharge scheme, depth and shape of the storage facility in recharge structure depends on the availability of runoff, depth of storm water drainage and space availability in an area. The recharge scheme as prepared may also be got vetted by appropriate authorities and experts to incorporate suggestions for improvement.

### 7.2 Recharge Structures

The most suitable recharge structures for roof top rain water harvesting are:

a) Recharge pits;
b) Recharge trenches;
c) Recharge through dry or operational dugwells;
d) Recharge through abandoned/existing tube wells; and
e) Recharge wells, etc.

#### 7.2.1 *Recharge Pits*

a) In alluvial areas where permeable rocks are exposed on the land surface or at very shallow depth, recharge pits are suitable for artificial recharge of water collected from the roof tops.
b) The technique is suitable for buildings having a roof area of 100 $m^2$. The recharge pits are constructed for recharging the shallow aquifers.
c) Recharge pits may be of any shape and size and are generally constructed 1 to 2 m wide and 2 to 3 m deep which are backfilled with boulders (5-20 cm), gravels (5-10 mm), and coarse sand (1.5-2 mm) in graded form — boulders at the bottom, gravels in between and coarse sand at the top so that the silt content that will come with runoff will be deposited on the top of the coarse sand layer and can easily be removed. For smaller roof area, pit may be filled with broken bricks/cobbles.
d) A mesh should be provided at the roof so that leaves or any other solid waste/debris are prevented from entering the pit and a desilting/ collection chamber may also be provided at the ground to arrest the flow of finer particles to the recharge pit.
e) The top layer of sand should be cleaned periodically to maintain the recharge rate.

#### 7.2.2 *Recharge Trenches*

a) Recharge trenches are suitable for buildings having roof area of 200-300 $m^2$ and where permeable strata is available at shallow depths.
b) Trench may be 0.5 to 1 m wide, 1 to 1.5 m

deep and 10 to 20 m long depending upon availability of water to be recharged.

c) These are backfilled with boulders (5-20 cm), gravels (5-10 mm), and coarse sand (1.5-2 mm) in graded form — boulders at the bottom, gravel in between and coarse sand at the top so that the silt content that will come with runoff will be deposited on the top of the sand layer and can easily be removed.

d) A mesh should be provided at the roof so that leaves or any other solid waste/debris is prevented from entering the trench and a desilting/collection chamber may also be provided on ground to arrest the flow of finer particles to the trench.

e) The top layer of sand should be cleaned periodically to maintain the recharge rate.

**7.2.3** *Recharge Through Dry or Operational Dug Wells* (*see* Fig. 4)

a) Dry/operational dug wells if exist in the area may be utilized as recharge structures after cleaning and desilting the same.

b) Recharge water is guided through a pipe from desilting chamber to the bottom of the well or below the water level to avoid scouring of bottom and entrapment of air bubbles in the aquifer.

c) Recharge water should be silt-free. For removing the silt content, the runoff water should pass either through a desilting chamber or filter chamber.

d) Periodic chlorination should be done for controlling the bacteriological contamination in operational dug well.

e) Wire mesh filter should be provided just before the inlet to avoid entry of any foreign material, tree leaves, etc, in to the dug well.

**7.2.4** *Recharge Through Abandoned/Existing Tube Wells* (*see* Fig. 5 and Fig. 6)

a) Abandoned/existing tube wells may be used as recharge structures.

b) The abandoned tube well should be properly developed before use as recharge structure.

c) PVC pipes of 10 cm diameter are connected to roof drains to collect rainwater.

d) The first roof runoff is drained through the bottom of drain pipe if existing tube well is used as recharge structure. After closing the bottom pipe, the rainwater of subsequent rain showers is taken through a 'Tee' to an online PVC filter in case of small roofs. If the roof area is larger, a filter pit may be provided. Rainwater from roofs is taken to collection/

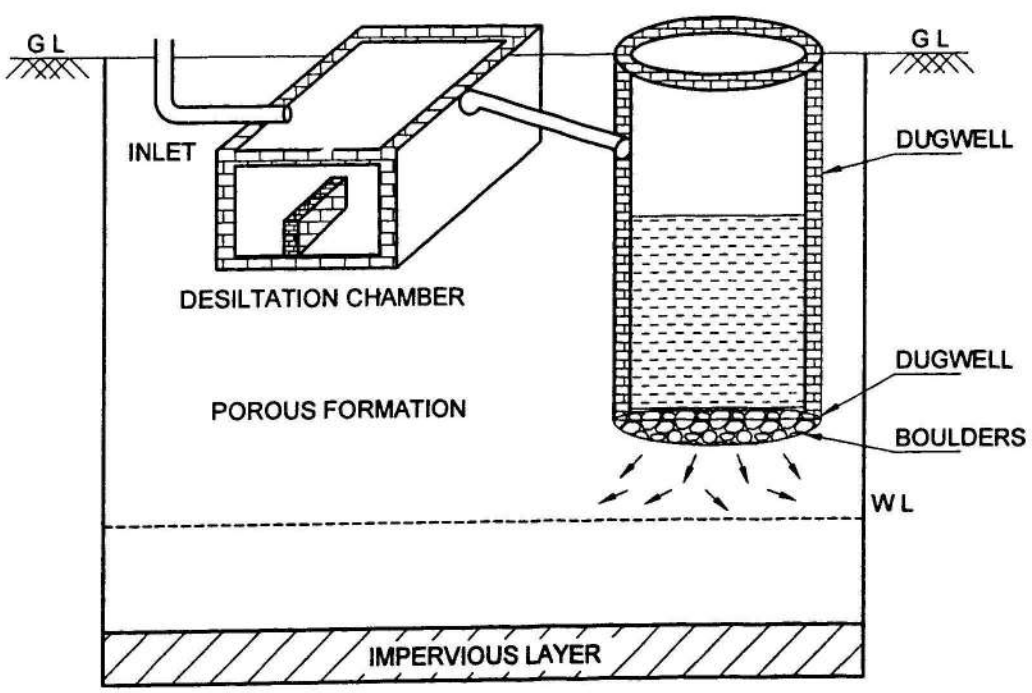



FIG. 4 RECHARGE THROUGH DUG WELL

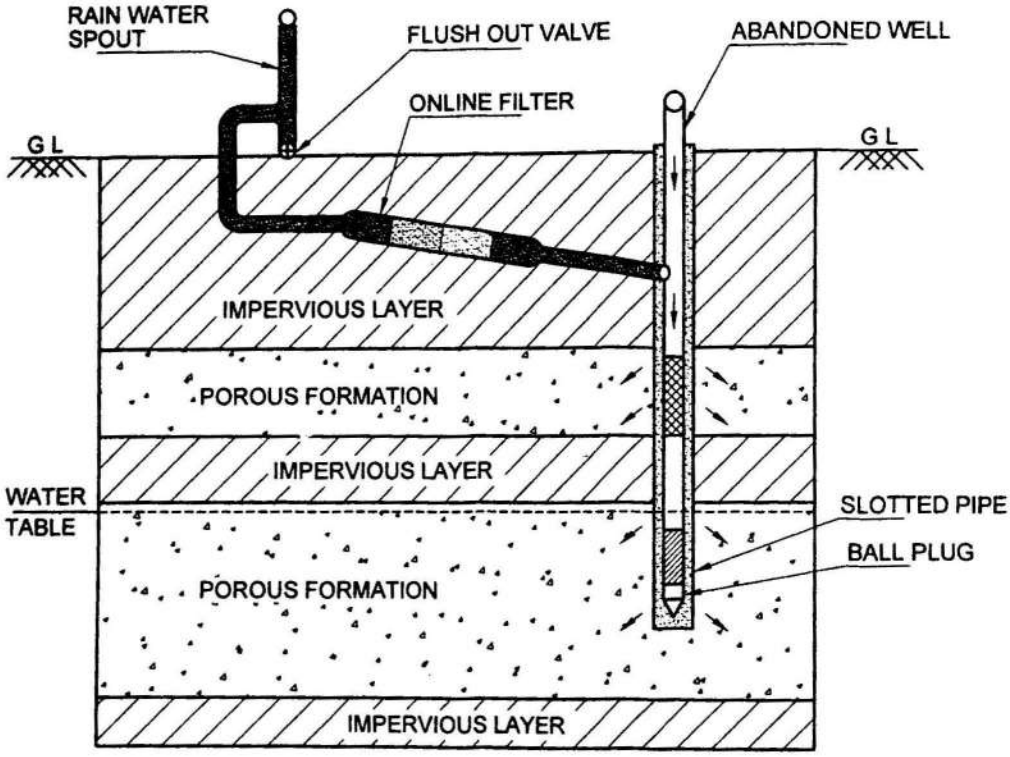
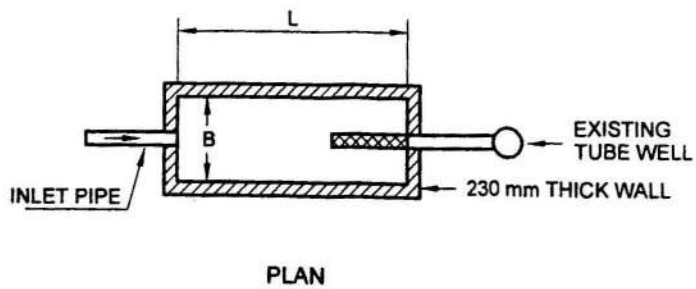



FIG. 5 RECHARGE THROUGH ABANDONED TUBE WELL



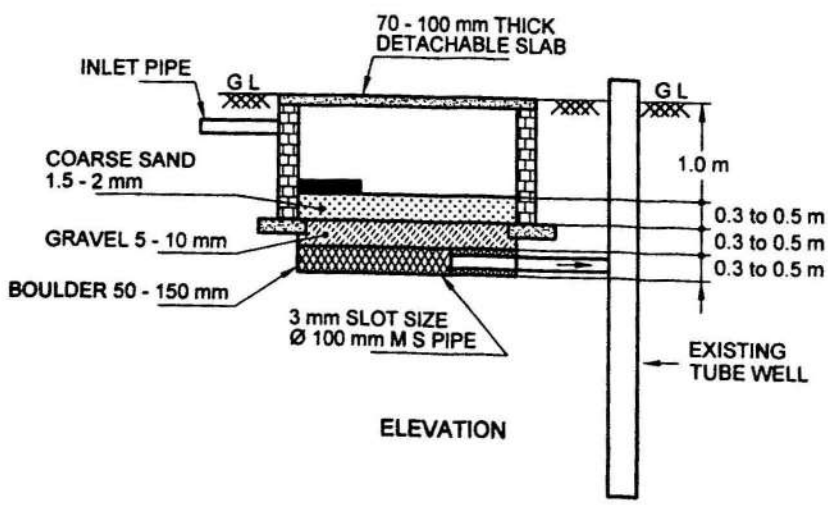




FIG. 6 RECHARGE THROUGH EXISTING TUBE WELL

desilting chambers located on ground. These collection chambers are interconnected as well as connected to the filter pit through pipes.

e) A connecting pipe with recharge well is provided at the bottom of the pit for recharging of filtered water through well.

f) Wire mesh filter should be provided just before the inlet to avoid entry of any foreign material, tree leaves, etc., in to the system.

**7.2.5** *Recharge Wells* (*see* Fig. 7)

a) In areas where the aquifers are overlain by a considerable thickness of impervious formation, a new recharge tube well can be constructed for recharging the harvested rainwater.

b) It is used for recharging single/multiple aquifers.

c) A settlement-cum-storage tank is constructed near the tube well for settlement of silt particles and storage of excess water.

d) Roof top water is diverted to the settlement tank through pipes.

e) Clear water of storage tank is diverted to the recharge tube well for recharge.

f) It is suitable for recharging roof top rainwater of big buildings/blocks.

g) If runoff availability is less, then online filter may be used in the pipe line connecting roof water with recharge well.

**7.2.5.1** *Construction of recharge well*

These are drilled by deploying the appropriate rig unit or by hand boring as per the site conditions and depth of the tube wells.

A well assembly of pipes with diameters varying from 100 to 250 mm may be lowered throughout the depth. Both M.S. and PVC pipes can be used. PVC pipes are rigid, light pipes in 6 or 9 m lengths available in all diameters. The main advantage of PVC pipes is their resistance to corrosion and slots of the pipes will not close with time. As the slotted pipes in recharge wells are in fluctuation zones of water levels, slots of M.S. pipes may become closed due to rusting. The main drawback of PVC pipes is that, these pipes can not be used in large diameter recharge wells. M.S. Pipes may be coated with bituminous coating to avoid rusting.

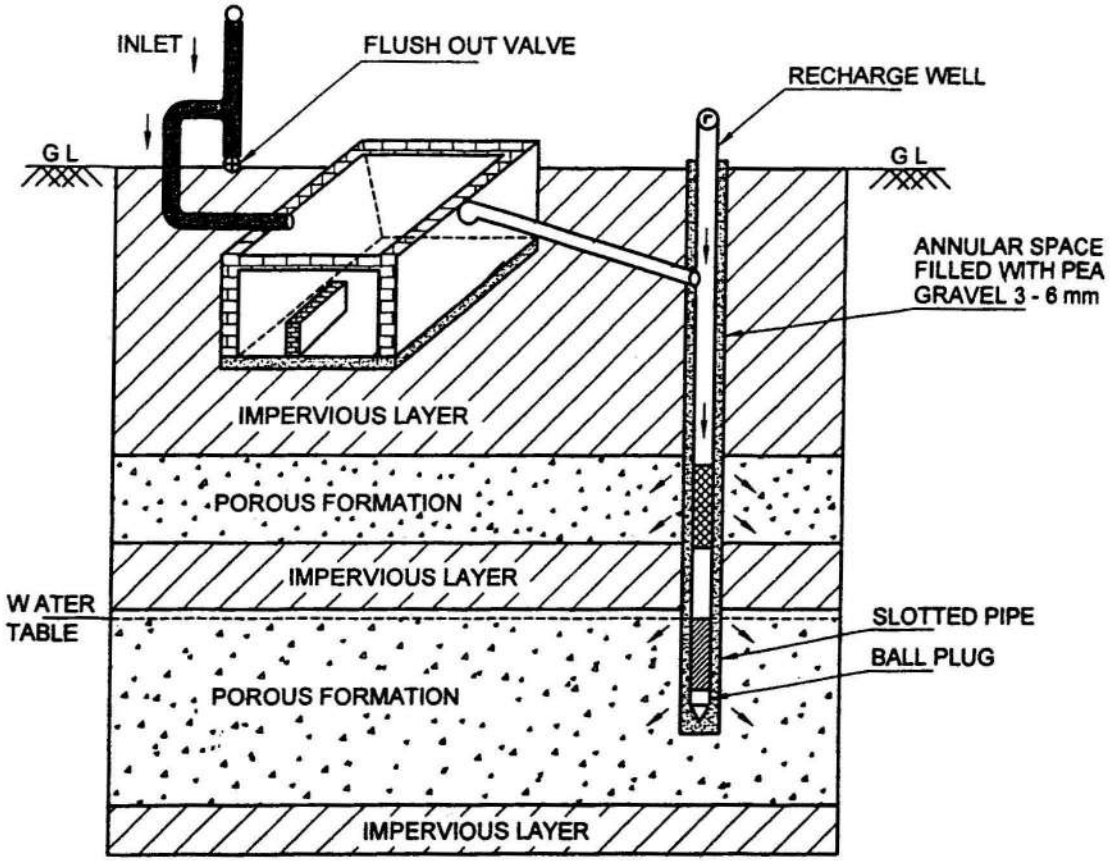



FIG. 7 RECHARGE THROUGH BORE WELL

After excavation of the recharge trench/shaft or filtration chamber is over, pipes should be rechecked and cleaned with wire brush. Depth sounding of recharge wells should be taken with tape to make sure that no silt or soil has gone into the recharge wells during the excavation of trench/shaft. Width of slots in recharge well should be in accordance with the aquifer system encountered. Slotted pipes should be placed against the aquifer or dried-up aquifers encountered in the recharge wells. A slotted pipe at the top of the recharge well will need to be placed to permit the entry of clean/clear water into the recharge well.

The annular space around the well assembly may be shrouded with appropriate size of gravel. The gravel should be washed so that it is silt-free. The recharge tube well should be developed by low capacity air compressor or by bailing method as required. The well may also be cleaned and developed by pouring the water from outside if required. The water levels of the tube well should be recorded and the well covered with cap with a provision to monitor the well in future. A vent pipe of about one inch diameter is also recommended which can act as escape for gases and for measuring the water levels. Once the recharge trench or shaft is constructed around the recharge tube well, recharge wells may be developed with hand bailers to avoid the disturbance of filter media.

**7.2.5.2** *Recharge ability test*

To test the recharge ability of the tube well, a slug test may be conducted [*see* IS 14476 (Part 6)].

### 7.3 Filters

Generally, the following two types of filters are used :

a) *Online Filter*

1) This filter is used when availability of runoff as well as recharge rate of recharge well is less.
2) Manufactured from reinforced engineering plastic material.
3) Available in various sizes and flow rates ranging from 3 to 25 $m^3/h$.
4) Easy to open and clean.

b) *Purpose Built Filter*

1) The filter material recommended is coarse sand of 1.5 to 2 mm size at the top, followed by gravel of 5 to 10 mm size, and boulders of 5 to 20 cm at bottom. The thickness of each layer should be about 0.5 m. Coarse sand should be placed at the top so that the silt content that comes with runoff will be deposited on the top of the coarse sand/ pea gravel and can easily be removed. For smaller roof area the pit may be filled with overburnt broken bricks/cobbles.
2) After excavation of filter chamber, boulders and gravel should be filled up first to the foundation of wall of the structure.
3) After filling of boulder and gravel, filter material should be covered with polythene/jute bags to avoid spilling of construction material, which may damage the filter bed. After the construction of walls, the polythene/jute bags should be removed and the sand/pea gravels filled up to the recommended depth as per the design.
4) Filter media should be free from silt and any other foreign material. Before putting the filter material into the chamber, filter material should be sieved and washed to remove all the finer material. During operation the scouring effect of flow of water into the structure should be checked upon and if flow is disturbing the filter media, the water can be released near the filter media. This can be done by providing an 'I' shape joint in the inlet pipe in trench.
5) Regular inspection of filter material is essential in recharge structures. Silt deposited on the filter media should be cleaned regularly. Once in a year the top 5-10 cm sand/pea gravel layer should also be scraped to maintain a constant recharge rate through filter material.
6) Growth of grass or bushes hampers the filtration rate of the chamber. The grass and bushes should be cleared regularly.

### 7.4 Maintenance of Catchment Area, Water Drains and Recharge Structures

a) The catchments should be neat and clean. The roof top/terrace of the building spaces around the buildings should not be used for dumping of unwanted items and scrap material.
b) The washing machine water having heavy dose of detergents should not be allowed to enter into the water drains which are connected with recharge structures.
c) Open water drains covered with perforated detachable RCC slabs are best as the maintenance of these drains is easy and pollution, especially bacteriological pollution, can be avoided. If the storm water drainage is through pipe system, provide manholes and

chambers at regular intervals as well as close to the suspected silt and waste accumulation places within the channel.

d) Protect the drainage system from tree leaves, polythene bags, plastic bottles and pouches of eatables.

e) Put up sign boards mentioning that the campus of building is equipped with rainwater harvesting system which is being recharged to the ground water system. Mention the ill effects and health impacts if the storm water drains are not properly maintained. Educate the staff maintaining the storm water drains to keep the drains neat and clean.

f) Provide wire mesh filter just before the inlet. Provide silt check wall within the drain bed at a convenient place. If more silt is expected provide check wall at regular intervals in the storm water drains.

g) The periodic removal of the material deposited on the surface be done by scraping the silt accumulated on top of the filter bed regularly.

h) Precaution should be taken to avoid domestic waste water entering into the recharge structures.

j) Recharge tube wells should be developed periodically by hand bailers to avoid clogging of the slots.

k) Before the arrival of monsoon, the roof top as well as drains should be properly cleaned.

m) Length and placement of the slotted pipe should be finalized after drilling of pilot hole for tube well.

n) Recharge water should be introduced into the structure at its lowest point to prevent erosion and disturbance of filter material.

p) A wire mesh should be placed at the entrance of recharge structures.

q) Periodic cleaning of collection chambers should be carried out to remove the plastic bags, leaves, etc, which may choke the entry of water recharge structures.

## ANNEX A

(*Foreword*)

### COMMITTEE COMPOSITION

Ground Water and Related Investigations Sectional Committee, WRD 3

| *Organization* | *Representative(s)* |
|---|---|
| Central Ground Water Board, New Delhi | SHRI B. M. JHA (***Chairman***) [Member (SAM)] |
| Central Electricity Authority, Hyderabad | SHRI MAJOR SINGH<br>SHRI S. B. ATRI (*Alternate*) |
| Central Ground Water Board, Faridabad | DR S. K. JAIN<br>SHRI S. K. SINHA (*Alternate*) |
| Central Pollution Control Board, New Delhi | DR R. C. TRIVEDI<br>DR SANJEEV AGRAWAL (*Alternate*) |
| Central Soil and Salinity Research Institute, Karnal | DR S. K. GUPTA |
| Central Water & Power Research Station, Pune | DR N. GHOSH<br>SHRI R.S. RAMTEKA (*Alternate*) |
| Central Water Commission, Faridabad | SUPERINTENDING ENGINEER (PLANNING CIRCLE)<br>DIRECTOR (WM) (*Alternate*) |
| Centre for Water Resources Development & Management, Kozhikode | HEAD<br>Dr E. J. JAMES (*Alternate*) |
| Geological Survey of India, Lucknow | SHRI S. KUMAR<br>SHRI Y. DEVA (*Alternate*) |
| Ground Water Surveys and Development Agency, Pune | DR B. S. CHANDRASEKHAR<br>SHRI S. P. BAGDE (*Alternate*) |

| *Organization* | *Representative(s)* |
|---|---|
| Gujarat Water Resources Development Corporation, Gujarat | SHRI J. P. RAVAL<br>SHRI A. D. GOHIL (*Alternate*) |
| India Meterological Department, New Delhi | SHRI N. Y. APTE |
| Indian Institute of Technology, Roorkee | DR DEEPAK KHARE |
| Irrigation Department, Government of Punjab, Chandigarh | CHIEF ENGINEER<br>DIRECTOR (*Alternate*) |
| Irrigation Department, Government of Uttarakhand, Dehra Dun | CHIEF ENGINEER<br>SUPERINTENDING ENGINEER (I & PI) (*Alternate*) |
| Ministry of Environment & Forests, New Delhi | ADVISOR<br>DR (SMT) NALINI BHAT (*Alternate*) |
| National Bureau of Soil Survey & Land Use Planning, New Delhi | DIRECTOR |
| National Geophysical Research Institute, Hyderabad | DR D. MURALIDHARAN |
| National Hydroelectric Power Corporation Ltd, Faridabad | SHRI IMRAN SAYEED<br>SHRI P. PUNETHA (*Alternate*) |
| National Institute of Hydrology, Roorkee | DR A. K. BHAR<br>DR N. C. GHOSH (*Alternate*) |
| National Remote Sensing Agency, Hyderabad | HEAD, HYDKO GEOLOGY DIVISION |
| North Eastern Region, Tejpur | DR P. V. SEETHAPATHI<br>DR S. C. PATRA (*Alternate*) |
| River Research Institute, Government of West Bengal, Kolkata | SHRI R. CHAKRABORTY |
| Survey of India, New Delhi | BRIG G. S. CHANDELA<br>SHRI C. B. SINGH (*Alternate*) |
| Water & Land Management Institute, Aurangabad | DR B. M. SAHNI<br>SHRI B. B. JADIA (*Alternate*) |
| Water Technology Centre for Eastern Region, Orissa, Bhubaneshwar | SHRI R. C. SRIVASTAVA |
| BIS Directorate General | SHRI A. M. DAVID, Director (WRD)<br>[Representing Director General (*Ex-officio*)] |

*Member Secretary*
MS BHAVANA SHARMA
Assistant Director (WRD), BIS

**Bureau of Indian Standards**

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This Indian Standard has been developed from Doc : No. WRD 3 (369).

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**SOP FOR PROPER UTILIZATION OF WATER AND RAINWATER MANAGEMENT IN METRO PROJECTS**

Water management in metro projects is a crucial aspect of ensuring sustainable and efficient operation. Integrating sustainable water management practices into metro projects can help reduce water consumption, minimize environmental impact, and ensure the long-term efficiency and sustainability of the system. Here is SoP for water management in metro projects during execution phase.

## A. WATER MANAGEMENT DURING CONSTRUCTION PHASE

### I. Underground Construction (Stations/ Tunnels)

(i) 'Fresh water' requirement for construction/ curing may be estimated prior to physical execution so that wastage of fresh water may be minimized.

(ii) Underground metro projects can have several potential impacts on groundwater, which depend on various factors such as the project's depth, construction methods, hydrogeological conditions, and the surrounding environment. To mitigate the potential impacts on groundwater, thorough hydrogeological investigations and monitoring programs should be conducted before, during, and after the construction of underground metro projects. The implementing agency must take into account **hydrogeological set up** of the area, prior to taking up actual execution of work. This will include understanding the sub-surface geology, water levels, groundwater flow direction etc. of the area. These assessments help identify potential risks and allow for the implementation of appropriate measures to protect groundwater resources, maintain water quality, and ensure the long-term sustainability of the project.

(iii) Wherever water table is encountered, behaviour/ pattern of groundwater flow and likely impact of construction activity and permanent underground construction on prevailing groundwater regime must be studied. Metro tunnels may intersect or pass through aquifers. Construction activities can disrupt these aquifers, affecting their ability to store and transmit groundwater and affect their hydraulic connectivity. This interference may alter the flow and distribution of groundwater. Proper engineering techniques, such as grouting and tunnel lining, should be employed to minimize the potential interference with aquifers and preserve their hydrogeological properties.

(iv) There could be situations where the construction of structures (tunnels/ stations) act as sub-surface barriers to groundwater flow, creating build-up of groundwater column against the barrier on upstream side, imposing threat to buildings in the vicinity. Metro Corporations may seek technical advice from Universities/ IITs/ Central Ground Water Board/ State GW Department etc. in such situations and take up appropriate mitigation measures.

(v) Quantification of expected quantum of dewatering should be part of hydrogeological study for proper planning for gainful utilization of dewatered water.

(vi) Construction activities, particularly tunnelling and drilling, may introduce contaminants into the groundwater. These contaminants may include construction related chemicals, fuels, lubricants, and other substances. If not properly managed,

they can infiltrate the groundwater and cause water quality issues. Maintaining water quality within and around the metro project area is vital to protect public health and the environment. Proper safeguards, such as using appropriate construction materials, implementing containment measures, and monitoring groundwater quality, should be put in place to prevent contamination. Measures like sedimentation basins, oil-water separators, and water treatment systems can be employed to remove pollutants and contaminants from construction runoff and wastewater generated during metro operations.

(vii) Piezometers along with automatic water level recorders should be installed along the metro alignment for continuous monitoring of water level behaviour in the vicinity of metro constructions during such periods. In the event of likely long-term deviation from normal pattern, the build-up of groundwater may be channelized or redirected to other locations through appropriate engineering measures. This can help manage groundwater levels and prevent excessive pressure against the tunnel walls. A few indicative methods that can be used to redirect the groundwater away from the metro tunnels are following.

( a ) Dewatering Wells: Dewatering wells can be installed strategically around the metro tunnels to lower the groundwater levels. These wells are equipped with pumps that extract groundwater, effectively lowering the water table and reducing hydrostatic pressure against the tunnels.

( b ) Drainage Systems: Installing a network of drainage systems, such as perforated pipes or weep holes, along the tunnel walls can provide a pathway for groundwater to flow and be collected. These drainage systems can be designed to lead the collected groundwater to designated discharge points.

( c ) Pumping Systems: In cases where the groundwater level needs to be actively managed, pumping systems can be employed to extract excess groundwater from the area surrounding the metro tunnels. These pumps can redirect the water to appropriate locations.

( d ) Permeable Backfill: Using permeable backfill material around the tunnels can allow groundwater to flow more easily through the surrounding soil, reducing the build-up of pressure against the tunnel walls. This can involve the use of granular materials or geo-composite drainage layers that facilitate the movement of water away from the tunnels.

It may be ensured that channelized groundwater is gainfully utilized as far as possible. It's important to note that the specific measures employed to manage groundwater around metro tunnels may vary depending on site-specific conditions, including the hydrogeological characteristics of the area, groundwater flow patterns, and the local regulatory requirements. A comprehensive hydrogeological study and proper engineering design are crucial to determine the most effective and sustainable methods for channelizing groundwater away from metro tunnels while ensuring the stability and safety of the tunnel structure.

(viii) NOC for groundwater dewatering/ extraction must be obtained from CGWA/ respective SGWA as mandated under Ministry of Jal Shakti guidelines for infrastructure projects involving dewatering (available on CGWA website https://cgwa-noc.gov.in).

(ix) Projects may fix targets for reduction in water requirement in construction/ curing through different available techniques (curing compounds/ hessian clothing

for wrapping etc.).

(x) During rains, arrangements may be made to divert rainwater from the construction to nearby rainwater harvesting channels, if possible/ feasible. This arrangement would also be useful during operational phase.

**II. Elevated Construction**

(i) Fresh water requirement for construction/ curing may be estimated prior to execution so that wastage of fresh water may be minimized.

(ii) Wherever water table is expected to be encountered during construction work (it may be small quantity), same may be gainfully utilized/ properly discharged, instead of letting it flow on ground.

(iii) RWH system may be inbuilt into the plans of metro stations. For elevated tracks, wherever feasible, arrangement may be in place for diverting rainwater from viaduct to RWH system on medians/ greenbelt below the elevated metro track. Recharge system may not be required where water levels are very shallow and may be completely avoided in stretches having chances of oil/ grease/ chemicals mixing into the rainwater.

**B. Water Management During Operational Phase**

(i) Along underground sections, water level data being received from installed piezometers must be continuously and religiously monitored. Metro Corporations are required to get regular studies conducted by professional agencies/ academic institutions. In the event undesirable effect on groundwater regime - such as build-up of groundwater column against the construction - is noticed, and the cause is established as Metro construction, mitigation measures like pumping out groundwater and its gainful utilization may be adopted. Metro Corporations may seek technical advice from Universities/ IITs/ Central Ground Water Board/ State GW Department etc. in such situations.

(ii) In case of use of groundwater/ construction of tubewells by the Metro Corporation for operation/ maintenance of stations, groundwater NOC must be obtained from CGWA/ respective SGWA as mandated by Ministry of Jal Shakti Guidelines for infrastructure projects (available on CGWA website https://cgwa-noc.gov.in).

(iii) Channelization of wastewater for reuse may be considered in large facilities like car depots.

(iv) Metro Projects should make all efforts to reduce fresh water usage for operation/ maintenance of Depots/ Metro Stations and also to minimize wastage.

(v) Metro projects create additional constructions, which can lead to some increased surface runoff during rainfall events. Proper stormwater management techniques can help mitigate the impact of stormwater runoff, reduce erosion, and prevent flooding.

(vi) Bureau of Indian Standards (**BIS**) has a dedicated Committee –**Ground Water and Related Investigations Sectional Committee, WRD 03**. The Committee, in consultation with experts have developed BIS standard **IS 15797:2008** for Roof Top Rainwater Harvesting - Guidelines (enclosed as

Appendix-G). Same should be used for implementing RWH at elevated metro stations and elevated tracks.

(vii) RWH system at medians/ greenbelt below the track may be maintained more frequently. In case of thefts/ breakage of downpipes/ chamber slabs, same may be replaced immediately. The environmental concerns far outweigh physical damages.

(viii) Caution may be applied in the stretches with chances of oil/ grease mixing with rainwater. In such stretches, recharge may be avoided.

(ix) Native tree plantation should be encouraged near project areas/ on medians. This would help in formation of macropores, thereby increasing recharging capacity of aquifers.

****

## List of Metro Corporations-:

| S.no | Name of State | Metro Corporations currently functioning in the State |
|---|---|---|
| 1. | Telangana | Hyderabad Metro Rail |
| 2. | Uttar Pradesh | Uttar Pradesh Metro Rail Corporation (Presently are running metro in Lucknow , Kanpur, Ghaziabad , Noida & Greater Noida cities of UP |
| 3. | Gujarat | Gujarat Metro Rail Corporation Limited (GMRC) |
| 4. | Rajasthan | Jaipur Metro rail Corporation |
| 5. | Maharashtra | Maharashtra Metro Rail Corporation Limited (MAHA-METRO) |
| 6. | Bihar | Patna Metro Rail Corporation (Under Construction) |
| 7. | Haryana | Rapid MetroRail Gurgaon Limited (Haryana Mass Rapid Transport Corporation Limited (HMRTC)) |
| 8. | NCT Delhi | Delhi Metro Rail Corporation (DMRC) |
| 9. | Kerala | Kochi Metro Rail Limited |
| 10. | Karnataka | Bangalore Metro Corporation limited |
| 11. | Tamil Nadu | Chennai Metro Rail Limited (CMRL) |
| 12. | West Bengal | Metro Railway, Kolkata |
| | | Kolkata Metro Rail Corporation Limited (Implementing the East West Metro Corridor) |
| 13. | Madhya Pradesh | Madhya Pradesh Metro Rail Corporation Limited |

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जल संसाधन,नदी विकास और गंगा संरक्षण विभाग
**केंद्रीय भूजल प्राधिकरण**
18/11 जामनगर हाउस, मानसिंह रोड
नई दिल्ली-110011
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**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA - 413** **Date: 31.07.2023**

To

Shri K V B Reddy,
MD and CEO,
L&T Metro Rail (Hyderabad) Limited,
Hyderabad Metro Rail
Administrative Building
Hyderabad Metro Rail Depot
Uppal Main Road, Uppal
Hyderabad, Telangana – 500039

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

Sir,

This is in reference to the Order dated 17.03.2023 (copy enclosed) in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. No. 198/2023) passed by Hon'ble NGT, wherein **the issue of undue wastage of water by way of discharge during construction of Metro Rail at Delhi, Jaipur and Mumbai, has been raised.** The Hon'ble NGT directed that *"A joint Committee of CPCB, Secretary, Ministry of Jal Shakti and Metro Rail Corporations may consider the issue and take requisite remedial measures. Secretary, MoJS will be the nodal agency for coordination and compliance. The Committee may meet within one week, interact with concerned authorities and stakeholders and taking stock of the factual position, prepare and execute an action plan for remedial measures in the matter. It may lay down necessary SOP to ensure proper utilisation of water and installation of Rain Water Harvesting systems (RWHS) to harness rain water".*

Accordingly, a committee under the chairmanship of Member (CGWA) was constituted by Ministry of Jal Shakti, comprising members from CPCB and Metro Projects of Delhi, Jaipur and Mumbai. The committee visited Metro projects in Delhi, Jaipur and Mumbai and based on the observations has come up with **SOP for proper utilization of water and rainwater management in metro projects.** The **SOP** is enclosed as **Annexure-I**. **It is advised** to follow the same in Metro Projects under construction/ under operation.

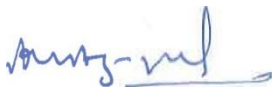
Furthermore, Department of Water Resources, RD & GR, Ministry of Jal Shaki has also issued advisory to all States vide letter No. T-81011/77/2021 - GW Section-MOWR, dated 31.03.2023 along with **BIS Standards for Roof Top RWH system** and **SoP with Do's and Dont's** which may be suitably consulted and adhered to (copies enclosed).

In view of the above, it is requested to kindly ensure the implementation of the enclosed SOP and its circulation to the lower offices in compliance to the directions of Hon'ble NGT. Your kind intervention is also solicited in the matter for issuing suitable directions to the concerned authorities/ line departments for immediate action to implement the scheme of artificial recharge of ground water/ rain water harvesting in Metro Projects.

Action taken in this regard may please be communicated to this office within 2 months.

Yours sincerely

Encl: as above



(A.K. Agrawal)
Chairman

**Copy to:**

1. The Secretary, Telangana Secretariat, 3rd Floor, Telangana Secretariat, Hyderabad, Telangana - 500022, secy-maud@telangana.gov.in
2. The Commissioner, PR & RD & Administrator, TSWALTA, Panchayath Raj Building, Urdu Hall Lane, Himayath Nagar, Hyderabad -500029, cpr-rd@telangana.gov.in, crd.telangana@gmail.com
3. The Regional Director,Central Ground Water Board Southern Region, 3-6-291, GSI Post,Bandlaguda, HYDERABAD, TELANGANA- 500068
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

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18/11 जामनगर हाउस, मानसिंह रोड
नई दिल्ली-110011
ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA** -401 **Date: 31.07.2023**

To
Shri Sushil Kumar ,
Managing Director,
Lucknow Metro Rail Corporation ,
Admistrative Building ,
Near Dr. Bhimrao Ambedkar Samajik Parivartan Sthal ,
Vipin Khand Gomatinagar
Uttar Pradesh-226010

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Action taken in this regard may please be communicated to this office within 2 months.

Yours sincerely

Encl: as above

(A.K. Agrawal)
Chairman
31/7/23

**Copy to:**

1. The Secretary, 801, Bapu Bhawan, Vidhan Sabha Marg, Lucknow –226001, secyud.up@gmail.com
2. The Director, 101, Lok Bhawan, U.P. Civil Secretariat, Vidhan Sabha Marg, Lucknow - 226001 UPGWD
3. The Regional Director, Central Ground Water Board Northern Region, Bhujal Bhavan, Sector-B. Sitapur Road Yojna, Ram Ram Bank Chauraha, Lucknow, Uttar Pradesh-226021
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

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**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -402** **Date: 31.07.2023**

To
Sh. S. S. Rathore,
Managing Director,
Block No. 1, First Floor,
Karmayogi Bhavan,
Behind Nirman Bhavan,
Sector 10/A, Gandhinagar- 382010

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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directions to the concerned authorities/ line departments for immediate action to implement the scheme of artificial recharge of ground water/ rain water harvesting in Metro Projects.

Action taken in this regard may please be communicated to this office within 2 months.

Yours sincerely

Encl: as above

31/7/2

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Joint Secretary (UD), 14th block, 9th Floor, New Sachivalaya, Gandhinagar-382010, email- jsudd@gujarat.gov.in
2. The Regional Director, Central Ground Water Board, West Central Region, Swami Narayan College, Building, Shah Alam Tolnaka, Ahmadabad, Gujarat-380022
3. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

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ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -403** **Date: 31.07.2023**

To
Sh. P. Ramesh,
Chairman and Managing Director
Admin Building,
Metro Depot, Bhrigu Path,
Mansarovar, Jaipur-302020

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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directions to the concerned authorities/ line departments for immediate action to implement the scheme of artificial recharge of ground water/ rain water harvesting in Metro Projects.

Action taken in this regard may please be communicated to this office within 2 months.

Yours sincerely

Encl: as above

31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Joint Secretary-I, Food Building, Secretariat, Jaipur -302005, Rajasthan, udh@rajasthan. gov.in
2. The Regional Director, Central Ground Water Board, Western Region, 6-A, Jhalana Doongri, Jaipur, Rajasthan-302004
3. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,नदी विकास और गंगा संरक्षण विभाग
केंद्रीय भूजल प्राधिकरण
18/11 जामनगर हाउस, मानसिंह रोड
नई दिल्ली-110011
ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -405** **Date: 31.07.2023**

To

1. SHRI. MANOJ JOSHI,
   Chairman,
   Maharashtra Metro Rail Corporation Limited & Secretary
   Ministry of Housing & Urban Affairs,
   METRO BHAVAN, VIP road,
   Near Dikshabhoomi, Nagpur - 440010

2. SHRI. NITIN KARIR
   Managing Director,
   Maharashtra Metro Rail Corporation Limited
   Metro Bhavan, VIP road,
   Near Dikshabhoomi, Nagpur - 440010

3. Dr. Sanjay Mukherjee
   Metropolitan Commissioner,
   MMRDA
   Bandra-kurla complex
   M.M.R.D.A. Office building,
   bandra-kurla complex,
   C-14 & 15, E block bandra (East),
   MUMBAI - 400 051

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Yours sincerely

Encl: as above

31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Principal Secretary to Government, Urban Development Department, Mantralay 4th Floor Mumbai-400032
2. The Regional Director, Central Ground Water Board, Central Region, N.S. Building, Civil Lines, Nagpur, Maharashtra,440001
3. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

भारत सरकार
जल शक्ति मंत्रालय
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नई दिल्ली-110011
ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -406** **Date: 31.07.2023**

To
Sri Arunish Chawla,
Additional Chief Secretary
Patna Metro Rail Corporation,
Department of Urban Development & Housing,
Govt. of Bihar, Vikash Bhawan,
Patna, Bihar-800015.

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Yours sincerely

Encl: as above

(A.K. Agrawal) 31/7/23
Chairman

**Copy to:**

1. The C.E.O., Patna Metropolitan Area Authority, Urban Development and Housing Department, Govt. of Bihar, Vikash Bhawan,Patna, Bihar-800015, ceo.pmaa@gmail.com
2. The Regional Director, Central Ground Water Board, Mid Eastern Region, 6th & 7th Floor, Lok Nayak Jai Prakash Bhawan, Frazer Road Dak Banglow, Patna, Bihar-800011
3. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

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Chairman

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ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail:** cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -407** **Date: 31.07.2023**

To
Sh. Ajit Balaji Joshi,
Managing Director,
C-3, HSVP Complex,
Sector 6, Panchkula - 134109

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Yours sincerely

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(A.K. Agrawal) 31/7/23
Chairman

**Copy to:**

1. The Director General, Department of Town & Country Planning Haryana, Plot No. 3, Sec-18A, Madhya Marg, Chandigarh 160018, e-mail:tcpharyana7@gmail.com
2. The Chairperson, Haryana Water Resources Authority, Rear Building, 3rd Floor, HSVP, Sector-6, Panchkula, Haryana-134108
3. The Regional Director, Central Ground Water Board, North Western Region, Bhujal Bhawan, Plot No. 3B, Sector 27-A, Chandigarh,160019
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

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**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
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**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA** -408 **Date: 31.07.2023**

To

1. Shri Manoj Joshi,
   Chairman,
   Metro Bhawan, Fire Brigade Lane,
   Barakhamba Road, New Delhi-110001

2. Shri Vikas Kumar,
   Managing Director,
   Metro Bhawan, Fire Brigade Lane,
   Barakhamba Road, New Delhi-110001

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31/7/23

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Chairman

**Copy to:**

1. The Secretary, Urban Development Department ,Govt. of NCT of Delhi, 9th & 10th level, Delhi Secretariat, I.P. Estate, Delhi-110002
2. The Chief Executive Officer, Delhi Jal Board (HQ), Room No.306, 3rd Floor, Varunalaya Ph-II, Jhandewalan, Karol Bagh, New Delhi-110005
3. The Office-in-Charge, State Unit Delhi, R.K. Puram, New Delhi-110066
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

भारत सरकार
जल शक्ति मंत्रालय
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**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA –५०९** **Date: 31.07.2023**

To
Shri Loknath Behera,
Managing Director,
Kochi Metro Rail Limited,
4th floor, JLN Metro station,
Kaloor, Kochi -682017

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Secretary to Government, Urban Development Department, (M&UDAs), Room No. 434, Vikasa Soudha, Bangalore
2. The Secretary, Ground Water Department, Room No. 393, 1st Floor, Main Block, Secretariat, Thiruvananthapuram-695001
3. The Regional Director, Central Ground Water Board, Kerala Region, Kedaram, Kesavadasapuram, THIRUVANANTHAPURAM, Kerala, 695004
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

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**Government of India**
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Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
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**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA** - 410

**Date: 31.07.2023**

To
Shri Anjum Parwez
Managing Director
Bangalore Metro Rail Corporation Ltd
3rd Floor, BMTC Complex,
K.H.Road, Shanthinagar,
Bangalore 560027
md@bmrc.co.in

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Secretary to Government, Urban Development Department, (M&UDAs), Room No. 434, Vikasa Soudha, Bangalore
2. The Director, Groundwater Directorate 2nd Floor, KSFC Bhawan, #1/1,Thimmiah Road, Bengaluru-560052
3. The Regional Director, Central Ground Water Board, South Western Region, 7th Cross, 27th Main, HSR layout, Sector 1, Bengaluru Urban, Karnataka,560102
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

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**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
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**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA -411** **Date: 31.07.2023**

To

Shri M.A.Siddique,
Managing Director,
METROS, No.327,
Anna Salai, Nandanam,
Chennai- 600035, Tamil Nadu

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Accordingly, a committee under the chairmanship of Member (CGWA) was constituted by Ministry of Jal Shakti, comprising members from CPCB and Metro Projects of Delhi, Jaipur and Mumbai. The committee visited Metro projects in Delhi, Jaipur and Mumbai and based on the observations has come up with **SOP for proper utilization of water and rainwater management in metro projects.** The **SOP** is enclosed as **Annexure-I**. **It is advised** to follow the same in Metro Projects under construction/ under operation.

Furthermore, Department of Water Resources, RD & GR, Ministry of Jal Shaki has also issued advisory to all States vide letter No. T-81011/77/2021 - GW Section-MOWR, dated 31.03.2023 along with **BIS Standards for Roof Top RWH system** and **SoP with Do's and Dont's** which may be suitably consulted and adhered to (copies enclosed).

In view of the above, it is requested to kindly ensure the implementation of the enclosed SOP and its circulation to the lower offices in compliance to the directions of Hon'ble NGT. Your kind intervention is also solicited in the matter for issuing suitable

directions to the concerned authorities/ line departments for immediate action to implement the scheme of artificial recharge of ground water/ rain water harvesting in Metro Projects.

Action taken in this regard may please be communicated to this office within 2 months.

Yours sincerely

Encl: as above

31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Chief Executive Officer, Chennai Metropolitan Development Authority, Thalamuthu - Natarajan Maaligai, No.1, Gandhi Irwin Road, Egmore, Chennai – 600008.
2. The Chief Engineer, State Ground Water & Surface Water Resources Data Center, Water Resources Department, Taramani, Chennai-600113
3. The Regional Director, Central Ground Water Board, South Eastern Coastal Region, E-Wing, G-Block, Rajaji Bhavan, CGO Complex Besant Nagar, Chennai, Tamil Nadu-600090
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,नदी विकास और गंगा संरक्षण विभाग
**केंद्रीय भूजल प्राधिकरण**
18/11 जामनगर हाउस, मानसिंह रोड
नई दिल्ली-110011
ई- मेल: cgwa@nic.in

**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**FileNo: CGWA-21/19/2020-CGWA -412** **Date: 31.07.2023**

To

1. Shri P. Uday Kumar Reddy,
   General Manager's Office
   Metro Rail Bhavan (2nd Floor)
   33/1, Jawaharlal Nehru Road
   Kolkata-700071

2. Shri V. K. Srivastava,
   Managing Director & Principal Chief Engineer,
   Metro Railway
   Kolkata Metro Rail Corporation Ltd
   HRBC Complex, KMRCL Bhawan
   2nd & 3rd Floor, Munsi Premchand Sarani
   Kolkata - 700021

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Yours sincerely

Encl: as above

31/7/23

(A.K. Agrawal)
Chairman

**Copy to:**

1. The Joint Secretary, Department of Urban Development & Municipal Affairs Nagarayan, DF-8, Sector-I, Salt Lake City, Kolkata-700064, secy.ma-wb@gov.in
2. The Director, SWID, Nirman Bhawan, 1st Floor, Salt Lake, Sector-III, Kolkata - 700091
3. The Regional Director, Central Ground Water Board, Eastern Region, Bhujalika CP Block-6, Sector-V, Bidhan Nagar, Kolkata, West Bengal, 700091
4. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,नदी विकास और गंगा संरक्षण विभाग
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**Government of India**
Ministry of Jal Shakti
Department of Water Resources, RD & GR
**Central Ground Water Authority**
18/11, Jamnagar House, Mansingh Road
New Delhi – 110011
**E-mail**: cgwa@nic.in

**File No: CGWA-21/19/2020-CGWA -५०५** **Date: 31.07.2023**

To
Sh. Manish Singh,
Managing Director,
Madhya Pradesh Metro Rail Corporation Limited,
Bhopal Metro Rail Office, 2nd Floor, Zone-14,
Bhopal Municipal Corporation,
Smart City Building, BHEL, Govindpura,
Near Natraj Petrol Pump,
Bhopal-462023

**Subject – Compliance of Hon'ble NGT Order dated 17.03.2023 in Harpal Singh Rana and another Vs State of Uttarakhand & Ors. (O.A. NO. 198/2023) w.r.t. proper utilization of water and rainwater management in metro projects – reg.**

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Yours sincerely

Encl: as above

(A.K. Agrawal) 31/7/23
Chairman

**Copy to:**

1. The Principal Secretary to Government, Urban Development Department, 3rd Floor Pallika Bhawan, Shivaji Nagar, Bhopal, M.P.-462016
2. The Regional Director, Central Ground Water Board North Central Region, Block-1, 4th Floor, Paryawas Bhawan, Area Hills, Jail Road, Bhopal, Madhya Pradesh, 462011
3. The Director (GW), DoWR, RD & GR, MoJS, Shram Shakti Bhawan, New Delhi.

(A.K. Agrawal)
Chairman

ए.के. अग्रवाल
अध्यक्ष
A.K. Agrawal
Chairman

सत्यमेव जयते

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
केंद्रीय भूमि जल प्राधिकरण
Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Authority

D.O. No. CGWA-21/31/2020-CGWA Part(2)-448 Dated: 09.08.2023

Dear. *Sh. Deouskar,*

Hope this letter finds you in good health and best of spirits. Central Ground Water Authority has been constituted by Ministry of Environment & Forests under Section 3 (3) of the Environment (Protection) Act, 1986 for the purpose of regulation and control of ground water development and management in the whole of India and to issue necessary regulatory directions.

2. It is to bring to your kind notice that in the matter of Harpal Singh Rana and another vs. State of Uttarakhand & Ors. (O.A. No. 198/2023) filed before the Hon'ble NGT, **the issue of undue wastage of water by way of discharge during construction of Metro Rail at Delhi, Jaipur and Mumbai, has been raised.** Vide Order dated 17.03.2023 (copy enclosed), the Hon'ble NGT directed that *"A joint Committee of CPCB, Secretary, Ministry of Jal Shakti and Metro Rail Corporations may consider the issue and take requisite remedial measures. Secretary, MoJS will be the nodal agency for coordination and compliance. The Committee may meet within one week, interact with concerned authorities and stakeholders and taking stock of the factual position, prepare and execute an action plan for remedial measures in the matter. It may lay down necessary SOP to ensure proper utilisation of water and installation of Rain Water Harvesting systems (RWHS) to harness rain water".*

**3. In pursuance to the NGT Order, Ministry of Jal Shakti has issued an SOP for proper utilization of water and rainwater management in metro projects which is enclosed as Annexure-I.** Furthermore, Department of Water Resources, RD & GR, Ministry of Jal Shaki has also issued advisory to all States vide letter No. T-81011/77/2021 - GW Section-MOWR, dated 31.03.2023 along with BIS Standards for Roof Top RWH system and SoP with Do's and Dont's.

4. It is understood that Ministry of Railways is involved in operation and maintenance of some metro projects. Kind intervention is, therefore, solicited in the matter for issuing suitable directions to the concerned authorities/ departments dealing with Metro Projects under Ministry of Railways for circulation of the attached SOP and its implementation in Metro Projects. Furthermore, it is also requested that suitable directions may be issued to the concerned authorities/ line departments for immediate action to implement the scheme of artificial recharge of ground water/ rain water harvesting in Metro Projects.

Yours Sincerely,

Encl: as above

(A.K. Agrawal) 9/8/23
Chairman

To
Milind K. Deouskar,
Secretary,
Ministry of Railways, 476-K, Rail Bhavan, Raisina Road,
New Delhi -110001

ए.के. अग्रवाल
अध्यक्ष
A.K. Agrawal
Chairman

सत्यमेव जयते

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
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Government of India
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Yours Sincerely,

Encl: as above

(A.K. Agrawal) 9/8/23
Chairman

To
Sh. Manoj Joshi,
Secretary,
Ministry of Housing and Urban Affairs, Maulana Azad Road,
Nirman Bhawan, New Delhi - 110011

Central Ground Water Authority
18/11, Jamnagar House, New Delhi- 110066, Email- chmn-cgwb@nic.in, Ph- 011-23383561