NGT ORDER DT. 13/1/15

(75) (64) NGT order 13/1/15

NGT CASE

Manoj Mishra V. Union of India

O.A. No. 06/2012 and O.A. No. 300/2013

BEFORE THE NATIONAL GREEN TRIBUNAL,
PRINCIPAL BENCH, NEW DELHI

M.A. No. 967 of 2013 & M.A. No. 275 of 2014
In
Original Application No. 6 of 2012
And
M.A. No.877 of 2013, M.A. No.49 of 2014,
M.A. No.88 of 2014 & M.A. No.570 of 2014
In
Original Application No. 300 of 2013

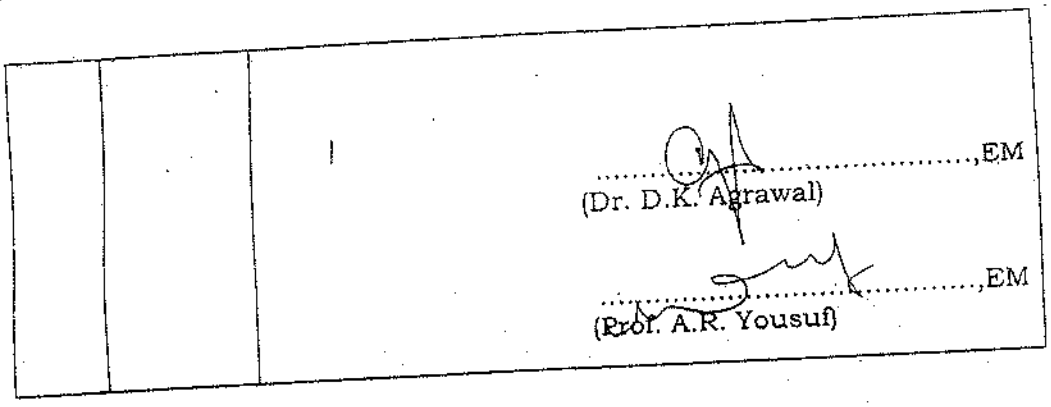
IN THE MATTER OF:

Manoj Mishra Vs. Union of India &Ors.
And
Manoj Kumar Misra & Anr. Vs. Union of India & Ors.

CORAM : **HON'BLE MR. JUSTICE SWATANTER KUMAR, CHAIRPERSON**
HON'BLE MR. JUSTICE M.S. NAMBIAR, JUDICIAL MEMBER
HON'BLE DR. D.K. AGRAWAL, EXPERT MEMBER
HON'BLE PROF. A.R. YOUSUF, EXPERT MEMBER

Present: Applicant — Appearance not marked
Respondent No. 3: — Mr. Kush Sharma and Mr. Rajiv Bansal, Advs.
Respondent No. 4 : — Mr. Narender Pal Singh and Mr. Dinesh Jindal, LO
Mr. S. Kumar, Adv. for DMRC

	Date and Remarks	Orders of the Tribunal
	Item No. 02-03 January 13, 2015 SS	The judgement has been pronounced. We direct the Secretary, Ministry of Environment & Forests to call for the meeting of the Principal Committee within two weeks from today and take all necessary steps and issue proper directions to all the concerned Authorities, mainly Delhi Jal Board for commencing the work of project of making Yamuna free from pollution of "Maily Se Nirmal Yamuna, Revitalization Project, 2017". .....,CP (Swatanter Kumar) .....,JM (M.S. Nambiar)


(Dr. D.K. Agrawal)
,EM
(Prof. A.R. Yousuf)
,EM

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH
NEW DELHI

.....

Original Application No. 6 of 2012

And

M.A. Nos. 967/2013 & 275/2014

In the matter of :

1. Manoj Misra
   178-F, Pocket, Mayur Vihar,
   Phase-1,
   Delhi – 110091.

..... Applicant

Versus

1. Union of India
   Through the Secretary
   Ministry of Environment and Forests
   Paryavaran Bhawan, CGO Complex
   Lodhi Road, New Delhi – 110003

2. National Capital Territory of Delhi
   Through the Chief Secretary,
   Delhi Secretariat, I.P. Estate,
   New Delhi - 110002

3. Delhi Development Authority
   Union Ministry of Urban Development
   Through its Vice Chairman,
   Vikas Sadan,
   New Delhi – 110023

4. Delhi Pollution Control Committee
   Through its Member Secretary
   4th Floor, ISBT Building, Kashmere Gate
   New Delhi - 110006

5. Yamuna River Development Authority
   Through its Chairman,
   Hon'ble Lt. Governor of Delhi,
   Raj Niwas, GNCT,
   New Delhi - 110054

6. Irrigation Department of Uttar Pradesh
   Government of Uttar Pradesh

Through its Principal Secretary
Lucknow, Uttar Pradesh

7. State of Uttar Pradesh
Through the Chief Secretary
Government of UP
Lal Bahadur Shastri Bhavan
UP Secretariat
Lucknow - 226001

8. Municipal Corporation of Delhi
Through the Deputy Commissioner
Shahdara South Zone
Near Karkardooma Court
Shahdara, Delhi - 110032

9. State of Haryana
Through the Chief Secretary
4th Floor, Haryana Civil Secretariat
Sector-1, Chandigarh

.....Respondents

AND

Original Application No. 300 of 2013

And

M. A. Nos. 877/2013, 49/2014, 88/2014 & 570/2014

In the matter of :

1. Manoj Misra
Convener, Yamuna Jiye Abhiyaan
178-F, Pocket,
Mayur Vihar Phase-1,
Delhi – 110091.

2. Mrs. Madhu Bhaduri
A-12, IFS Apartment
Mayor Vihar Phase-I
Delhi - 110091

..... Applicants

Versus

1. Union of India
   Through the Secretary
   Ministry of Environment and Forests
   Paryavaran Bhawan, CGO Complex
   Lodhi Road, New Delhi – 110003

2. Ministry of Urban Development
   Through the Secretary,
   Nirman Bhawan
   Maulana Azad Road
   New Delhi – 110008

3. National Capital Territory of Delhi
   Through the Chief Secretary,
   Delhi Secretariat, I.P. Estate,
   New Delhi - 110002

4. Delhi Development Authority
   Through its Vice Chairman,
   Vikas Bhawan,
   New Delhi – 110002

5. South Delhi Municipal Corporation
   Through its Commissioner
   Civic Centre, Near Minto Road
   New Delhi – 110002

6. Delhi Tourism and Transportation Corporation
   18-A, D.D.A. SCO Complex,
   Defence Colony
   New Delhi – 110024

7. Unified Traffic and Transportation
   Infrastructure (Planning & Engineering) Centre (UTTIPEC)
   2nd Floor, Vikas Minar
   New Delhi – 110002

8. Department of Irrigation and Flood Control
   Government of National Capital Territory of Delhi
   Nandlal Jhuggi, Gopal Pur,
   Dr. Mukherjee Nagar,
   Mukherjee Nagar
   New Delhi – 110003

9. Delhi Urban Art Commission, DUAC
India Habitat Centre,
Lodhi Road,
New Delhi – 110003 |

10. Delhi Pollution Control Committee
Through its Member Secretary
4th Floor, ISBT Building, Kashmere Gate
New Delhi - 110006

11. State Environment Impact Assessment Authority, SEIAA
Through Member Secretary,
Department of Environment,
Govt. of NCT of Delhi
New Delhi .....Respondents

Counsel for Applicants:

Mr. Ritwick Dutta, Advocate.
Mr. Rahul Choudhary, Advocate
Ms. Pallavi Talware, Advocate
Ms. Preeta Dhar, Advocate
Ms. Richa Relhan, Advocate

Counsel for Respondents :

(In O.A. No. 6 of 2012)

Mr. Vivek Chib, Asif Ahmed, Ms Ruchira Goel and Mr. Kushal Gupta, Advs. for Respondent No. 1
Ms. Mamta Tandon and Mr. V. K. Tondon, Advs. for Respondent No. 2 & 5
Mr. Rajiv Bansal and Mr. Kush Sharma, Advs. for Respondent No. 3
Mr. Narender Pal Singh, Adv. and Mr. Dinesh Jindal, LO, DPCC for Respondent No. 4
Mr. Raman Yadav, Adv. for Respondent No. 6
Mr. Balendu Shekhar and Mr. Vivek Jaiswal, Advs. for Respondent No. 8
Mr. Narrender Hooda, Sr. Adv. and Mr. Vineet Malik, Adv. for State of Haryana
Mr. Mahesh Kr. Sharma, Adv. for Delhi Cantonment Board
Ms. Maninder Acharya, Sr. Adv with Ms. Puja Kalra, Advs. for South Delhi Municipal Corporation
Mr. Suresh Tripathi, Adv. for DJB
Mr. Venkatesh and Mr. Anuj P. Agarwala, Advocates for DCW
Mr. Ankur Gupta and Mr. Sanjay Kumar, Advs. for DMRC

(In O.A. No. 300 of 2013):

Mr. Vikas Malhotra and Mr. M.P. Sahay, Advs. for Respondent No. 1
Mr. Ravi P. Malhotra and Mr. Abhinav Kumar Malik, Advs. for Respondent No. 2&4,7
Mr. V. K. Tondon and Ms. Mamta Tandon, Advs. for Respondent No. 3 &8
Ms. Maninder Acharya, Sr. Adv. with Mr. Balendu Shekhar, Ms.Puja Kalra, Advs. and Mr. Yashish Chandra, Advocate for Respondent No. 5
Mr. S.B. Upadhyay, Sr. Advocate with Mr. Sarvjit Pratap Singh Mr. Kaustuv P. Pathak, and Mr. Param Kumar Misra, Advs. for Respondent No. 6
Mr. Robin R. David and Mr. Febin M. Varghese, Advocates for Respondent No. 9
Mr. Narendra Pal Singh, Advocate & Mr. Dinesh Jindal, Law Officer, DPCC for Respondent Nos. 10&11
Mr. Yusuf Khan, Mr. Avneesh Arputham and Mr. Kabeer Shrivastava, Advocates for Respondent Nos. 14 to 16
Mr. Mahesh Kumar Sharma, Advocate for Delhi Cantonment Board
Mr. Balendu Shekhar and Mr. Vivek Jaiswal, Advocates for EDMC
Mr. Suresh Tripathi, Adv. for DJB
Mr. Venkatesh and Mr. Anuj P. Agarwal, Adv. for DCWA
Ms. Puja Kalra for North MCD

JUDGMENT

PRESENT:

Hon'ble Mr. Justice Swatanter Kumar (Chairperson)
Hon'ble Mr. Justice M.S. Nambiar (Judicial Member)
Hon'ble Dr. D.K. Agrawal (Expert Member)
Hon'ble Prof. A.R. Yousuf (Expert Member)

Reserved on: 9th December, 2014
Pronounced on: 13th January, 2015

1. Whether the judgment is allowed to be published on the net?

2. Whether the judgment is allowed to be published in the NGT Reporter?

JUSTICE SWATANTER KUMAR, (CHAIRPERSON)

In the year 1994, in furtherance to a news item published in Hindustan Times titled 'And Quite Flows the Maily Yamuna', the Hon'ble Supreme Court of India issued *suo moto* notice to various

authorities. Since 1994, the Hon'ble Supreme Court has passed various orders in Writ Petition No. 725 of 1994 and other connected matters with one object in mind, that, the '*Maily Yamuna*' should be converted into salubrious and pristine Yamuna and its water in the entire region, at least from Hathnikund in Haryana, to the Monitoring Station at Taj Mahal, Agra, should be least polluted. However, nothing mentionable was achieved for prevention, control and restoration of River Yamuna on behalf of the concerned authorities. Being completely dissatisfied with the state of affairs prevailing in that regard, the Hon'ble Supreme Court, vide its Order dated 10th October, 2012, observed as under:

> "It has been brought to the notice of this Court that despite heavy expenditure, in thousands of crores, having been incurred by the Central Government, Government of the States of Haryana and Uttar Pradesh and the local authorities in the National Capital Territory of Delhi, the pollution of river Yamuna has increased by the day. A report has been filed on behalf of the Central Pollution Control Board wherein it has been reflected in paragraph (2) that the samples collected from river Yamuna show flagrant violation of the prescribed standards. For example, where the maximum permissible limit of BOD is 3 mg/l, there at the Nizammudin Bridge, it is 37 mg/1. Similarly, the total coliform permissible is 5000 MPN/100 ml, there it is 17000000000. The situation at some of the other points, including Kalindi Kunj, Okhla and even Palwal is no different. It is unfortunate that huge public funds have been spent without showing any results in the improvement of water quality of river Yamuna. Learned counsel appearing for Delhi Jal Board has not been able to inform the Court as to how many CETP and/or STP have been established by the Board and whether they are functional or not as per the requirements."

2. The Hon'ble Supreme Court then proceeded to pass certain directions, with the hope that the authorities would take adequate and appropriate steps to attain the object of making Yamuna clean and healthy. We are, in the present applications, primarily

concerned with that section of River Yamuna which flows in the National Capital Territory (for short 'NCT') of Delhi. Yamuna has a 54 km stretch from Village Palla in the north to village Jaitpur in the south and forms inter-state border between Delhi and UP. Nearly 26-27 km stretch is from Wazirabad Barrage to village Jaitpur, which is the most significant section from the point of view of pollution. Experience has shown that authorities lacked requisite will to execute the orders, plans and schemes sincerely and effectively, which has resulted in turning Yamuna, particularly, in this section into a drain carrying sewage, domestic waste as well as industrial and trade effluents. The State instrumentalities and authorities have failed to discharge their Constitutional and statutory duties, while citizens have failed to discharge their Fundamental Duty to protect the environment, particularly in relation to River Yamuna. While, on one hand we venerate our rivers, on the other hand, we do not think twice before discharging untreated industrial effluents and sewage into them. River Yamuna is a victim of this dereliction of our Fundamental Duty for years. Despite assaults on nature by polluting River Yamuna through various activities like, encroachments on its banks and dumping waste on its river bed and floodplain, still, River Yamuna really flows 'quietly'. The authorities, as well as the people of Delhi owe a Fundamental Duty to do everything in their power to ensure restoration of River Yamuna to its natural flow and tranquillity. Thus, there is dire need to take stringent and effective steps, with a determined mind, to ensure that none fails in performance of their

respective functions, duties and obligations to achieve the ultimate goal of converting *'Maily Yamuna'* into *'Nirmal Yamuna'* under the project *'Maily Se Nirmal Yamuna'* Revitalization Plan, 2017.

Factual matrix of the case/Facts leading to filing of the present applications.

3. The Applicant – Mr. Manoj Mishra, is a retired officer from the Indian Forest Services and the Applicant No. 2 (in Original Application No. 300/2013) Mrs. Madhu Bhaduri, is a former member of Indian Foreign Services, who have instituted both these applications under Sections 14 and 15 read with Section 18(1) of the National Green Tribunal Act, 2010 (for short, 'the NGT Act'). The first applicant has stated that besides being a member of Indian Forest Services of the country, he is a convener of the *'Yamuna Jiye Abhiyaan'*, part of a citizens movement to save the River Yamuna. Applicant no. 2 has averred that she has been a diplomat and an ambassador of Belarus, Lithuania and Portugal and after retirement from the services, she has been working as a social worker, with active engagement in various issues concerning the society and environment.

4. These applicants have approached the Tribunal with averments in their respective applications that their campaign has recognised that River Yamuna is not only a sacred river of India, but an aquatic lifeline for millions of people and also a large number of them depend on it for sustenance. Various studies and data have revealed the fact that River Yamuna is critically

threatened by unrelenting encroachments on its flood plain and by increasing population load, emanating as much as from domestic refuse, as from the agricultural practices in the flood plains and industrial effluents from the catchment area draining into Yamuna. The flood plains and river bed of Yamuna are under increasing pressure of alternative land use for various purposes, which are driven primarily by growth of economy at the cost of the river's integrity as an eco-system. The applicants strive to protect River Yamuna. The primary subject matter of the Original Application No. 6 of 2012 is the recent encroachment and dumping of building debris and other solid waste in the river bed/flood plain and even into the natural water body of River Yamuna. According to the applicants, there is a water body situated in the river bed of Yamuna, located across the road from colonies of East Delhi. The City Map, Delhi Eicher, 2006 Edition, clearly shows proof of long living natural water body opposite to these colonies. A picture taken from the Google Earth on 28th October, 2010, after the floods in the river, also shows the water bodies. When the applicant visited the river beds and flood plain of River Yamuna on 11th November, 2011, it was revealed that the said river bed and the downstream of the water body is being covered with solid waste, including construction debris and household waste. Photographs have been filed with the Application to show that one of the water bodies has become a dumping ground. The applicants made various representations to the Yamuna River Development Authority and informed it about the illegal actions on the part of the

concerned Departments, more particularly, the Department of Irrigation and Flood Control, Municipal Corporation of Delhi and the Department of Agriculture & Co-operation, but to no avail. On the contrary, fresh debris continued to be dumped in that area and a large number of "*Jhuggies*" (hutments) were also constructed. The applicants paid successive visits to the site in question during November and December, 2011 but such dumping activities increased with time, despite the fact that applicant made all possible efforts to move the authorities vested with duty of preventing such activities.

5. The Ministry of Environment, Forest and Climate Change (for short, the 'MoEF'), in exercise of the powers conferred under sections 3, 6 and 25 of the Environment (Protection) Act, 1986 (for short, the 'Act of 1986') promulgated the Municipal Solid Waste (Management and Handling) Rules, 2000 (for short, the 'Rules of 2000') which clearly provide the entire mechanism for management of solid waste and respective responsibilities of the State Government, Municipalities and the Delhi Pollution Control Committee. Most of them are respondent authorities who have failed to discharge their duties to manage and regulate the dumping of municipal and other solid waste on the flood plain, river bed and in the river itself. According to the applicant, illegal and indiscriminate dumping of solid waste in the natural water body in the river bed of Yamuna has not only recklessly polluted River Yamuna but also damaged the ecology in the area.

6. According to the applicant, the right to a clean and healthy environment for the inhabitants of the area and the entire Delhi for that matter is violated. The authorities have miserably failed to discharge their duties to protect the River Yamuna, its river bed, flood plain and wildlife, in and around the river, from being polluted and being adversely affected. This is a clear violation of the rights of the public at large in terms of Article 21 of the Constitution of India. There is a clear constitutional mandate that not only requires the State to endure to safeguard environment and wildlife, but, also the citizens to improve the natural environment including forest, lake, river, etc. The present case, according to the applicant, is a glaring example of total failure of both the constitutional obligation of the State and fundamental duty by the citizens under Articles 48A and 51A(g) respectively of the Constitution of India. The applicant has also relied upon the judgement of the Supreme Court in the case of *Subhash Kumar v. State of Bihar & Ors., (1991) 1 SCC 598,* where the Supreme Court held that: "right to live is a fundamental right under Article 21 of the Constitution and it includes right to enjoyment of pollution free water and air for full enjoyment of life." The applicant also invoked special jurisdiction of the Tribunal in terms of Section 15 of the NGT Act, praying for complete restitution of the environment and ecology of the river bed and for making Yamuna pollution free.

7. On the above factual averments, the applicant has prayed in Original Application No. 6 of 2012 that all the debris and other solid waste dumped in the river bed should be directed to be removed

and the natural water body be restored to its original form. The authority should be directed to take appropriate steps for preventing the dumping of debris on the river bed and for taking all other steps that may be necessary in that behalf.

8. The grievance of the two applicants in Application No. 300/2013 is in regard to the ongoing encroachments and the conversion of Kushak Drain into parking and road-cum-parking space and conversion of land use of the Shahdara Link Drain from 'utility' to 'commercial' and proposed construction of commercial undertaking in the form and nature of "Delhi Haat" - a commercial shopping complex, over and above the drain.

9. The case of the applicants in this application is that River Yamuna cuts across the eastern part of the NCT of Delhi and is bound by hard rocky area of the ridge and closed basin of Chhattarpur. A physiographic layout of NCT of Delhi shows that the natural drainage of city is river bound. The city of Delhi, on account of its undulating terrain, has a number of natural and manmade storm water drains to ensure that the city does not get flooded during rains and the water reaches with ease to River Yamuna. Quite contrary to this, the urban flooding in Delhi in monsoon is common. The main reason for this frequent flooding is that, over a period of time many of the storm water drains, which also at one time acted as the natural tributaries of River Yamuna, have been first turned into storm-cum-waste water drains and later many of them were covered and taken away from public view and obstructed from playing their natural role as storm water drains a:

well as verdant greenways within the city. According to the applicants, such ill-advised conversion of drains has reduced the easy and efficient drainage in the city as well as compromised the biodiversity present in and along these drains and their ability to recharge the ground water. The conversion has played havoc with the environment and the ecology associated with these drains, including their ability to carry clean water and to keep the ambient air quality. Further, as a result of pollution resulting from traffic coming to a standstill, there is manifold increase in air pollution and people have to face unimaginable hardship. There is also the risk of fatal diseases like dengue etc. from the standing water. Some newspaper cuttings have been annexed to substantiate this plea.

10. The Kushak drainage system in South Delhi forms a major tributary of the Barapula drainage basin and is situated in the west bank of the River. Originating from the southern ridge beyond the Mehrauli Badarpur Road, it drains out wastes from areas in Saket, Pushp Vihar, Khidki Village onto Sheikh Sarai, Chirag Delhi and then enters Panchsheel Enclave after crossing the outer Ring Road. Skirting along the Siri Fort area, it flows further into G.K.-I, Andrews Ganj, Defence Colony along the Jawahar Lal Nehru Stadium and Jangpura before meeting the Barapula Drain opposite Nizamuddin area. It covers a distance of some 11 kms and drains out sewage and other wastes from most key localities of South Delhi area.

The Shahdara Basin covering about 30,000 acres of land in the Union Territory of Delhi, is situated on the eastern bank of

River Yamuna. The basin is bound by the River on the west, river Hindon on the east and Uttar Pradesh on the north and south. The G.T. road passes through the centre of this basin from west to east. The Shahdara drain is managed by the Department of Irrigation and Flood Control of the Government of Delhi. According to the applicants, the whole of the Shahdara basin in Delhi is below the High Flood Level of River Yamuna and it has the tendency of getting flooded quite often. This drain is helpful in carrying runoff during the rains and helps in preventing flooding of the area during excessive rains. This drain acts as a lifeline for many aquatic and riparian species of flora and fauna, which thrive and survive on the existence of this drain. The Shahdara drain in east Delhi is around 5 kms long, beginning from Northern Railways main line in Shakarpur area, till it meets the main Shahdara drain close to the Chilla Regulator. The applicants have stated in their application that these, amongst other drains, are an essential feature of the city to keep the environment and ecology balanced.

11. The applicants have made an attempt to show the significance of storm water drains and why is it essential that they must be kept obstruction and pollution free. It is also the averment of these applicants that the drains ought not to be covered, as covering of such drains would add to natural calamity, increase in pollution and diseases. They have specifically referred to the advantages of open drain system in the application. The relevant part thereof reads as under:

"...well protected and conserved drainage architecture (natural as well as manmade) in any city is an essential part of its efficient environmental and social planning and management. Open to sky storm water drains that ensure easy collection and draining away of rainfall water serves a number of purpose, in addition to ensuring that the potential flooding of areas in a city is prevented. These include:

a) Serve as ground water recharge channels;

b) Serve as greenways, when these are properly managed;

c) Provide much needed open stretches in cities which are otherwise turning into concrete jungles and heat sinks;

d) Ensure that the water that flows in these drains is well oxygenated and hence wholesome before it finally drains into a river, sea or a lake;

e) Help clean naturally the waste water if any that flows in these drains;

f) Maintain biodiversity and habitat conditions for a variety of plants and animals including small mammals, reptiles, birds, butterflies, etc.

g) Act as NMT (non motorized transport) channels;

h) Help maintain/increase value of property lying close to these channels in cities where widespread concretization has turned an urban area/city into a heat sink and where open spaces are available only at a premium."

12. To further support their plea, they have also averred that many cities in developed countries like USA, UK, Canada, Germany, Denmark and Switzerland etc. where the city and town planners had previously permitted the covering of urban streams and storm water drains and converted them into either roadways or other incompatible uses, are now realizing the past mistakes and have now reverted to the open drain system and are taking steps to reopen its drains in a process called, "greening of city's grey architecture".

13. The MoEF had visited the drain systems in Pune and reported to the High Court in Bombay in PIL No. 41/2011, that the works on the drain system, i.e. its channelization, wrong channelization, concretization or converting the drains in the name of development, showed the following disadvantages:

> "1. Constriction and alteration of water bodies.
> 2. Reduced recharge of ground water and impeding the natural ecological flow.
> 3. Destruction of riparian biodiversity, riverine ecology and the wetlands/floodplains.
> 4. Pollution of Surface, Subsurface and Ground water.
> 5. Change of natural functions of streams to convert them into sewers and gutters."

14. The applicants have specifically averred that articles based on different studies which have also been published, show formation of an unambiguous opinion that Yamuna can be described as 'The Dirty Drain'. Referring to the 21st meeting of the governing body of the Unified Traffic and Transportation Infrastructure (Planning and Engineering) Centre (for short 'UTTIPEC') held on 19th February, 2010, the applicant avers that covering a drain is injurious to the environment, ecology and human health. The applicants have relied upon the following extract of the said meeting.

> "no such covering of drain, henceforth, will be taken up by any agency, apart from the works which have already been undertaken and these drains should be cleaned and developed with ecological and local landscaping and to be used as NMT connectivity routes as per the presentations earlier given by various experts at previous Governing Body meetings."

15. However, in absolute contradiction to the afore-referred, the South Delhi Municipal Corporation (for short 'SDMC') is

implementing a project under Jawaharlal Nehru National Urban Renewal Mission (for short 'JNNURM'), for conversion of Kushak Nallah/drain for providing parking/road-cum-parking under its jurisdiction. They are also planning to construct "Delhi Haat" in East Delhi, by covering Shahdara Link Drain along NOIDA Link Road at Mayur Vihar, Phase-I. They have even issued public notice to that effect on 5th July, 2013 for changing use of 27,000 square meters area of Shahdara Link Drain from 'utility' to 'commercial'. The applicants made various representations against these proposed projects. Relying upon the Doctrine of 'Public Trust', the applicant made further representations before these authorities, with an intention to draw their attention, but nothing fruitful was achieved from these efforts, thus, compelling the applicants to approach the Tribunal by filing the present application.

16. The applicants heavily relied upon the judgment of the Supreme Court in the cases of *M.C. Mehta v. Kamal Nath & Ors.*, (2000) 6 SCC 213 and *Dr. B.L. Wadhera v. Union of India & Ors.*, (1996) 2 SCC 594.

17. With reference to these judgments, it is contended that pollution is a civil wrong and is committed against the community at large. Persons who commit such wrong have to pay damages (compensation) for restitution of the environment and ecology. Rapid industrial development, urbanization and regular flow of persons from rural to urban areas, has made major contribution to environmental degradation. Thus, the authorities entrusted with the work of pollution control, cannot be permitted to sit back with

folded hands on the pretext that they have no means to control the pollution and protect the environment. The drains, particularly, the natural storm water drains which meet River Yamuna and provide it water, that can even help in diluting pollution and provide safer environment, must be kept free of obstruction and pollution. With reference to the above facts and the principles of law, the applicants have prayed that for preservation of environment and maintaining the ecological balance, the Tribunal should direct stopping of construction activities on both these drains, that the drains should not be covered, that Expert Committees should be appointed to suggest methods for maintenance of storm water drains as ecologically secure green ways and the respondents or any other person be prohibited from demolishing or destroying the natural and/or artificial drains in Delhi.

18. To these applications, the respondents have filed different replies. According to the respondent no. 6, Delhi Tourism and Transportation Corporation (for short 'DTTC'), the work of constructing "Delhi Haat" has not commenced and is at a preliminary stage of consideration, thus, the petition is not maintainable. As the said respondent is only concerned with the "Delhi Haat" project they have not dealt with any averment in relation to the Kushak drain. According to this respondent, the matter in relation to the covering of storm water drain is a matter of controversy and some directions have also been passed by the Delhi High Court in that behalf. No work has commenced on the Shahdara Link Drain. Only objections have been called for by the

Delhi Development Authority (for short 'DDA') by issuing a public notice for conversion of land use from 'utility' to 'commercial'.

19. According to the Respondent Nos. 4 and 7, objections and suggestions have been received in response to the public notice dated 5th July, 2013, issued by the DDA and the matter is pending for further decision. It is stated that the Delhi Master Plan, 2021 is to be modified, subject to determination of these objections. The averment with regard to passing of the resolution dated 19th February, 2010 by the governing body is not disputed before us.

20. According to the Delhi Pollution Control Committee (for short 'DPCC') and the State Level Environmental Impact Assessment Authority (for short 'SEIAA'), it is stated that these projects may fall within the Clause 8(a) of Environmental Impact Assessment Notification, 2006 (for short 'Notification of 2006') and if that be so, the SDMC or the Delhi Municipal Corporation (for short 'MCD') or any other agency, on that behalf, has not approached any of the respondents for getting Environmental Clearance, ought to have been taken. In Original Application No. 6/2012, respondent no. 1 has taken the stand that the present application does not involve substantial question relating to environment. However, referring to the Rules of 2000, it is stated that these Rules stipulate specifications source segregation, collection, transportation, waste process disposal and other features of disposal of Municipal Solid Waste (for short 'MSW'). It is denied by this respondent that any representation was received by them. According to them, it is the responsibility of all the concerned State Pollution Control Boards to

control and monitor the discharge of industrial effluents in order to ensure that untreated industrial effluents do not fall into the river. It is stated that in order to address the immediate need for intervention in the interest of ecology and environment of River Yamuna, the Central Government had extended a hand-holding role, through central assistance for pollution abatement works in identified stretches of certain rivers under the Ganga Action Plan. The Yamuna Action Plan is being implemented by the Government with assistance from Japan International Corporation Agency, in three States; Uttar Pradesh, Haryana and Delhi, in a phased manner. According to this respondent, the Municipal Authorities are required to set up waste processing and disposal facilities following the norms for handling MSW, i.e. collection, segregation, transportation, processing and disposal of MSW.

21. The DDA/respondent no. 3 has responded to this application stating that the DDA is not the person responsible and hardly any relief can be claimed against them under the provisions of the NGT Act, 2010. According to this respondent also, the responsibility lies on the municipalities and municipal authorities for dealing with MSW. The structure plan for Yamuna River Front Development (for short 'YRFD') Project has been developed by the DDA on the basis of value analysis and through study of the site and other factual data. In their reply, details of such plan have been provided. The purpose of the project is to facilitate the citizens of Delhi with vast recreational areas and simultaneously preserving, restoring and developing biodiversity of river basin. The areas under jurisdiction

of DDA are under various stages of development and designs were meticulously made to reach the goal of achieving the objectives of YRFD Project. According to them, they are putting up warning sign boards against dumping of *malba* and debris at the sites which are under its purview and jurisdiction.

22. According to the respondent nos. 2, 4 and 5, the Tribunal has no jurisdiction to entertain this application, as it does not involve any substantial question of law relating to environment, arising out of the implementation of enactments specified in the Schedule I to the NGT Act, 2010. On 16th May, 2012, a meeting of these respondents and the implementing/monitoring agencies was held and decisions were taken in relation to identification of areas generating solid and/or building waste in bulk, creation of special task force for patrolling of areas generating solid/building waste in bulk and illegal dumping sites, removal of dumped soil by the Delhi Metro Rail Corporation (for short the 'DMRC'), issuance of public notice publicising the temporary waste deposit sites under the MCD, removal of waste lying along the roadside and submission of YRFD by the DDA to the Environment Department. These decisions were approved and some actions had been taken in furtherance thereto. On 9th July, 2012 a meeting to review the progress and compliance of the decisions/directions which emerged in the meeting dated 18th May, 2012, was conducted, where the steps to be taken in future to prevent dumping of solid waste in the River Yamuna flood plain, which was a serious problem, were stated. It was considered necessary to install barricades, identify areas

generating bulk solid/building wastes and erection of further warning signage at the sides of Yamuna river. With these averments, these respondents said that they are taking effective steps to control and prevent the menace of dumping debris in the flood plain and in the River Yamuna, including the MSW and construction debris.

23. As would be evident from the above-referred pleadings and the voluminous records that have been produced before the Tribunal, no one before the Tribunal is questioning the seriousness of the environmental and ecological issues arising from pollution of River Yamuna, throwing of construction debris and other MSW in the River, it's flood plain, as well as the storm water drains, whether natural or artificial, which have been converted as dirty drains carrying sewage or municipal waste. These pollutants and unchecked developments which are violative of the Principle o Sustainable Development are causing havoc in the city of Delhi The various concerned authorities, particularly respondent no. 6 are shifting the responsibility on others, but are unable to dispute hard fact, that they have failed to prevent and control the pollutio much less, restore River Yamuna to its natural flow. The vario measures stated to have been taken by the authorities have fall much short of those required. There appears to be a lack institutional will to implement various policies, schemes a decisions to protect and restore River Yamuna and its banks. H long this attitude of planning, waiting and watching would resorted to by the concerned authorities and would it be in

interest of environment, ecology and public interest and health of the residents of Delhi, is the moot question, to which the attention of all concerned needs to be adverted to.

Proceedings before the Tribunal with reference to its Orders and implementations thereof

24. Finding that substantial questions of law, with regard to environment, are involved in these applications, notices were issued to the respondents. In the meanwhile, they were directed to take steps to stop further encroachment and dumping of MSW and debris in the riverbed. The question that was required to be considered was to find out the most effective and practical way in which dumping could be stopped on the Flood Plain and the riverbed of Yamuna, as well as how these areas are to be restored and beautified so as to discourage further dumping of construction debris or waste in and around River Yamuna. Vide order dated 31st January, 2013, the Tribunal directed State of UP, the DDA, Government of NCT of Delhi and the East Delhi Municipal Corporation to start the removal of debris from the river banks and the water bodies mentioned in the petition near River Yamuna. The Corporation had stated that it had issued Notification identifying the sites at Gazipur which were meant for dumping of MSW. Thus, all other authorities were also directed to identify the sites for dumping of debris and waste and in the meanwhile all construction debris was directed to be transported to the site at Gazipur.

25. Vice Chairman, DDA was directed to hold meeting within one week with all the concerned Corporation/Authorities as well as with the State of UP to ensure that the directions are complied with and debris, which was stated to be in huge quantity, is removed from the riverbed. Vide our order dated 1st February, 2013, keeping in view the fact that a large number of authorities were involved, it was considered appropriate to constitute a Special Committee chaired by the Secretary, MoEF and of which Additional Secretary, MoEF was also directed to be a Member. The Tribunal had also appointed Local Commissioners to visit the sites in the entire stretch of Yamuna that flows in Delhi and to report with regard to removal of construction debris and other waste. The reports from the Local Commissioners had shown that the directions issued by the Tribunal were not being carried out in its true letter and spirit. One of the Commissioners noticed that trucks are entering into River Yamuna from different places where the wall was found punctured despite the fact that there are police posts. It was also pointed out that DMRC was also throwing its debris in the riverbed of Yamuna. Again, all public authorities were directed to ensure removal of debris and maintenance of proper log records for carrying of such debris to the earmarked sites. We must notice that all the Learned Local Commissioners acted *pro bono* and did not take any fees for ensuring compliance of the directions of the Tribunal. The High Powered Committee constituted by the Tribunal, in its report noticed that nearly 37000 cu.m. of debris/construction materials are lying on the eastern bank and 53,000 cu.m. on the

western bank near Nizamuddin bridge, Batla House, of the river Yamuna. These figures were undisputed. The report of the High Powered Committee was provided to all the authorities and they were directed to remove the debris thrown by the respective authorities and take them to the earmarked sites. The Tribunal also directed all concerned authorities, including the Police, to ensure that no fresh debris or waste was thrown on the riverbed. The High Powered Committee had also considered development, beautification and restoration of river banks for entire River Yamuna from one end to another end of NCT of Delhi. It was felt that out of the total 9700 hectares area for River Front Development ('O' Zone) only 1452 hectares was available with DDA and the balance area is under agriculture and other leases, encroachments, etc. by different persons.

26. In the order dated 17th July, 2013, the Learned Local Commissioners had filed their respective reports. They brought to the notice of the Tribunal that dumping continues on the river bank particularly in Geeta Colony. They also stated that the debris has not been lifted from that site and mainly the debris have been dumped at the bank of the River Yamuna. This debris was thrown in front of the residential block of the DMRC and in Geeta Colony.

27. In the order dated 22nd July, 2013, it was noticed that nearly 400 to 500 tonnes debris per month is being disposed of on the banks of river Yamuna in Geeta Colony, more particularly, during the night hours. Thus, the Tribunal issued directions for the Government of UP and NCT of Delhi to depute officers and keep a

vigil over dumping of debris on the river bank. It was further noticed that nearly 5000 tonnes of debris was lying on the western bank. The dispute was whether it belongs to DDA or DMRC. Both these authorities were directed to hold a meeting and mutually decide as to who is responsible to remove debris. But, in any event if no decision is mutually taken, both the parties will remove debris in equal share and report to the Tribunal on 15th August, 2013.

28. In this very order, the Tribunal, while invoking the 'Polluter Pays' Principle, directed that any person who is found dumping debris on river bank in Geeta Colony site and for that matter in any site, shall be liable to pay compensation of Rs. Five Lakhs for causing pollution and/or destroying the riverbed and flood plain and the time and man power taken for removal of the said debris from the site in question. The Learned Counsel appearing for the MoEF had stated before the Tribunal that the Expert Committee requires further time to finalise the 'Preservation and Beautification Plan' of river bank and flood plain and that the terms of reference are under preparation. This request was accepted and time was granted to the authorities. The Tribunal also clarified that the sum of Rs. Five Lakhs for dumping, debris or waste on the river bank Yamuna would be the liability of the person responsible fo dumping, even the truck owner, as well as person to whom th debris belongs. In other words, the person whose property wa demolished and debris was generated and the contractors who we carrying on the business and were transporting the debris. It w stated before the Tribunal and it was found to be correct that t

debris thrown by DMRC and DDA had been completely removed and only some smaller debris remained. They were agreed to be cleared by 15th September, 2013 positively. The Irrigation Department of UP was throwing its debris at Thokar No. 11&13 and the solid waste is also being thrown along side of Noida link road towards Geeta Colony. These authorities were directed to clean and remove both construction debris and MSW. The Learned Local Commissioners in their Report confirmed that the debris dumped by the authorities and people have been removed. Through our order dated 24th September, 2013, we had recorded appreciation for the work done by all authorities in removing the debris. The High Powered Committee was directed to expedite the filing of the report before the Tribunal. The Committee had also asked for some details from various other authorities who were directed to fully cooperate and furnish the required information to the Committee so as to enable and prepare this report with utmost expeditiousness.

29. Learned Advocate General appearing for the State of UP submitted that entire debris had been removed from the banks of River Yamuna from the area under their jurisdiction and they were keeping strong vigil, ensuring that no dumping of any material is permitted in future. The DMRC filed an affidavit stating that they have removed nearly around 23280 metric tonnes debris and 4700 metric tonnes debris still remains around the locations which are occupied by *Jhuggies* and it is difficult for them to remove that debris. However, they were directed to remove the same as well.

30. On 21st October, 2013, in Original Application No. 300 of

2013, after hearing the parties at great length and considering the resolution of the UTTIPEC, it was directed that *status quo* shall be maintained, i.e., no further construction shall be carried out in the drains in Delhi: whether manmade or natural. Even the Delhi High Court had noticed that there is no consistent policy of the State as to whether they should be covered or not.

31. Vide our order dated 28th November, 2013, we had also directed the authorities to take a clear stand as to whether such projects would be covered under the Notification of 2006 or not. As already noticed, the Corporation had taken a stand that such projects are covered. Thereafter, the matters had mainly been heard together and common orders were passed in the Original Application Nos. 06 of 2012 and 300 of 2013.

32. Interim Report on behalf of the MoEF was filed and time was prayed for filing of the final report. On 18th December, 2013 Professor C.R. Babu, Chairman of the Committee which was constituted by the MoEF to critically analyse and examine the YRFD Plan and to give suggestion for its further improvement, was present before the Tribunal. He submitted that considerable work was still required to be completed and some data is to be collected It was noticed that some data was available which had been provided for the first time by Geo-Spatial Delhi Ltd (GSLD) in form of 0.6m contour interval maps, examination of which, will result in better mapping of Yamuna River Front flood plan. Tribunal granted time till February, 2014 to accomplish the object.

33. The River Yamuna is one of the sacred Himalayan Rivers originating from Yamunotri Glacier (near Saptarishi Kund at Bandar Poonch Glacier Peak at an elevation of 6387 m in Mussoorie range of lower Himalaya. The river travels over a distance of 1370 km across Uttarakhand, Himachal Pradesh, Haryana, Delhi, Rajasthan and Uttar Pradesh and finally joins Ganga at Allahabad (Prayag); its basin spreads over an area of 66,220 sq.km which constitutes 42.5% of the total Ganga River basin and has four major tributaries – Tons, Giri and Bata, which join it from its right side and Asan, which join it from its left side, all of which constitute basin (Head water) of the river in Himalayan states. Tons constitute 60% of the flow of the river. In plains its tributaries are Hindon, Chambal, Sindh, Betwa and Ken. The upper Yamuna basin upto Okhla in Delhi represents less than 20% of its total basin (Martin et al, 2007; Agarwal & Krause, 2013). According to Agarwal & Krause (2013), 17 hydroelectric projects were completed, one hydroelectric project is under construction and about 20 are proposed within Yamuna river basin. It enters into plains of north India after the river forms an interstate border for about 50 km between Uttarakhand and Himachal Pradesh. In the plains, it forms an interstate border between Haryana and Uttar Pradesh for about 200 km distance and then it enters into Delhi. After traversing 45 km, it forms an interstate border between Delhi and UP and then forms interstate border between Haryana and UP and finally enters into UP and runs parallel to Ganga before joining it at Allahabad. A total of 6 barrages were constructed across the river. In the hills

one barrage on Yamuna at Dakpathar and another one on its major tributary Asan were constructed in Uttarakhand; in the upstream of Delhi, Hathnikund (Tajewala) barrage was constructed in Haryana and the water was diverted to Western Yamuna Canal (WYC) and Eastern Yamuna Canal (EYC). The tail end of WYC joins the River Yamuna near Palla and EYC also joins at Wazirabad reservoir. Further, the abstraction of water at Tajewala barrage, which is about 2 km distance downstream from Hathnikund, takes place. Within NCT of Delhi, three barrages were constructed across the river-the Wazirabad, the ITO and the Okhla barrages. In UP, Gokul barrage was constructed to provide drinking water to Mathura and Agra. The river enters into NCT of Delhi at Palla in the north and exists at Jaitpur in the south. The river Yamuna within NCT of Delhi and the corresponding portion of UP traverses over a distance of 54 km. , The stretch of 26 km in the upstream of Wazirabad reservoir receives water from a branch of Western Yamuna canal which joins the river at Palla and the Eastern Yamuna canal joins it at Wazirabad barrage, both the canals originate from Hathnikund barrage, the downstream of which there is no flow from barrage, during lean period and whatever the flow is from the canals. Consequently, there is practically no flow after Hathnikund barrage into river Yamuna during dry season.

34. However, it needs to be noticed that during monsoon season, because of higher floods (7 lakh cusecs of water passed over Tajewala weir in 1978; Report of the High Powered Committee, 2010), Haryana, Uttar Pradesh and Delhi planned and constructed

extensive drainage and river control works including embankments. The mean availability of water in the river at Tajewala during monsoon (July-October) is 19705 cusecs for distribution among basin States. The discharges higher than 1975 cusecs are received at Tajewala for an average of 28 days during 4 months of monsoon. The Delhi Development Authority had intended to channelize the river in the city portion (from downstream of Wazirabad to Okhla during MPD 1981-2001) to restrict the flow area in the river and utilize the remaining land for other development purposes. The concept of channelization was however not found technically feasible, as there are: (i) no flood moderating structures in the upstream and (ii) adverse impacts of higher flow levels in the canalized river section on the entire drainage system.

35. For these reasons, it is necessary to first workout mechanism for ensuring minimum environmental flow in the River Yamuna, passing through NCT Delhi during non-monsoon season on the one hand, whereas, have complete obstruction free cross-sectional area, including the flood plain, for safe disposal of peak monsoon flood as released from upstream barrage at Tajewala, on the other hand. Maintaining minimum environment flow of River Yamuna and the fact that this was considered by the Expert Committee as one of the essential facets for the effective implementation of the report, vide our order dated 17th February, 2014, we directed the State of Haryana to be impleaded as a party. The copy of the report furnished was directed to be supplied to all the Learned Counsels appearing in the case. After considering the findings of the Expert

Committee, the Tribunal had directed the Director, IIT Delhi and the Director, IIT Roorkee and Professor Brij Gopal on 27th May, 2014 to provide due assistance to the Tribunal. The Directors were granted liberty to nominate Professors from the relevant fields. Professor Gosain appeared before the Tribunal and submitted a note on the facets of pollution resulting from drain sewage and finally polluting River Yamuna very seriously. Professor Brij Gopal also appeared and after hearing them along with and on the basis of the interim reports that have been submitted by the MoEF, the matters covering both these applications were divided into three different classes vide our Order dated 30th May, 2014, which were the environmental issues. It will be useful to refer to the order dated 30th May, 2014 as it deals with the different facets of environmental issues raised in these two petitions and how it should be proceeded any further:

> "In furtherance to the order of the Tribunal we are informed by the Professor Gosain, that Director of IIT Delhi as well as Director of IIT Roorkee are out of the country and therefore have not been able to present today before the Tribunal. We direct both the Directors to be present on the next date of hearing positively and without fail."
>
> Professor Gosain, has placed before the Tribunal a short note on the various facets of pollution i.e. resulting from the drains sewage and finally polluting the river Yamuna very seriously.
>
> After hearing the Learned Counsel appearing for the parties as well as Professor Gosain and Professor Brij Gopal we will divide this environmental issue into three different facets:
>
> 1. The first issue is related to the drains (natural or artificial) coverage thereof and the pollution resulting there from.
>
> 2. Steps that are required to be taken for ensuring and rendering Yamuna river free from pollution.

3. Restoration and beautification of the bar
Yamuna

As far as all the above aspects are concerned ar
Tribunal passes any direction for ensuring p...
Yamuna in NCT Delhi, it is necessary for the Tribunal to have certain specific data and suggestions before the Tribunal we hereby, therefore, constitute the following committee:-

(a) An officer not below the rank of Joint Secretary from the Ministry of Environment and Forest

(b) Member Secretary of the Central Pollution Control Board

(c) Engineer- in-Chief, Delhi Development Authority

(d) Member Secretary, Delhi Pollution Control Committee

(e) Member (Drainage), Delhi Jal Board

(f) Two Chief Engineers from South Delhi Municipal Corporation and East Delhi Municipal Corporation

(g) Professor Gosain and Professor Brij Gopal

The above committee shall conduct the inspection and visit all or any of the places that they consider it appropriate and report as follows:-

i. There are how many natural and or artificial drains in Delhi.

ii. Drains which are joining the main Drains of Delhi directly or indirectly joining the river Yamuna.

iii. How many of storm water drains are there and how many carry sewage jointly or separately.

iv. How many STPs have been established in Delhi for treating the sewage or otherwise. The effluents/waste/sewage thrown/dumped in these drains. What is the present status of all the STPs? Are they functional and are working to their optimum capacity and their performance? At how many points, new STPs needs to be established? Whether it is possible to restore the existing STPs and make them functional to their optimum capacity suggestion in that regard?

The Additional Secretary, Ministry of Environment and Forests and Vice-Chairman of Delhi Development Authority shall hold the meeting within two weeks from today to ensure the compliance of these directions as well as to consider the proposal for restoration and beautification plan of Yamuna River banks submitted by the DDA before the Tribunal, merit

thereof or substitution of the entire scheme by another appropriate scheme.

We make it clear that the banks of river Yamuna would be left lie abandon areas and it should be ensured that no debris, construction debris or any other material including MSW is thrown into the river banks or even all along the drains of Delhi and the same is not used for human evacuation.

Let this report be submitted to the Tribunal. This Committee shall conduct its meeting at the earliest and would ensure that by the next date of hearing the report is placed before the Tribunal.

Liberty to the respective Corporations to remove the hurdles in the direct flow of the drains.

The South Municipal Corporation may examine all the possibility of restoration, greenery of the area near to Archana Cinema."

36. During the course of arguments following issues were deliberated upon and were also noticed by us in our order dated 17th July, 2014, as would be evident from the following extract:

"Upon hearing the learned Counsel appearing for the parties and the Experts, we direct the Committee inter-alia to consider two major alternatives for ensuring pollution control and protection of river Yamuna therefrom, and restoration to its original natural status of being a river and not a drain.

(i) Whether it is advisable to install STPs of various sizes in all the outlets smaller and bigger i.e. each drain of Delhi or (ii) it is more beneficial to prohibit discharge into Yamuna river of any sewage, domestic or trade effluents through the drains and all drains be connected to a new major drain which should carry the entire waste of Delhi to a destination where requisite treatment plant should be established to treat the waste, recycle semi solid and water for beneficial purposes."

37. The Expert Members and the High Powered Committee found that it was not feasible and advisable to take recourse to the latter issue and the former option would be more feasible and would effectively control the pollution in river Yamuna. In relation to the

matters relating to drainage in Delhi, the Committee was put at a disadvantage because of non-availability of relevant data. Thus, the Tribunal directed that the drainage map of 1976, which shows the natural drains and man-made drains, should be taken as the basis for preparing recommendations in that report. Vide order dated 4th September, 2014, it was noticed that it was imperative for all authorities to work *in tandem* and co-operation, to achieve the object of making Yamuna free of pollution for the restoration and beautification of its flood plains. Both these aspects are essentially interlinked as making the drains of Delhi pollution free would automatically result in improving tremendously the quality of water in River Yamuna. Thus, the High Powered Committee, of which, even eminent Professors were members, was directed to hold its meeting and *inter alia* answer the following:

> "A) The Committee constituted by this Tribunal shall expeditiously and in any case not less than one week from today hold a meeting and provide a clear answer on the following to the Tribunal:
> 1) Taking the 1976 drainage map of Delhi as the basis, the two maps submitted by Prof. A.K. Gosain today before the 1) 1)Tribunal, one showing natural drains and other natural drains carrying sewage, are the correct documents to be the foundation for further progress of the Project.
>
> 2) Whether the drainage carrying sewage, (the storm water drainage) should or should not be permitted to carry sewage in any part of Delhi.
>
> 3) How many STPs are required and in what capacity?
>
> 4) There are nearly 201 natural drains and the majority of which are also carrying sewage which ultimately joins into the River Yamuna through 22 outfall points. Whether it will be technically feasible, taking all aspects into consideration including the geographical and economical parameters, to lay down a separate pipeline/open lined channel to carry the sewage from these 22 points to an appropriate distant place in Delhi where an STP of an appropriate capacity

should be established with proper utilisation of the remnant water or whether it will be more advisable to construct STPs on most of the drains carrying sewage to ensure that the same sewage waste is treated prior to its joining River Yamuna.

5) Lastly, the Committee should state as to what is the best methodology to be adopted to ensure that the sewage from the colonies where sewage treatment system does not exist as of today is appropriately brought to the STP plants and/or to the point of the major drains collecting the sewage. This is more particularly in relation to the unauthorised colonies of Delhi."

38. It also needs to be noticed that the MoEF had constituted an Expert Committee vide its order dated 13th September, 2013. This Committee was to critically analyse and examine the YRFD Plan of DDA, steps to be taken for further improvement of river bank and also to consider other relevant aspects. This Committee submitted its report on these aspects on 19th April, 2014. Vide order dated 24th September, 2014, the Tribunal further directed that the report shall not only suggest the methodology or process that is required to be followed for restoration and beautification of riverbed, but, even state as to who should execute the work and the manner in which the work should be executed.

39. The Committees had filed interim status reports and final reports as well during pendency of the applications. These reports were prepared by the Committees on two facets: firstly on restoration, preservation and beautification of river banks and secondly on control of pollution in River Yamuna. In these meetings, representative from Engineers India Ltd, Central Pollution Control Board, Central Water Commission, National Disasters

anagement Authority, Indian Space Research Organisation, DDA and other authorities were present and participated.

40. We may notice that the final report relating to 'preservation, restoration and beautification of River Yamuna' was finally submitted by the High Powered Committee on 19th April, 2014, while the other report relating to 'control of pollution and restoration of Yamuna river' by the Expert Committee appointed by the Tribunal, was submitted on 13th October, 2014. Both these reports shall constitute an integral part of this judgment.

41. This matter was listed for final hearing and was heard on different dates. Referring to their respective reports, Professor Brij Gopal, Professor A.A. Kazmi and Professor A. K. Gosain were present before the Tribunal and had explained the various aspects of their reports, as well as the need for prioritization for installation of various Sewage Treatment Plants (for short 'STPs') on the drains. After detailed discussions, it was found to be feasible and in fact the entire project was decided to be completed within two and a half years. After the matters were heard at great length, we reserved the case for judgment on 9th December, 2014. Vide the same order, the Tribunal had also directed CPCB, DPCC and a representative of the MoEF and the Delhi Jal Board to take samples of the drains joining River Yamuna from 10 different points from the 22 km stretch flowing in NCR Delhi and prepare baseline data for the purposes of determining the improvement or restoration of the water quality of River Yamuna as well as its banks.

42. We may notice here that even during the pendency of this application, directions had been issued to various authorities to act and take steps in accordance with law to protect River Yamuna and its banks. It was submitted by various authorities that huge construction debris and other waste that had been dumped at the river bank and riverbeds of Yamuna, have been removed. There is, according to all, a total check on dumping of fresh construction debris or waste on the riverbeds. It is hoped that the directions in this regard even in future would be strictly adhered to by all concerned.

Analytical discussion on merits and the reports of the Expert Committee

43. It not only seems, but, is virtually difficult to visualize the extent of pollution of River Yamuna, particularly in NCR Delhi. Some have called Yamuna, 'a drain', some as 'most polluted river' while others have termed it a 'dry river', except for in the monsoon season, when it only carries wastes of different kinds. These expressions may not sound very appropriate for a river which is the major source of human living and has religious sentiments attached with it, but when examined scientifically, these expressions are found to be having substance. River Yamuna, a major tributary of River Ganga, originates from Yamunotri Glacier near Bandarpunj peaks in the Mussorie Range at an elevation of about 6,320 meters above mean sea level in District of Uttarkashi, Uttarakhand. The catchment area of the River Yamuna covers parts of Himachal Pradesh, Uttarakhand, Uttar Pradesh Haryana, Rajasthan, Madhya

Pradesh and the entire territory of Delhi. At Yamuna Nagar District of Haryana, the river is diverted into Western Yamuna Canal and the Eastern Yamuna Canal for irrigation. River regains its water from ground water accrual and feeding canal (Drain No.2), downstream of Karnal, before it enters Delhi, near Pala Village. Yamuna River within NCR is classified into five distinct segments due to its characteristics, hydrological and ecological conditions. All these five segments have different sources of water and waste water. In the Delhi segment of Wazirabad Village at Okhla, nearly a segment of 22 kilometers, it only get domestic and industrial waste water of Delhi and thus, is the most polluted segment. The CPCB has placed on record state-wise contribution of waste water generation in the cities located on the banks of Yamuna. The figures in this statement are astonishing. It shows that in Delhi the length of the River is 48 kms, forming merely 3% of the total length of this river, before it joins the River Ganga. However, the sewage generation is 3,800 MLT, forming 76% of the pollutants put into the River Yamuna. Keeping in view the fact that the Yamuna River is not a continuous river, especially during dry months between October and May, the situation is bound to get worse. This situation stares all concerned, including the Government in face and leads only to one question: "Would it ever be possible to clean River Yamuna and restore its wholesomeness?" This question can safely be answered in the affirmative. But all that is needed is the concerted effort from all stakeholders and a positive participation from the residents of NCR, Delhi. No process can prove to deliver

the desired results unless and until the persons involved in carrying on the process as well as the people for whose benefit the process is being set up, fully cooperate and ensure adherence to the prescribed methodologies.

44. The Expert Committee has opined that 32 STP's ought to be installed at minor and major drains of Delhi, in addition to the existing STP's. Once these proposed STP's are established and made operational, the drains are kept clean and it is ensured that sewage does not enter these drains, restoration of Yamuna to its original status is completely an achievable goal.

45. The Tribunal while accepting the reports of the Expert Committees, not only critically examined the reports and recommendations but even considered other alternative proposals to make River Yamuna pollution free. One of the main suggestions was with regard to laying down of an independent pipeline on the banks of River Yamuna, where all the drains carrying sewage, industrial waste and trade effluents would join it. This pipeline shall carry such waste to a designated destination near Agra Canal, where it shall be treated. The treated water shall be recycled for industrial and agricultural purposes. This suggestion was found to be not practicable for variety of reasons by the expert bodies. Firstly, it may become unworkable during the monsoons for high level of water and its pressure. Secondly, the pipeline itself may get chocked or blocked because of the effluents containing variety of wastes including solid waste. Further that laying down of such long pipeline in the river bank may not be ecologically advisable.

46. We have accepted these final reports after due scrutiny and keeping in view all the practical aspects including financial implications. The only viable way to clean River Yamuna and its river beds is to implement these reports without default and demur with the amendments and additions that have been made by us in this judgment. Another advantage of accepting this report is that the infrastructure of existing STP's would come handy and can be effectively utilised for treatment of the sewage and ensuring removal of pollutants. According to Delhi Jal Board, there are 23 STP's planned and existing as of today in Delhi. These include one STP that is proposed to be established at Delhi Cantt. Other STP is stated to be under construction and is likely to commence in the year 2014-2015. The oxidation pond at Timarpur is proposed to be closed which was commissioned in 1947. There is a STP at Okhla which was commissioned in 1937 and four STP's at Kondli are lying closed due to inadequate sewerage. Majority of the STP's are not operating to their optimum capacity and some of them are not functioning properly for a variety of reasons. Thus, the entire STP infrastructure, if made fully functional, can be utilised to support and aid the effective implementation of the project under the Expert Reports. Only 32 additional STP's are required to be established and made operational for complete treatment of sewage which is generated in Delhi. Under this project, total of 55 STP's are required to be established and made operational. Out of them, 22 STP's are already in place. However, they are not operating to their optimum capacity. This itself, places the entire project at a great advantage

as the investments already made would not be wasted and would form integral part of the comprehensive project. However, it is essential that Delhi Jal Board takes all steps without any further delay to ensure that the existing 23 STP's are made functional effectively and operate to their optimum capacity.

47. Ancillary corollary thereto is recycling and reutilization of the water that would be discharged from these STP's after treatment of the sewage. This would not only help in providing usable water for horticulture and industrial purposes for which there is a great shortage in Delhi, but, would also minimize the discharge into River Yamuna, preventing its pollution on the one hand and furthering the cause of its restoration on the other.

48. We may also advert to existence of high pollutants in River Yamuna. Analysis Reports have been submitted by the CPCB of the various samples showing water quality in main 18 drains of Delhi. The samples were collected by the Board from 19th November, 2013 to 18th October, 2014 at different dates on different intervals and from all the 18 drains of Delhi (Najafgarh + Supplementary drain, Magzine Road drain, Sweeper Colony drain, Khyber Pass drain, Metcalf House drain, ISBT + Mori Gate drain, Tonga Stand drain, Kailash Nagar drain, Civil Mill drain, Delhi Gate (power house) drain, Sen Nursing Home drain, drain number 14, Barapulla drain, Maharani Bagh drain, Abu Fazal drain, Jaitpur drain, Tuglakabad drain and Shahdara drain). Most of these drains are found to be highly polluted and are releasing much higher quantity of BOD. Even presence of heavy metal was noticed. We would only be

referring to the high content of pollutants in the respective drains which would sufficiently indicate the dimensions of the environmental problem and its seriousness which we are dealing in the present case. For instance, Magzine Road drain carries 593 mg/l Chemical Oxygen Demand (COD)as opposed to the prescribed value of 250 mg/l. Tonga Stand drain, Kailash Nagar drain, Delhi Gate (Power House)drain carries the COD content of 810 mg/l, 547 mg/l and 633 mg/l respectively, as opposed to the same prescribed value of 250 mg/l. As far as Suspended Solids in mg/l is concerned, the prescribed limit is 100 mg/l, while the Shahdara drain, Delhi Power House drain, Kailash Nagar drain, Tonga Stand drain, Khyber Pass drain and Magzine Road drain are carrying 405 mg/l, 845 mg/l, 373 mg/l, 953 mg/l, 581 mg/l and 329 mg/l respectively. In this very report, it has been shown that metals like Chromium (Cr), Copper (Cu), Iron (Fe), Nickel (Ni), Lead (Pb) and Zinc (Zn), are the metals out of which, all or few of them, have been found to be present in all the 18 drains. Such high levels of pollutants in River Yamuna, are indicators of the likely environmental and health hazards, which will result from direct or indirect use of the Yamuna water. Large scale agricultural activity on the river bank or floodplain, is one of the glaring examples of indirect impacts of environmental pollution. The vegetables grown in these areas, for which the direct source of irrigation is the ground water or water flowing in River Yamuna, are bound to be contaminated. We have noticed in some detail the serious health hazards, including diseases like cancer and other serious diseases,

from which the persons consuming such products may suffer. Thus, the agricultural activity needs to be stopped immediately to prevent further environmental and health hazards and in any case till the time Yamuna is restored to its original status and carries only wholesome water or the water which can be used for irrigation purposes, without exposing the residents of Delhi to serious diseases and health hazards. We have already noticed the disputes that are pending between the lessees of land, falling in the river Flood Plain, but, that would either way be inconsequential against the issues of environment which have to take precedence over the individual rights. Most of the lessees do not have subsistent rights, therefore, they cannot be permitted to continue the activity to raise agricultural produce, which would be seriously injurious to human health. This fact is fully substantiated by the data placed before the Tribunal which shows that the drains joining River Yamuna and even Yamuna itself, carries heavy pollutants, including the heavy metals. On top of that, pesticides are being used and sprayed over the agricultural produce, which only makes them worse for human consumption in regard to the injury that they would cause to human health. Unless the river is restored to its original health, the agricultural activity would result in seriously jeopardising the environment as well as human health. The period involved in the restoration under the project approved by the Tribunal is not very long. The prohibition is not of permanent nature but is only for a limited period of two and a half years. Certainly for the good of the society and in public interest such restrictions can safely be

imposed in consonance with the provisions of environmental laws in force in the country.

48. As we have already indicated the entire stretch of River Yamuna through NCT Delhi and its border with Uttar Pradesh is 52 kms. This stretch has been divided into three main sections. First is of 26 kms. from village Palla to Wazirabad, which is largely rural in character. Generally, it is in its natural state, except marginal bunds on its two sides and has growing urbanization on the UP side. On this stretch the river and its Flood Plains together span 1.5 km to 4 km.

49. The next stretch of 22 kms is from Wazirabad Barrage to Okhla Barrage. This section is highly urbanized, with the river and its Flood Plains greatly compromised. Flow of the river is further impeded by the ITO Barrage and 9 bridges and flyovers resulting in the river and its flood plain getting restricted to as low as 800 m strip in some places. The last stretch of 4 to 5 kms is from Okhla Barrage to village Jaitpur. This stretch has developed rapidly, both on Delhi and UP side; its flood plain either being encroached by settlements or intensely degraded by stone crushers, resulting in the river and its floodplain reducing to 800 m to 1.5 km width.

50. It cannot be disputed and in fact, has not been disputed that the present status of Yamuna is only of a sewer, due to lack of fresh water flow, discharge of untreated or partly treated domestic and industrial waste and due to dumping of debris on its banks and in it. Its flood plains are highly truncated and degraded, resulting in depletion in most of its natural bio-diversity. It has been submitted

before the Tribunal that around 37000 cu. m. on the Eastern bank and around 53000 cu.m. on the Western bank is the quantum of debris which was lying on the banks River Yamuna. Of course, majority of this has already been removed under the directions of the Tribunal and steps have been taken to identify such sites. Still little part of debris, consisting of construction and other debris remains. Steps need to be taken not only to remove the remaining part of debris and clear the river banks absolutely, but also to prevent and ensure that there is no fresh dumping of debris in the entire stretch passing through National Capital Region (for short, 'NCR'). Huge dumps and encroachments of the river banks were noticed by the Expert Committee constituted by the MoEF, during their visits to these sites. Private persons, authorities and even bodies like DMRC had contributed to encroachments and dumping, which was rampant. Thus, the Committee recommended that:

1. All solid waste dumps, including those used for roads and bunds, within the active floodplain should be removed forthwith.
2. All solid waste recycling units, farm houses, cattle farms and nurseries must be relocated at the earliest.
3. Construction of new bunds, roads and guide bunds, widening of existing bunds, spurs and guide bunds within the active floodplains should be stopped and banned.
4. No filling of the floodplain / riverbeds be allowed in the name of development and renovation of ghats. The floodplain under built up areas at Sur Ghat and Quedsia Ghat should be

recovered. All recreational facilities for people visiting ghats should be created close to the embankments/roads where a channel taken out from the water course of the river can be brought for the purpose.

5. All settlements encroaching upon the floodplain (with the exceptions noted in the detailed report) should be relocated at the earliest.
6. Construction of new barrages and roads, railway and metro bridges, and embankments and bunds should not be permitted. In exceptional cases, a critical assessment of their potential impacts on flood aggravation and environmental clearances should be made mandatory.
7. There is a shortage of landfill sites in Delhi. Immediate action is required to identify additional landfill sites catering to the next 25 years of requirement. Action is also required to identify more sites for recycling of building material waste.

51. Unauthorised activities are being carried out on the floodplain and at some places they have even encroached up to the riverbed of Yamuna. Agricultural products raised from these areas have shown to be injurious to human health, primarily for the reasons that the river carries very high pollutants, including heavy metals and acidic elements. One of the studies brought on record which is even supported by the United Nations, is the first to link river contamination with adverse impacts on human health. According to this study, around 23% of children had lead levels in their blood above 10 micro grams – a widely accepted guideline – whose

adverse health effects have been noted. The study said high level of lead in blood was eight times more when exposed to the riverbank after Wazirabad in north Delhi, compared to rural areas upstream in Haryana, where river water contamination was found to be less. Heavy metals such as lead are more readily absorbed by children as compared to adults. The resultant disasters would be impairment of motoring skills, onset and development of hypertension and may even result in slow cognitive development. Water and soil samples were lifted every 2 km, starting, from Wazirabad Barrage and covered 22 km of the river in the capital. The presence of heavy metals increased after Wazirabad even though every drop of water that flows in the river in Delhi has to be cleaned through Sewage Treatment and Effluent Treatment Plants. Presence of heavy metals was negligible in Haryana. Hexavalent chromium, said to be hazardous was found to be highest at Old Yamuna Bridge and Indraprastha Estate Power Plant. This is the area where maximum vegetables are grown on riverbed. At this point there is also heavy industrial discharge into the river.

52. Agricultural activities must be carried on as it is essential for our day to day living, but, agriculture produce that will lead to greater harm to human health must be checked and if necessary should also be stopped. The principle of 'Inter-generational Equity' would require that todays' younger generation should not be exposed to serious health hazards and thus, it will not only be desirable but essential that such contaminated produce/vegetables are not offered for consumption to the people at large. The Principle

of Comparative Hardship would clearly mandate that where the injury is much greater in proportion to the benefit that would accrue as a result of such activity, the activity must be stopped in the larger interest of the public and of public health.

53. The health of the public is a matter which ought to find absolute priority in the agenda of proper governance by the State. Right to health is a part of the right to life guaranteed by Article 21 of the Constitution of India. Where the planning processes are left to the government and to the public bodies, it is inherent that overriding considerations of public health and danger to life must be issues to which top priority consideration is bestowed. Where there is a failure in this regard, the Courts will have to step in. Nothing can be more fundamental than the issue of public safety and public health. No amount of technical pleas can justify a situation where a large number of people are exposed to health hazards because of industrial or any other activity, causing pollution of air or water. Unfortunately, as the sad situation may be, River Yamuna - the main source of drinking water supply - was stated to be the free dumping place for untreated sewage and industrial waste, as back as in 1996 (Ref.: State of Panjab & Ors. v. Mohinder Singh Chawla & Ors., (1997) 2 SCC 83, Bayer (India) Ltd. & Ors. v. State of Maharashtra & Ors., AIR 1995 Bom 290, Dr. B.L. Wadhera v. Union of India Ors., (1996) 2 SCC 594).

Thus, as of today, the Tribunal cannot ignore the extreme pollution of River Yamuna and its consequential adverse impacts on health of residents of Delhi.

54. We may also notice that an application being M.A. No. 275 of 2014 had been filed before the Tribunal where the applicants referred to large scale pollution of River Yamuna which resultantly has led to the contamination of food crops grown in the area, soil pollution, ground water contamination thereby adversely affecting the human health. River Yamuna is a major tributary which forms a large part of the larger River Ganga system. Applicants have claimed that such pollution in the River Yamuna is contaminating the vegetables grown on its banks. Some of the news articles have even described this river as "Yamuna, the poison river". Moderate levels of toxic metals (nickel, lead, manganese, chromium and zinc) were evident in the water at several locations. At one particular location lead levels were found 10 times more than anywhere else in the river and in another location near a thermal power plant, mercury concentration was 200 times more than determined by the United States Environmental Protection Agency. The study reveals that industrial effluents and untreated sewage continue to choke the river. The amount of Faecal Coliform - bacteria available in human and animal faeces – has grown by as much as 30 times as compared to the CPCB values. The applicants have annexed various articles and photographs in support of their averments. The study titled "Anthropogenic Arsenic menace in Delhi Yamuna Flood Plains" showed that the maximum concentration up to 180 ppb was found in the groundwater. Analysis of around 120 water samples collected extensively along the Yamuna Flood Plain showed that more than 55% had arsenic contamination beyond the WHO limit of

have nothing to do

prohibited in terms of the provisions of the Act of 1986. We find merit in the contentions raised on behalf of the DDA, of course, subject to such orders as may be passed by the High Court of Delhi. Even if these persons have an interest in the land, they cannot carry on an activity which is environmentally improper and is completely injurious to human health, just to make some money. Section 5 of the Act of 1986 clearly empowers the Boards and/or MoEF to prohibit such activity which is injurious to environment and human health.

56. The Expert Committee, in its report dated 19th April, 2014 stated that it had more than 6 meetings and conducted site visits. The Committee also critically evaluated the available information relating to rejuvenation, development and management of River Yamuna, particularly, with respect to the 52 km stretch of NCT of Delhi and the portion relating to the State of Uttar Pradesh and recommendations of different Authorities and Committees constituted by the Government and agencies differently. The Committee also generated 1:1000 resolution maps on GIS platform using 2010 data sets supplied by GSDL on different aspects of the river ecosystem and flood zoning was also undertaken using digital model. The High Powered Committee constituted by the Tribunal with the Secretary, MoEF as Chairperson, had also constituted Expert Committee and sub-Committee to examine various matters in this regard. Experts were chosen by the MoEF and it had also deputed its own experts and scientists to examine these various

aspects. This is how all the above reports came to be submitted before the Tribunal from time to time.

57. As already noticed above, vide order dated 13th September, 2013 passed by the Tribunal, the Expert Committee was required to examine and critically analyse the Yamuna River Front Development Plan of the DDA as well. This was done by the Committee. This Plan of DDA is an 'Integrated project of recreational areas along with bio-diversity parks, in four of the sub-zones of the 'O Zone'. The area proposed for the implementation of Yamuna River Front Development (YRFD) scheme by the DDA, is the active Flood Plain which is frequently flooded by medium floods. According to the Expert Committee, the proposed activities such as construction of various recreational and public facilities, by effecting topographic changes, will reduce the flood carrying capacity and aggravate flooding, besides contributing to pollution. Development of the flood plains has to be strictly done, while keeping the biodiversity intact and ensuring that no major and impermissible construction activity is permitted on the flood plain. Biodiversity parks could be made at suitable locations, for example, sub-zone IV and sub-zone VI, as recommended by the Expert Committee in its report. The Committee has specifically noticed that the flood carrying capacity of the river has been considerably reduced due to encroachments and waste dumps resulting in flooding of its banks every year and this was also reported by NEERI in its report of 2005. The Committee has suggested that new wetland habitats should be created for biodiversity

conservation, wherever feasible and inter-connectedness between wetlands for water movement and exchange should be promoted. The Expert Committee, for the reasons stated in its Report, suggested that the YRFD plan of DDA is untenable and should be stopped. It has already been placed on record that the DDA itself admits in their proposed re-delineation of 'O Zone', in terms of the public notice issued by it on 28th September, 2013, that the 'River Front' refers to an area that lies outside the embankments of a river, but the area of the proposed YRFD plan is within the active floodplain. Thus, it is recommended that this YRFD scheme should be replaced by another plan for restoration of the river and its floodplain, as suggested by the Expert Committee and accepted by the High Powered Committee. We direct that all the recommendations of the Expert Committee, including the above, should be implemented without any further delay.

58. This report has been examined by the Tribunal and we are of the considered view that the DDA should not proceed further with its YRFD scheme and the recommendations of the Expert Committee as accepted by the High Powered Committee should be implemented. We order accordingly. Preservation, restoration and beautification of River Yamuna and its banks would not achieve the desired results, unless effective steps were taken to ensure that the riverbed is neither encroached nor any kind of waste (construction debris, municipal waste or any other waste) is dumped at the banks of River Yamuna. The Expert Committee's recommendations, as accepted by the High Powered Committee, were that the 'O' Zone as

defined in the MPD, 2021 and as delineated in the report dated 19th April, 2014, together with the corresponding part of the River and its active floodplain, within the embankments on the UP side on the east, should be designated as the River Zone. The river zone so designated should be preserved and protected for the conservation and restoration of the river and no development activity should be permitted within the river zone that encroaches upon the active floodplain, obstructs the flow or pollutes the river.

59. Having considered all aspects and the Expert Committee Report before the Tribunal, the Tribunal is of the considered view that till Yamuna is rejuvenated and is restored to its wholesomeness, agricultural activities on the flood plain/ 'O' Zone should be strictly prohibited. The concerned authorities should ensure that the vegetables grown on this belt are not permitted to be sold in the market. The Association of such vegetable market should be informed of this prohibition and the MoEF should issue directions forthwith, prohibiting the production and sale of vegetables from this area with immediate effect.

60. Some of the Municipal Corporations on their own have taken steps to concretize the drains as well as to cover them. In some parts of Delhi, particularly, in relation to the drain in Defence Colony and other parts of South Delhi, drains have been covered to some extent. In other places, the work has just started while in other places, a very meagre part of the work has been executed. According to the report of the Expert Committee, covering of drains in Delhi would have very serious adverse impacts upon the

environment and ecology of Delhi. This would result in more flooding, explosion of diseases and clogging of drains.

The Expert Committee noticed that the storm water drain system is designed to carry the rain water only and also to allow recharge in the ground water through its drainage system, as well as through other bodies. It stated that the storm water drain system has been designed based on the good engineering practices and taking average intensity of rainfall as 1 cusecs per acre. The storm water drain system should carry rain water and nothing else to maintain the ecology and environment. Ideally, the storm water should flow through its designed natural drainage system and sewage through sewerage network and finally treated at STPs before it is finally disposable into the river. They proceeded to notice with approval the policy decision taken by a Committee chaired by the Chief Secretary, Delhi in respect of the various drains as circulated by Circular dated 25th February, 2014 which inter alia provided as under: -

> *"1. Natural drains*: Natural drains are those drains which are naturally occurring, formed by the watershed of the area draining into it and have been existing naturally with a fully unlined base originally. Although many modifications have been made to the natural drains over the years through lining, covering etc. these drains would still continue to be considers as natural drains. The policy in r/o natural drains shall be as under:-
>
> a. The natural drains shall neither be lined (concretising the surface) nor shall they be allowed to be covered in any case.
> b. The number of the natural drains will be confined to the list of such drains contained in the MPD 2021.
> c. Construction of elevated road along these drains without affecting the aesthetics, flow of drain and

without hampering cleaning of the drain may be allowed. Similarly, service road and NMV track along the drain may also be allowed provided it does not in any manner affect the flow, cleaning of the drain and aesthetics of the area."

The said policy has also found favour with the High Court in W.P.(C) No. 2385/2011.

The Committee, thus, has recommended that there should not be any concretization or covering of drains particularly natural drains in Delhi. According to the Committee such course is not technically feasible and is not in the interest of ecology and environment.

61. Upon its examination, the view expressed by the Expert Committee is not only acceptable, but is in consonance with the settled principles of ecology. The natural drains cannot be permitted to be concretised or covered, as it would not only destroy the flora and fauna but would even destroy the ecology of the entire area. We are in the agreement with the reasons given by the Expert Committee that it is neither appropriate nor in the public interest to permit Corporations to concretise and cover all the natural drains of Delhi. In order to prevent wastage of public funds which have been spent recklessly, even though without proper application of mind and after consideration of requisite data, we would permit the Corporations to keep intact the construction done so far on the drains, particularly, where the work has fully been completed in all respects and they have already been covered. However, where work has just commenced or just a partition wall has been erected, in our considered view all this work should be dismantled, especially,

where only *saria* (iron rods) have only been fixed. Iron removed from these places can safely be used in construction of other projects by the Corporations, including construction and setting up of STP's and allied infrastructure. Thus, it would cause minimum, albeit unavoidable waste of some public money. M.A. No. 88 of 2014 has been filed by a Resident Welfare Association praying for directing the Corporations to protect the environment, remove pollutants and prevent encroachments from drains. The Corporations or such authorities are liable to be directed to clean all the drains of Delhi not only of the area pertaining to the applicant, but also ensure that the drains are kept clean and obstruction free in the entire NCR. Proper legal action should be taken against the persons who throw any Municipal Solid Waste, including plastic etc. into these drains. The Corporations and concerned authorities should provide dustbin/containers of appropriate size and give due incentive to the citizens as well as cleaning agencies, for dumping the municipal or any other solid waste into the big dustbins, from where the same should be transported for disposal in accordance with the Rules of 2000.The Corporations can certainly take steps to beautify and maintain the banks of such drains, for which the residents should be required to participate and ensure proper maintenance of the drains and their surrounding areas. We are not oblivious of the fact that it may not be possible for the NCR Delhi to incur the entire financial liability of this project in the current year. The project is proposed to be completed within two and a half years. Thus, the expenditure can be spread over that period. In any case, there

appears to be no financial constraint on the DJB and other concerned authorities, as it has been conceded before us that Rs. 20,000 Crore is the planned budget for providing of network of water and sewage in the entire Delhi for the coming five years, commencing from the year 2012-2013. Pipeline and sewage is to be laid for 9,000 kms in the 2000 odd colonies of Delhi. The establishment of STP's is also covered under this planned expenditure. Out of this amount, Rs. 1000 Crore has been earmarked for water network and Rs. 1031 Crore for sewage network, for the current year. Similar amount is also provided for the financial years 2014-2015 to 2016-2017. This being the financial status, we do not foresee any difficulty in provisioning of adequate funds for timely completion of this project. In fact, the DJB and the concerned authorities would have ample finances at their disposal within the ambit of the already provided planned expenditure. Besides that, we have also granted liberty to the Corporation and the DJB to collect funds from the general public on the 'Polluter Pays' Principle. The safest criteria for determining the quantum of environmental compensation payable by people of Delhi, would be the certain percentage of the property/house tax payable by an individual. It may be noticed that certain kind of charges like education cess, sewage tax and certain other charges, do form part of the property/house tax payable by individuals, thus, environmental compensation can also form part of such property/house tax. But this, we would leave primarily at the discretion of the authorities concerned. They may or may not

impose such charges if there are more than adequate funds available with the DJB and the NCT Delhi for completion of the project.

62. Another facet which calls for attention of the Tribunal is that all the natural and manmade drains in Delhi should be kept clean, free of obstruction and dumping of any material or municipal waste, in or around them should be strictly prohibited. It has been submitted before us that besides the existing 157 natural drains which have been identified by the Expert Committee with reference to the 1976 Drainage Map of Delhi, around 44 drains are not traceable. It is important that the said untraceable 44 drains should be traced and a definite report is submitted to the Tribunal, for two reasons. Firstly, if these drains are traced, then they could be kept clean and obstruction free and if any additional STP or ETP is required to be provided on any of them, timely steps in that regard could be taken. Secondly, if these drains are existing and are covered, while being connected to such colonies which do not have STP and are discharging their sewage into such drains, then it is bound to affect the success of the project adversely. Therefore, the Principal Committee should trace and/or cause to be traced, these 44 drains and submit a status report in that regard to the Tribunal. After submission of such report, if any further directions are necessitated, the Tribunal would pass such directions.

63. To keep the matters beyond ambiguity and with reference to the report filed on behalf of the South Delhi Municipal Corporation and the photographs annexed thereto, we direct that no further

construction work would be carried on in the G.K-I drain and all the iron rods, especially in the middle section of the drain, shall be entirely removed. The part of the drain which has been covered would be permitted to remain, while it will be ensured that the same is neither occupied by unauthorised occupants nor is used as a platform for dumping, as is even evident from the photographs submitted by the Corporation. No further construction work would be carried out in the Andrews Ganj drain and the entire middle section where iron bars are visible shall be removed. On the Chirag Delhi drain, no work appears to have been done as shown in photographs and only iron bars have been fixed on one side of the drain. The entire iron bars shall be removed and no construction shall be carried out on the drain. In Pushp Vihar, the drain which is already covered need not be demolished, but the iron bars which have been fixed in the portion ahead of the covered area, would be removed and the drain would be made obstruction free and not divided. The iron so removed, shall be used for other construction works by the Corporations/authorities concerned. The wall on one side of the drain that has been constructed would not be demolished. However, it should also be ensured that the covered part of the drain, even at Pushp Vihar, is not used as a platform for unauthorised occupation or dumping of waste

64. The Act of 1986 was enacted by the Indian Parliament for protection and improvement of environment and to implement the decisions taken at the United Nations Conference on Human Environment at Stockholm in June, 1972. The rapid decline ir

environmental quality that was evidenced by increasing pollution, loss of vegetal cover and biological diversity, excessive concentrations of harmful chemicals in the ambient atmosphere and in food chains, growing risks of environmental accidents and threats to life support systems, were the main aspects that weighed with the Legislators to enact various environmental laws. The Water (Prevention and Control of Pollution) Act, 1974 (for short 'the Water Act) and the Air (Prevention and Control of Pollution) Act, 1981 (for short 'the Air Act') intend to provide pristine water and clean air on one hand, while on the other, place a statutory obligation upon the industries or units intending or carrying on any industrial or other activity where they emit gases or smoke in the air or trade effluents in the land/water/stream etc., not to operate without consent of the concerned Pollution Control Boards. In other words, they are mandated by law to adhere to the prescribed standards of emission and discharge of trade effluents. Where they intend to prevent and control pollution of air and water, there they give a statutory right to the citizens of India to claim clean environment.

65. The most significant event in the recent past of the Indian environmental jurisprudence, was the declaration of the Hon'ble Supreme Court that right to decent and clean environment was an essential feature of right to life as enshrined under Article 21 of the Constitution of India. The dictum of the Supreme Court of India in its various judgments, not only declared it to be a fundamental right, but commanded the States to discharge its constitutional

obligation for providing a cleaner environment, as its contamination was of a very high degree (Ref: *Vellore Citizens Welfare Forum v. Union of India and others*, (1996) 5 SCC 647, *Tirupur Dyeing Factory Owners' Association v. Noyyal River Ayacutdars Protection Association*, (2009) 9 SCC 737 and *M.C. Mehta v. Union of India and Ors.*, (2009) 6 SCC 142). The judgments of the Supreme Court, of course, were with reference to the facts and circumstances of a given case, but the golden principle underlining these judgments was uniform, i.e. protection and improvement of the environment. The Supreme Court in its judgments even rejected the plea of the State that lack of availability of finances at a given point of time could be an available defense, for not taking effective steps for providing a cleaner environment. In this regard, reference can be made to the judgment of the Supreme Court in the case of *Ashok Kumar Thakur v. Union of India*, (2008) 6 SCC 1, wherein the Supreme Court held:

> "It is to be noted that financial constraint cannot be a ground to deny fundamental rights and the provision for the schemes and the utilisation of the funds are also relevant factors. It appears that better coordination between the funds provider and the utiliser is necessary."

66. The concern of the framers of the Constitution for environment is not only exhibited by introduction of Article 48A by the 42 Amendment Act of 1976, but also by Article 51A(g) of the Constitution, which places a fundamental duty upon the citizens protect and improve the natural environment, including forest rivers, wildlife and to have compassion for living creature Therefore, the law declared by the Supreme Court of India, manda

of the Constitution and the statutory rights and obligations, are *ad idem* to the mandate that there has to be protection and improvement of environment and all must contribute to provide decent and clean environment. United Nations conference on Environment and Development held at Rio-de-Janeiro in June, 1992, in which India participated had also called upon the States to provide effective access to judicial administrative proceedings, including redress and remedy and to develop national laws regarding liability and compensation for the victims of pollution and other environmental damage. The States in discharge of their above obligation have enacted the National Green Tribunal Act, 2010 which provides for access to specialised environmental justice in the country. This Tribunal has been established for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources, including enforcement of any legal right relating to environment and giving relief and compensation for damage to the person and property and for matters connected therewith and incidental thereto.The primary object of establishing this Tribunal is to provide easy access and expeditious dispensation of environmental justice. The legislature in its wisdom has vested wide jurisdiction in the Tribunal to ensure that major spectrum of environmental jurisprudence are covered, so as to render effective and concerned decisions in the field of environment.

67. It is expected of the Tribunal to deal with the multi-disciplinary issues relating to environment. Section 20 of the NGT Act reads as under:

> "The Tribunal shall, while passing any order or decision or award, apply the principles of sustainable development, the precautionary principle and the polluter pays principle."

68. A bare reading of the above provision makes it amply clear that in exercise of its varied jurisdictions, i.e. original, appellate and special jurisdiction, the Tribunal is to be guided by the three well-settled canons of environmental jurisprudence. These principles being a part of the statute that created this Tribunal, the obligation upon this Tribunal, to ensure that cases before it are expeditiously disposed of, in line with these principles, is greater. In other words, these principles are the very foundation of the determinative process before the Tribunal. The Principle of Sustainable Development takes within its ambit the Principle of Inter-generational Equity. In fact, all these three principles, i.e. the Precautionary Principle, the Polluter Pays Principle and the Principle of Sustainable Development have to be collectively applied for proper dispensation of environmental justice.In the case of *Tirupur Dyeing Factory Association case* (supra),the Hon'ble Supreme Court observed that the 'Polluter Pays' Principle and Precautionary Principle itself have to be read with the doctrine of Sustainable Development. Normally, they are applied collectively depending upon the facts and circumstances of case. Restriction is an inbuilt fact of Sustainable Development and that itself serves the cause of Intergenerational Equity. Sustainable Development means

the development that can take place and which can be sustained by the nature and ecology with or without mitigation. In such matters the required standard is the risk of harm to environment or to human health and has to be decided in public interest, according to a 'reasonable person's test'.

69. The Supreme Court in the case of *Vellore Citizens Welfare Forum* (supra), referred with approval, the concept of development to say that the traditional concept that development and ecology are opposed to each other is no longer acceptable. Sustainable Development is the answer i.e., development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. It is intended to improve the quality of human life, while living within the carrying capacity of the supporting ecosystems. The 'Precautionary' Principle and 'Polluter Pays' Principles were, therefore, said to be the essential features of the Principle of Sustainable Development.

70. We have referred to the Principle of Sustainable Development only to illustratively repel the contention that development on the banks of River Yamuna is necessary by raising constructions of the kinds which were contemplated by the DDA and even suggested by the Bar. This reasoning would equally be applicable to the concept of covering of natural storm water drains. Unquestionably, Yamuna is a very polluted river and it hardly contains water, which could be used for many useful purposes, including agricultural activities. The water is unfit for human consumption and even for industrial

purposes. Steps have to be taken to restore Yamuna to its original salubrious and pristine form.

71. Before we examine the applicability of the three statutorily stated Principles to the present case, we must refer to the project and the manner in which it is to resolve these serious environmental issues and achieve the object of revitalizing River Yamuna.

72. The entire issue could be identified into two segments, which are the primary sources of pollution of River Yamuna. The first, pollution resulting from discharge of industrial and trade effluents; and the second, sewage and domestic discharge and untreated waste entering the River Yamuna through different drains. The installation and operationalization of CETPs for all industrial pockets of Delhi, would take care of treating the trade and industrial effluents before it is permitted to join any drain. As of date, in some industrial clusters CETPs are in existence, but are not working to their optimum capacity and effectively. Thus, it is required that all the industrial clusters in Delhi should have a CETP which has to be established and made effectively operational by the concerned authorities, particularly the DJB and other Corporations and authorities in-charge of industrial clusters under the guidance of the Principal Committee. Wherever they are in existence, it should be ensured that they should work to their optimum capacity and effectively, to prevent and control the pollution resulting from discharge of industrial/trade effluent of that industrial cluster. The new CETPs that are to be installed

must be established keeping in view the manufacturing and production activities of the industries within that industrial cluster. It should be ensured that the treated effluent is strictly in consonance with the prescribed parameters and does not carry any hazardous ingredients, particularly, heavy metals. We also direct that the authorities concerned would require each industry to contribute for the establishment, maintenance and operationalization of such CETPs. The criteria has to be the quantum of production/manufacture, nature of process and consumption of water and electricity by such industrial units. Such industrial units within a particular industrial cluster have to pay these amounts on the 'Polluter Pays' Principle, for the pollution already caused by them and even which they are causing presently, as well as to prevent pollution in future on the Precautionary Principle. Major part of such costs, obviously have to be borne by the authorities concerned, let us say 2/3rd, while 1/3rd of the total costs should be borne by the industries.

73. Once all the new 32 STPs are established and made effectively operational and all the existing STPs (21) are set in order and they operate to their optimum capacity, then the entire sewage and domestic discharge from all the colonies of Delhi, through nearly more than 157 drains, would stand treated. This treated discharge then has to be re-used, recycled for supplying water for industrial and agricultural purposes. In other words, the treated sewage and domestic discharge would have only remnant water, which is not to have pollutant elements and even odour for that matter. Keeping in

view the demand of water by industrial and agricultural sector of Delhi, larger part of the treated discharge would stand recycled, reutilized and a very small remaining part would be discharged into the River Yamuna. The environmental flow of Yamuna would be maintained, which will be preceded with controlled dredging, required to remove huge accumulation of sediments, sludge and debris. Upon completion of this project, River Yamuna would stand restored to its crystalline and pristine form and would provide clean and wholesome water for use by the residents of Delhi, as well as its natural beauty would add to the glory of the National Capital.

74. It will also be ensured that the remaining debris which has not been lifted so far, should be removed from the Flood Plain of the River Yamuna and it should be ensured that no waste of any kind, much less construction debris or waste, is dumped or permitted to be dumped in that area again. We have already noticed and directed that all the drains would be cleaned and there will be complete prohibition on dumping of any kind of waste and construction and demolition material in and on the banks of the drains, which would then carry only the treated effluent, free of any foul smell.

75. Controlled dredging of river and drains has been recommended by the High Powered Committee. Such exercise would be necessary for cleaning of River Yamuna. For years, Yamuna has been carrying untreated sewage, trade and industrial waste and bearing the brunt of dumping of municipal and/or other waste, including construction debris, plastic, metals and even the

wet waste. With the passage of time, there has been a huge accumulation of sediments and sludge. This, besides causing serious pollution of the river, has considerably reduced the flood carrying capacity of the main channel. This has even silted up wetlands, flood plain and water bodies. According to the High Powered Committee in several places, many of the spurs have lost their original purpose because of the flow in the river is highly reduced and regulated. In several places, these are being extended right up to the current channel and being developed as parks etc. Such development has to stop, to provide water space for the river channel to carry more water. Existing wetlands and water bodies, both upstream and downstream of Wazirabad reservoir, should be deepened and enlarged. Besides, recommending stopping of such activities on the Flood Plain, the Expert Committees have made various recommendations which we accept, *inter-alia,* that (i) culverts must be constructed under the existing guide bunds of roads and flyovers, which have fragmented massive wetlands, so that flood waters flow without obstructions along the river course and into the floodplain wetlands. This will also help movement of aquatic biota (e.g., fish) and enhance the groundwater recharge. (ii) a greenbelt/greenway should be developed on both sides of the embankment, for controlling erosion, reducing sediment load of the main channel, reduce pollution, and beautification. Nature trails may be provided across riparian areas for recreation to the public without losing ecological function of the Flood Plain.

76. And most importantly the Committee recommends control of sewage pollution must be given highest priority, adoption of new technologies to reduce BOD levels from 20 - 30 mg/l to below 10 mg/l together with the use of treatment wetlands as suggested which would enhance quality of water in the river.

77. Upon proper analysis, it is required that controlled dredging is carried-out by the authorities of the main drains of Delhi and River Yamuna to remove huge accumulation of sediments, sludge and waste dumped in and around river and drains to enhance the capacity of the main channel and to restore ecology and bio-diversity.

78. Improvement in the levels of pollution in river Yamuna, widening of the river carrying capacity of the main channel and taking of other remedial and preventive measures still may not completely and satisfactorily serve the object of attaining 'Nirmal Yamuna' unless the environmental flow of the river is maintained continuously. Respondent no. 7 (the Central Water Commission), Upper River Division, Government of India has filed a detailed affidavit in which it has been stated that as per entry 17 of list-II of 7th Schedule, Constitution of India, water is a State subject and reach of respondent no. 7 in this regard is advisory, promotional catalytically in nature.

79. Development and regulation of floodplain of rivers falls within the purview of the State. Floodplain is an integral part of river system even though it is used only occasionally to pass down flood

flows. When floodplain is not occupied by water it forms part of the land system providing possibilities of carrying on some restricted activity. It is not possible to provide uniformity in the extent of floodplains with respect to different rivers as well as its various reaches.

80. Floodplain zoning has been accepted as an important non-structural strategy for flood management. The basic concept of floodplain zoning is to regulate land use of floodplains to restrict damage caused due to floods. The floodplain zoning, therefore, aims at determination of locations so that flood damages are reduced to minimum. A very restrictive activity can be allowed in that area. It is not only to protect the areas from damage resulting from floods and failure of water protective measures, but is also useful in reducing the damage caused due to drainage congestion, particularly in urban areas. The Commission claims to have prepared a model bill relating to floodplain zoning. This model bill provides for different categories based of priorities in floodplain.

Following are the recommended priorities:

1. "Defense installations, industries, public utilities like hospitals, electricity, installations, water supply, telephone exchanges, aerodromes, railway stations, commercial centres, etc buildings should be located in such a fashion that they are above the levels corresponding to a 100 years frequency or the maximum observed flood levels. Similarly, they should also be

above the levels corresponding to a 50 years rainfall and the likely submersion due to drainage congestion.

2. Public institutions, government offices, universities, public libraries and residential areas. Buildings should be above a level corresponding to a 25 year flood or a 10 year rainfall with stipulation that all buildings in vulnerable zones should be constructed on columns or stills as indicated above.

3. Parks and playgrounds. Infrastructure such as playgrounds and parks can be located in areas vulnerable to frequent floods. Since every city needs some open areas and gardens, by restricting building activity in vulnerable areas, it will be possible to develop parks and play grounds, which would provide a proper environment for the growth of the city."

81. According to this affidavit, the National Water Policy – 2012 provides that conservation of rivers, river corridor, water bodies and infrastructure should be undertaken in a scientifically planned manner through community participation. Encroachments and diversion of water bodies must not be allowed and wherever it has taken place, it should be restored to the extent feasible and maintained properly. Despite declaration of floodplains demarcation has all along been a matter of concern.

82. The floodplain must be demarcated, kept free from any permanent developments and wherever it is possible, it should be restored to its original position.

83. Keeping in view the fact that various developments have taken on the floodplain of river Yamuna and to a larger extent they have adversely affected the river flow, its ecology and bio-diversity, we would direct that floodplain zoning should be taken with reference to the flood of once in 25 years, as against other suggested figure of more years. It is important to demarcate the floodplain on this basis immediately, to protect it from any encroachments or development activities, which as already discussed and requested by the High Powered Committee, would adversely affect the ecology and environment.

84. Thus, it is necessary to call upon the authorities to demarcate the floodplain for the flood of once in 25 years and to prohibit any kind of development activity in the area in question. Furthermore, the Committee should consider restoration of the area and wherever necessary, even demolish the properties, which are likely to be dangerously exposed to the flood and are even affecting the ecology and bio-diversity and flow of the river.

85. Environmental flow of river identifies the minimum flow which the river should maintain round the year. If no water or minimum desired level of water is maintained in River Yamuna through-out the year, then it would not help the cause of environment. The flow of the river would by itself keep the river and environment healthier and also cause dilution to the requisite levels, even if some extent of pollutants enter the river. The carrying capacity of the river has a direct co-relation to the availability of quantity of water. We have also noticed that water of river Yamuna in Delhi NCR is released a

Tajewala. At Tajewala, the river is divided into two canals, which go through different parts of State of Haryana and ultimately join river Yamuna and Ganga. The water released in river Yamuna passing through NCT Delhi is low or negligible except in monsoon period. Thus, it adds to the concentration of the pollution and adds to the environmental degradation. This has to be prevented. Thus, we direct the Chief Secretaries of NCT of Delhi and State of Haryana to have a meeting with the Principal Committee and fix the quantity of water that should be released through-out the year to maintain the environmental flow of river Yamuna throughout the year to ensure prevention and control of pollution.

86. There is unanimity amongst all the stakeholders appearing before the Tribunal including the Expert Members in making the submission that there should be one organisation for looking after the entire project and all departments, corporations and authorities should be answerable and work through that organisation or body. That body should implement the entire project and should oversee the functioning, performance and execution of all the segments of this project. It is in view of this that we have constituted a 'Principal Committee' where more or less all concerned departments are represented or individual department like DDA, NCT of Delhi, Department of Irrigation, DJB, corporations and any other body or authority responsible for executing the work or any part thereof would be answerable and work under the direct supervision of the 'Principal Committee'. All permissions sought for by the respective departments are required to be dealt with utmost expeditiousness,

for ensuring timely completion of the project. The 'Principal Committee' shall submit reports to the Tribunal every quarter in relation to execution and progress of the project.

87. Now let us revert to the developments on the banks of River Yamuna. On a Flood Plain, rampant construction is prohibited under the law. A regulated activity could be carried on, only with the approval of the concerned authorities. The DDA had proposed a plan for prohibition, restoration and beautification of the Flood Plain of River Yamuna which has been found to be prejudicial to the environment and ecology, as well as to the flow of the river. Besides these defects, the Expert Committee has also pointed out that there could be heavy floods in Delhi, if the proposal of the DDA was implemented. For these reasons, besides the ones recorded in the Expert Committee's report, of which the DDA itself was a party, we do not approve of implementation of the DDA plan, but would accept the report of the Expert Committee and direct the river bank/Flood Plain to be kept in the manner as indicated in the report. We direct that walkways will be provided on the outer extreme of the Flood Plain of the River Yamuna, away from the embankments, with green area around providing a space and environment which is safe for walkers. In this judgment, of which the reports of the Expert Committee are an integral part, we have applied the precautionary principle by directing various steps which are required to be taken by the authorities, including prohibitory orders in relation to dumping and throwing of waste of any kind in the drains in the River Yamuna to protect the environment. We

have evoked the Polluter Pays Principle requiring the industrial clusters to contribute towards establishment of CETPs. Similar directions in regard to the contribution by residents for establishment of STPs wherever the State feels the need for that purpose. In any case, maintenance of CETPs and STPs should be a burden that is required to be shared by the industries and residents of Delhi. They have the fundamental duty to protect the environment, not only on the Polluter Pays Principle but even on the correct analysis of Article 51A(g) of the Constitution. There is a rapid growth in the construction and industrial activity in the city causing further and more serious pressures on the environment and infrastructures in the city. If the authorities are permitting such growth then they have to impose restrictions to regulate the same as well as incur such costs which are necessary for preventing irretrievable injury to the environment and ecology of River Yamuna in Delhi. The sustainable development would certainly require all these authorities and residents of Delhi to act with reasonable caution and restrictions on the one hand and contribute towards protection, improvement and restoration of the environment on the other.

88. Subject to any law coming into force, we have already stated that flood of once in 25 years would be considered for defining and demarcating the flood plain. No development/construction activity except that is stated herein, would be permitted in the Flood Plain of River Yamuna. No authority or person before us has even taken up the plea that why development/construction activity cannot be

carried on in other parts of NCR, Delhi. As of now, sufficient land is available, may it is expensive, but that cannot be a ground for destroying the ecology, environment and biodiversity of River Yamuna of Delhi. The result of indiscriminate, unregulated and uncontrolled development activity are widely visible and felt by each and every one in Delhi. It would not only be unwise, but may prove fatal, if such approach is continued any further.

89. At the very initial stages of this application, the Tribunal vide its order dated 31st January, 2013, had constituted a Committee chaired by the Vice Chairman of Delhi Development Authority, which consisted of Senior Bureaucrats and technocrats from the concerned Departments of NCT of Delhi, State of UP and Commissioners of the Corporations to examine the entire matter in relation to preservation, beautification and restoration of river bank and pollution of River Yamuna, including the restoration of drainage system in Delhi. On the submission of the learned Counsel appearing for the parties and examining the wide repercussions and significance of the recommendations, it was considered appropriate to involve the concerned Ministries of the Government of India as well. Resultantly, vide order dated 1st February, 2013, Secretary MoEF was made the Chairperson of the Committee while the Additional Secretary, MoEF was made as a Member of the Committee. They were free to co-opt high officers from other Ministries, if they considered it necessary. Thus subsequently, this Committee consisted of Secretary and other Senior Officers and Scientists from the MoEF, Vice-Chairman and

Chief Engineer and other senior officers from various Corporations of Delhi, Member Secretary, CPCB, Sr. Technocrats and officials from State of UP. This Committee had been submitting interim reports before the Tribunal upon which various directions were issued by the Tribunal from time to time for more specific and scientific examination of the issues involved in the present application and for submission of more definite and practical recommendations for achievement of the object. These recommendations were not only in relation to prevention and control of pollution of river Yamuna and improvement of the river bank but also for removal of huge debris as before noticed from the river banks and their utilisation at the site of the plant at Burari for production of all tiles.

90. The Principal Committee constituted by the Tribunal, in terms of its above orders, for adopting a more scientific approach and assessment of data collected through field studies, further constituted a more specialised Committee, consisting of Professor C.R. Babu, Professor A.K. Gosain and Professor Brij Gopal. This Committee made its recommendations on the basis of their vast experience in their respective fields and made scientific data available upon making such field visits.

91. This Expert Committee submitted its comprehensive report which was considered by the High Powered Committee chaired by the Secretary MoEF. This Committee accepted the complete report in regard to restoration, preservation and beautification of the river bank of Yamuna. In this Committee even DDA had been du

represented. The point of view of DDA was considered in great depth by Experts from various fields with a specific technical know-how in restoration of river banks. As already noticed, it was found that the execution of the plan prepared by the DDA would not be in the interest of environment particularly the ecology and bio-diversity in and around river Yamuna and it could be even fatal in relation to floods harming the larger public interest. The report prepared by the Committee on 19th April, 2014 was duly approved and while reiterating its recommendations, the High Powered Committee submitted the report in that behalf to the Tribunal dated 2nd August, 2014.

92. The report in relation to the improvement of drainage system and control of pollution of river Yamuna was dealt with by the Committee consisting of experts in the field as constituted vide order dated 30th May, 2014 of this Tribunal.

93. The Members of this Expert Committee we have already referred above. This Committee besides interacting with various departments also interacted with the foreign consultants engaged by the DJB. After serious deliberations and even considering the proposal of the Corporations for covering all the natural and man made drains of Delhi, it submitted its recommendations on 13th October, 2014 to the Tribunal. This report of the Committee dated 13th October, 2014 makes the project prepared by the DJB as annexure to the report for the purpose of complete and effective execution of its recommendations. Both the above reports were subjected to serious deliberations and consideration before the

Tribunal particularly its Expert Members. Certain queries in relation to the second report were specifically raised by the Tribunal and as recorded vide its order which had been duly explained by the Members of the Expert Committee and it was only after serious deliberation scrutiny and examining its various facets including practical aspects, the reports have been accepted by this Tribunal as well.

94. We are not oblivious of the herculean task which will be required in carrying out the '*Maily Se Nirmal Yamuna*' Revitalization Project, 2017, but we are of the firm view that any further deferment in taking stern and serious steps for preventing and controlling pollution of River Yamuna, is bound to expose Delhi and its residents to grave environmental disasters. Implementation of provocative action plan postulated by the Expert Committees as described in this judgment is inevitable to protect public health, public interest and the environment. This is the only solution to bring down the highest contribution of pollutants (76% of the total Yamuna's Pollution level) to a negligible and preferably to zero percent, in the interest of ecology, environment and to provide clean water to the residents of Delhi.

To ensure complete and effective implementation of the recommendations made by the Expert Committees in their reports dated 19th April, 2014 and 13th October, 2014 respectively, as well as, to identify the authorities responsible for compliance for time preparation and execution of action plans, prepared in terms of

judgment, we hereby issue the following directions in the larger environmental and public interest:

i. The Tribunal hereby accepts both the reports filed by the Expert Committees: first report dated 19th April, 2014, read with the gist of recommendations submitted by the Principal Committee on 2nd August, 2014, on the aspects of preservation, restoration and beautification of the banks of River Yamuna and the second report dated 13th October, 2014, read with its annexure, in relation to drainage system in Delhi, together with the Action Plan prepared by the DJB for revitalization of River Yamuna. Both these reports shall form integral part of this judgment. All the concerned authorities of NCT of Delhi, State of UP and State of Haryana shall implement the same without demur and default, expeditiously. The entire project contemplated under these reports and this judgment of the Tribunal shall be completed by 31st March, 2017.

ii. **This project shall be called '*Maily Se Nirmal Yamuna*' Revitalization Project, 2017.**

iii. Implementation of both these reports and the components of the project shall be simultaneously executed by the concerned agencies, who shall prepare their respective Action Plans in terms of the reports as well as this judgment and submit it to the Principal Committee constituted hereinafter, in not later than four weeks from the date of pronouncement of this judgment.

iv. (a) Presently, under the jurisdiction of the DJB, there are 23 STPs in existence or planned to be made operational by 2015. Out of them, the oxidation pond at Timarpur is proposed to be closed, as it was commissioned in the year 1947. The STPs at Okhla and Kondli are lying closed due to inadequate sewerage and majority of the STPs are not operating to their optimum capacity. Thus, we direct that the DJB and other concerned Corporations under whose jurisdiction the existing STPs fall, shall, within two months from today, ensure that all these STPs, including the one proposed to be commissioned at Delhi Cantt., should be made fully operational, should operate to their optimum capacity and operate effectively 24x7, without compromising the quality of treated water released from such STPs.

(b) It is further directed that the Action Plan in regard to installation of STPs on 32 major and minor drains shall be prepared, in accordance with the recommendations in the Expert Committee Report afore-referred and action taken in furtherance thereto, within three months from the date of passing of this order.

(c) All the newly proposed 32 STPs should be constructed and installed with the requisite capacity varying from 0.6 mgd to 10 mgd, at the sites specified in the report of the Expert Committee within the time frame indicated in this judgment. Once, the total of 55 STPs would operate effectively and to their optimum capacity, the water released from them shall be

recycled and utilised for agriculture, horticulture and industrial purposes and least of this recycled water would be discharged into the River Yamuna.

(d) Action Plan to be prepared to utilize the treated water from the existing 23 STPs as well as from the 32 proposed STPs. It will be ensured that the release of water from these existing STPs should be strictly in accordance with the prescribed parameters and free of any odour and it should meet the faecal coliforms standards.

(e) Wherever necessary, the technology of the existing STP's should be upgraded to ensure proper performance and adherence to the prescribed standards of effluent discharge.

(f) The concerned authorities shall construct and install 26 pump stations at the locations and of the capacity as indicated in the Action Plan placed before the Tribunal. The process thereof should begin within three months from the date of passing of this judgment.

(g) Further, all the STPs shall be provided with a power backup to ensure that they operate effectively 24x7. It shall be ensured that the functional data of all STPs is online and is connected to the Delhi Pollution Control Committee as well as the Central Pollution Control Board, particularly in respect of COD, TDS, TSS and pH and it shall be ensured that the STP's are operational even during power failures.

(h) All the industrial clusters in Delhi shall be provided with Common Effluent Treatment Plants (CETPs). These CETPs

shall be effluent-specific and capacity-specific, with reference to the particular industrial cluster. The installation cost of the CETP shall be borne preferably by the authority that owns and maintains that industrial cluster. In the event of shortage of finances the authority concerned can require the persons running the industrial activity/unit in that cluster to share the cost on 'Polluter Pays Principle' in the ratio 2/3 and 1/3 respectively.

(i) We direct the State of Haryana to ensure that all the industries/industrial clusters that are located near or at the banks of River Yamuna, should preferably be no discharge units. If that is not possible, then such industrial clusters should be directed to install CETPs of the requisite size and standards, so as to ensure that the effluent discharged by them is strictly in accordance with the prescribed norms.

v. (a) Having given our considered view to the various reports placed on record, submissions made by the Learned Counse appearing for the parties and the Experts, we are of the opinion that presently the flood plain should be identified fo the flood of once in 25 years in the interest of ecology, bio diversity and the river flow. Thus, we direct accordingly an also direct that the DDA shall prepare a map in this regar and would physically demarcate the entire flood plain.

Above interim prescription of the flood plain is not rigic but is subject to change, in the event any of the publi authorities, including the MoEF, moves the Tribunal, base

upon some collected data or any other specific information in that regard .

(b) We direct and prohibit carrying on of any construction activity in the demarcated flood plain henceforth. We further direct the Principal Committee to identify or cause to be identified, all existing structures as of today which fall on the so identified and demarcated flood plain. Upon identification, the Principal Committee shall make its recommendations as to which of the structures ought or ought not to be demolished, in the interest of environment and ecology, particularly, if such structures have been raised in an unauthorised and illegal manner.

(c) The Principal Committee may keep in mind that certain structures need to be protected, amongst other reasons, for their historical, mythological and heritage importance and/or are protected structures. The Committee shall clearly spell out the regulatory regime that should be provided for dealing with such existing structure in the flood plain.

(d) We direct all the concerned authorities including the DDA, Municipal Corporations and the NCT of Delhi, to take immediate and effective steps for repossessing the Flood Plain area under the unauthorised and illegal occupation of any person and/or any other body.

This direction is also necessitated for the reason that as per the records before the Tribunal, out of total area of 9700 hectares for River Front Development ('O' Zone), only 1452

hectare is presently available with the DDA for development and the remaining area is occupied in an unauthorised manner and is under agriculture activity for which leases had been granted by the DDA or even otherwise.

(e) It is an established fact that presently, vegetables, fodder grown and allied projects at the flood plain of River Yamuna are highly contaminated. Besides containing ingredients of high pollutants, such produce is even found to contain metallic pollutants. Thus, it is an indirect but a serious public health issue as the persons eating or using such agricultural produce can suffer from serious diseases including cancer.

Therefore, we direct that no authority shall permit and no person shall carryout, any edible crops /fodder cultivation on the Flood Plain. This direction shall strictly be adhered to till Yamuna is made pollution free and is restored to its natural wholesomeness.

vi. (a) During the pendency of this application, it was brought on record that nearly 37,000 cubic m. construction debris are lying on the eastern bank of River Yamuna, while 53,000 cubic m. debris is lying on the western bank of the River. The major part of this debris has already been removed under the orders of the Tribunal during pendency of this application. The local Commissioners appointed had reported to the Tribunal that major part of debris had been removed by the DDA, DMRC Corporations, the PWD and the UP Government. DMRC has removed 33,000 cu. m. from Sarai Kale Khan and 20,000 M

from Shastri Park, the State of UP has removed 37,000 MT from the Flood Plain and DDA has removed 2500 cu. m. from Eastern Bank of River Yamuna and 7500 cu. m. from Western bank of River Yamuna, amongst others.

(b) Indiscriminate dumping of debris and construction waste is a direct source of not only pollution of River Yamuna, but even the environment and ecology as a whole. In order to control and prevent such pollution, we confirm the interim order dated 22nd July, 2013, passed by the Tribunal, with the variation in payment of amount of compensation payable by the offender and direct that no person, authority, corporation and/or by whatever name or designation it is called, shall dump any kind of construction debris, municipal, or any other waste on the floodplain/river bed of River Yamuna and its associated water bodies. There shall be complete prohibition on dumping of any material in and around River Yamuna.

(c) Whoever violates this direction relating to the dumping of debris, shall be liable to pay compensation of Rs. 50,000/- on the 'Polluter Pays' Principle and the Precautionary Principle. Such compensation shall be used for removal of such waste and restoration of environment.

(d) We hereby prohibit any person from throwing *pooja* material or any other material like, food-grain, oil, etc into River Yamuna, except on the designated site. Any person who is found disobeying this direction shall be liable to pay compensation of Rs. 5,000/- on the 'Polluter Pays' Principle.

At the same time, we direct the concerned authorities, particularly, the Irrigation Department and concerned Corporations or authorities to build special Ghats on the banks of River Yamuna, where people could offer or immerse such materials, which shall then be duly collected by the concerned authorities for immediate and proper disposal in a scientific manner. It shall be ensured that no such material is permitted to join the main stream of the river at any point. In this regard they may take such steps, as may be technically advised, including, providing of screens and barricades.

(e) We have provided the above compensation payable by the offenders who are found to be throwing municipal or any other waste into the river or its flood plain and by the persons who are found to be dumping construction and heavy debris, based on the 'Polluter Pays' Principle. Even though, it is not practically possible to determine the amount of compensation with exactitude, that such offenders should be directed to pay, however, on a rough estimation based on manpower required, time and money spent for removal of such waste and debris as well as making the river free from adverse environmental impacts of such dumping into the river and on the flood plain, we have fixed the above compensation for environmental degradation under Section 15 of the NGT Act.

(f) Whatever remnant construction or other waste is still lying on the banks of the entire stretch of Yamuna in NCT Delhi, would be removed positively within four months from

today by the concerned authority/State under whose jurisdiction the said area falls.

vii. We direct all the concerned authorities, corporations, bodies including Resident Welfare Associations to clean all the 157 natural storm water drains as identified by the Committee, within four months from the date of passing of this judgment and the drains should be made obstruction free and no waste should be permitted to be dumped in such drains. The drains may be cleaned mechanically or manually as the situation may demand. Such cleaning would include the dredging of the drains besides compliance of the specific recommendations of the Expert Committee. There shall be controlled dredging of River Yamuna to remove the huge accumulation of sediments and sludge for restoration of the cross section and flood carrying capacity of the River Yamuna.

viii. Existing wetlands and water bodies, both up-stream and downstream of Wazirabad reservoir, should be deepened and enlarged. This should be done in addition to providing more water bodies.

We direct the Chief Secretaries of the States of Himachal Pradesh, Uttarakhand, NCT of Delhi, Haryana and Uttar Pradesh, Secretary, Water Resources, Government of India and Secretary, MoEF, to hold a meeting within four weeks from today to prepare an immediate action plan required to ensure proper environmental flows throughout the year, in the entire river and particularly the stretch flowing through Delhi.

ix. The concerned Corporations under the guidance of the Principal Committee shall submit a report as to the identification and existence of the 44 drains (natural) which have been reflected in the Drainage Map of 1976, but were not traceable, as pointed out by the Expert Committee before the Tribunal. This report will be submitted to the Principal Committee within three months from the date of passing of this judgment.

x. The compostable material drawn out of such immersion or offering, should be used for manure purposes and should not be unduly stored. All other scientific method may be adopted for its removal and disposal.

xi. The Yamuna River Front i.e. the flood plain shall be restored, preserved and beautified, strictly in accordance with the report of the Expert Committee dated 19th April, 2014 as per its acceptance on 2nd August, 2014 by the MoEF as well as High Powered Committee.

xii. However, restricted activities of floriculture and silviculture can be carried on, subject to such specific permissions and restrictions as may be imposed by the authorities/Principal Committee and also subject to the orders of the Courts, wherever, the matters are stated to be pending.

xiii. The respective Corporations and/or authorities would be responsible for execution of these directions directly under the supervision of the Principal Committee constituted herein.

xiv. The Government of the NCT of Delhi and the neighbouring States shall, within a period of three months from today, identify the site where the sludge/dredged material from the drains and River Yamuna is to be stored. The Principal Committee shall also issue directions as to the best way of utilisation of such sludge/dredged material including, for construction of tiles, particularly in reference to paver blocks.

xv. Sites for storage of fly ash are a direct source of air and water pollution. Therefore, in furtherance to the MoEF Notification dated 14th September, 1999 and this judgement, we direct proper covering of fly ash at the particular sites on the river bank of Yamuna. All the concerned authorities shall ensure that such fly ash should be disposed of at the earliest. Further, we direct that the Government should provide incentives for use of bricks made of fly ash in preference to red bricks. Since the Indraprastha Power Station generates considerable amount of fly ash and is located very close to the river bank, thus, the unit should take all effective steps to prevent pollution of the river water by dumping fly ash at suitable locations.

xvi. We are informed that Rupees Twenty Thousand Crores has already been provided under the planned expenditure to the NCT of Delhi, out of which Rs. Two Thousand Thirty One Crores have been specifically earmarked for providing sewage connection, sewage treatment, sewage disposal and water network. As per the Expert Committee the total expenditure of

the present project is estimated at Rs. Four Thousand Crores, which can safely be met from the above head under the planned budget. However, still if there be need, we direct that the public authorities/Municipal Corporations could require the public at large to contribute to this expenditure based on the 'Polluter Pays' Principle. Funds/compensation so collected shall exclusively be used for this project and allied projects, with the object of ensuring pollution free Yamuna, clean and effective drainage system and for providing wholesome water to the residents of Delhi. Such environmental compensation may be determined by the Authority/Corporation with reference to the size of plots, construction raised thereupon, activity being carried on therein, consumption of water, quantum of sewage and domestic discharge and such other relevant considerations as the authority may deem fit and proper. The charges could be collected as part of the property/house tax.

xvii. We direct all Public Authorities, Municipal Corporations and the concerned Departments, including the Department of Irrigation, to take effective steps to protect the Flood Plain as well as to educate all sections of society to co-operate and not to do any acts or deeds which are prohibited under this judgment and would have adverse consequences. These authorities should place large-sized dustbins, beyond the demarcated Flood Plain and towards the inhabitation, as well as in the bio-diversity parks. They shall request for concerted

efforts both by the ones who are governing and ones who are governed. They shall issue circulars, display signages and may take recourse of Print and Electronic Media for educating people at large for effective completion of this project.

xviii. We direct all concerned to make every possible effort to ensure that the storm water drains do not carry sewage. Sewage may be carried through those drains upon which the STP's have already been installed, till the completion of the project. After the completion of the project, steps shall be taken so that only minimal quantity of treated water from the STPs reaches Yamuna.

xix. The CPCB, DPCC in coordination with the DJB, shall collect samples from River Yamuna, its floodplain and from the respective STP's at different places and sites for detailed analysis. This shall form the baseline data for implementation of this project. It will also be helpful in determining the improvement in the water quality.

xx. The authorities concerned shall take all steps to rejuvenate the water bodies associated with River Yamuna.

xxi. All concerned authorities shall deal with utmost priority and expeditiousness, in case any application in furtherance to any construction or authorization is moved by any of the authorities, Corporations or DJB, directly or through the Principal Committee, in execution of the Project. We grant liberty to the State Authorities, Corporation and DJB to

approach the Tribunal in the event there is undue delay in dealing with such application in accordance with law.

xxii. There shall be no construction and/or coverage of any of the drains in Delhi by any Authority or Municipal Corporation. All the drains shall be kept obstruction free by the concerned Corporation. Where substantial work (more than 85%) has been completed, such work is permitted to be completed by the Corporation after obtaining specific orders from the Tribunal in that regard. Rest of the work, where construction has just begun, the construction, including iron material, shall be removed. While completing such remnant work, Corporation shall ensure that the cross section of the drains to carry the requisite storm water for the flood of once in 25 years and other effluents, are not compromised. Such construction and/or removal shall be carried on in terms of paragraph no. 61 of this judgment.

xxiii. We constitute the 'Principal Committee' which shall be responsible and under whose supervision the directions contained in this judgment and the project reports shall be completely, effectively and expeditiously complied with. All concerned Authorities, Corporations, DJB and any other department, responsible for carrying out directives of this judgment, shall report the matters and submit the respective reports and data to the Principal Committee, for onward transmission to this Tribunal. The Committee shall file quarterly report of compliance before the Tribunal. The

Committee shall consist of Special Secretary, MoEF, Joint Secretary of Ministry of Water Resources, Chief Secretary, Delhi Administration, Vice Chairman, DDA, Commissioner of all the Corporations, Commissioner, DJB, Secretary, Department of Irrigation, NCT of Delhi, concerned Secretaries of the States of Haryana, Uttar Pradesh, Himachal Pradesh and Uttarakhand.

The four Members, namely, Professor C.R. Babu, Professor A.K. Gosain, Professor Brij Gopal and Professor A.A. Kazmi shall be the Members of the Principal Committee and shall be associated with commencement and completion of all the aspects of this project. The Delhi Jal Board along with Corporation under whose jurisdiction the required number of STP is to be constructed and established as well as the drains which are to be completed and made obstruction free shall be responsible for execution of the work as contemplated in the action plan, reports of the Committee and the judgment of the Tribunal. They shall work in tandem and under the supervision of the Principal Committee.

xxiv. All the Authorities, Corporation, DJB, CPCB, DPCC and any other department or authority, directly or indirectly connected with the compliance of these directions and the Project Reports, shall report to the Principal Committee in relation to all the actions taken in furtherance thereto and their progress from time to time. In the event of default, the Head of

Department of such Authority/Corporation/Board would be held personally responsible.

xxv. These specific directions are in addition to any other direction that we have recorded in the entire judgment.

xxvi. By this judgment, we not only mandate but even request all the concerned Authorities, State Governments and the Principal Committee to ensure timely compliance of these directions, as this is the only plausible and practical way by which River Yamuna would become pollution free and its flood plain conducive for the biodiversity that it deserves. We have no doubt that with the concerted efforts of all concerned, *'Maily Se Nirmal Yamuna'* Revitalization Project, 2017, would be a success. It would not only meet the ecological and environmental standards prescribed but would also provide clean air and water to the residents of Delhi, who are entitled to it and have a legal and constitutional right to receive the same. It will also help in providing sufficient water for agricultural and industrial purposes, thus, saving considerable quantity of potable water, so as to enable the concerned authorities to provide the same to all the colonies of Delhi. We also express a pious hope that residents of Delhi would render all help and assistance to all concerned and even abide by their fundamental duty for rejuvenating River Yamuna.

xxvii. We would be failing in our duty if we do not record our sincere appreciation for the contribution made, efforts put in and

technical guidance provided, by the Members of the Principal Committee constituted by the Tribunal particularly the Expert Members, namely, Professor C.R. Babu, Professor A.K. Gosain, Professor Brij Gopal and Professor A.A. Kazmi.

xxviii. We grant liberty to all the parties, the applicants or even the public, to approach the Tribunal for any clarification or modification or for removal of any of the difficulties felt by them in implementation of the directions contained in this judgment and/or of the project reports.

95. In view of the above discussion, Original Application Nos. 6 of 2012 and 300 of 2013 and M. A. Nos. 877/2013, 49/2014, 88/2014 & 570/2014 in Original Application No. 300/2013 and M.A. Nos. 967/2013 & 275/2014 in Original Application No. 6/2012 stand disposed of in terms of this judgment and particularly, the directions stated in paragraph no. 94 of the judgment. The parties are left to bear their own costs.

Justice Swatanter Kumar
Chairperson

Justice M.S. Nambiar
Judicial Member

Dr. D.K. Agrawal
Expert Member

Prof. A.R. Yousuf
Expert Member

New Delhi
13th January, 2015

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BEFORE THE NATIONAL GREEN TRIBUNAL,
PRINCIPAL BENCH NEW DELHI

APPLICATION NO.6 OF 2012

IN THE MATTER OF:

MANOJ MISHRA ...Applicant

VERSUS

UNION OF INDIA AND OTHERS ...Respondents

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DOH-25/04/014

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RESPONDENT NO.1

THROUGH

(VIVEK CHIB)
ADVOCATE
F-17, LGF-4, HAUZ KHAS ENCLAVE,
NEW DELHI-110016
Ph.41667560-63 (Fax: 41667563)

NEW DELHI:
DATED: 24/04/014

NATIONAL GREEN TRIBUNAL
NEW DELHI
DY. No.: 1129/2014
DATE: 24/4/14
Sign. of receiving Officer

Restoration and Conservation of River Yamuna

Final Report

Submitted to the

National Green Tribunal

with reference to Main Application no. 06 of 2012

(Tribunal's order dated 24 September 2013)

Expert Committee constituted by the
Ministry of Environment and Forests, New Delhi
(Order no. K-1301/2/2013-NRCD Dated 13 September, 2013)

Prof. C. R. Babu (Delhi University, Delhi) – *Chairman*

Prof. A. K. Gosain (IIT-Delhi) - *Member*

Prof. Brij Gopal (Jaipur) – *Member*

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PREFACE

The river Yamuna is one of the sacred rivers of India. Besides Delhi, the Capital of India since Moghul period, two other major cities, Mathura and Agra, within its 200 km distance downstream of Delhi are of greatest historical and cultural importance. However, this very stretch of the river is also one of the most heavily polluted and degraded river stretches in the country. Although the flow of river Yamuna had been diverted at Tajewala (Haryana) more than a century ago, the lean season flows in the river have been totally eliminated downstream of Tajewala (now Hathnikund) over recent decades. Delhi receives its water requirements only upstream of Wazirabad barrage through a distributary of the Western Yamuna Canal, and no freshwater flow below the barrage. Rapid growth of Delhi has resulted in the generation of huge quantities of sewage and wastewater that are not treated fully before discharge into the river. The 52 km stretch of the river from Palla to Jaitpur in the NCT of Delhi has lost its life supporting potential. The 22 km stretch from Wazirabad to Okhla is the most polluted segment of the river as it receives outfall from 22 drains which contribute 80% of the pollution load of the river. The vast floodplains, which serve as a floodway and help recharge ground water, have also been gradually eliminated to a great extent and encroached upon by gradual reclamation by dumping solid wastes and construction of various buildings. This has reduced the flood carrying capacity, groundwater recharging capacity, and other biodiversity related ecological functions. The morphology of the river and the wetland functions are also altered by embankments, bunds, roads, flyovers, guide bunds and spurs, several bridges and three barrages.

The latest among the many PILs before the Courts, including the Supreme Court, is the case of Manoj Mishra Vs Union of India & Others (Application No. 6 of 2012) before the Hon'ble National Green Tribunal (NGT). The NGT directed the Ministry of Environment & Forests, Government of India to constitute an Expert Committee to examine various issues related to the dumping of solid wastes, the Riverfront Development Scheme of DDA and the restoration, preservation and beautification of the river Yamuna. The MoEF constituted a three-member Expert Committee comprising of the undersigned. We the members of the committee held 6 meetings, surveyed both banks of the river along the entire 52 km stretch from Palla to Jaitpur, held discussions with different stakeholders including the Applicant.

We also critically examined the documented information available in Reports of the committees and authorities and Court Orders and decisions. The committee also generated high resolution maps (1:1000) with different layers on GIS platform and delineated the river zone.

We present here in this Report an assessment of the current status of the river, our field observations, comments on the major issues and the approaches to restoration of the river and its floodplain. We have made a set of recommendations and suggested an institutional framework, and timelines for implementation of the recommendations.

Brij Gopal
(Member)

C. R. Babu
(Chairman)

A. K. Gosain
(Member)

ACKNOWLEDGEMENTS

The members of the Expert Committee would like to record their gratitude to the Secretary to the Government of India, Ministry of Environment and Forests, Shri Dr. V. Rajagopalan, for entrusting the task of preparing a Report on the rejuvenation of the river Yamuna in NCT of Delhi and the corresponding UP portion as directed by the Hon'ble National Green Tribunal.

The National River Conservation Directorate of the Ministry of Environment & Forests, Government of India has extended full support to the committee to discharge its functions. The Committee members express their sincere appreciation to the cooperation and guidance provided by the Advisor, Shri Brijesh Sikka, who is also the convenor for the committee. We also thank Dr A. Senthil Vel (former Director, NRCD), Shri Ravi Sinha (Director, NRCD), Shri Sandeep Gupta (Senior Monitoring Expert, YAP-III, NRCD) and Ms. Vandana Singh, (Monitoring Expert, YAP-III, NRCD) for their help in various ways.

We gratefully acknowledge the Delhi Development Authority for not only providing the financial assistance to GSDL for the generation of data sets and high resolution maps of 'O' zone with different layers but also for providing valuable available information. Thanks are due to the officers of Landscape Division and the Chief Engineers of concerned Divisions of DDA and officials of Irrigation and Flood Control Department of Uttar Pradesh for assisting the committee during field visits.

The Committee thanks Miss Anu Priya Goyal and Mr Jatin Anant of Professor Gosain's Lab at IIT, Delhi for their help on the various aspects of analysis of the geo-spatial data. Thanks are also due to Dr Rakesh Kumar and Shri Pankaj Kumar of the Centre of Excellence Programme of MoEF at Centre for Environmental Management of Degraded Ecosystems (CEMDE), University of Delhi for their assistance in finalization of the Report.

We would like to record our appreciation for all the stakeholders, particularly officers of DDA, Delhi Jal Board, Central Pollution Control Board, the Central Ground Water Board, the Central Water Commission, GSDL and ISRO who had interacted with members on more than one occasion. We also thank the Applicant, Shri Manoj Misra for the presentation of his vision on the river Yamuna before the Committee.

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SUMMARY OF THE REPORT AND RECOMMENDATIONS

During the past two decades, the 22-km urban stretch of River Yamuna passing through the NCT of Delhi has undergone serious degradation in many respects. Despite several interventions by the Government, various high level committees and the courts at the highest level, the river remains critically polluted (except during the rainy season) and its space continues to be encroached upon for different purposes.

On the direction of the Hon'ble National Green Tribunal (NGT) in the present case of Mr Manoj Misra vs Union of India and Others (Application No. 6 of 2012), the Ministry of Environment & Forests (MoEF), Government of India, constituted a three member Expert Committee to examine the issues related to the large-scale dumping of solid wastes, the encroachment, the reclamation of river bed and the floodplains, the river front development scheme of DDA, and the restoration and conservation of the river Yamuna.

The MOEF constituted the Expert Committee (Order No. K-13011/2/2013-NRCD of 13 Sept 2013) with the following TOR:

(i) to critically analyse and examine the Yamuna River Front Development Plan of DDA,

(ii) to suggest steps for further improvement of the Yamuna River Front Development Plan keeping in view the environmental concerns of river Yamuna in the proposed stretch, and

(iii) to also take into account the observations of Hon'ble Supreme Court in the matter relating to 'Maily Yamuna' Writ Petition No.725 of 1994.

The Hon'ble NGT in its order of 24 September 2013, extended the mandate of the Expert Committee by stating that "the Report shall not only suggest the methodology and process required to be followed for restoration, preservation and beautification of the river beds but even state as to who should execute the work and the manner in which such work should be executed". The Hon'ble NGT also stated that "keeping in mind, the committee, even if it chooses to inspect the entire Yamuna and find out whether debris has been completely removed or not, it has to state with certainty the plan for restoration, preservation and

beautification which is to be carried out within a time frame to be prescribed by the Tribunal".

The committee had 6 meetings and conducted site visits. The Committee held six meetings to discuss with different stakeholders including the petitioner, different facets of the river and its degradation leading to its eclipse and possible ways and means to restore and conserve it. The members of the committee also extensively surveyed both the banks of the river in the entire 52 km stretch of River Yamuna through NCT of Delhi and its border with UP. The committee also critically evaluated the available information relating to rejuvenation, development and management of river Yamuna, particularly with respect to 52 km stretch of NCT of Delhi and UP portion, in the Reports and recommendations of different Authorities and Committees constituted, different projects undertaken by the Government agencies/institutions and court orders and decisions as well as the status of 'Maily Yamuna' case. The committee also generated 1:1000 resolution maps on GIS platform using 2010 data sets supplied by GSDL on different aspects of the river ecosystem, and flood zoning was also undertaken using digital model.

Based on the observations and critical assessment of available documented information presented in this Report, the Committee recommends the following:

Solid Wastes, Garbage Dumps and Encroachments

During field visits, the Committee observed large dumps of solid wastes and garbage in many places. In several cases, the solid wastes had been relocated to the edge of the floodplain, and dumped for widening the bunds and guide bunds, for constructing roads to cremation grounds / ghats / temples, nurseries and agricultural fields located within the active floodplain. Extensive areas of the floodplain (on the eastern side, in UP area) are being used by solid waste recycling units and their dumps. Similarly, floodplain areas are also encroached upon by the DMRC's prefabrication units. Further, encroachments have occurred for expansion of settlements such as Jaitpur extension, and at Badarpur Khadar.

Recommendations

1. All solid waste dumps including those used for roads and bunds within the active floodplain should be removed forthwith.

2. All solid waste recycling units, farm houses, cattle farms and nurseries must be relocated at the earliest.

3. Construction of new bunds, roads and guide bunds, widening of existing bunds, spurs and guide bunds within the active floodplains should be stopped and banned.

4. No filling of the floodplains / riverbed be allowed in the name of development and renovation of ghats. The floodplain under built up areas at Sur Ghat and Quidesia Ghat should be recovered. All recreational facilities for people visiting ghats should be created close to the embankments/roads where a channel taken out from the water course of the river can be brought for the purpose.

5. All settlements encroaching upon the floodplain (with the exceptions noted in the detailed report) should be relocated at the earliest.

6. Construction of new barrages and roads, railway and metro bridges, and embankments and bunds should not be permitted. In exceptional cases, a critical assessment of their potential impacts on flood aggravation and environmental clearances should be made mandatory.

7. There is a shortage of landfill sites in Delhi. Immediate action is required to identify additional landfill sites catering to the next 25 years of requirement. Action is also required to identify more sites for recycling of building material waste.

Responsible Organizations: (Irrigation & Flood Control Departments of Delhi, Delhi Development Authority, Land Revenue Department of Delhi & Uttar Pradesh, concerned Municipal Corporations of Delhi & Uttar Pradesh)

The River Zone

Rivers require a certain space to carry their peak flows and sediments, and for their ecological functions. This includes the river channel(s) and the floodplains which together are often designated as river corridor or floodways or simply the river zone. In case of river Yamuna, the embankments and numerous constructions on the floodplain, especially within the 22 km stretch through urban Delhi, have already constricted the river zone to a very narrow space,

and at many points, the channel flows along the embankment and hence, has no floodplain left.

Recommendations

1. The 'O' zone as defined in MPD 2021 and as delineated in the present Report, together with the corresponding part of the river and active floodplain within the embankments on the U.P. side on the east, should be designated as the river zone.
2. The River Zone so designated should be preserved and protected for the conservation and restoration of the river. No development activity should be permitted within the river zone that encroaches upon the active floodplain, obstructs the flow or pollutes the river (solid waste or wastewater).
3. The existing constructions/facilities/ within the river zone that are allowed as an exception (such as Akshardham temple and Commonwealth Games Village, settlements such as old Jaitpur, Sonia Vihar, Jagatpur, etc., Samadhis, Delhi Secretariat and Velodrome, Thermal Power Plants, etc.) should be treated as a Special Zone within the river zone. The Special Zone should have a regulatory regime which needs to be worked out separately keeping in view that these areas do not cause any impact whatsoever on the water quality or flow of the river.
4. The Committee notes that the Govt of NCT-Delhi has already agreed to relocate the Millennium Bus Depot (as per the affidavit filed in the High Court of Delhi).
5. Appropriate measures such as barbed wire fencing in highly vulnerable areas should be considered for preventing encroachments and waste dumping in future. The polluter-pays principle should be enforced for defaulters.

Responsible Organizations: State Governments of National Capital Territory of Delhi & Uttar Pradesh including their concerned Agencies such as Delhi Development Authority, Irrigation & Flood Control Department of Delhi & Uttar Pradesh, Land Revenue Department of Delhi & Uttar Pradesh.

The Yamuna Riverfront Development (YRFD) Scheme of the DDA

The Yamuna River Front Development plan of the DDA is an "Integrated project of recreational areas along with biodiversity parks" in four of the subzones (of the O-zone). The area proposed for the implementation of Yamuna Riverfront Development (YRFD) scheme by DDA is the active floodplain which is frequently flooded by medium floods. The proposed activities such as construction of various recreational and public facilities by effecting topographic changes will reduce the flood carrying capacity and aggravate flooding, besides contributing to pollution.

Recommendations

1. The Yamuna Riverfront Development scheme is untenable and should be stopped. It is noteworthy that the DDA itself admits on their proposed re-delineation of 'O'-zone (as per the Public Notice issued by DDA on 28 September 2013) that the riverfront refers to the area that lies outside the embankments. But the area of the proposed YRFD is within the active floodplain.

2. The Riverfront Development Scheme should be replaced by a plan for restoration of the river and its floodplain as suggested below and detailed in this report.

Restoration of River Yamuna

Restoration of a river to bring back its biophysical characteristics and ecological functions requires addressing the root causes of degradation. River Yamuna is severely affected by the elimination of its natural flow (except during the rainy season), destruction of its physical characteristics (elimination of floodplains by embankments and encroachments, and solid waste dumping and reclamation), habitat fragmentation (by barrages and guide bunds of bridges/flyovers), destruction of natural floodplain biodiversity, and excessive discharge of wastewaters (untreated or partly treated sewage, and stormwater). The Committee recognises that some of these changes are irreversible and it will not be possible to restore the river fully to its old glory, it is possible to rehabilitate the river for many of its functions, water quality and beauty.

Recommendations

1. Controlled dredging is required to remove the huge accumulation of sediments and sludge which has reduced the flood carrying capacity of the main channel, silted up

wetlands and floodplain water bodies, and aggraded the floodplain (partly due to solid waste dumps).

2. Dredging of the river bed and pondage of Okhla barrage should be undertaken.
3. Many of the spurs have lost their original purpose because the flow in the river is highly reduced and regulated. In several places these are being extended right upto the current channel and being developed as parks. This extension and development must be stopped and the length of spurs should be restricted to allow a wider space for the river channel to meander and carry more water.
4. Existing wetlands and water bodies both upstream and downstream of Wazirabad reservoir should be deepened and enlarged.
5. Culverts must be constructed under the existing guide bunds of roads and flyovers, which have fragmented massive wetlands, so that flood waters flow without obstruction along the river course and into the floodplain wetlands. This will also help movement of aquatic biota (e.g., fish) and enhance the groundwater recharge.
6. A mosaic of wetlands and floodplain vegetation having native biodiversity should be developed. A cascade of treatment wetlands along the western and eastern banks (100-150 m belt) must be created and the outfall from all the major drains (after treatment in STPs) should pass through them before discharging into the river channel. These wetlands will help improve the water quality by reducing the BOD and nutrient levels through the action of the plants and animals therein. Wetlands should also be developed along the smaller drains before they discharge their contents into main drains. The outfall from Barapulla drain should be channelized through the cascade of wetlands already existing in the area.
7. A greenbelt/greenway should be developed on both sides of the embankment, for controlling erosion, reducing sediment load of the main channel, reduce pollution, and beautification. Nature trails may be provided across riparian areas for recreation to the public without losing the ecological functions of the floodplains.
8. The control of sewage pollution must be given highest priority. Besides the interceptor sewer system now being developed, the capacity of sewage treatment plants must be increased; their efficiency must be ensured and enhanced; sewerage facilities should extended to un-sewered areas, and the present sewerage systems be

rehabilitated. Adoption of new technologies to reduce BOD levels from 20-30 mg/l to below 10 mg/l, together with the use of treatment wetlands as noted above, would enhance the quality of water in the river.

9. Immediate action is required to ensure the provision of environmental flows throughout the river, and especially in the stretch downstream of Wazirabad. The sewage and stormwater generated from the city can help mitigate the flow requirement to some extent provided they are treated to an acceptable quality as per CPCB standards and then allowed to flow through wetland systems restored on the floodplain as recommended above.

10. To manage the waste water system in the NCT of Delhi, a comprehensive master plan for sewerage for complete Delhi should be prepared by DJB.

11. Agricultural activity on the floodplain should be regulated to totally prohibit the use of agrochemicals (fertilisers and pesticides) and should be restricted to areas beyond 100 m on either side of the river channel and other wetlands/water bodies.

12. Access to the river channel for social/cultural/religious functions and recreation should be allowed in a manner that it avoids construction of paved (pucca) paths and does not cause any kind of pollution.

Responsible Organizations: *State Governments of National Capital Territory of Delhi & Uttar Pradesh and its agencies like Irrigation & Flood control department of Uttar Pradesh, Delhi Development Authority, Land & Revenue department of Uttar Pradesh Pollution Control Board / Delhi Pollution Control Committee, Delhi Jal Board, Ministry of Water Resources, Government of India.*

Institutional Arrangements

1. The River Zone of the river Yamuna within the NCT-Delhi (together with the corresponding areas of U.P.), as identified in this report, is highly vulnerable to several anthropogenic pressures in the absence of regulatory measures and legal protection. The ecological integrity of the river, particularly the functioning of floodplain ecosystems, cannot be sustained even after restoration unless adequate measures are taken for its protection. The Committee therefore recommends that the 52 km stretch of the river Yamuna in the NCT of

Delhi and UP should be declared as a **Conservation Zone** under section 3 of the Environmental Protection Act 1986 (29 of 1986) and appropriate rules be framed for the human activities to be permitted or prohibited.

Responsible Organizations: (Ministry of Environment and Forests, Government of India)

2. A High Powered Committee (HPC) for Yamuna River Development chaired by the Lt. Governor, Delhi had been constituted by the Govt. of India in August, 2007. It is suggested that this Committee be expanded to include the Chief Secretary, U.P as well as five expert members in the field of Science and Engineering and its mandate to also include integrated management and coordination among various planning, execution, funding and regulatory agencies of the two states to be involved in the restoration and management of the river in the Delhi stretch. The HPC should also closely liaise with the NGRBA for better integration of their activities, since Yamuna is a sub-basin of the Ganga Basin.

Additional Recommendations

1. Successful restoration of the river for its ecological functions and their future sustainability will depend heavily on the provision for Environmental Flows through the entire 52-km stretch. Despite an earlier Supreme Court direction for providing 10 cumecs of freshwater flow downstream of Wazirabad, the desired flow has not yet been made available. The Committee recommends that the Environmental Flows requirements, particularly for the lean season, may be re-assessed for the entire 52-km stretch and the required flows be ensured at the earliest.

Responsible Organizations: (Ministry of Water Resources, & Ministry of Environment and Forests, Government of India)

2. A separate programme of promoting public awareness for the conservation of the river and for the community participation in the restoration, management and monitoring of the river should be prepared and implemented through a separate Society / Trust.

Responsible Organizations: (Delhi Development Authority)

3. To secure the ecological integrity of the river, to prevent encroachment and dumping of solid wastes and to prevent unauthorized constructions, river policing by a dedicated unit should be enforced by the respective states.

Responsible Organizations: *(State Governments of National Capital Territory of Delhi & Uttar Pradesh)*

INTRODUCTION

Background

It is well established that the environmental and ecological degradation of the river Yamuna in the stretch passing through the NCT of Delhi due to anthropogenic factors has led to the loss and degradation of riparian ecosystems. The loss of life supporting potential of the river is the major concern to the public, the Government and the courts. For example: (i) the water quality in this stretch is characterised by 40 to 50 mg/l BOD and almost zero DO levels and extremely high coliform density (2,40,00,000/ml), (ii) the flowing water, the river bed, the floodplain forest and grassland ecosystems are locally extinct, and (ii) further, the floodplain is so restricted in some segments by encroachments using combinations of bunds roads, guide bunds and spurs (Figure 1) that not only reduced the recharging area for flood waters leading to the reduction in ground water recharge but also make the city highly vulnerable to floods resulting in ecological disasters as has been happened recently in Kosi (Bihar) and Ganga river basin (Uttarakhand).

Several PILs have been filed in the Supreme Court and many orders have been issued to the Central Government and the Government of NCT of Delhi which have constituted a number of committees for the improvement of the river. Earlier, the Delhi High Court had also constituted a Committee – the Usha Mehra committee – which suggested removal of encroachments and some of these were removed. However, the river continued to be further degraded and encroached upon.

Shri Manoj Mishra filed a petition (Application No. 06 of 2012) at National Green Tribunal against Union of India and others on the activities that are contributing to the eclipse of river. The issues are the large scale dumping of solid waste, the encroachment, the reclamation of river bed and the floodplains, the river front development scheme of DDA and the re-delineation of 'O' zone by DDA. The Hon'ble Tribunal directed the Secretary, Ministry of Environment and Forests (MoEF), Government of India to constitute a committee, under his Chairmanship, to oversee the removal of solid waste dumps and also prevent dumping of solid waste. It also directed MoEF to constitute an Expert Committee to examine the Riverfront Development Scheme proposed by DDA.

While constituting this Expert Committee, the MoEF took into consideration also the ongoing 'Maily Yamuna' case in the Hon'ble Supreme Court. The SC also directed the MoEF to constitute a committee, under the Chairmanship of its Secretary, and that committee constituted a Technical Committee under the chairmanship of the Member Secretary of CPCB. The Technical Committee asked IIT-Roorkee and IIT-Delhi, both of which were represented in the committee, to submit a joint proposal for pollution abatement in the urban stretch of NCT of Delhi. Both IITs have only recently submitted a proposal on "Formulation of study proposal for integrated management and control of water quality of river Yamuna".

TERMS OF REFERENCE

Following the directive of the Hon'ble Tribunal, the MoEF constituted the Expert Committee (Office Order No. K-13011/2/2013-NRCD of 13 September 2013), with following ToR (Annexure I):

(iv) to critically analyse and examine the Yamuna River Front Development Plan of DDA,

(v) to suggest steps for further improvement of the Yamuna River Front Development Plan keeping in view the environmental concerns of river Yamuna in the proposed stretch, and

(vi) to also take into account the observations of Hon'ble Supreme Court in the matter relating to 'Maily Yamuna' Writ Petition No.725 of 1993.

The Hon'ble NGT in its order of 24 September 2013 (Annexure II), extended the mandate of the Expert Committee by stating that "the Report shall not only suggest the methodology and process required to be followed for restoration, preservation and beautification of the river beds but even state as to who should execute the work and the manner in which such work should be executed".

The Hon'ble NGT also stated that "keeping in mind, the committee, even if it chooses to inspect the entire Yamuna and find out whether debris has been completely removed or not, it has to state with certainty the plan for restoration, preservation and beautification which is to be carried out within a time frame to be prescribed by the Tribunal.

APPROACHES FOLLOWED BY THE EXPERT COMMITTEE

The Expert Committee set forth the following approaches to address the issues mentioned in ToR through the suggested implementable action plan for restoration, preservation and beautification of river Yamuna:

(i) Interactions with the applicant and Government stakeholders, the data presented by them (Manoj Misra, Landscape Unit and GIS unit of DDA, Delhi Jal Board, 2013) were examined.

(ii) Study of voluminous data generated by different public and private agencies using geospatial techniques,

(iii) Analysis of legal judgements passed,

(iv) Critical evaluation of the recommendations/action plans made by different committees set up by the Central and State Governments,

(v) Intensive field surveys of the river zone, and

(vi) Analyses of high resolution maps of 1:1000 with different layers generated by the committee on GIS platform.

The Expert Committee held 6 meetings and undertook field surveys of both the banks in the entire 52 km stretch of the river from Palla to Jaitpur (Annexures 3-10).

Geospatial Data Analyses

The following are the details on Geospatial Data analysed:

The geospatial layers supplied by GSDL in the ArcGis format are given in Table 1.

The geographic data were organised in the form of Geospatial Database for information processing, geospatial analysis and subsequently composing different thematic maps for reporting.

Google satellite imageries (updated 2014) were used for cross verification of the geographic data.

The area under floodplain in UP was identified by demarcating the embankment line in UP using temporal satellite imagery from Google as base map.

The elevation values for UP area were interpolated from the elevation values of the cross-sectional profiles available along the stretch of Yamuna from the Department of Irrigation & Flood Control, Government of NCT of Delhi (GNCTD).

The entire floodplain stretch (composed of O-Zone and UP portion of floodplain) was cut into 8 sub zones (as described in Yamuna River Front Development Scheme formulated by DDA, Sep 2013) and furthermore the floodplain were classified into left and right banks along the Yamuna river flow for better depiction. The area under each segment has been described separately.

The built up area within the O-Zone was demarcated as polygon using satellite imagery from Google as base map.

The terrain for each subzone was extracted and overlaid with layers of various infrastructure and land use and land cover features to render 3D perspective on a geospatial platform.

Table 1: List of Data layers used in Geospatial Framework

Data Layer	Data Format	
Digital Elevation Model (DEM)	Raster (5x5 m)	DEM for Delhi merged with DEM for UP (constructed using the data on river cross-sections supplied by the Department of Irrigation & Flood Control)
Cross sections	Points	Cross sections every 250 m along the river longitudinal section
Boundary	Polygons	'O' Zone, 'O' zone + UP
River Boundary	Polygons	River main channel of 2010
Infrastructure	Lines	Roads
Infrastructure	Lines	Embankments, Bridges
Land Use / Land Cover	Polygons	Buildings, Cultivated Area, Plantations, Reserved Forest, Farms, Barren Land
Topographic Feature	Polygons	Marshy Swamp, Water Bodies

17.

STATUS OF THE RIVER YAMUNA

Origin and Journey of the River

The river Yamuna is one of the sacred Himalayan rivers originating from Yamunotri glacier (near Saptarishi Kund at Bandar Poonch glacier peak at an elevation of 6387 m in Mussoorie range of lower Himalaya. The river travels over a distance of 1370 km across Uttarakhand, Himachal Pradesh, Haryana, Delhi, Rajasthan and Uttar Pradesh and finally joins Ganga at Allahabad (Prayag); its basin spreads over an area of 66,220 sq.km which constitutes 42.5% of the total Ganga River basin and has major four tributaries - Tons, Giri and Bata joins it from its right side and Asan joins it from its left side, all of which constitute basin (Head waters) of the river in Himalayan states. Tons constitute 60% of the flow of the river. In plains its tributaries are Hindon, Chambal, Sindh, Betwa and Ken. The upper Yamuna basin upto Okhla in Delhi represents less than 20% of its total basin (Martin et al, 2007; Agarwal & Krause, 2013).

According to Agarwal & Krause (2013) 17 hydroelectric projects were completed, one hydroelectric project is under construction and about 20 are proposed within Yamuna river basin. It enters into plains of north India after the river forms an interstate border for about 50 km between Uttarakhand and Himachal Pradesh. In the plains it forms an interstate border between Haryana and Uttar Pradesh for about 200 km distance and then it enters into Delhi. After traversing 45 km, it forms an interstate border between Delhi and UP and then forms interstate border between Haryana and UP and finally enters into UP, and runs parallel to Ganga before joining it at Allahabad. A total of 6 barrages were constricted across the river. In the hills one barrage on Yamuna at Dakpathar and another one on its major tributary Asan were constructed in Uttarakhand; in the upstream of Delhi, Hathnikund (Tajewala) barrage was constructed in Haryana and the water was diverted to Western Yamuna Canal (WYC) and Eastern Yamuna Canal (EYC). The tail end of WYC joins the river Yamuna near Palla and EYC also joins at Wazirabad reservoir. Further, the abstraction of water at Tajewala barrage which is about 2 km distance downstream from Hathnikund take place. The upstream of Wazirabad has also been deteriorating recently due to release of pollutant into Yamuna river from the towns of Karnal, Panipat, Sonipat and others. Consequently, there was no flow after Hathnikund barrage into rive Yamuna during dry season. Within NCT of Delhi three barrages were constructed across the river – the Wazirabad, the ITO and the Okhla barrages.

In UP, Gokul barrage was constructed to provide drinking water to Mathura and Agra. The river enters into NCT of Delhi at Palla in the north and exits at Jaitpur in the south.

River Course within NCT of Delhi

The river Yamuna within NCT of Delhi and the corresponding portion of UP traverses over a distance of 54 km. The stretch of 26 km in the upstream of Wazirabad reservoir receives water from a branch of Western Yamuna canal which joins the river at Palla and the Eastern Yamuna canal joins it at Wazirabad barrage; both the canals originate from Hathnikund barrage, the downstream of which there is no flow from barrage during lean period and whatever the flow is from the canals. This stretch of river has potable water and does not receive any sewage water. The water in the upstream of Wazirabad barrage has recently been deteriorating due to release of pollutants from towns of Haryana located in the upstream. The **urban stretch of the river of 22 km between Wazirabad barrage and Okhla barrage receives only sewage from 22 drains and fresh water from Wazirabad barrage during monsoon.** The upstream of Okhla barrage receives polluted water through Hindon cut canal from Hindon river (originates from Siwaliks), and water from Okhla barrage is drawn by Agra canal and Gurgaon canal. The Hindon river also receives waste water from Ghaziabad through Dhasana drain and finally discharge its contents into Yamuna after it crosses the NCT stretch. In other words, Hindon also contributes to the pollution load of Yamuna. The Shahadra drain carrying waste water from Trans Yamuna area discharges its content into river after Okhla barrage. **In other words, the NCT of Delhi constitutes less than 1% of the total catchment of Yamuna but contributes more than 50% of the total pollutant load in the river and this load of pollutants is discharged over the urban stretch of 22 km between Wazirabad and Okhla barrages.** Further, water from Okhla barrage is abstracted into Agra canal that carries share of Uttar Pradesh and Rajasthan.

The Delhi share of river water is received in the upstream of Wazirabad barrage to meet water treatment plants located at Wazirabad and Chandrawal. Further, Delhi also gets water from Satluj and Beas water through Narwana branch Karnal link which joins Yamuna canal at Karnal. The share of Delhi from Ravi-Beas is carried through this link upto Karnal and thereafter through Western Yamuna canal system upto Haiderpur water treatment plant.

During monsoon, there is a provision of transfer of Yamuna water to Bhakhra waters through Sirsa branch of Western Yamuna canal at Indri near Karnal (Report of High Powered Committee, 2010). These linkages illustrate the inter-basin transfers of water. About 40% of drinking water of Delhi is met by the river Yamuna.

Flows in the River

At 75% dependent (assured minimum flows available in 75 percent of the time span under consideration) the notional virgin flows (original flows of the river) in the river upto Okhla is 11.70 billion cubic meter (BCM) and the mean availability is 13.00 BCM, the bulk of which (75.6%) is received as monsoon waters (July-October) and the contribution of snow melting is only about 25-30%. Since there is no upstream storage, only a part of monsoon flows are utilized and the remaining flows are allowed to flow unutilized in the downstream of Okhla. There are heavy inflows during monsoon but the flows are meagre and are mainly contributed by snow melt during monsoon (Report of High Powered Committee, 2010).

Because of higher floods (7 lakh cusecs of water passed over Tajewala weir in 1978; Report of the High Powered Committee, 2010), Haryana, Uttar Pradesh and Delhi planned and constructed extensive drainage and river control works including embankments. The mean availability of water in the river at Tajewala during monsoon (July-October) is 19705 cusecs for distribution among basin States. The discharges higher than 1975 cusecs are received at Tajewala for an average of 28 days during 4 months of monsoon. For half of the monsoon days the availability is perhaps less than mean availability. For non-monsoon season, the mean availability is 2783 cusecs and 4061 cusecs for November-February and March-June, respectively, but the actual availability is much less i.e. about 80% and infact flows at Tajewala touch as low as 1700-1800 cusecs. There are some low height dams and barrages on the river Yamuna and its tributaries in Uttarakhand and Himachal Pradesh and these are run of the river hydroelectric power projects. For the purpose of water storing, the main barrages on the river are: (i) Hathnikund, (ii) Wazirabad, (iii) Yamuna (ITO), and (iv) Okhla (Report of the High Powered Committee, 2010). The above analyses on river flows, barrages, hydraulic structures and flood levels suggest that: (i) Haryana and Uttar Pradesh are the major users of Yamuna river for irrigation purposes where the state of Rajasthan is a marginal user

of Yamuna river, (ii) about 40% of the drinking water of Delhi are met with the river waters, and (iii) 25 to 30% of cumulative annual river flows remains unutilized because of the absence of upstream storages on the river. Renuka dam, Kishan dam and Lakhwar Vyasi dam, may enhance the storage capacity.

The Delhi Development Authority had intended to channelize the river in the city portion (from downstream of Wazirabad to Okhla during MPD 1981-2001) to restrict the flow area in the river and utilize the remaining land for other developmental purposes. The concept of channelization is found not technically feasible, as there are: (i) no flood moderating structures in the upstream and (ii) adverse impacts of higher flow levels in the canalized river section on the entire drainage system! The project is rejected by Flood and Irrigation Department of Delhi, Haryana and Uttar Pradesh. Further, the width of river varies from 1.5 to 2 km only which make it impossible to hold large amounts of discharges during monsoon season.

Quality of Water and Pollution in the River

The Report of the High Powered Committee on Yamuna River Development (2010) also summarizes the status of pollution in different sections of the river. The deterioration of the quality in the river is due to the complete withdrawal of fresh water for irrigation and drinking purposes and cumulative discharges of domestic, industrial and agricultural waste waters into the river, all of which transformed the river into an open sewer in Delhi-Agra stretch. This is adversely impacting riparian ecosystems and endangering public health of inhabitants. The poor sanitation practices especially in unauthorized colonies often lead to epidemic of water bore diseases. The Himalayan stretch of the river (section I) from the origin to Tajewala (172 km) has good water quality and blocks dry weather flow by Tajewala barrage with the bulk of water is abstracted for irrigation and drinking. In this section, the water is of bathing quality with BOD and DO levels are 1.2 mg/l and 11.7 mg/l, respectively. The Tajewala-Wazirabad stretch of 224 km (upper stream of Wazirabad reservoir) receives (i) only dry weather flow composed of waste water from urban and rural settlements (Yamuna Nagar, Jagadhri, Karnal, Panipat, Sonepat, Saharanpur, Muzaffarnagar etc.) and (ii) the fresh water from Western and Eastern Yamuna canal systems, and these flows are stored

at Wazirabad barrage for meeting the drinking water demand of Delhi Section (Section II). The quality of water in the upstream of Wazirabad is fairly good with average BOD levels in the range of 1.0-2.0 mg/l but with high levels of coliform density and pesticide contaminants. The low BOD levels are due to self purification of water which flows over a distance of 224 km. The Delhi urban stretch of 22 km in the downstream of Wazirabad barrage upto Okhla barrage (Section III) is critically polluted and dry weather flow is almost the treated and untreated sewage from 22 drains and the fresh water flow from upstream or lateral connection and it is perhaps one of the most polluted river stretches in the country with zero DO and over 30 mg/l BOD levels. Apart from domestic sewage of 3452 mld (million litres per day) which includes partly treated sewage and untreated sewage, the river also receives pollution loads (180 mld) from planned and unplanned industries. This pollution load is partly controlled by relocation of industrial suits and setting up of common effluent treatment plants (CETP). The 490 km stretch from downstream of Okhla barrage upto (Section IV) confluence with Chambal is highly polluted and eutrophicated with waste water from urban settlements.

The status of the river was also highlighted by the presentations made by the Applicant (Petitioner), Delhi Jal Board, Central Pollution Control Board and Central Ground Water Board. The Delhi Jal Board also mentioned that 22 km stretch of the river between two barrages receives 80% of total pollution load with BOD more than 40 mg/l and coliform of 24 millions and with no fresh water during dry season; besides sewage, dumping of litter, plastic and solid waste also contributed to the pollution of river.

The Central Pollution Control Board also confirms that water is unfit in this stretch of river for any purpose (Presentation made before the Committee on 17 October 2013). According to Central Pollution Control Board's Report on 'River Yamuna – Waste Water Management Plan in Delhi (2013) the water quality is deteriorated with respect to DO and BOD during 2011/2012 as compared to 2001. The Report gives % flow of sewage from different drains and % BOD (Tones/day) contributed by different drains.

Ground Water Potential

The Central Ground Water Board in its Report on 'Ground Water Potential of the Yamuna Floodplain, NCT Delhi (2013)' states that Yamuna active floodplain aquifer of NCT Delhi occupies 97 sq.km of area and stretches about 35 km along river Yamuna covering 7 districts of Delhi. The 97 sq. km of the active floodplains includes river bed and out of which 16.5 sq. km is under water and the rest 80.5 sq.km has shallow water table. The tube wells dug in the floodplains provides 35 MGD of fresh water from the fresh ground water zone of the aquifers. The thickness of alluvium is 10 to 300 m in the floodplain and depth to bed is 10-150 m below the ground level. Newer alluvium deposits belonging to recent age are extended all along the floodplain area and is composed of clay/silt mixed with tiny mica flakes to medium/coarse sand and gravel and its thickness varies between 45 to 55 m. There are three horizons – the top layer of silt mixed with clay followed by fine to medium grained soils which varies from 4 to 30 m thickness and then followed by sand mixed with gravel which acts as very good aquifer system, particularly in Palla well field area.

The transmissivity of the aquifer system of newer alluvium varies between 730 m^2/day and 2100 m^2/day with hydraulic conductivity ranging between 13 m/day and 20 m/day. The depth to water level in the floodplains varies from 1 to 10 m below ground level (mbgl) both during pre and post monsoon. The ground water flow direction is towards river Yamuna in the upstream of Wazirabad reservoir (north) but in the upstream of Okhla barrage and its downstream (south) the ground water flow is away from the river Yamuna. This is perhaps due to artificial and regulated surface pondage by weir and barrages.

The quality of ground water is fresh in the aquifers to a depth of 30 to 45 m (sometimes upto 65 m in Palla area) with EC, fluoride and nitrates are within the permission levels, but water is saline underlying fresh water and saline/fresh water interface is between 30 to 65 m below ground level. The total fresh ground water in the floodplain area is 615 MCM and the whole floodplain area of NCT Delhi has yield potential of 153 MCM (92 MGD) and the void created due to dewatering of aquifer system will result in 95 MCM of recharging potential. Soni & Diwan Singh (2013) pointed out that the floodplain aquifers have natural storage and recharge even in the absence of sufficient rainfall recharge and hence floodplains are local

source of water for cities located on their banks. They suggested that recharge of floodplain aquifers can be enhanced during monsoon by having running shallow channels form upstream barrage along the elevated embankment and allow the water to drain over the floodplains. Soni et al (2014) highlighted that 50% of the virgin monsoon flow (July-September) is necessary for transport of the river sediment and a similar flow is needed for an adequate recharge of floodplain aquifer along the river. For the lean period (October to June) at least 60% of the virgin flow is necessary to avoid growth of still water algae and to support river biodiversity.

Riverfront Development

There are different proposal developed by different agencies on the riverfront development in the name of Yamuna rejuvenation, many of which are, in fact aimed at development rather than for rejuvenation per se. For example

(i) NCR-Regional Plan 2021,

(ii) Yamuna Action Plan,

(iii) Inland Waterways Authority of India (IWAI),

(iv) NEERI's EMP for rejuvenation of rivers,

(v) DDA's 2004 Master Plan recommendations 1962, 2011 and 2021,

(vi) DDA's Zonal Development Plan's recommendations,

(vii) Yamuna Riverfront Development by Landscape Division of DDA (2010), and

(viii) Report of the High Powered Committee on Yamuna River Development, also dealt with the Yamuna Riverfront Development within the stretch of NCT of Delhi

The MPD (1962-1981) proposed the development of district parks, play grounds and open spaces on the western bank of the river south of Wazirabad barrage. The Master Plan 2001 (1981-2001) mentioned that the river should be made pollution free and large recreational areas should be developed on the bank of the river in a way that the river become an integrated part of the city physically and visually. It also recommended channelization of river, development of riverfront and strict enforcement of the Water Pollution Act. The Master Plan 2021 (2001-2021) talks about the rejuvenation of river Yamuna through a

number of measures including: (i) ensuring adequate flow in the river by upper riparian states, (ii) refurbishment of trunk sewers, (iii) efficient treatment of waste water (iv) sewering of un-sewered areas, (v) recycling of treated effluent and (vi) removal of coliforms. It also mentions that the natural features such as forests, wildlife sanctuary in the bed of river Yamuna and other water bodies should be conserved and kept free from unrestricted and unplanned urban development. The designation and delineation of appropriate land uses and aesthetics of the riverfront should be more fully integrated with the city and made more accessible physically, functionally and visually; water bodies having a minimum size of surface area of 1 ha be preserved and efforts be made at the local level to retain smaller water bodies (Report of High Powered Committee, 2010).

The National Capital Region regional plan 2021 has identified the river zone as a natural conservation zone and recommends that the water bodies should be kept free from any encroachment/development to allow free flow of water. Construction activities for human habitation or any other ancillary purposes are not to be permitted. The activities recommended in the natural conservation zone include agriculture and horticulture, pisiculture, social forestry, plantation including afforestation, regional recreation activities with no construction exceeding 0.5% of the area with the permission of the competent authority (Report of High Powered Committee, 2010).

In spite of these recommendations, the pollution, the encroachment, the dumping of solid waste and draining of wetlands, high siltation of water course have been continuing unabatedly and it may be difficult to identify the presence of river in some segments.

The Prime Minister constituted a High Powered Committee in 2007 on Yamuna rejuvenation and River Development with the following terms:

"(a) Commission studies on different aspects of the development of the river viz. hydrology, ecology, environmental pollution, sustainable use of the river front, to feed into the policy framework.

(b) Develop an operational plan for implementation of the river action programme.

(c) Develop a policy framework and prepare an integrated plan addressing issues of both quantity in terms of flow and quality in the Yamuna river.

(d) Effect inter-sectorial coordination for planning implementation untill such times as a statutory arrangement is in place.

(e) Suggest/list design for a statutory framework.

In order to bring out a comprehensive review of the status and management of river Yamuna in all its dimensions and ramifications, the High Powered Committee appointed a Technical Advisory Group (TAG) in its first meeting on 12 October 2007. The Committee also assigned specific tasks to Central Groundwater Board and National Institute of Hydrology to work out potential for extraction of underground water to supplement the city's needs from the floodplains of riven Yamuna particularly from Wazirabad to Okhla.

The TAG submitted its Report in 2010, which was approved by the High Powered Committee on Yamuna River Development. The Report is a review of different committee's recommendations rather than suggesting strategies for the actual revival of the Yamuna river. It recommended (i) the implementation of upper storage projects, (ii) trapping of groundwater from floodplains, (iii) approved riverfront development as proposed by DDA and (iv) implementation of interceptor sewer system for pollution abatement. The Report also discusses various court orders, decisions taken by different agencies, and Institutional mechanisms and policy options for Yamuna river rejuvenation, development and management.

Inspite of Court Orders and number of Committees and Action Plans for rejuvenation of river, the river in urban stretch 22 km is dead and the floodplains are vanishing. This is evident from the observations made by the Committee during the field visits (Annexures 3-9) and geospatial data collected.

FIELD OBSERVATIONS BY THE EXPERT COMMITTEE

The Expert Committee visited the entire river zone (O Zone) of MPD 2021 and the portion belonging to UP from Palla to Jaitpur on both sides western and eastern banks). The observations made by the Expert Committee are given in Annexures 3-9 and also illustrated by site photographs (Figures 1-5). The significant observations are summarized below:

(i) rampant construction of roads and embankments on the active floodplain within the old embankments in many segments of the river leading to massive encroachment;

(ii) construction of houses and or infrastructure development within 300 m from the river channel in some segments;

(iii) construction of bathing ghats on the floodplain and subsequent encroachment around the ghats;

(iv) reclamation of floodplain in the name of developing ghats;

(v) continuous dumping of solid waste into wetlands in some segments;

(vi) reclamation of floodplains for construction of houses in and around religious structures;

(vii) location of cattle farming even on the edges of channels;

(viii) cultivation of vegetables and seasonal crops with high inputs of fertilizers and pesticides;

(ix) construction of roads and other structures under riverfront development scheme of DDA;

(x) development of nurseries and orchards;

(xi) indiscriminate construction of spurs having metaled roads on the top leading to permanent encroachments;

(xii) relocation of dumps from one site to another within the floodplain leading to further encroachment;

(xiii) alteration in the morphology of the river significantly by barrages, bridges/flyovers (with extensive guide bunds), embankments, buildings;

(xiv) continuous discharge of wastewaters and dumping of solid wastes into waters;

(xv) inadequate flushing down of sediments and sludge by the peak floods;

(xvi) constriction of river channel and loss of its natural meandering;

(xvii) reduction in the flood carrying capacity of the river;

(xviii) decline in the groundwater levels in the absence of recharge in the floodplains;

(xix) replacement of the wetland vegetation by exotic water hyacinth and other undesirable species;

(xx) conversion of wetlands and connecting inundation channels into agricultural fields;

(xxi) construction of drains within the active floodplains for carrying sewage from newly developed cities and human settlements outside the embankments;

(xxii) location of ash dykes and creation of Bus depots on the abandoned ash dykes;

(xxiii) small scale plantation of exotics on the floodplain;

(xxiv) establishment of farm houses;

(xxv) sand mining in areas vulnerable to erosion;

(xxvi) discharge of effluents from Power Plants;

(xxvii) unregulated number of bore wells in the upstream;

(xxviii)absence of culverts for the bunds/embankments/road that connect the wetland; and

(xxix) umping of plastics and religious material into the river located outside the embankments

Some of these observations are documented in Figures 1-5 and Annexures 3-9).

Figure 6 illustrates the morphology of river in 1893 with a layer of 'O' zone of 2010 and encroachments in 2012. There is a marked change in the morphology of river in 2010 as compared to that of 1893. For example, in 1893, the river has many channels and vast

floodplains but in 2010 the river has a single channel and the floodplain is greatly reduced. In fact some human settlements in 'O' zone are mapped in the water channel of the river in 1893.

The 'O' zone showing a layer of land use/cover also suggested that the floodplain is drastically reduced and the channel is also sedimented with shoals and islands in the riverbed.

Further developments on the floodplain in the name of river front development and any reduction in the area of the O-Zone will completely destroy the river – especially its water quality and the flood carrying capacity that will in turn threaten the city on both sides.

ISSUES EXAMINED AND OBSERVATIONS

The Committee, while taking into account the ToR of MoEF as directed by the Hon'ble Tribunal and the Tribunal's own directives to the Expert Committee, examined the following major issues for drawing an Action Plan for Restoration and Conservation of Yamuna River:

(i) Whether the river zone, particularly the floodplain is completely free from dumps of garbage and solid waste?

(ii) What is 'O' Zone as defined by MPD 2021? What are its boundaries? How it can be redefined in the light of recent public notification issued by DDA?

(iii) What is Yamuna riverfront development? And how appropriate is the proposed riverfront development scheme by DDA for rejuvenation of the river and its ecological integrity? Is it possible to modify and improve it?

(iv) What is the quality of water in the NCT stretch of the river and how to enhance the quality of water, particularly in 22 km stretch between Wazirabad and Okhla barrage?

(v) How can the river be restored to its natural state and conserved (preserved)?

(vi) Is it possible to manage the NCT portion of the river in isolation from the interstate boundary portion between NCT and UP?

(vii) How the proposed river zone is managed?

(viii) What are the Institutional mechanisms, policy prescription and statutory options are required to conserve the river?

(ix) How the restoration work would be carried and what are the agencies available to undertake the work?

These issues were then clubbed into four major groups which are discussed below.

Dumping of Garbage and Solid Waste and Reclamation of the Floodplains

The Hon'ble Tribunal in its orders of 31 January 2013 and 01 February 2013 in the matter relating to removal of solid waste and debris from the banks of river Yamuna in the on-going

case of Manoj Misra Vs Union of India & Ors (Original Application No. 6 of 2012) constituted a Committee to work out an Action Plan for the removal of solid waste and debris, under the Chairmanship of the Secretary, MoEF, Govt. of India. The Committee did initiate Action Plan for the removal of solid waste and debris, and authorities (DDA, Irrigation and Flood Control Departments of NCT Delhi and UP, Municipal Corporations of Delhi) and DMRC removed substantial amounts of solid waste and debris dumped on the active floodplains.

The river zone between western and eastern embankments/roads in entire stretch of 54 km from Pall to Jaitpur including UP portion was surveyed by the committee during field visits. The detailed observations were given in Annexures (3-9). The significant findings are mentioned below:

(i) At Badarpur Khadar village, reclamation of active floodplains by filling with soil and solid wastes has been widely practiced for expansion of the existing settlement.

(ii) A sewer canal was made with flyash embankments within the active floodplain to discharge sewage from Tronica City and villages around it, and the flyash has been eroded and has been carried into the river.

(iii) Parallel to Sonia Vihar - Badarpur Khadar embankment road, a solid waste dump along the entire stretch was made into a road on the active floodplain and it has been encroached.

(iv) Sand mining in the erosion prone areas of the river has been observed.

(v) Widening of guide bunds and spurs with solid wastes and concretization of the tops of guide bunds and spurs have been widely practised on the eastern bank in the upstream of Wazirabad barrage.

(vi) On the western bank, dumping of solid waste dump has been carried out on the active floodplains along Jagatpur – Palla embankment road.

(vii) Both on the upstream and downstream of Wazirabad reservoir and along both the banks of the river, roads have been constructed to the religious structures and crematoria and illegal settlements using solid waste.

(viii) Cattle farming and cowdung heaps have been found in abundance within the active floodplains all along the stretch, particularly near Jagatpur and Eastern bank near Garhi

Mandu, Usmanpur and Chilla Khadar villages and also all along Pusta Road. Illegal colonies and solid waste dumps have been observed near nurseries located on the active floodplains.

The relocated solid waste dumps along the Pusta Road have been encroached. Active dumping of solid waste and debris have been carried out and filling the wetlands by solid waste dumps and construction of roads across the wetland using solid wastes have been rampant in Garhi Mandu area.

(ix) Active dumping of solid waste and debris have been observed for reclamation of floodplain at Majnu Tilla and the dump almost reached to the water channel.

(x) Concretization of floodplain around Sur Ghat and Qudesia Ghat has been observed.

(xi) At Pantoon bridge and Signature bridge, the floodplain have been filled by solid waste for construction of roads. The DMRC has been dumping solid waste in the active floodplains.

(xii) Near Indraprastha Power Station, the flyash duke has been converted into DTC Bus Depot and active ash dykes have been observed.

(xiii) Make shift temples and ghats have been observed near old railway bridge which generate huge quantities of solid waste and debris, all of which ultimately find its way into the river.

(xiv) Near Millennium Bus Depot, a new road was constructed using solid waste within the floodplain and the Depot itself is located on the flyash dump. In contiguity to it and further southwards (opposite to Sarai Kale Khan Bus Terminal) a massive dump of solid waste is located and the DDA intended to develop a park on it.

(xv) All along the western bank from UP Irrigation and Flood Control Department colony upto Okhla barrage garbage have been dumped into pondage of Okhla barrage; in the upstream of barrage, a road has been constructed using solid waste and dumps of different sizes and shapes of garbage and solid waste have been found in this area.

(xvi) Downstream of Okhla barrage, solid waste dumps and road construction to the religious structures and to DMRC's prefabricated unit and agricultural fields have been widely practised. Infact, construction of houses and massive dumping of solid waste have been undertaken at Jaitpur extension.

(xvii) On the eastern bank in the UP stretch of the river, the entire floodplain has been covered by solid waste dumps; recycling units of solid waste dump and recycled solid

material dumps. The water channel has been completely sedimented due to washing from recycled material dumps and the sediment was red coloured.

In light of the sorry state of affairs in the riverscape, the committee suggests the following measures to prevent the continuing onslaught on the river:

(i) The encroachments, the villages, the cattle farms and nurseries located on the active floodplain i.e. within the embankments should be relocated; (ii) solid waste dumps should be removed; (iii) no sand mining is permitted from erosion prone areas of the river; (iv) roads leading to religious structure should be removed; (v) the solid waste recycling units and dumps of solid waste should be removed from the floodplains; (vi) no widening of spurs and guide bunds and embankment roads should be permitted; and (vii) agriculture should be regulated.

To prevent solid waste dumping, encroachments, construction of roads, ghats, religious structures in the active floodplains of the river and dumping of solid wastes into water across the road, railway and metro bridges and barrages, it is suggested that policing of river is a must. Further, some kind of tree line and a protective structure should be created all along the inner side of embankments/bunds/roads that delimit the river zone.

Delineation of 'O' Zone of MPD 2021

To manage the riparian ecosystems sustainably and to maintain their ecological integrity, it is essential to delineate the present river boundaries, as the boundaries have been continuously changing due to urbanization and change in river morphology due to construction of embankments within the embankments for recovery of land from the river. The boundaries of the river are the embankments / bunds / roads and the portion between the two embankments is the river system / riverscape / riparian system / river zone. These embankments are man-made and new embankments / bunds / roads are being continuously constructed within the old ones as the encroachment / expansion of urbanization has been shifting closer to the river

channel. For example, the river used to flow close to the red fort in the 19th century (1893's), but today the river channel is more than 1 km away from the Red Fort.

What constitutes 'O' zone was defined in MPD 2021.

The NCT of Delhi was divided into 15 zones (divisions) in the Master Plan for Delhi 2021 (MPD 2021). The Zone 'O' covers the river Yamuna/River front. Figure 7 shows the boundaries of Zone 'O' (as on 2010) of NCT Delhi (red line) and UP portion of the river (black). The boundaries are the present embankments/roads/bunds with landuse/land cover area. The river zone which includes Zone 'O' of DDA and UP portion, is delimited as follows:

North:	Palla Village
South:	Haryana Border - downstream of Jaitpur Village
East:	Main road/marginal bund road linking Noida to Wazirabad and from Wazirabad to Badarpur Khadar by Sonia Vihar bund road
West:	Ring road from Metcalf house to Okhla; northwards from Metcalf house to Wazirabad and from Wazirabad to Palla village by Palla bund road

Western bank is connected to eastern bank and vice versa by the following road bridges, railroads, metro bridges and flyovers across the river stretch of 28 km of the downstream of Wazirabad barrage upto Jaitpur.

(i) Wazirabad road over the barrage
(ii) Signature bridge
(iii) ISBT bridge
(iv) Shastri Park Metro Bridge
(v) Old Rail road bridge
(vi) Geeta Colony flyover
(vii) Ring Road bypass road
(viii) ITO bridge over the barrage
(ix) Yamuna bank metro bridge
(x) Nizamuddin Rail bridge
(xi) Nizamuddin road (NH 24)

(xii) Barapulla flyover bridge (passing over the floodplain on the right bank)

(xiii) DND flyover

(xiv) Okhla – Noida road over Okhla barrage.

Figure 6 illustrates how the morphology of river has been changed over a time period. In 1893, the river with its vast floodplains having numerous channels was flowing by the side of Red Fort. Infact, some of the today's encroachments were mapped in the main channel of 1893. There is a massive reduction in floodplain width at some stretches, particularly on the western bank. The 'O' zone and its subdivisions are depicted in Figure 9. Figures 10-17 illustrate the topographic features of the riverscape of different subzones of Zone 'O' and UP portion of the river zone. The river zone used in this Report includes not only NCT of Delhi but also UP portion within the embankments/bunds/roads that form the boundary on the west and east. The details of land use /cover in the river zone is given below (Figure 8; Table 2).

Table 2: Area under different land use /cover categories

Land Use	Area (ha)
Water bodies	51.286688
Plantation	20.65358
Agriculture	4351.262164
buildings/encroachment	599.146218
Barren Land	319.2872458
Crematorium Graveyards	6.710550076
Cultivation Area	4034.303547
Farm Limit	24.4883632
Forest Area	278.7553007
Garden Parks	210.8338312
Nursery	52.94419042
Open Land	1453.731888
Orchard	15.384075
Permanent Market Area	0.133398435
Plantation Area	13.95039109
Play Ground	19.53834945

	(Flyash brick plant)		
4.	Recreational (Green)***	2045.00	21.08
5.	Transportation	582.93	6.01
6.	Utilities	172.66	1.78
7.	Government*	1.80	0.02
8.	Public & Semipublic*	181.74	1.87
9.	River & Waterbody****	6591.12	67.84
	Total	**9700.00**	**100.00**

** No additional areas other than existing/earmarked have been proposed under residential, commercial, industrial, government and public and semi-public use zones.*

*** Commercial includes existing IT Park (6.0 Ha), Bottling Plant (28.0 Ha) at Madanpur Khadar, Commercial/Hotel (5.5 Ha) site at CWG Village.*

**** Proposed Recreational uses will be considered as Green Park/herbal park, science park, theme park, etc. will be permitted without any pucca/permanent construction.*

***** The area of 'River & Waterbody' may decrease by 980 Ha (approximately) after the regularization and subsequent change of land use of unauthorized colonies as per Govt. Guidelines/Govt. policy, falling in Zone 'O'.*

The Zone 'O' defined by DDA does not have well-defined boundaries, as the new bunds/embankments/roads have been developed within the old bunds/embankments/roads for human settlements and infrastructure development. Consequently, Zone 'O' is open ended zone with boundaries changing as the encroachments and infrastructural development continue to take place in the ecologically critical functional floodplain ecosystems. These developmental activities in the Zone 'O' led to court cases.

The High Court of Delhi in its order of 29 March 2006 (in the case of WP(C) No. 2112/2002 and WP(C) No. 6891/2004 passed that no construction to take place within 300 meters on either side of Yamuna river except in case of Majnu Ka Tilla and Kalindi bypass where a minimum distance of 120 m from the edge of river Yamuna is permitted (vide order of 11 August 2006 by HC). The HC also constituted Usha Mehra Committee to ensure removal of

all encroachments upto 300 m from both sides of river Yamuna in the first instance, and infact 15,000 Jhuggi Jhopri were removed between 2001 and 2006. The Court also mentioned in its order the following "No encroachment either in the form of Jhuggi Jhopri clusters or in any other manner by any person or organization shall be permitted. Yamuna was to be redeveloped in such a manner that becomes habitat for trees, forests, and Centre for recreation. We are making it clear that no structure whether it pertains to religious, residential or commercial or any other purpose shall be allowed to exist".

In 23 August 2007, the then Lt. Governor of Delhi declared that there shall be complete embargo on any new construction other than common wealth games village etc. on the river bed within the floodplains until a detailed hydrological studies and other required studies are carried out. In its meeting 18 June 2008, DDA resolved that the river bed will be retained as a Biodiversity Reserve and no pucca construction should be permitted in this zone.

Inspite of the above court orders and decisions by land owning authorities, the DDA has brought out a public notice on re-delineation and rezoning of the Zone 'O' as a part of review of MPD 2021 as per the provisions of MPD on 28 September 2013 (Annexure 10) to regularize the human settlements (authorized and unauthorized residential areas and villages) by transfer from Zone 'O' to adjoining zones such as D,E,F and P II etc. The areas include Rajghat, IP Power Station, Millennium Bus Depot, Sonia Vihar, Shastri Park, DMRC land, Akshardham temple, CWG, Yamuna Bank DMRC land, Batla House Area, Jaitpur, Meethapur, Okhla, Jagatpur and area under circulation (all of which encompass an area of 3109 ha). It also mentioned that the total area under Zone 'O' was 8534 ha instead of 9700 ha as mentioned in MPD 2021. The difference of 1700 ha is not accountable. Further, there are villages and unauthorized encroachments within the embankment/bunds/roads which are subjected to annual flooding. These include Badarpur Khadar, Garhi Mandu, Usmanpur, Chilla Khadar, and other encroachments. The re-delineated Zone 'O' (river zone will have 4961 ha in place of 8070 ha).

It also redefined the river Yamuna in terms of riverbed, river floodplain and river front (area outside the embankments). The riverfront area is proposed to be used for recreational, tourism oriented infrastructure, transportation facilities, utilities, additional facilities for Samadhi Complex etc.

The Expert Committee is of the view that the river does not recognise the administrative boundaries, and its ecological integrity as well as water quality cannot be ensured by treating the left and right banks of the river separately. It is therefore necessary to consider together the areas of the river and its floodplain lying on the west in the UP territory corresponding with the O-Zone's northern and southern limits. The Committee has named this total area of the river (O-zone of the DDA plus the corresponding areas in UP) as the RIVER ZONE. Our analysis of subzonal maps of Zone 'O' and UP portion of the river yielded the following:

Table 4 gives the area (ha) in each subzone as per DDA and Expert Committee. Table 4 gives the floodplain area in each subzone under west and east banks. The total area of the river zone is 12375.4 ha of which the floodplain is 12366.76 ha (5895.82 ha of west bank and 6470.94 ha of east bank) and the channel is 1411.54 ha.

The flood zone in the 'O' zone is illustrated in Figures 18,19.

Table 4: Area under each subzone of 'O' zone as per DDA, and the Expert Committee

SUB ZONE	Area (ha) (DDA)	Area (ha) (Expert Committee)
UP Border- Wazirabad Barrage	3620.0	2599.6
Wazirabad Barrage- ISBT bridge	1100.0	8102.2
ISBT Bridge- Old Rly Bridge	225.0	1447.3
Old Rly Bridge- I.P. Barrage	800.0	348.3
I.P. Barrage- New Rly Bridge	365.0	1208.9
New Rly Bridge- NH 24 Bridge	390.0	524.1
NH24 Bridge- Okhla Barrage	1300.0	549.8
Okhala Barrage- Haryana Border	1900.0	2903.2
TOTAL	9700.0	12375.4

Table 5: Area under west and east banks of each subzone of 'O' zone including UP portion

SUB ZONE	Floodplain Area (ha) West Bank	Floodplain Area (ha) East Bank
UP Border- Wazirabad Barrage	2557.22	3117.50
Wazirabad Barrage- ISBT bridge	140.78	899.90
ISBT Bridge- Old Rly Bridge	62.74	180.58
Old Rly Bridge- I.P. Barrage	540.58	268.10
I.P. Barrage- New Rly Bridge	103.21	275.70
New Rly Bridge- NH 24 Bridge	80.06	326.46
NH24 Brudge- Okhala Barrage	1027.17	1030.28
Okhala Barrage- Haryana Border	1384.06	372.42
TOTAL	5895.82	6470.94

The total river channel is 1411.54 ha (2010).

Flooding in 'O' Zone

The data on floods in Delhi show that the city has experienced floods at least once every decade since 1947. High floods occurred in 1947, 1956, 1966, 1978, 1988, 1995, 1998, 2010 and 2013 (Figures 18-19). The 1978 flood with water level reaching 207.4 m at old railway bridge had inundated areas as far as Model Town and Mukherjee Nagar. With the top elevation of the embankment on the west side being at about the same level, the high floods with much lower discharge at the Old Railway bridge touch the embankments. Almost entire area of the O-zone gets flooded practically every year with much lower flood levels.

It is important to recall here that following the 1978 flood in Delhi, the Yamuna Standing Committee (YSC) of the Central Water Commission (CWC), in its 37th meeting (May 1979) had decided that " ... *the minimum spacing between future embankments on the banks of the river Yamuna should be 5 km and the embankment should be aligned at a minimum distance of at least 600 m from the active river edge at the time of construction of embankments.*" The YSC at its meeting on 5 January 2008 decided that a width of 1650 m must be reserved for the river. Unfortunately, this decision has not been followed and today, the maximum distance between the two embankments of the river Yamuna is less than 2 km, and hence the floodwater carrying capacity of the river has been greatly compromised.

Based on the above mentioned observations and taking into account the earlier court order, recommendations made by different Committees and ecological functions of floodplains, the Committee suggests the following:

(i) To maintain the ecological integrity of the riparian ecosystems, the 'O' Zone with 8 subzones as defined by MPD 2021 and UP portion of the river should be declared as riverzone and areas within the identified in each subzone between two existing embankments/bunds/roads should be preserved and conserved and no construction activity of any kind is permitted.

(ii) The areas outside the embankments/bunds/roads should be treated as riverfront as defined by DDA and the human settlements and infrastructure developed (except for millennium Bus Depot, for which the Govt. of NCT of Delhi filed an affidavit in High Court stating that it will be shifted elsewhere) be allowed to remain with stringent regulations on future developmental activities in the area. The river zone may be declared as an ecological sensitive area.

(iii) All villages, encroachments, cattle farming and nurseries located inside the embankments/bunds/roads (active floodplain) should be relocated.

(iv) Agriculture should be regulated.

(v) Waterbodies and their connecting channels should be restored.

(vi) A mosaic of floodplain forests on high elevated areas, on grasslands moderately elevated areas and water bodies with interconnecting channels should be developed.

(vii) A green belt/green way should be developed along the inner embankments/bunds/roads on both sides of the river.

(viii) No new bunds / embankments / roads within the existing boundaries should be allowed.

(ix) Construction of new barrages and bridges should not be encouraged.

(x) A cascade of treatment wetlands should be developed on the western bank and the discharges of 22 drains be diverted into these wetlands before discharging directly into the river.

Riverfront Development Plan of DDA

The second issue that was examined by the Committee is the riverfront development scheme formulated by DDA. The following are the observations and recommendations made by the committee, taking into account the presentations made by DDA the topographic features of the river zone, the re-delineation of the river zone by DDA based on topographic features, the assessments made by different committees constituted on the river front development plan and flood zoning based on the digital model developed using highest flood level in 40 years.

What constitutes riverfront in 'O' Zone was not defined till the public notice issued by DDA on the re-delineation and rezoning of the 'O' zone of MPD 2021 on 23rd September 2013, wherein it was mentioned that riverfront refers to one of the three components of the 'O' zone (river bed, river floodplain and river front) and defined it as the area outside the embankment; it is proposed to use it for recreational, tourism oriented infrastructure, transportation facilities, utilities, additional facilities for Samadhi Complex etc. This is just contrary to the Riverfront Development Plan prepared by DDA and accepted by different Committees with certain limitations.

The River front Development Plan originates from NEERI's proposal on the development of river front area on both sides by channelizing the river. As per the proposed land use in Zone 'O', riverfront does not figure, but 2045 ha was earmarked for recreational (green) and 6591.12 for river and waterbody which makes an area of 8636 ha out of 9700 ha of Zone 'O'. NEERI's Report mentions that "6205 ha for recreational facilities which will include district parks in continuity with vast green spaces, water sports, golf course, tourist cottages, camping sites with public convenience, small shopping plaza, pleasure parks for different age groups, children parks, auditorium, restaurants/café, amusement/antique hall sports Centres, boat club with paddle boats, facilities of swimming with dress changing facilities, gymnastic, skating, rest rooms, etc., parking facilities for different types of vehicles, dispensary, bird sanctuary, race course, science park with reception office, public conveniences, stores, exhibit development, solar energy corner and other service models, amusement park, fun island, children's airport with facilities of helicopter, mini forests, green preservations along bunds, horse riding/training centre and temple complexes, etc.

The proposed riverfront development scheme of DDA includes some of the recreational facilities mentioned in the NEERI's Report (2004). The purpose of channelization is to restrict the flow area in the river and utilize the remaining lands for other developmental

purpose. Such a proposal is technically not feasible because the canalized section can not hold high discharges in the absence of upstream storage facilities (flood moderation structures), and this may threaten the entire city. Further, the higher flow in the canalized section of the river affects the city's drainage system due to back flow. Further, channelization destroys the floodplains and its numerous wetlands, and serious floods (1 in 100 years) may submerge the entire city which may be buried under sediment as it has happened for the township of Srinagar in recent floods. On these grounds the NEERI's proposal has been rejected. Consequently, the river front development plan based on NEERI's Report on channelization cannot be implemented. The reality is that the riverfront development scheme formulated by DDA is entirely based on channelization and river dressing and on the land reclaimed by filling as proposed in the NEERI's Report. Consequently, it cannot be implemented without creation of safe land.

The 2013 low and medium floods, in fact, submerged the floodplains where the river front development scheme is being implemented.

(i) The riverfront development scheme of DDA was formulated using concept widely adopted for the management of Biosphere Reserves where riparian ecosystems form just one component. The zonation like core, buffer and transition zones have altogether different connotation with respect to biosphere reserves and other protected areas such as National Parks and Wildlife Sanctuaries. This concept is just not applicable to riparian ecosystems where the dynamics of riverscape changes, particularly rivers like Yamuna. For example, at one time the river was flowing by the side of Red Fort but today it is about 1 km away from the Red Fort (Figure 6). The meandering of river, sediment load, erosive transportive forces and sedimentation pattern always change in time and space. For example, 1km width of floodplain along 10km stretch of the upstream of Wazirabad barrage was removed by the river in 2013 flood; similarly the meandering has been changed in both upstream and downstream of Wazirabad reservoir. Consequently, the creation of protective and interactive biodiversity zone and public recreation zone with green linkage is unrealistic. For example, the floodplain area where Golden Jubilee Park has been initiated under riverfront development scheme, is close to the meandering river channel and is submerged during annual floods and the elevated fringe portion along the road is also submerged during floods, in the frequency of 1 in 2, 5, or 10 years.

(ii) The scheme did not take into account the present topographical features, contours and flood ways. Therefore, it is schematic and is far from ground reality. For example, the Golden Jubilee Park is in flood way and all the structures developed were submerged and some of which were buried in 2013 floods. The Golden Jubilee Park also reduces the flood recharging area.

(iii) The introductory chapter of the river front development scheme clearly states that commercial area flourishes when it is in balance with recreation or vice-versa snd cites Mayur Vihar DCC (District Centre) and Noida P.B.D. (Public Business District) as examples of successful development along the Yamuna river but both the area are located outside bund road. The riverfront development scheme itself is based on such principles and embodies zonal development plan's recommendations. This is further evident by activities mentioned in the redefined riverfront as per re-delineation of 'O' zone. In fact, all the activities mentioned in redefined riverfront (outside the embankment/bund of 'O' zone) are proposed to be implemented on an active floodplain i.e. inside the bunds / embankments as per the riverfront development scheme.

(iv) it may be noted that many committees including the High Powered Committee on Yamuna Development clearly mentioned the major limitations of the scheme as the areas proposed for development are in the flood way.

The DDA prepared a plan for development in four of the subzones out of 8 subzones as an "Integrated project of Recreational areas along with biodiversity parks". It is noteworthy that the area upstream of Wazirabad is largely rural (except for a few settlements). In subzones other than the four identified by DDA for development between Wazirabad and Okhla, the river flows close to the western embankment leaving only a narrow strip of active floodplain. It is noteworthy that a very large area of the O-zone (about 2700 ha) is already under different kinds of constructions, buildings, samadhis, power houses, settlements etc. besides the guide bunds and other bunds. These are listed in Table 4 based on remote-sensing data.

Table 6: Built-up area in each subzone of 'O' zone

Subzone	Location	Area	Side
I	Badarpur Khadar	8.67	Left (UP)
I	Sonia Vihar	728.41	left
I	Sonia Vihar built	147.92	left
I	Sonia vihar ground	107.25	left
I	Jagatpur to Wazirabad	355.67	right
II	Majnu ka Tila	10.55	right
II	Delhi IT Park	97.36	left
II	South of Sonia Vihar	8.21	left
II	Near Garhi Mandu	5.51	left
III	Budh Vihar & Downstream	10.28	right
III	Opp ISBT	4.27	right
III	Nigambodh Ghat	13.64	right
III	Salimgarh fort	5.59	right
IV	Ghats (Samadhis)	190.58	right
IV	Stadium+Secretariat	49.56	right
V	Indraprastha Power Grid	34.03	right
VI	Millenium Bus Depot	14.88	right
VII	Jamia Nagar	202.95	right
VIII	Madanpur Khadar	208.69	right
VIII	Jaitpur	383.98	right
VIII	Jaitpur Extension	8.13	right
VI	Commonwealth Games Village	107.69	left
V	Yamuna Bank Metro	32.88	left
	TOTAL	2736.7	

The YRFD Plan proposes to alter the topography and contours of the floodplain area within the four subzones of the Zone O on the right (west) side of the river, by raising various structures. According to a CWPRS study in 1987, a reduction in the channel width and construction of guide bunds etc. on the floodplain will increase the hazard of flooding on both sides of the river. During the past 25 years several bridges and flyovers have been constructed and large chunks of land have been brought under permanent construction for various reasons. The river's flood water carrying capacity has been greatly reduced though it has not been estimated by any study. The recent floods in Delhi (2010 and 2013) point to a growing flood hazard even at lower rates of discharge in the river.

The proposals made in the YRFD Plan will not only reduce the flood carrying capacity of the river but also contribute to further degradation of the water quality, besides promoting encroachments within the Zone O.

The YRFD Plan is bound to adversely affect the goods and services of river Yamuna by eliminating and converting the floodplain to other uses. This will particularly affect the water quality, fisheries and groundwater recharge.

In the light of above observations; the Committee recommends the following, along with specific suggestions for each subzone proposed for development by the DDA:

(i) The Riverfront Development Plan as proposed by DDA, an active floodplains of Yamuna, i.e. area between two embankments/bunds/roads is untenable and should be abandoned. Alternatively, the recreational facilities as proposed in the riverfront development may be created outside the embankments where human settlements already exist.

(ii) Floodplain wetlands, water bodies with connected channels and other flood tolerant vegetation should be developed according to the plan for restoration of the river as discussed later. Only regulated organic agriculture may be allowed in certain parts at higher elevation away from the main channel.

Subzone I

The DDA has already developed in the Subzone I, a Biodiversity Park Phase I in 63.6 ha area which is outside the embankment and cutoff from the river. A Phase II of the biodiversity Park in another 121.5 ha area adjacent to it but on the river floodplain (between river channel and the embankment) is under development. The area has no major point source of pollution and the biodiversity Park will include some water bodies and wetlands besides the flood-tolerant vegetation. The Park will not interfere significantly with the flooding of the river upstream of Wazirabad. Hence, we recommend that this development may be continued.

However, in Subzone II, the plan involves construction of several structures, mounds, parking lots, boating facilities and green linkage that is not well defined. Here the channel

flows close to the ghat and the water is highly polluted, shallow and filled with garbage. The area should not be developed as proposed by DDA.

For *Subzone IV* (Golden Jubilee Park) two phases are proposed. Some development has already been undertaken. The current programme of development must be stopped forthwith and the area should be restored to the river and its natural floodplain.

In Subzone VII, the proposed plan will degrade the river further, promote flooding. The current programme of development must be stopped forthwith and the area should be restored to the river and its natural floodplain.

In our view, the interests of the river and the city will be best served by abandoning the YRFD Plan, and restoring the remaining floodplain area to bring back it natural functions and biodiversity

RESTORATION OF RIVER YAMUNA AND ITS FLOODPLAIN

The Hon'nle NGT specifically required the Committee to discuss the restoration, preservation and beautification of the river together with its methodology and process to be followed. Therefore the Restoration of river yamuna in the NXT stretch is discussed below in some detail.

Scientific Principles

The Expert Committee has examined the scientific literature on the ecology, conservation and restoration of rivers worldwide in order to reassure its understanding of the scientific principles on which the case of River Yamuna can be taken up for its restoration and conservation. We briefly highlight the salient points of the basic scientific principles which must underlie any conservation and restoration effort for its success.

Rivers and their Floodplains

The ecological integrity of a river depends upon its uninterrupted flow (which maintains the longitudinal connections between upstream and downstream reaches), its seasonally high flows (periodic floodings; which regulate the interactions with floodplains lying laterally to the river channels), and the nature of sediments carried by the river (which influence the vertical connections with the groundwater). The natural functions of a river are governed by the characteristics of its channel, flow regime, water quality, biological diversity, and the riparian and floodplain habitats and their interactions.

Rivers do not flow all the time in channels defined by natural levees (river banks), especially in the lower reaches with low gradient. Seasonally high flows, such as those during the rainy season, exceed the channel capacity and spill over the river banks flooding areas on either side. Frequently very high flows occur at irregular intervals at varying frequency. Internationally, the area lying laterally to the river channels and flooded at least once in 100 years is considered as the floodplain, and the major expanse between the two edges that carries major portion of the 1:100 year flood is known as floodway or river corridor. The naturally formed river banks (levees) and a part of the floodplain immediately adjacent to, and influenced by the river channel, is often distinguished as the riparian zone. Some parts of

the floodplain closer to the river channels experience flooding more frequently during lower magnitude floods of one in 25, 30 or 40 years, than the distant parts.

The floodplains play a critical role in determining the ecological characteristics of a river and provide many ecosystem services. They form a crucial link between the adjacent upland terrestrial habitats and the river. The major and most important functions of floodplains include:

- Moderation of flood peaks through temporary retention of water and spread of water;
- Enhancement of groundwater recharge in larger area and improvement of ground water quality;
- Stabilization of banks by the vegetation and maintaining channel form;
- Maintenance of high biodiversity and high production of natural resources;
- Provision for fresh sediments with high fertility (suitable for high productivity of vegetation for grazing animals or for growing vegetables);
- Filtering sediments, chemicals and nutrients from upslope sources, and thereby improving water quality;
- Maintenance of good stream habitat for fish (and other wildlife also), thereby promoting high fisheries production.

We may quote from: D. Mussared (1997; Living on Floodplains, CRC Freshwater Ecology, Australia) who states:

"Floodplains are as important to rivers as bark is to trees. Most of the processes that drive life in rivers happen around their edges. Just as the sap flows through the outermost ring of a tree, not through its centre, the lifeblood of a river ebbs and flows on its floodplains. The vegetation growing there isn't mere decoration; it is a river's roots and leaves"

In alluvial plains, the rivers usually migrate laterally across the floodway. Periodic flooding causes movement of sediments both downstream and laterally. These two processes continually modify the floodplain. The floodplain provides temporary storage space for

floodwaters and sediments from the watershed. It allows for a *lag period* between the peak runoff caused by, for example, heavy rainfall and flood peak downstream.

Any reduction in the capacity of a river to carry water and/or an increase in the sediment load results in more frequent and severe flooding. Flooding forces the exchange of materials and energy between the river and its floodplain. These exchanges are important for development of fisheries, transport of organic matter, sediments and nutrients between the floodplain and the river. Shallow water bodies and marshes (wetlands) on the floodplain sustain large biodiversity, help recharge groundwater and improve water quality of the river.

In order to protect the rivers for their water quality, biodiversity, and various ecological functions and ecosystem services, it is absolutely necessary that their floodplains are conserved by notifying appropriate zones (based on topography, climate and natural flow regime) with a list of permissible and prohibited activities, and adequate buffers are provided along the active floodplains.

River Restoration: Principles and Approaches

Restoration refers to bringing back an ecosystem to an original or earlier condition in terms of biophysical state and its ecological processes. Restoration of an aquatic ecosystem aims at re-establishing the *"pre-disturbance aquatic functions and related physical, chemical, and biological characteristics. Restoration is ...a holistic process not achieved through the isolated manipulation of individual elements...* (U.S. National Research Council). Restoration therefore requires addressing the root causes of degradation which may have also changed in their nature and magnitude over time. However, the question of what conditions and functions to restore and how far back in time has to be examined with respect to several other factors concerning a specific ecosystem. These include feasibility, potential for sustainability, and social, cultural and economic considerations.

Restoration of a river requires interventions to improve channel morphology (such as depth, bed characteristics and meandering), flow regime, water quality, biological diversity, and the riparian and floodplain habitats in a manner that ensures their interactions. *Flow regime of a river is the master variable* that controls all other components and in turn the

river's characteristics. ***Improvement of flow regime and water quality are critical to the restoration of a river*** and necessarily require a catchment wide action. ***Continued discharge of wastewaters without adequate treatment and the absence of adequate flows will negate all efforts to improve the channel, biodiversity and floodplain habitats.***. Wastewater discharges need to be effectively controlled and the treated effluent quality entering the river has to be strictly regulated.

The channel habitat restoration in an alluvial river such as Yamuna requires dredging out of accumulated sediments and sludge, and some re-meandering. The riparian areas need protection against erosion and frequent shifting of the channels. Non-structural approaches such as plantation of appropriate vegetation should be preferred. Riparian / floodplain zones link the stream with its terrestrial catchment, and can modify, incorporate, dilute, or concentrate pollutants before they enter a river. The floodplain habitats with appropriate wetland vegetation help improve the water quality further, and depending upon the extent of floodplain areas and the amount and quality of wastewaters, the river water quality can be restored to a fairly high level. Floodplain restoration involves creation of habitats on low lying land by reconfiguration to promote and enhance interaction between river and adjacent area through hydrological linkages.

Considering the fact that:

- The river channel has silted up in many parts because of the near stagnant conditions and the disposal of solid wastes;
- Most parts of the floodplain have also silted up because of lack of river flows, and large areas have been raised by dumping soil, garbage and solid construction wastes;
- Many water bodies on the floodplain have silted up by excessive growth of weeds such as water hyacinth and by untreated sewage discharge or have been filled up by the farmers for cultivation;
- The floodplain biodiversity has been significantly altered and reduced such that the natural functions of floodplains are lost;
- The groundwater recharge has declined over the years;

SPECIFIC RECOMMENDATIONS FOR SUBZONES

SUBZONE I

The area has no point source of pollution and is ideal for freshwater storage during floods. The area under large farms use groundwater for irrigation and number of wells and ranney wells have been made throughout. Part of the floodplain close to natural levees and part of the river bed on either side of the channel should be desilted for creating water storages. Some proposals have been made in the past to create reservoirs on the river by building barrages or off-the-river. Both are undesirable and require permanent submergence of land. Instead, the creation of relatively shallow (3 m or so) floodplain water bodies will offer more functions for recharge of groundwater and improving downstream flow as well as water quality. During the low water phase the peripheral areas of the water bodies can provide useful plant resources and the water bodies themselves can be used for promoting fisheries (without adding feeds). The loss of agriculture on the floodplain will be more than compensated by fisheries, other resources and the benefits accruing downstream. These areas can also be developed somewhat on the lines of the Biodiversity Park for recreational benefits but without any construction/structures except walking trails or boardwalks.

SUBZONE II

Sur ghat downstream of Wazirabad – It is an artificial pool created for bathing by bringing water through pipes. The pool and adjoining buildings should be dismantled and a proper ghat with steps be provided. The area should be connected with a channel carrying water from Wazirabad barrage/impoundment and properly isolated from the Najafgarh drain.

The Pontoon bridge and the road laid on the floodplain for dry season access should be dismantled, and the entire area should be re-developed as naturalised floodplain. The signature bridge (now under construction) makes it redundant.

There are forest patches of *Prosopis juliflora* along the road that forms the western boundary. This forest patch can be developed into biodiversity parks. On the eastern side, besides Garhi Mandu plantations there are number of water bodies which are silted. The entire floodplain on the eastern bank in this subzone is vulnerable to encroachment and hence a mosaic of

wetlands and floodplain forests should be developed. At some sites reclamation of floodplain by dumping solid waste is being continued.

SUBZONE III

On the western side whatever the floodplain available is occupied by makeshift religious structures and ghats. Night shelters have also been built on the reclaimed floodplains on the eastern bank. Several drains discharge untreated sewage into the river.

On the eastern side, Shastri Park Metro Station and DMRC Depot are located on the active floodplain. There are water bodies, woody vegetation patches, orchards and nurseries. This area can be developed into a mosaic of wetlands, floodplain forests and grasslands.

SUBZONE IV

On the western side the proposed Golden Jubilee Park area and the floodplain around it should be developed into natural floodplain forest and grassland communities without altering the existing topography. There are extensive marshes and water bodies within and outside the roads of Geeta Colony flyover complex, particularly on the backside of Samadhis Complex. These wetlands should be restored and the surrounding elevated areas should be developed in native floodplain vegetation.

DTC bus depot located on the flyash dump should be relocated and the ash dykes should be converted into wetlands after the closure of Power Plant.

On the eastern side there are floodplains which are put to use for seasonal agriculture, orchards and nurseries. Wetlands / waterbodies are also found. Some encroachments do exist in this subzone and these should be relocated. Nurseries should be removed. The wetlands and their inundation channels should be restored. Floodplain forests should be developed in areas where orchards are located.

SUBZONE V

On the western bank, the floodplain is restricted. Except for one green patch where a nursery is located, the floodplain is filled up by the ash generated by abandoned Thermal Power

Plant. The controversial Millennium Bus Depot is located on the flyash dump. A new bund road is created to separate the Bus Depot from the water course of the river. There are some narrow strips of floodplain where nurseries are found. Encroachments also exist within the nurseries. The nurseries and encroachments should be relocated. The Bus Depot should be relocated on the Millennium Park if no land is available, the flyash dump, after bioremediation and proper lining and caping, should be used for the development of Millennium Park.

On the eastern bank, seasonal agricultural fields, orchards and nurseries are common on the floodplains. Waterbodies / wetlands are also found. A mosaic of floodplain forests, grasslands, wetlands with wetland corridors and greenways should be developed. Native biotic communities should be used in the restoration of the area. Some encroachments are also found and these have to be relocated.

SUBZONE VI

On the west, there are floodplains but much of it is filled up and a part of it has already developed into woodlands. A portion of the filled up floodplain is encroached. The encroachment should be removed. A biodiversity park should be developed on the remaining filled up area.

On the eastern bank a bund was carved out for building Common Wealth Games village and Akshardham temple. Akshardham elevated metro station is also located. There are orchards, nurseries and agricultural fields besides waterbodies. The nurseries should be relocated. Native biotic communities should be established. The wetlands and their inundation channels should be dredged and restored.

SUBZONE VII

Upstream of DND flyover

On the western side, there are some constructions which should be removed. A network of wetlands with their corridors should be developed into treatment wetlands from NH24 to DND flyover and the outfall from Barapulla drain should be allowed to pass through these wetlands before allowing it into the river. There are agricultural fields and compensatory

afforestation plots and also patches of *Eucalyptus* plantations. Greenways should be developed on the spurs and guide bunds that intersect the wetlands.

On the eastern bank, agricultural fields, cattle farms, nurseries and orchards are located. There are also wetlands and some drains discharge their contents into the wetlands. The cattle farms and nurseries should be removed. The wetlands and their corridors should be dredged and should be developed into treatment wetlands.

Between downstream of DND flyover and upstream of Okhla barrage

There are encroachments, solid waste dumps and roads on the floodplains of western bank. Untreated sewage is discharged into the wetlands. There are islands in the pondage area. There are 3 or more channels of the river and some of which are connected to wetlands and marshes. The network of wetlands on the western side should be developed into treatment wetlands after dredging. The pondage area of the barrage should also be dredged. The wetlands and marshes and the channels have to be dredged. After dredging, a mosaic of floodplain forests, grasslands and catchment and treatment wetlands with green linkages and greenways should be integrated with Okhla Bird Sanctuary and should be designated as Biodiversity Park.

SUBZONE VIII

The encroachments, the solid waste dumps and spurs and roads constructed on the floodplains of western bank should be removed. Jaitpur extension should be relocated. The *Prosopis juliflora* patches found in UP portion and DDA area should be replaced by Biodiversity Park with native communities.

On the eastern side, the solid waste dumps, the solid waste recycling units, recycled solid waste material dumps should be removed. The entire 8 km stretch of UP should be developed into Biodiversity Park and is integrated with Okhla Bird Sanctuary. Farm houses should also be removed.

The settlement in Jaitpur extension on the left side of the embankment / road from Okhla barrage to Jaitpur must be removed / relocated elsewhere and the entire floodplain up to the river channel must be restored. Agriculture should be regulated to remain seasonal and without use of any agrochemicals.

INSTITUTIONAL MECHANISMS AND STATUTORY OPTIONS

The Report of the High Powered Committee on Yamuna River Development (2010) has reviewed the different authorities, the committees and the court orders passed with respect to rejuvenation of the river Yamuna in the stretch of NCT of Delhi. Some of the important existing authorities and committees constituted for the management of the river Yamuna are described below.

Although water is a state subject as per the Constitution (entry 18 of the 3rd Schedule of the Constitution, waters of interstate rivers (like Yamuna river) are regulated by Entry 56 of the 3rd Schedule). The Article 262 (1) states that: 'Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in any interstate river or river valley' and Article 262 (2) provides that: 'Notwithstanding anything in this constitution, Parliament may by law provide that neither the Supreme Court nor any other court shall exercise jurisdiction in respect of any such dispute or complaint as is referred to in above clause'. In light of the Article 262 (1) and (2), Parliament enacted Interstate water Dispute Act 1956 and any water dispute in sharing of water etc. has to be dealt with under this Act.

'Ministry of Water Resources, Government of India is the nodal agency for the development, conservation and management of water as a national resource and provides technical guidance/ assistance to the States on irrigation, multipurpose hydro-projects, ground water, exploration, command area development, drainage, flood control and water logging etc.

In any interstate river the dominant issues are sharing of water, construction of storage projects, flood control and environment. With respect to Yamuna, the existing institutional mechanisms are as follows':

Sharing of water

This is a critical issue for the rejuvenation of Yamuna. There was a MoU signed by the Chief Ministers of 5 basin States (Haryana, Uttar Pradesh, Himachal Pradesh, Rajasthan and Delhi)

and the Union Minister of Water Resources on 12May 1994 for sharing surface water and this MoU assessed and distributed water available up to Okhla. For implementation of the MoU and regulate the available flows, the MoU also created Upper Yamuna River Board (UYRB) which has also brought into existence under the Chairmanship of the Member of Planning Commission (Water, Planning and Projects). To supervise the working of UYRB and ensure the implementation of 1994 MoU, an Upper Yamuna River Committee (UYRC) consisting of Chief Ministers of the basin States with Union Minister/ Minister of State of Water Resources as the Chairman, was constituted.

In spite of these committees the three upper storage projects are not yet implemented because of refusal of Rajasthan for Lakhwar Vyast Project although UYRC constituted a Steering Committee on 12 April 2006 to address the issue.

Flood Control

As a rule flood control works in a State is the State's responsibility but for an interstate river, like Yamuna river the construction of flood control works on the Yamuna is regulated by a Yamuna Standing Committee of the Central Water Commission which is headed by Member (River Management) of the Central Water Commission with Chief Engineers of concerned basin States as members. The committee formulated guidelines for the construction of flood control works and also to address the issues among the basin States relating to flood control works.

Environmental Issues

The Pollution Control Boards of each States are concerned with the quality of water in their respective reaches. The Central Pollution Control Board is entrusted to address the issue of pollution of one basin State flowing into another basin State. The National River Conservation Directorate (NRCD) of the MoEF monitors the conservation of the river system and constituted a High Powered Committee to decide the requirement of minimum flow in the river in 1997. The committee headed by the Member, Planning Commission as the Chairman with Chief Secretaries of basin States as members, took a decision that 10 cumecs be released into river as minimum and the share of each basin State to the minimum flow was also worked out.

The different agencies within the Delhi and their functions and responsibilities with respect to Delhi stretch of the river is given in the table.

Table 7: Functions and Responsibilities of different agencies in Delhi

SN	Name of Agency	Functions	Nature of Responsibility
1.	Delhi Development Authority	Determining Land use	Planning
		Enforcing Land use	Monitoring/Prevention/Regulatory
2.	Delhi Pollution Control Committee/Central Pollution Control Board	Testing and monitoring water quality	Regulatory
		Securing Water Quality	Regulatory
3.	Irrigation and Flood Control	Flood Control works	Project specific planning and execution
4.	Industries Department	Management of industrial effluents	Planning and execution of projects (CETP)
			Sealing of polluting industries
			Relocation of non-conforming industries
5.	Delhi Jal Board	Management of Domestic Waste	Planning, execution, and monitoring projects (STP, Interceptor sewers)
		Use of raw water	Planning, and execution of projects (WTP)
6.	Local Bodies (MCD/NDMC)	Management of storm water drains	Planning, execution and maintenance
			Prevention of deposit of solid wastes into the drains and even river; prevention of encroachments and developments.

In spite of all these agencies, committees and authorities, the river is dead in the urban stretch of 22 km between Wazirabad and Okhla barrages.

The High Powered Committee constituted by the Prime Minister (2010) suggested the following after taking into account the status of the river:

(a) "The inter-agency coordination between various public stakeholders (planners, developers, regulators, service providers) in the Delhi stretch needs to be substantially improved at all levels".

(b) "An apex body to achieve integration and coordination between the planning, execution, funding and regulation of steps intended to improve river water quality and developments along its banks appears to be an immediate necessity".

(c) The Report also suggests the following Statutory Options to rejuvenate and manage the river Yamuna.

Option I

The Central Government may constitute the Yamuna River Board under River Boards Act, 1956 to regulate the water distribution among States and GNCTD may constitute the Yamuna River Basin (Development & Regulation) Authority by legislation which will not include power to make Master Plan and land use and it will require consent of President of India.

Option II

The Yamuna River Basin (Development & Management) Authority may be constituted for development of the river basin and preparation of Master Plans and zonal plans and for regulation of the land use and other activities in the basin area by the Parliament of India.

Option III

The National Yamuna River Basin (Development & Management) Authority may be constituted by the Central Government under section 3 of the Environmental Protection Act for regulation of minimum water flow, Master Plan and land use, and the State Authority may be constituted by the Government o Delhi for development work as per Master Plan of National Authority. The powers of Central Pollution Control relating to water pollution may be delegated to the river Yamuna Basin Authority to which, the powers of Central Government under section 5 of the EPA for issuing directions for controlling pollution may also be delegated.

The Central Government may enact legislation for creating a two-tier mechanism for effectively dealing with inter-State river development and regulation for minimum ecological flow of water. The Report also suggested National level Authority be created for overseeing development, rejuvenation and management of the river Yamuna.

To sum up, the Report of High Powered Committee on Yamuna River Development constituted by the Prime Minister did not spell out any action plans for rejuvenation of the river but simply summarized the status on (i) upstream storages; (ii) share of waters among basin States and the minimum flows into the river; (iii) pollution abatement activities by DJB; (iv) riverfront scheme of DDA. It recommended the followings projects: (i) construction of upstream storages (Himachal Pradesh and Uttaranchal); (ii) interceptor sewer projects (DJB); (iii) expansion of existing STP capacity of sewerage network (DJB); (iv) Yamuna riverfront development (DDA) with certain stipulations; (v) development, management and utilization of ground water from the floodplains (DJB) and (vi) public awareness (GNCTD, MCD).

In light of the observations made on the status of the river, and evaluation of proposed Institutional mechanisms and Statutory Options proposed by the High Powered Committee on Yamuna River Development, the committee suggest the following Institutional Mechanisms and Statutory Options for implementations of the recommendations made in this Report.

(i) An apex Authority should be assigned the responsibility of integration and coordination among multiple agencies involving the rejuvenation of river should be created. This authority will include the heads of DDA, CPCB, DJB, MCDs, DPCC, CWC, and Scientists / Technologists.

It is suggested that the High Powered Committee for Yamuna River Development chaired by the Lt. Governor, Delhi (constituted by the Govt. of India in August, 2007), be expanded to include the Chief Secretary, U.P as well as five expert members in the fields of River Science and Engineering and its mandate may also include integrated management and coordination among various planning, execution, funding and regulatory agencies of the two states to be involved in the restoration and management of the river in the Delhi stretch. The HPC should

also closely liaise with the NGRBA for better integration of their activities, since Yamuna is a sub-basin of the Ganga Basin.

Additional Recommendations

1. Successful restoration of the river for its ecological functions and their future sustainability will depend heavily on the provision for Environmental Flows through the entire 52 km stretch. Despite an earlier Supreme Court direction for providing 10 cumecs of freshwater flow downstream of Wazirabad, the desired flow has not yet been made available. The Committee recommends that the Environmental Flows requirements, particularly for the lean season, may be re-assessed for the entire 52-km stretch and the required flows be ensured at the earliest.

2. To secure the ecological integrity of the river, to prevent encroachment and dumping of solid wastes and to prevent unauthorized constructions, and unregulated cultivation, river policing by a dedicated unit should be enforced by the respective states.

3. For promoting: (a) public awareness on the conservation of river Yamuna, (b) participation of the society in the restoration of the river and (c) long-term studies and monitoring on the riparian ecosystems and their management, the Committee suggests the establishment of an autonomous Society / Trust like Delhi Biodiversity Foundation.

WATER QUALITY AND WASTEWATER IN RIVER YAMUNA

The Expert Committee examined also the issues related to the Supreme Court case, in the matter of WP(C) No. 725/1994 and 'And Quite Flows the Maily Yamuna' as required in the ToR by the Ministry of Environment and Forests. The case relates to the issue of environmental pollution of the river and lack of flow. The Expert Committee Considers this as a highly relevant and connected issue because the restoration of the river cannot be contemplated without ensuring that all sewage, wastewater and storm water enter the river after treatment to the prescribed standards and the water quality in the river is significantly improved by other supporting actions including the provision of environmental flows in the entire stretch.

The Expert Committee made the following observations, after taking into account the recommendations by different committees, presentations made by DJB, Central Water Commission and Irrigation and Flood Control Department of NCT of Delhi and UP.

(i) The river Yamuna is one of the most polluted rivers in India and pollution is mostly contributed by domestic sewage (untreated/partially treated), industrial effluents and agricultural practices. Mostly the towns and cities located along the river Yamuna contributes to maximum pollution lead. In fact the Delhi-Agra stretch of the river is the most polluted segment and is an open sewer in some stretches within NCT of Delhi and UP; the river bed cannot be distinguished from surrounding agricultural fields and is totally dried with no water during dry season. In Delhi, the urban stretch of 22 km between Wazirabad and Okhla barrages is a threat to public health and the aquatic ecosystems are extinct; it is this stretch that contributes 70% of the pollution load in Yamuna (more than 40 mg/l BOD, 24 millions of coliform and absence of DO). About 22 sewers, each having several sub-sewers empty their contents (a total of 3452 MLD) into the river and this accounts 80% of the pollution load, six of these drains (Najafgarh, Shahdara, Savita Vihar, Maharani Bagh, Barapulla and Sen Nurseries Home drains) contribute 90% of the flow and 80% of BOD levels. The total waste water generated is about 3800 MLD, but the treatment capacity is only 2460 MLD and the capacity for carrying waste water to STPs is only 1556 MLD. Besides domestic sewage, industrial effluents (180 MLD) form planned and unplanned industrial areas also contribute

to the pollution load of the river. The solid waste is also dumped into water. For example, the following Table gives the extent of solid waste dumped into the river.

Table 8: Solid waste dumped over 1 month (September 2009) from one of the 9 bridges (Source: Agrawal & Krause, 2013)

Items	Number of Sacks	Amount
Polybag	22	180 kg
Paper	18	220 kg
Cloth	7	80 kg
Glass	1	30 kg
Paintings	5	300 pieces
Idols	10	250 pieces
Earthen pots	Pieces	5 kg
Organic waste	50	1000 kg

Besides solid waste dumping, agricultural residues, fertilizers and pesticides form agriculture and wading cattle farming are also contributed to the pollution. Clothes washing, cattle --- and bathing and open defecation by large population residing in river catchment also contributes to rive pollution.

(ii) The status of the water quality in the downstream of Wazirabad barrage is as follows:

(a) no lean season flow in the downstream of Wazirabad barrage, (b) 22 major drains discharge their collective load in Yamuna river, (c) BOD levels are over 50 mg/l, (d) presence of unacceptable levels of coliform density, nitrates and phosphates, (e) absence of DO, and (f) presence of molecules originating from pharmaceutical and related industries.

The Delhi Jal Board and the Central Pollution Control Board appraised the status of pollution in the river Yamuna and the mitigative measures followed to reduce the pollution load to a level that allow the functioning of aquatic ecosystem. The Report of the High Powered Committee on Yamuna River Development also reviewed the extent of pollution of the river and the efforts made to clean the river. The significant observations made are summarized below:

(iii) Inspite of the constitution of a number of Committees, court orders passed and Action Plans prepared and implemented, no improvement in the quality of water and poor flows in the urban stretch was observed. These aspects have been excellently summarized by Manoj Misra (2013). The Report of High Powered Committee (2010) summarised the actions plans proposed and implemented for addressing the issues of minimum ecological flows and pollution abatement in the river. Yamuna.

(a) The basic requirement is the environmental (ecological) flow of fresh water in the downstream of Wazirabad reservoir during lean period. Since there was no release of Delhi's share of water from Hathnikund for drinking purpose in spite of agreements (MoU) among river basin States, the SC passed an order on 09 February 1996 - "*We order and direct that Delhi shall continue to get as much water for domestic use from Haryana through river Yamuna which can be consumed and filled in the two water reservoirs and treatment plants at Wazirabad and Hyderpur-----.*" "*----we, therefore, close the proceedings by requiring Haryana to make available the aforesaid quantity of water to Delhi throughout the year. Let it be made clear that any violation of this direction would be viewed seriously and the guilty persons would be dealt with appropriately. This order of ours would bind, not only the parties to this proceedings but also the upper Yamuna River Board.*" The MoU was signed among basin States of U.P., Haryana, Rajasthan, Himachal Pradesh and NCT of Delhi for sharing of surface flow of Yamuna waters in May 1994 for total allocation of 0.724 BCH (0.58 in July-October, 0.068 in November-February and 0.076 in March-June). The MoU also stressed the need for upper storage. An upper Yamuna River Board was constituted for monitoring and regulate the available flows so that the basin states get their allocated share. This Board is under the control of upper Yamuna River Committee.

A MoU was also signed by basin States except for Rajasthan for the construction of upper storage facilities - (i) Renuka dam across the river Giri in Himachal Pradesh, (ii) Kishau dam across Tons river in Uttarakhand and Lakhwar Vyasi across Yamuna in Uttarakhand. Because of the refusal of Rajasthan to sign the above MoU, these storage facilities did not come up.

(b) In response to I.A. writ petition No. 537 of 1992 filed by Commander S.D. Sinha & others vs Union of India & others, in the matter of release of minimum flow into river Yamuna by upper riparian states, the SC ordered that the High Powered Committee constituted by the River Conservation Directorate (NRCD) of the Ministry of Environment & Forests should

determine the minimum flow in river Yamuna and also to determine the respective shares of the riparian states for release of further fresh water in river Yamuna so as to maintain the minimum flow. Accordingly, the High Powered Committee met on 25 May 1999, wherein it was agreed by the basin states to release their share of minimum flow (10 cusec) into the river Yamuna downstream of Wazirabad. NRCD is the nodal agency to advice and monitor the release of minimum flow in the rivers and release of the same by concerned states/agencies.

Inspite of the above orders by SC and signing of MoU by basin States, there is no flow in the downstream of Wazirabad during lean season

(c) The SC also passed an order on 4 August 2004 in the matter of 'And Quite Flows the Maily Yamuna' in the case of CWP No. 725/1994, for setting up a High Powered Committee, to suggest an action plan for river Yamuna, under the Secretary, Ministry of Water Resources, Government of India. The Committee made recommendations and these were incorporated in MPD 2021. Some of the recommendations included in MPD 2021 are:

(i) minimum flow in river Yamuna to be ensured by upper riparian States, (ii) Refurbishment of trunk sewerage system, (iii) rehabilitation of major trunk sewers which are dilapidated, (iv) untreated sewage that enters into Najafgarh and Shahdara drains should be treated before releasing into major drains by laying internal sewerage system or installation of decentralized treatment plants, (v) laying of sewer lines in the unsewered areas of Delhi, (vi) treatment of industrial effluent through common effluent treatment plants, (vii) utilization of treated waste water, (viii) removal of coliform at STP, and (ix) environmental studies of the existing major drains should be conducted before their covering.

The SC also took note of the Report published by the Government of NCT of Delhi on the interceptor sewer concept as a solution to clean Yamuna, and constituted an Expert Committee to examine the feasibility of implementing the interceptor sewer system; the Committee recommended for its implementation. Presently the Delhi Jal Board has been implementing the interceptor sewer system.

(d) The MoEF has also taken action to clean the river by initiating Yamuna Action Plan I (YAP) with the special assistance from Japan Bank for international Corporation (JBIC). In these programmes the emphasis was the construction of drain interceptors, diversion of sewer lines, sewage pumping stations and sewage treatments among Delhi, Haryana and UP, with

NRCD is the executing agency. In Yamuna Action Plan II was also implemented to have a visible and tangible impact on the immediate improvement of water quality, formulation of Master Plan for sewerage in Delhi and project preparation for YAP III. The NCT of Delhi also undertook some projects on the abatement of pollution in the river Yamuna through installation of CETPs.

The impacts of these projects undertaken so far are minimal on the quality of water in the river Yamuna.

(e) The Parliamentary Standing Committee (219th Report of 13 December 2010) writes "The Committee notes that the actions have been initiated to augment the lean season flow in the river Yamuna and is of the view that such actions would not have much impact unless and until it is pursued in a time bound manner. The Committee opinions that the Ministry should fix time frame for carrying out the measures recommended by the High Powered Committee for Yamuna river development and would like to see better implementation and --------".

The High Powered Committee (2010) simply reviewed the status of different schemes proposed but suggested some institutional mechanisms for implementation of the recommendation made by different Authorities and Court orders.

(f) On the on-going case relating to 'Maily Yamuna' the SC also appointed a committee, under the Chairmanship of the Secretary, Ministry of Environment & Forests (MoEF), Government of India, to look into 'Maily Yamuna' matter. The committee appointed a technical subgroup with Member Secretary of CPCB as the convener. The subgroup requested the IIT Roorkee and IIT Delhi to provide solutions to clean the water of Yamuna in the downstream stretch of Wazirabad reservoir up to Okhla. A proposal has already been submitted to CPCB by both the IITs for feasibility studies.

Based on the above analyses, the following are suggestions of the Committee:

(i) Enhanced flows of fresh water into NCT of Delhi stretch of the river Yamuna must be ensured to sustain the ecological functions of riparian ecosystem downstream of Wazirabad.

(ii) Preparation of a complete Sewerage Master Plan 2031 for both sewered and unsewered areas

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FIGURES

Figure 1: Confluence of Najafgarh drain with the river Yamuna (A), Surghat area (B) and water course of the river (C) just after Wazirabad barrage, solid waste dump (D), and widening and concretization of spurs at Sarita Vihar

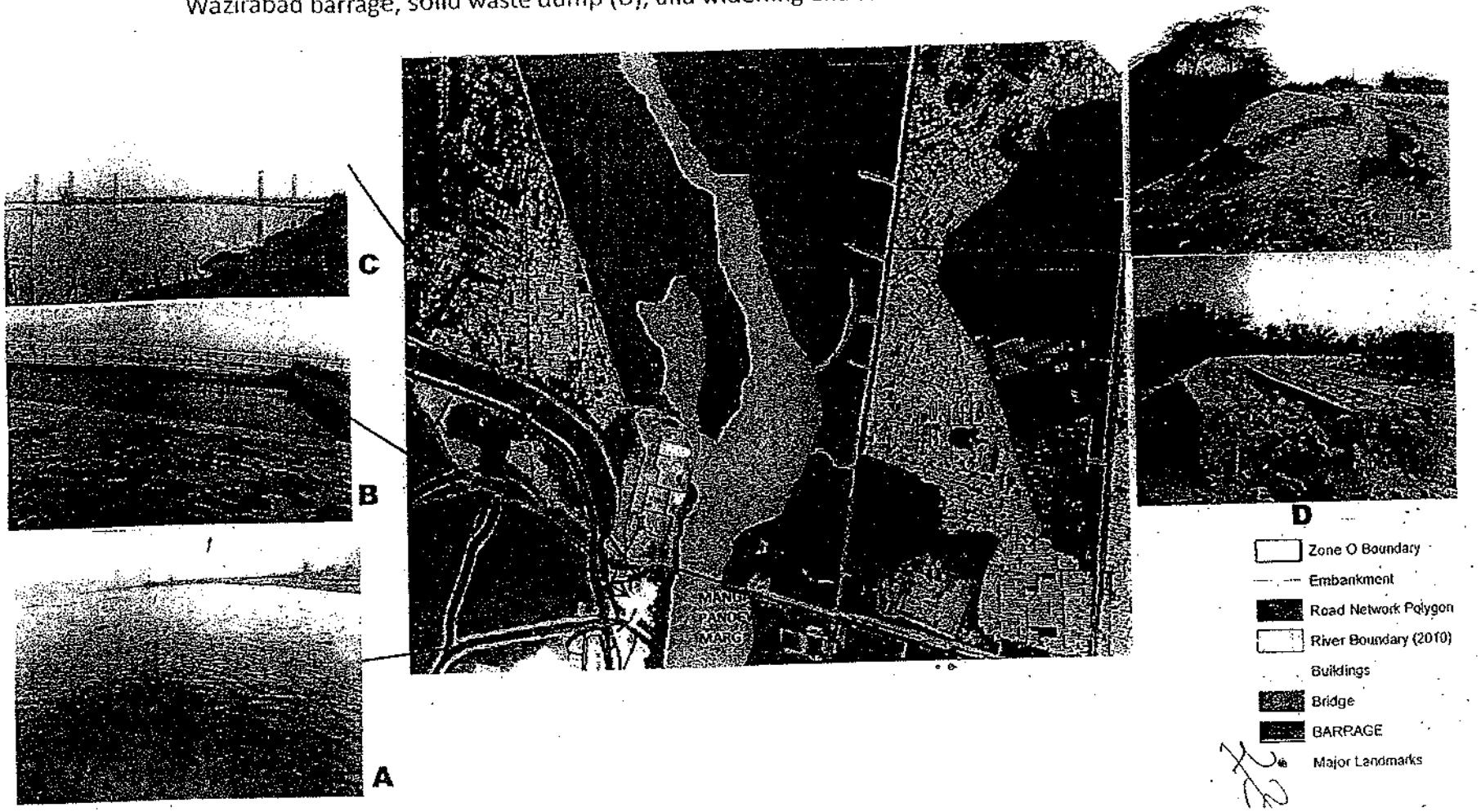

FIGURE 2: Garbage and waste dumps used to reclaim the marshes (A) and water bodies (B) along the Pusta road

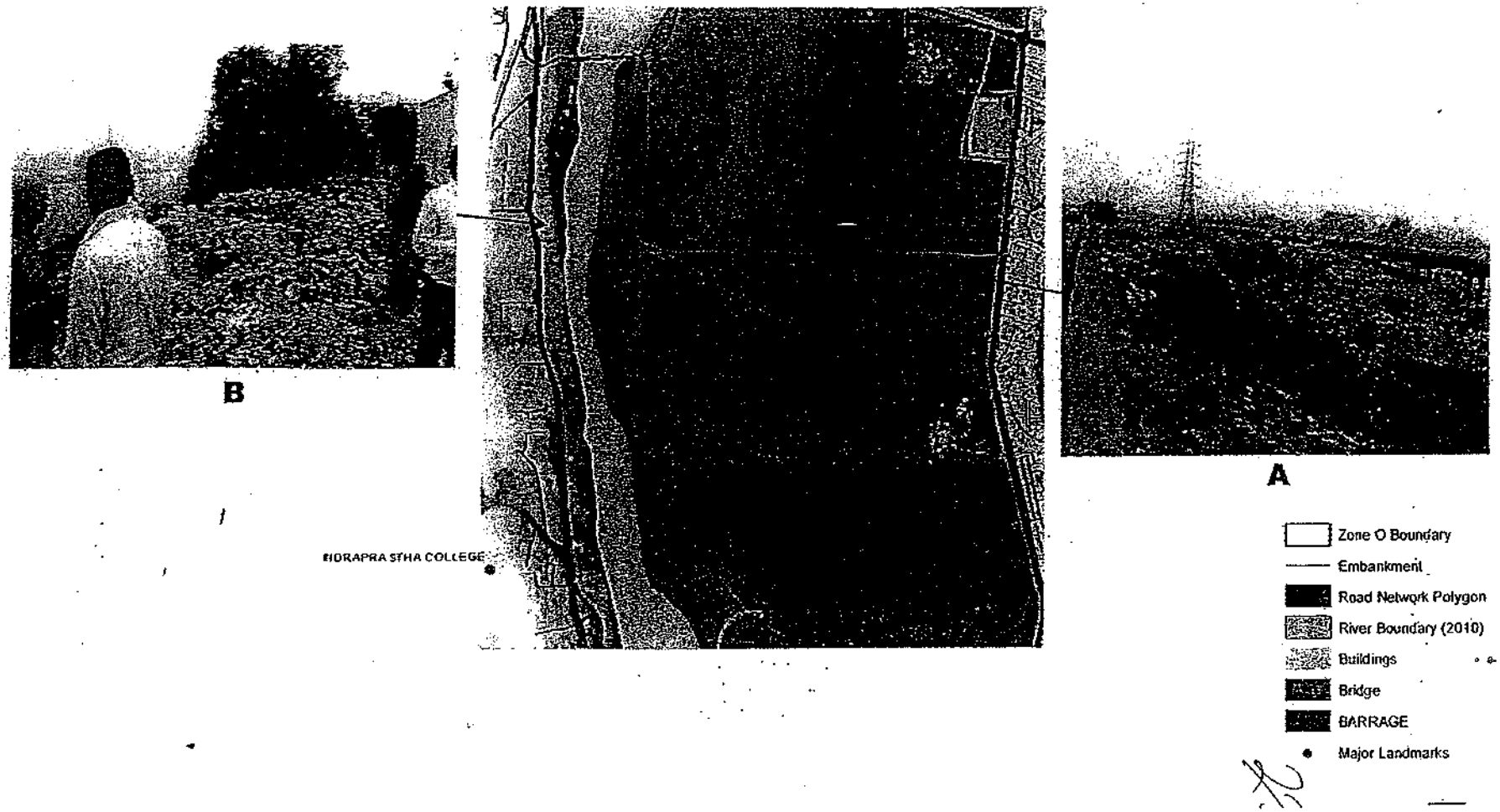

Figure 3: Filled up area in the river bed at Qudesia Ghat

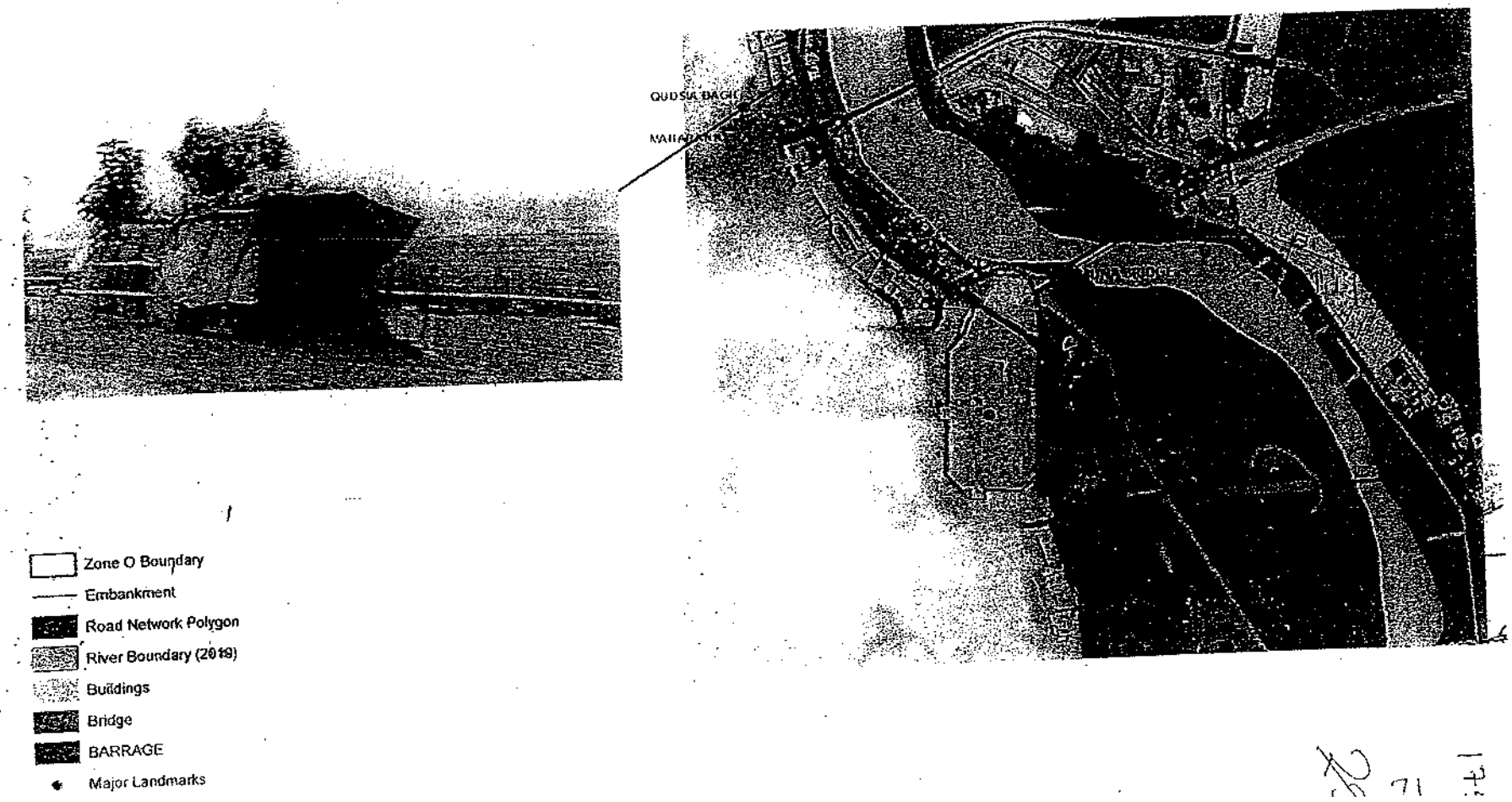

Figure 3A: Widening of roads on to the flood plains (A) using relocated solid waste dumps at Pusta road and paved car parking of Akshardham on the flood plain (B)

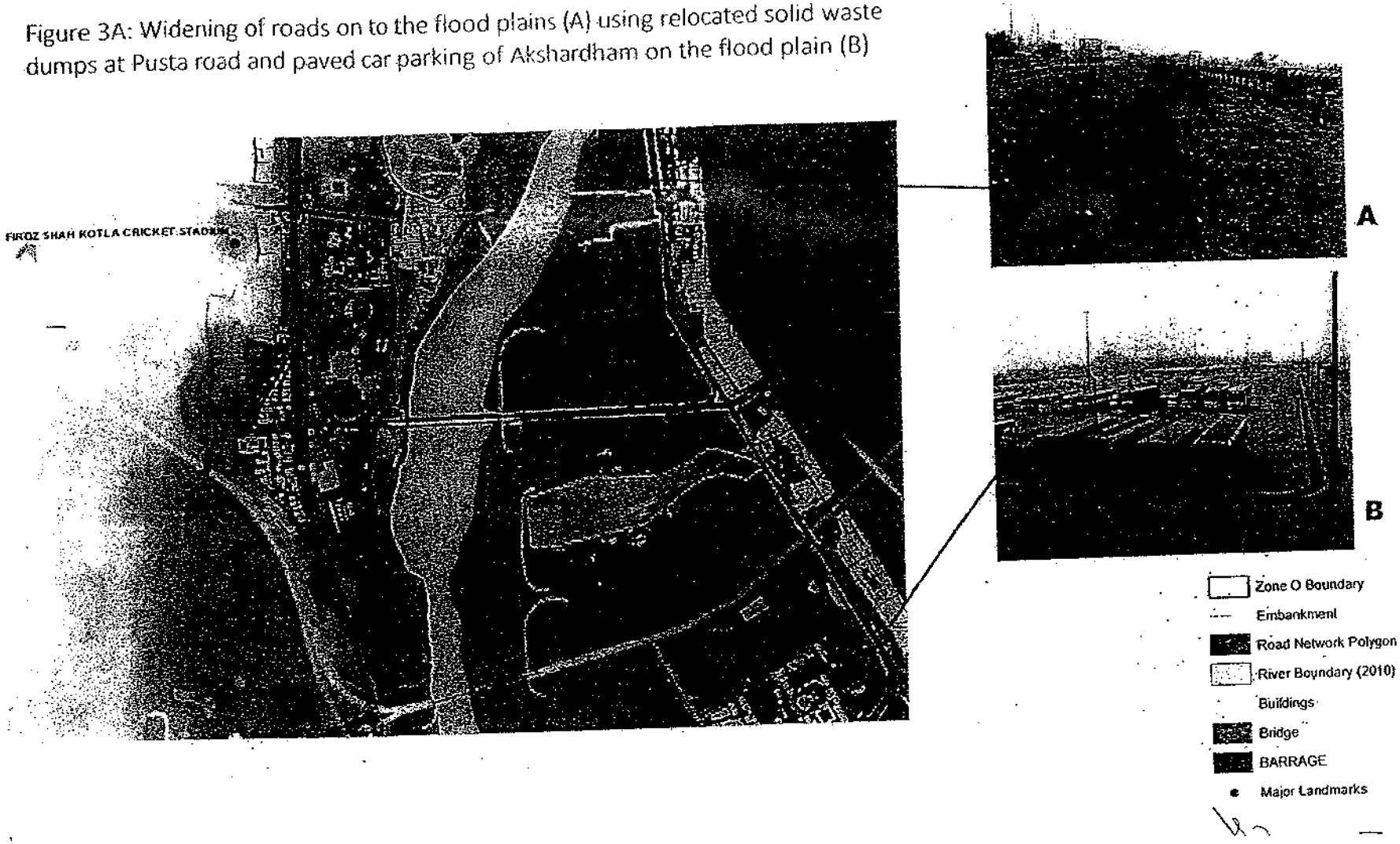

Figure 3B: Nursery and encroachment on the flood plain (A) and road construction on the narrow strip of flood plain to separate Millenium Bus Depot

Zone O Boundary
Embankment
Road Network Polygon
River Boundary (2010)
Buildings
Bridge

Figure 4: Encroachment of floodplain at DND flyover

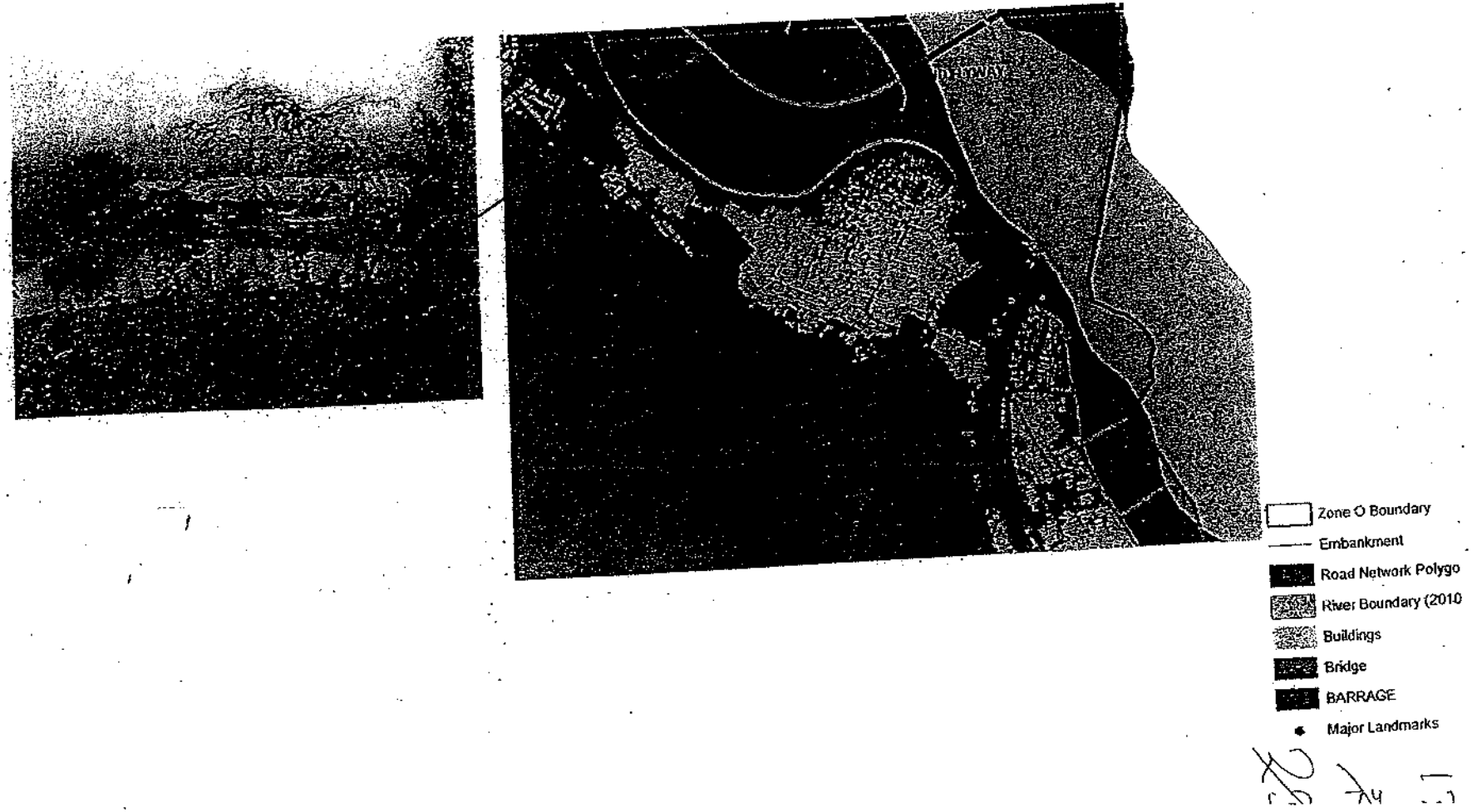

Figure 4A: Solid waste material used for construction of roads to the temple across the flood plain (A) and solid waste used for reclamation of flood plain for temple and DMRC unit (B)

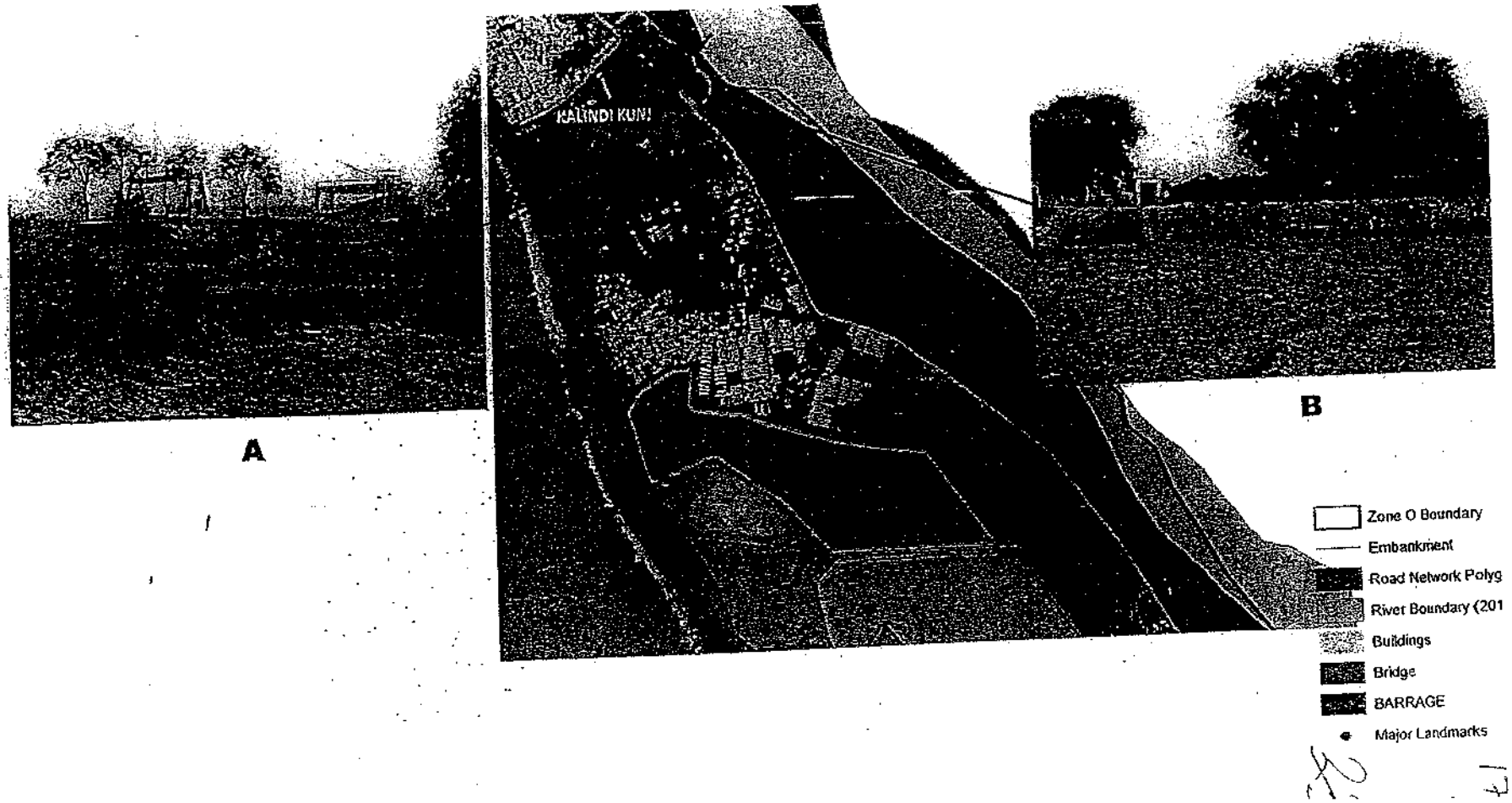

Figure 5: On going construction activity and dumping of solid waste on the active flood plains at Jaitpur

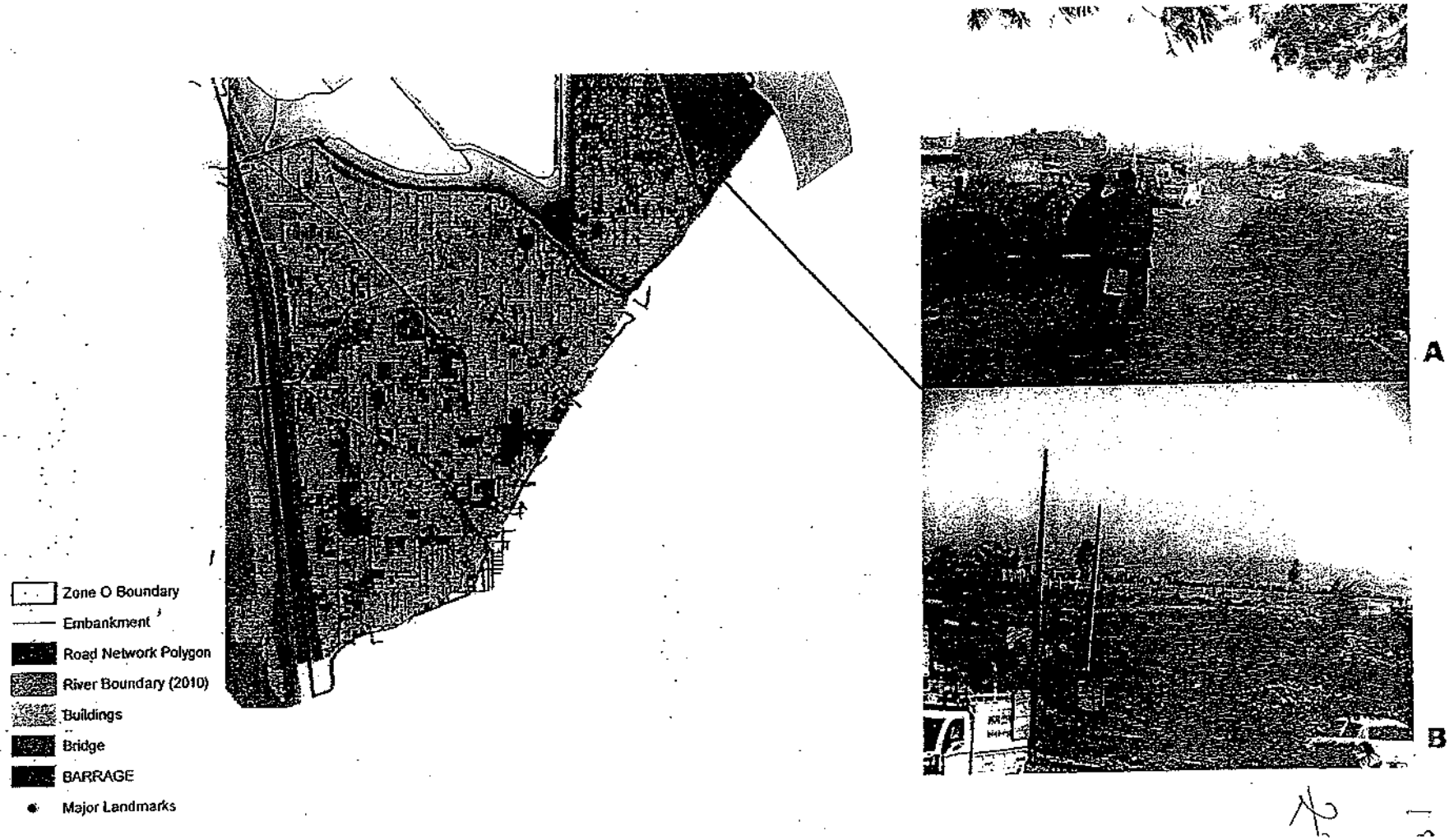

Figure 6: Yamuna in 1893 with O-Zone boundaries (2010) and Encroachment in 2012

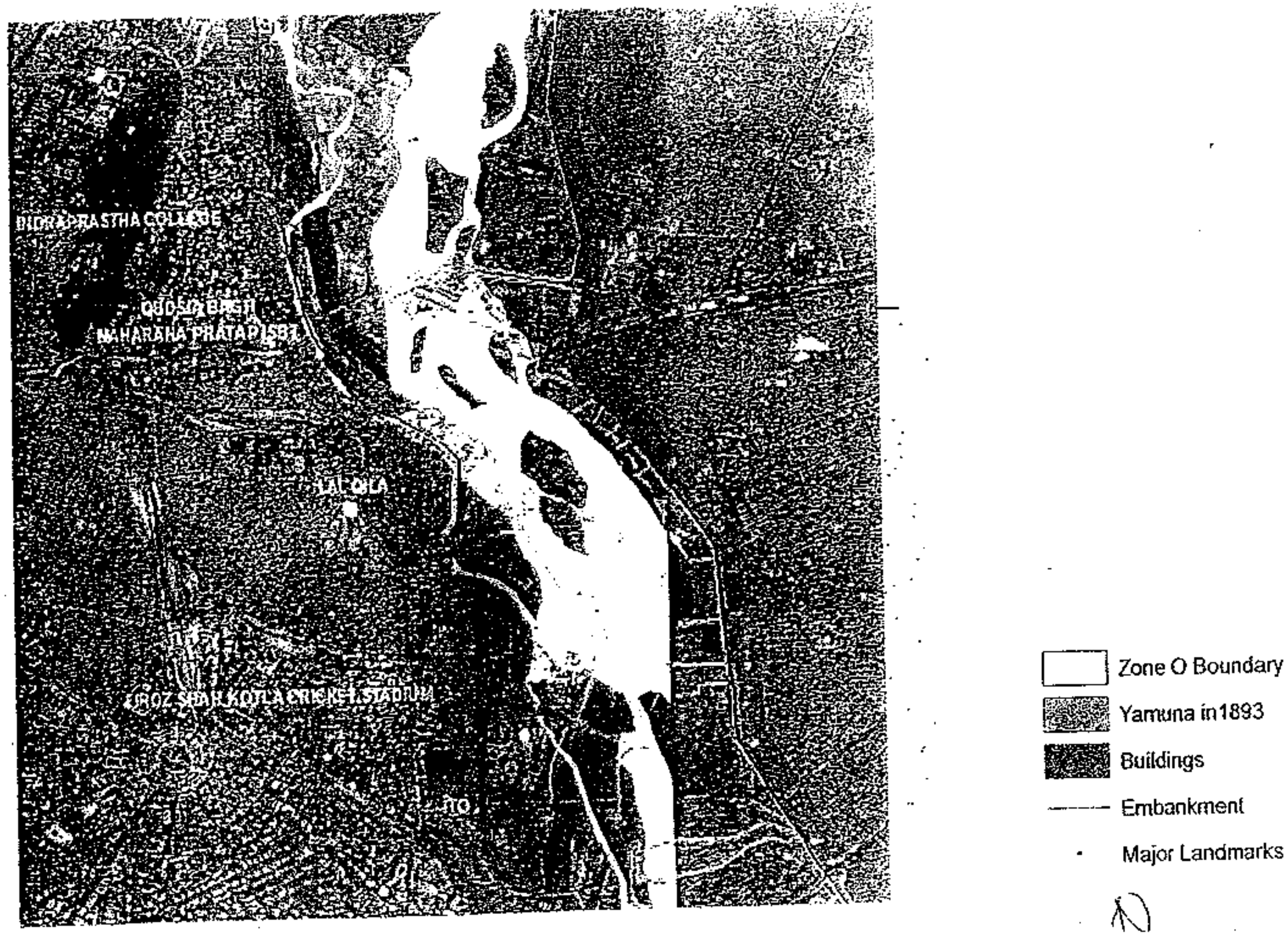

FIGURE 7: Yamuna Stretch with O-Zone and Embankments

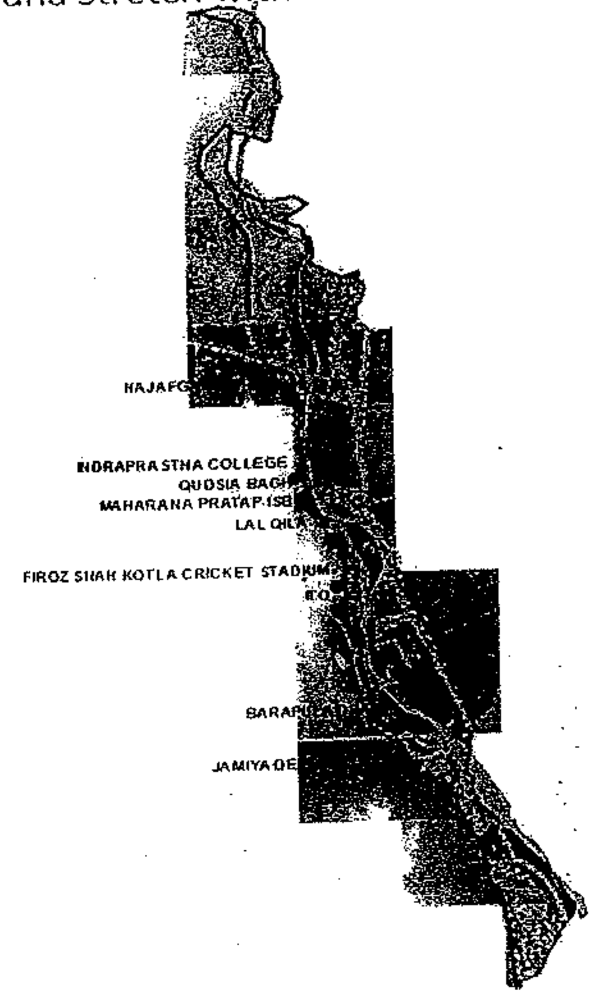

Figure 8: Land Use Land Cover Of Yamuna River Flood plain of NCT of Delhi and UP portion

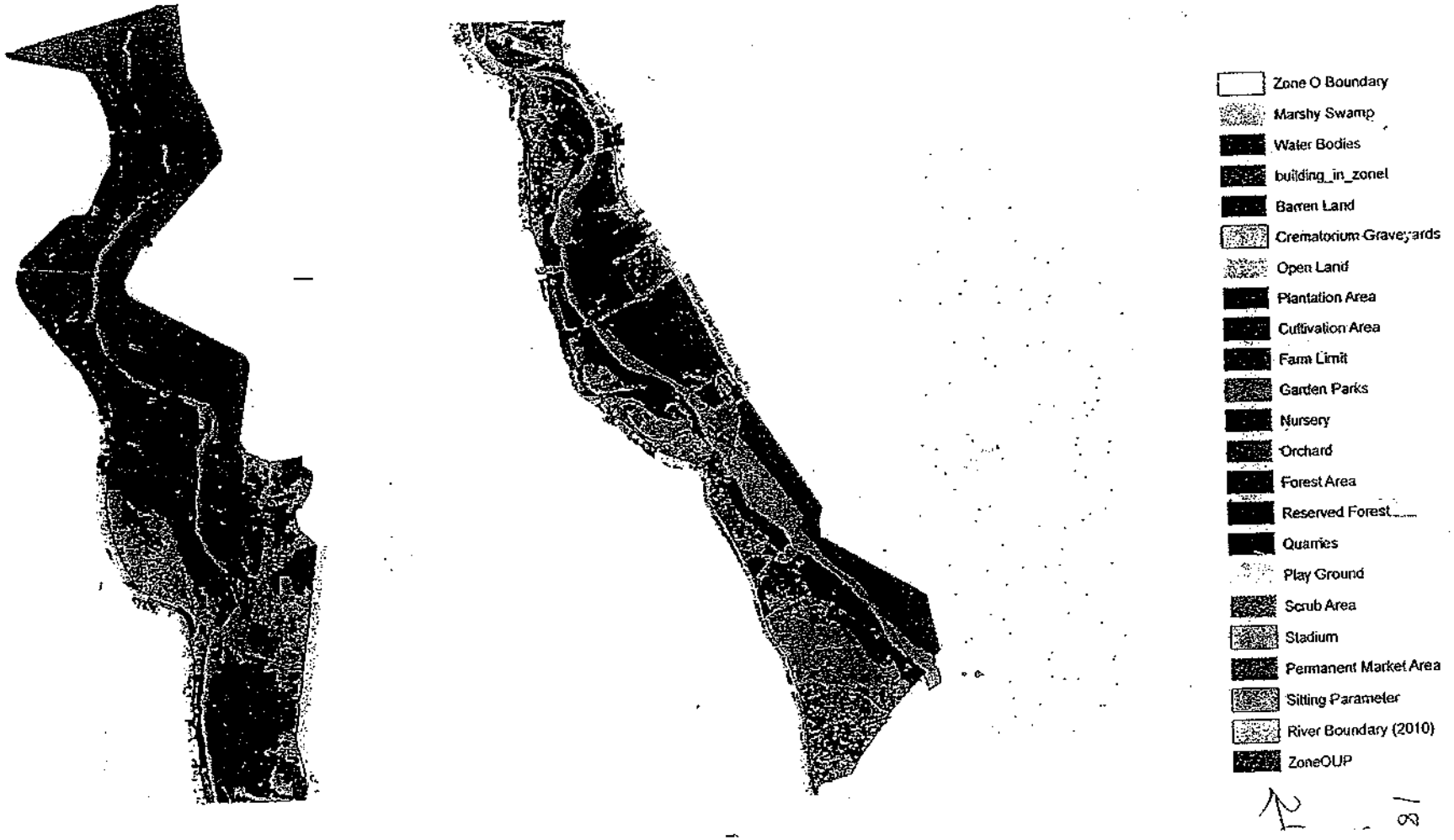

FIGURE 9: Map showing O-Zone and subzones

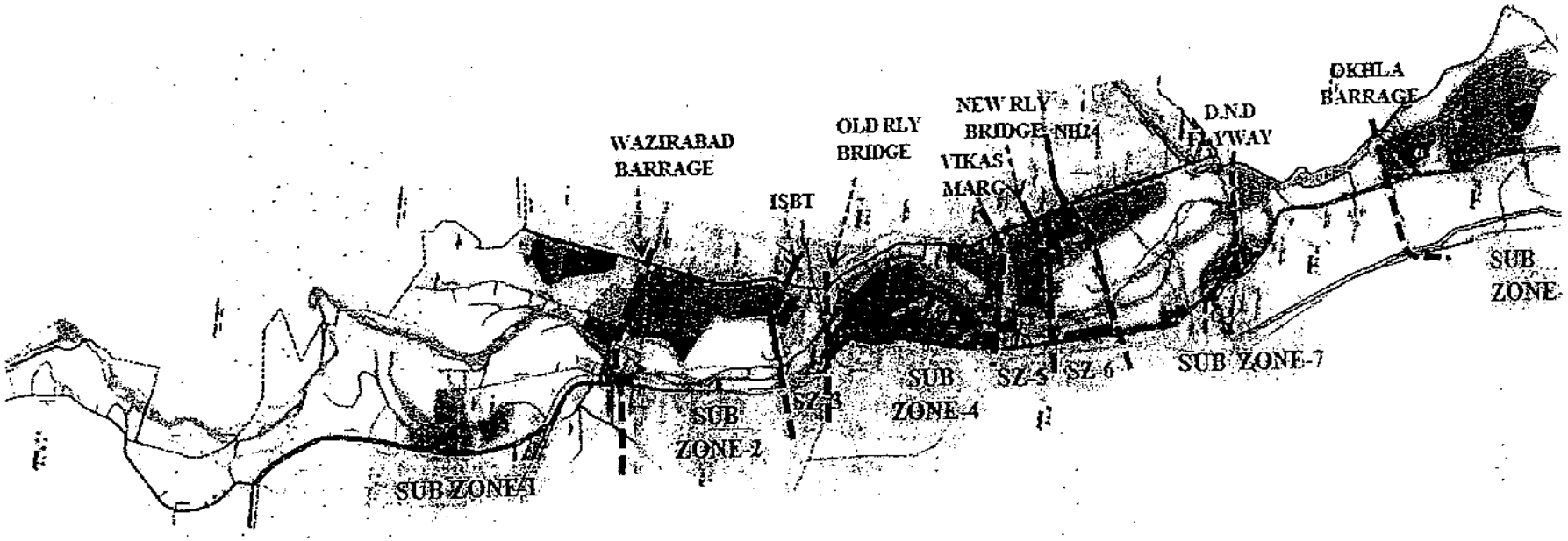

Figure 10
Subzone I: UP Border - Wazirabad Barrage

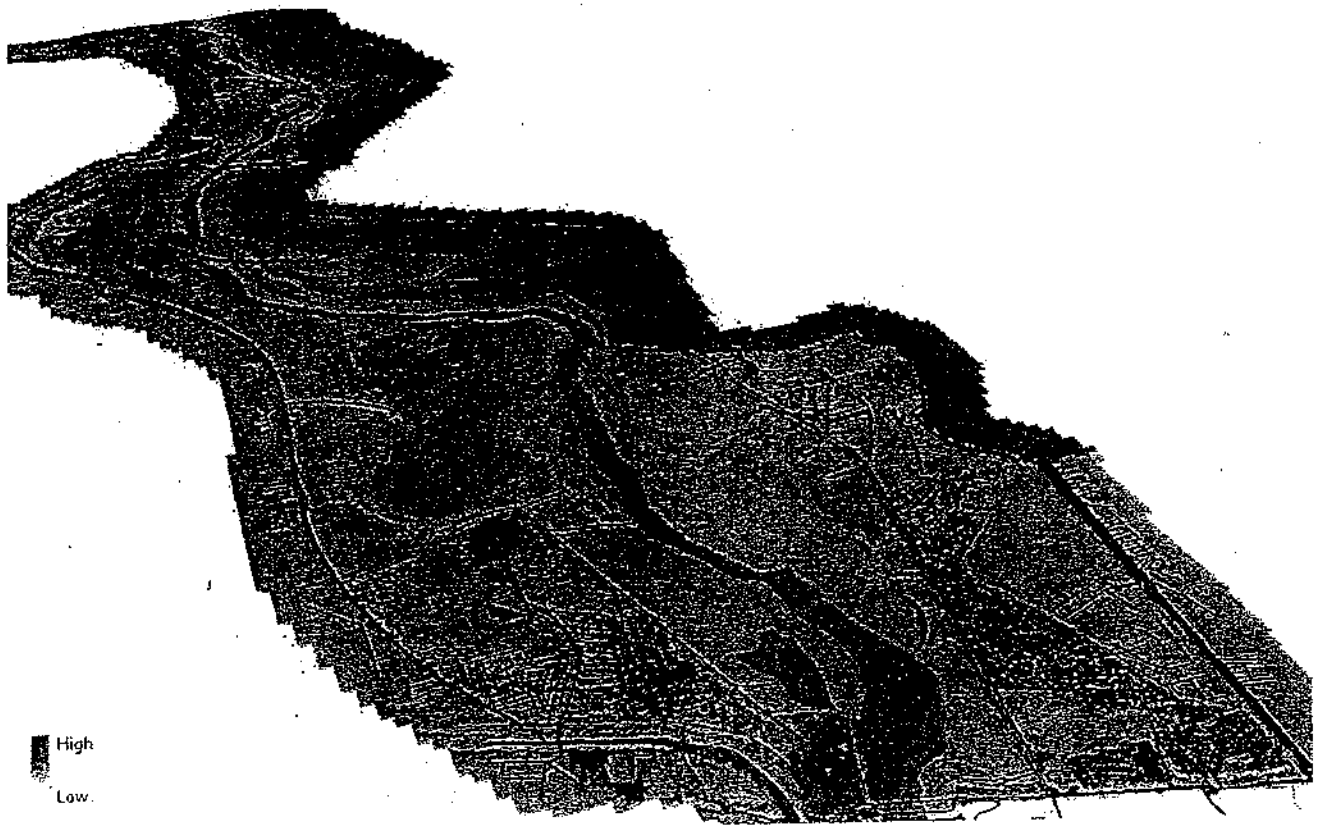

Figure11
Subzone II: Wazirabad Barrage- ISBT Bridge

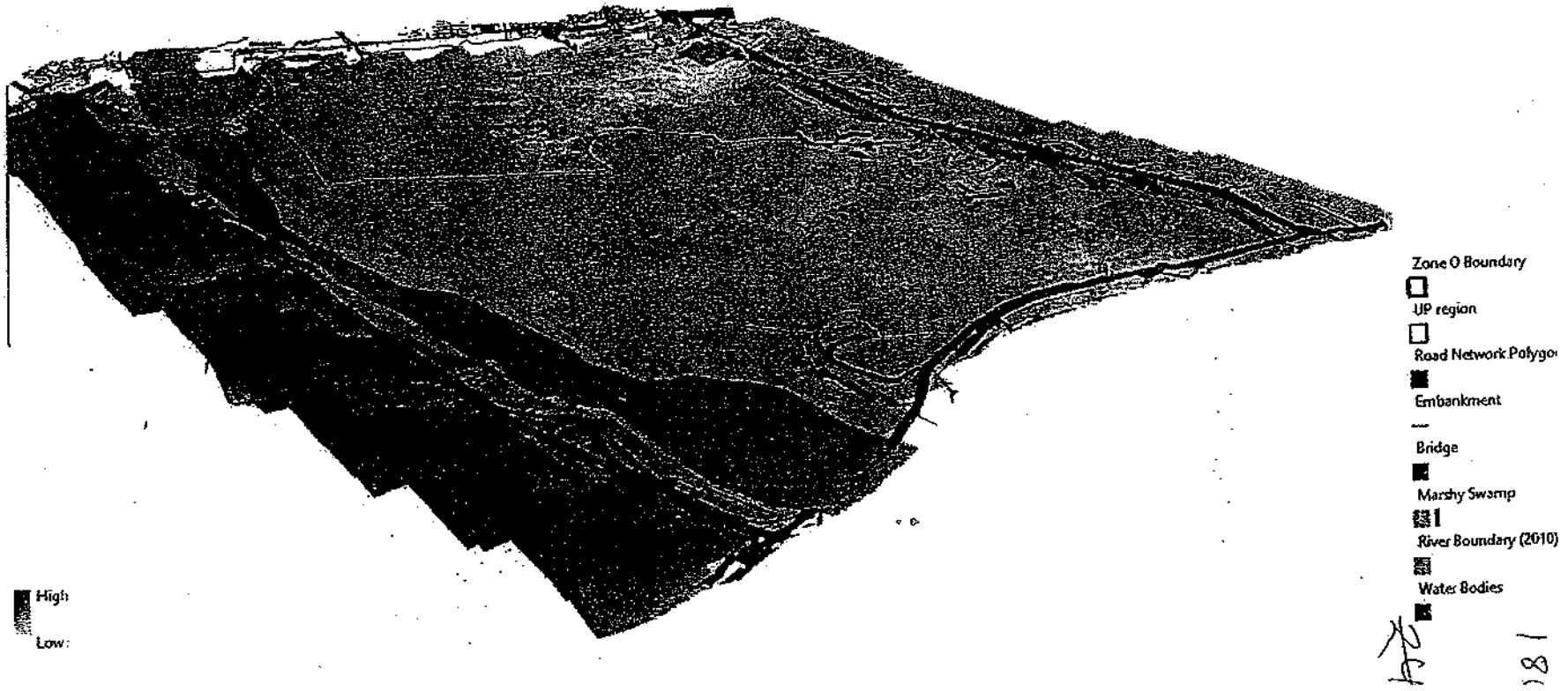

Figure 12
Subzone III: ISBT Bridge - Old Rly Bridge

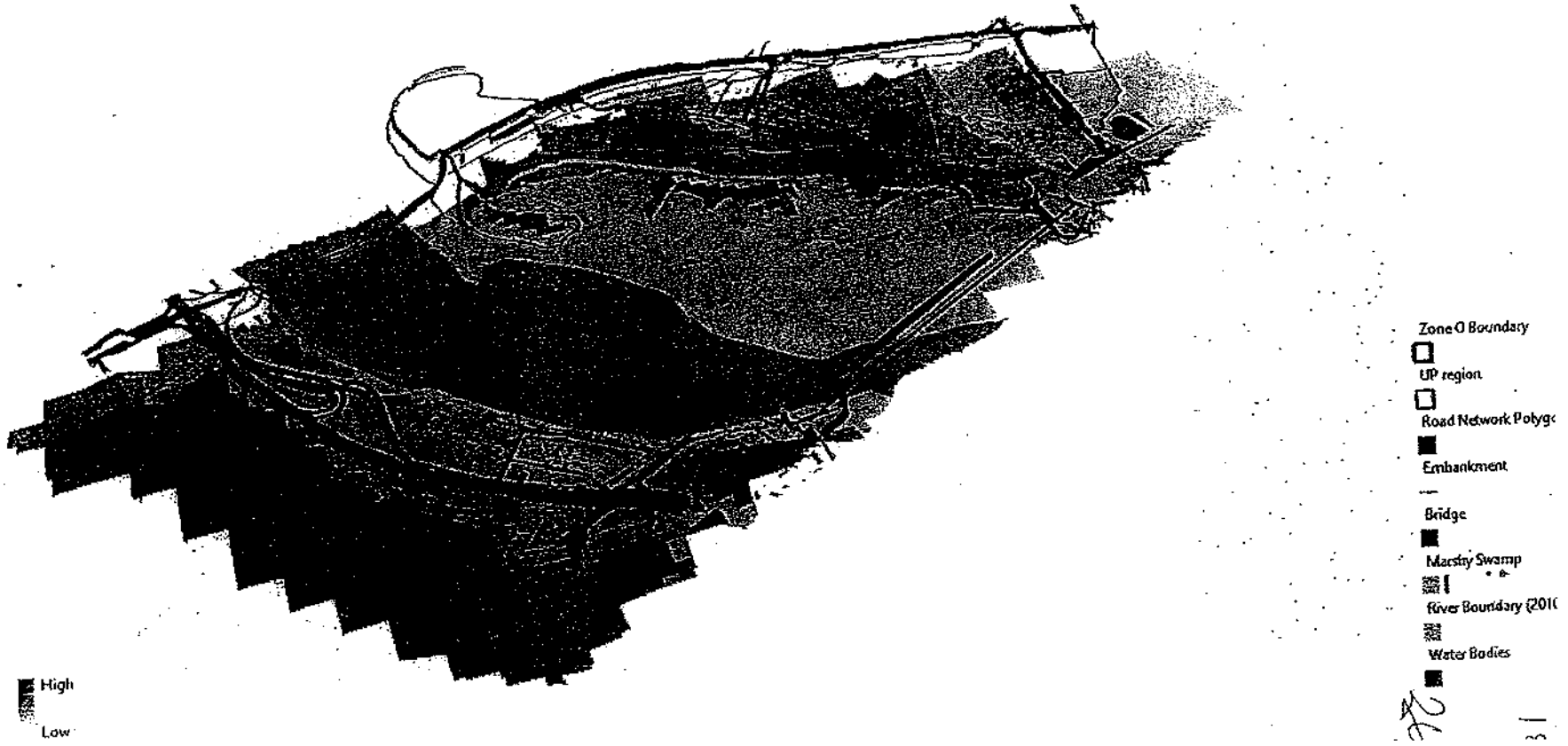

Figure 13
Subzone IV: Old Rly Bridge - I.P. Barrage

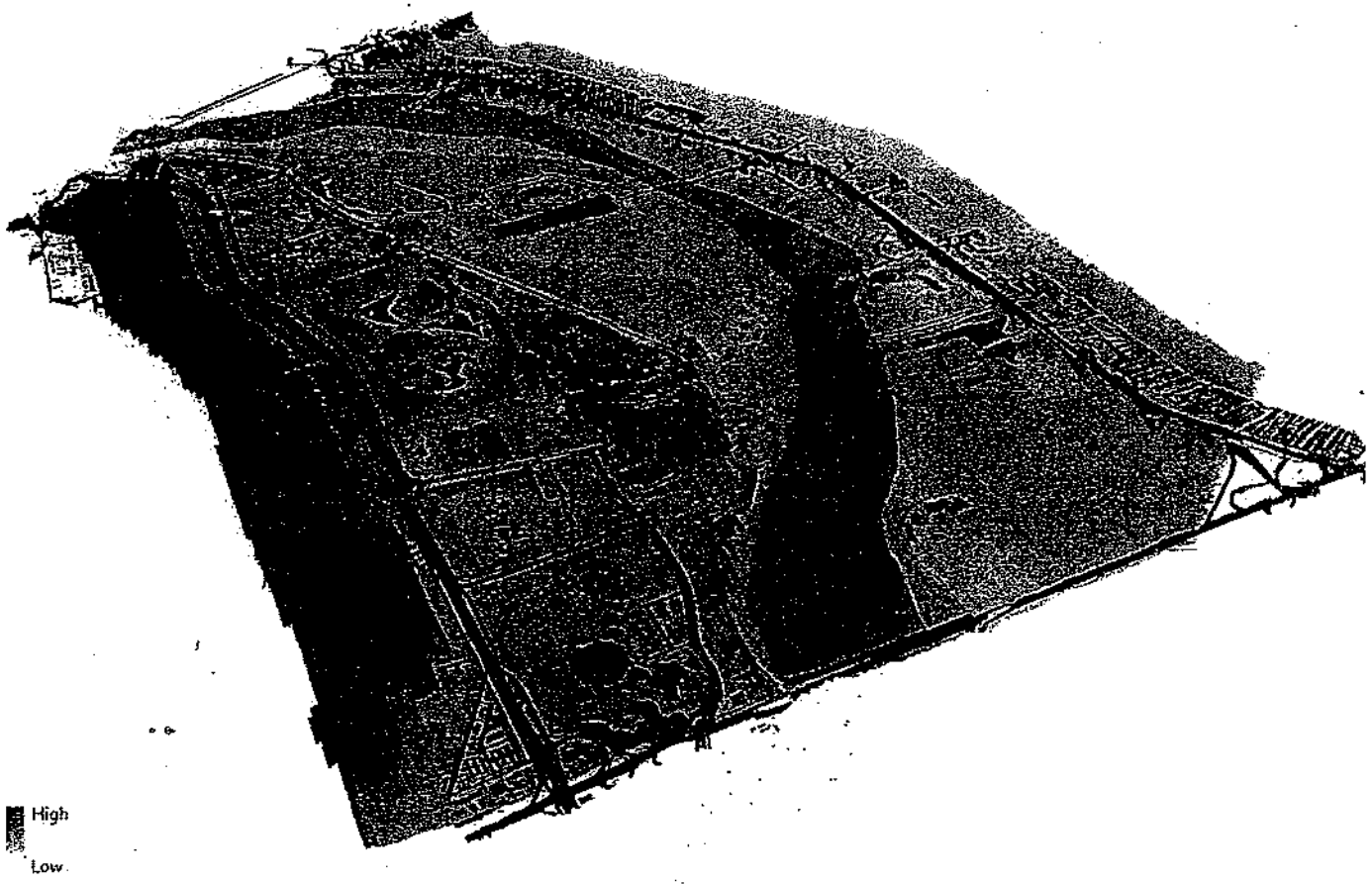

Figure 14
Subzone V: I.P. Barrage - New Rly Bridge

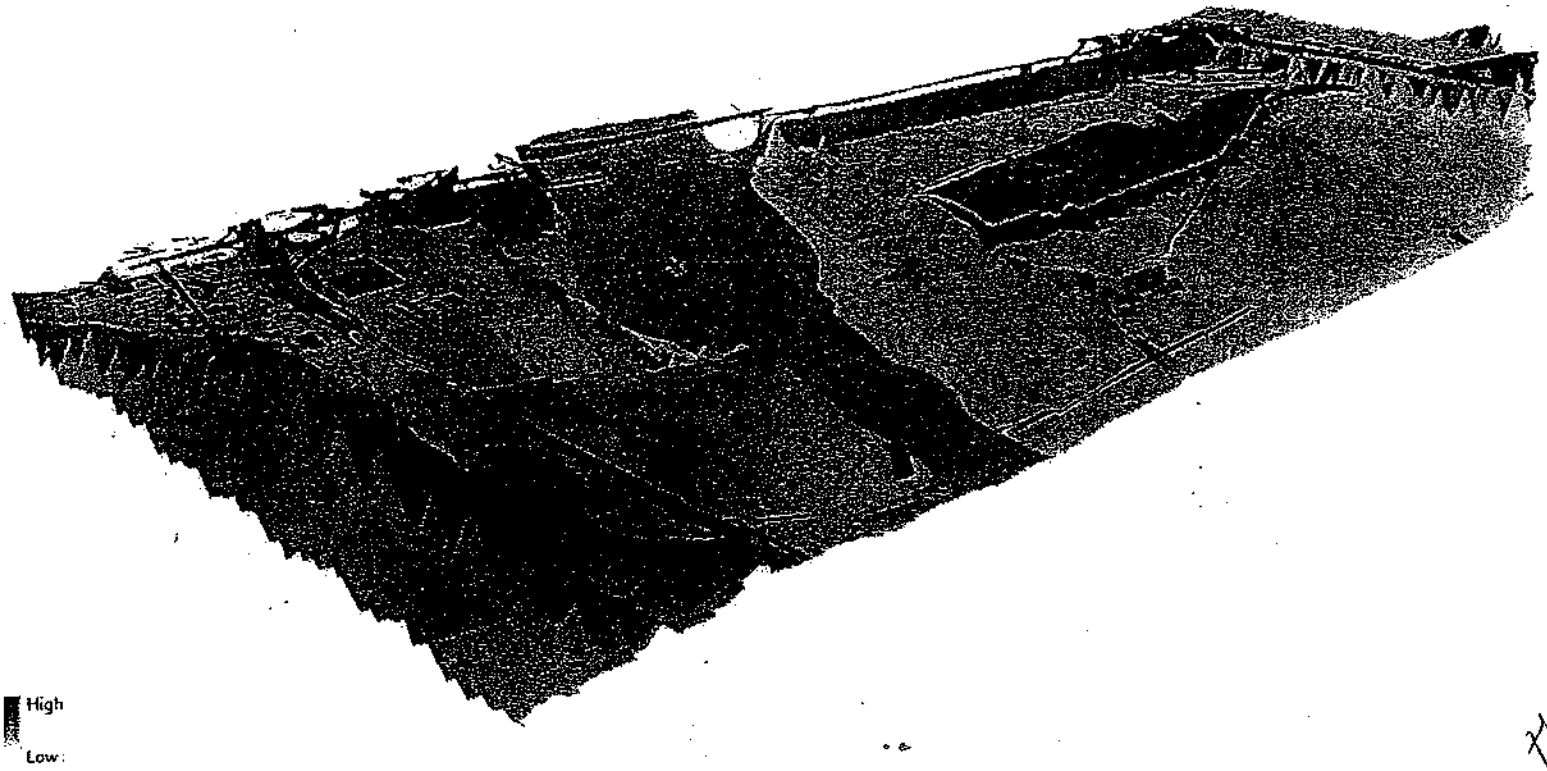

Figure 15
Subzone VI: New Rly Bridge - NH 24 Bridge

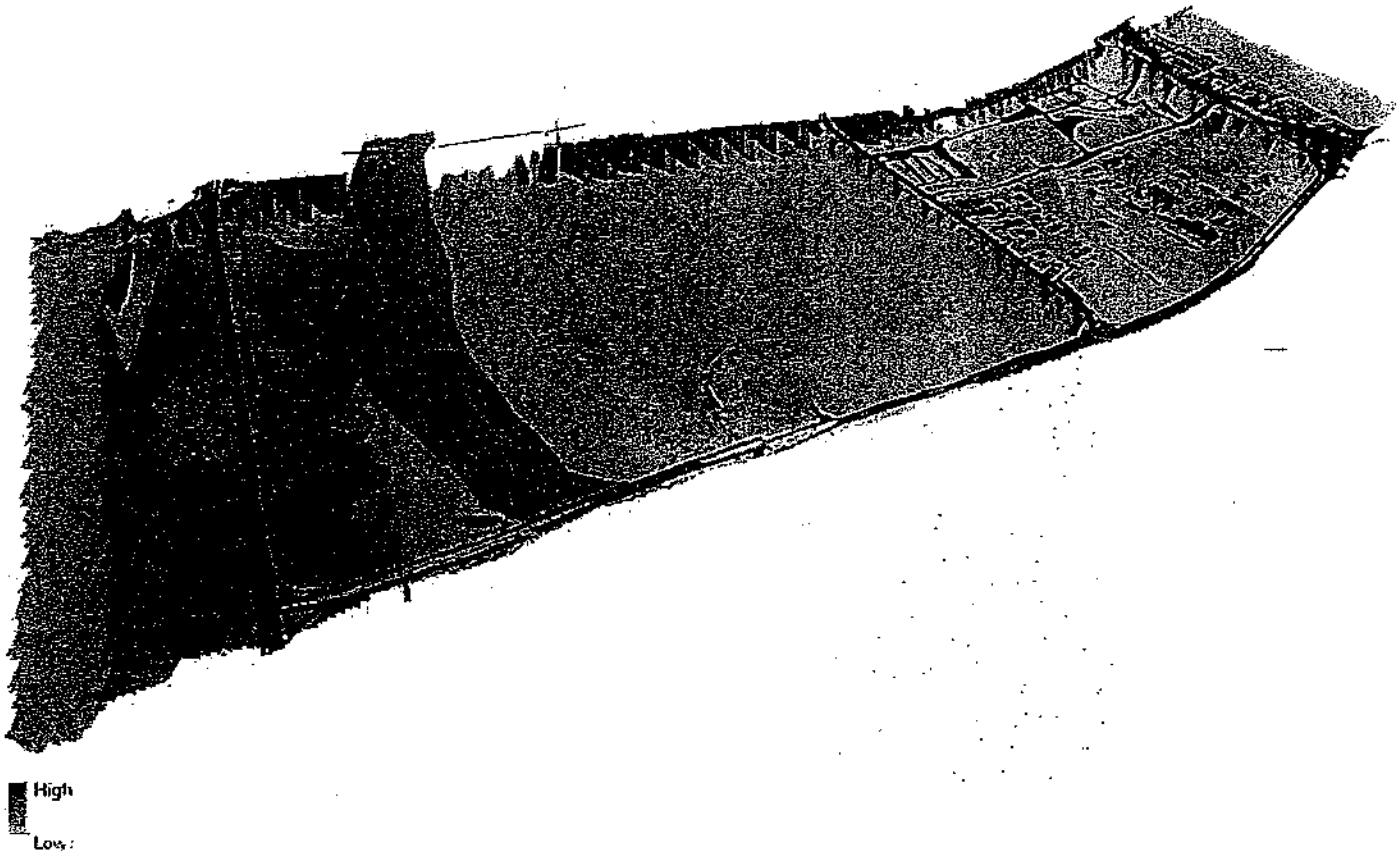

Figure 16
Subzone VII: NH24 Bridge - Okhala Barrage

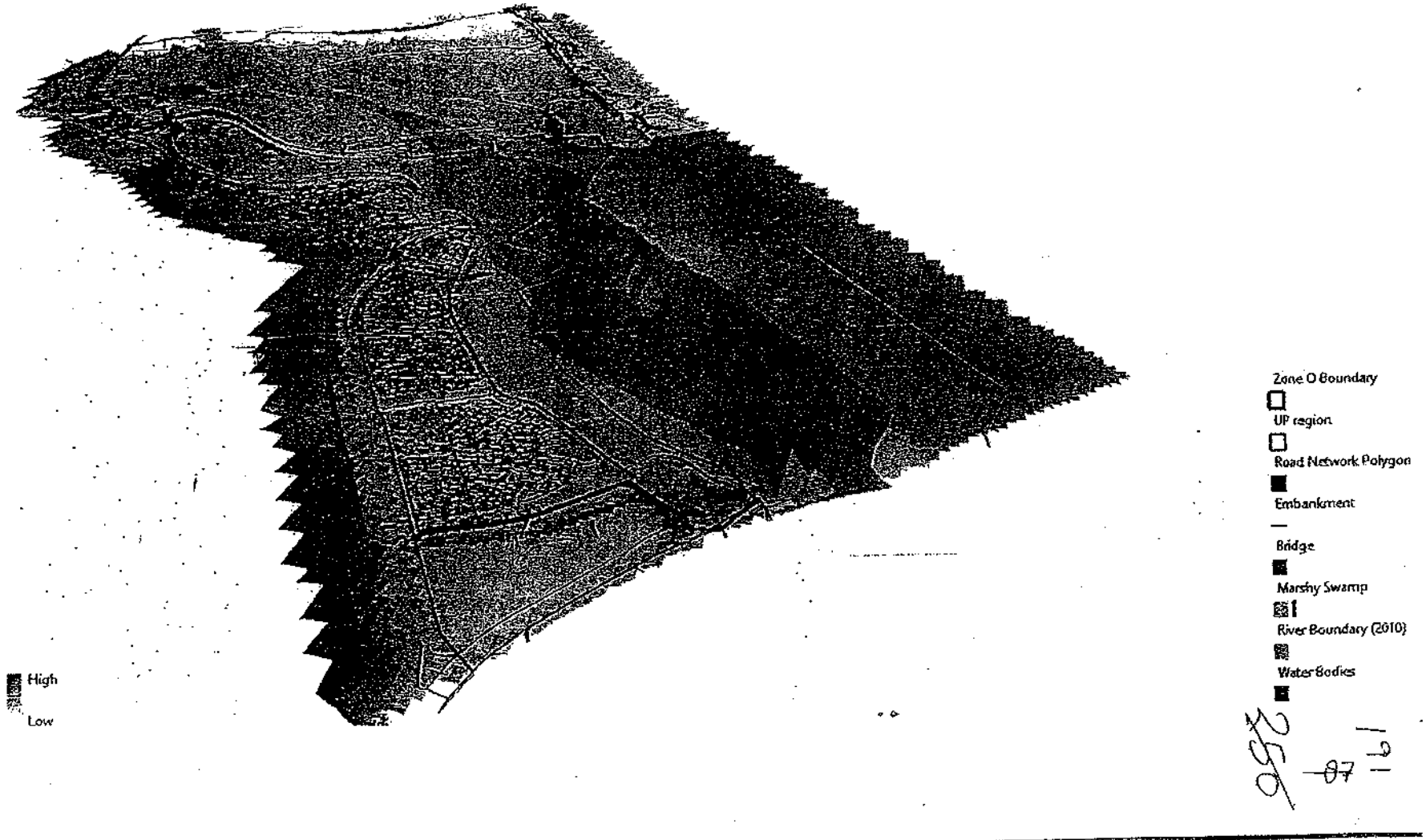

Figure 17
Subzone VIII: Okhala Barrage- Haryana Border

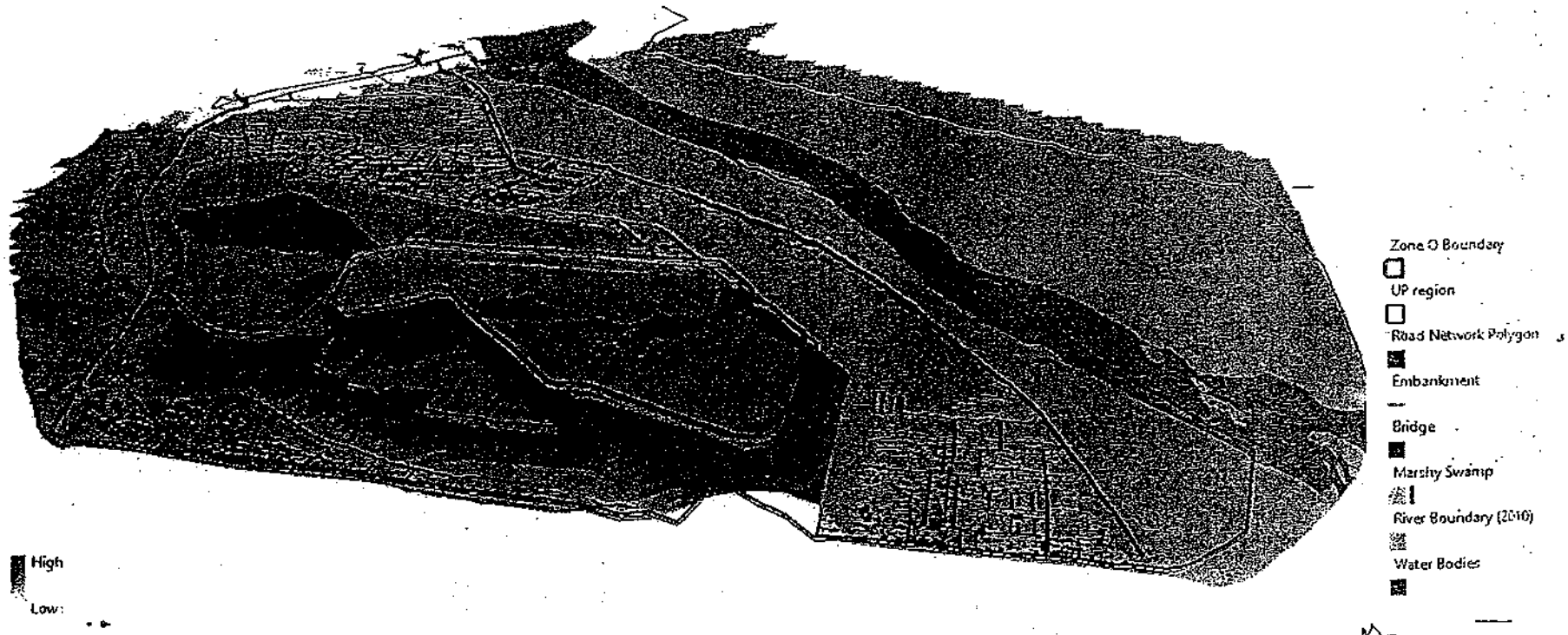

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FIGURE 18: Area inundation derived using observed water levels for the respective floods

Flood 1978 (30 years)

Flood 1991 (Lowest)

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89
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FIGURE 19: Area inundation derived using observed water levels for the respective floods

Flood 2003 (25 years)

Flood 2004 (10 years)

ANNEXURES

ANNEXURE-1

Most Urgent
Court Matter

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K-13011/2/2013-NRCD
Government of India
Ministry of Environment and Forests
National River Conservation Directorate

Paryavaran Bhawan
CGO Complex, Lodhi Road,
New Delhi-110003

Dated: 13th September, 2013

Office Order

Subject: Constitution of an Expert Committee to examine and analyse the Yamuna River Front Development Project of DDA.

1. In the ongoing Application No. 06 of 2012 before the Hon'ble National Green Tribunal (NGT), a Committee has been constituted under the chairmanship of Secretary, Ministry of Environment and Forests in connection with development/beautification of the banks of river Yamuna and removal of debris along the river banks by the concerned agencies.

2. For beautification and development of the banks of river Yamuna, DDA has formulated a Yamuna Riverfront Development Plan which aims to conserve, protect & restore biodiversity of Yamuna and integrate it with public recreation spaces that the city needs. The Plan of DDA also includes the area under the control of UP Irrigation Department.

3. In this context, it has been decided to constitute an Expert Committee with the following composition and Terms of Reference:

(i) Prof. C.R.Babu, Retd. from, University of Delhi- Chairman.
(ii) Prof. Brij Gopal, Retd. from, JNU-Member.
(iii) Prof. A.K.Gosain, Serving Prof in IIT Delhi -Member.

4. The Committee shall:-

(i) Critically analyse and examine the Yamuna River Front Development Plan of DDA.
(ii) Suggest steps for further improvement of the Yamuna River Front Development Plan keeping in view the environmental concerns of river Yamuna in the proposed stretch.
(iii) Suggest steps for finalising the Yamuna River Front Development Plan after taking into account the views of all concerned agencies, including the observations of Hon'ble Supreme Court in the matter relating to 'Maily Yamuna' Writ Petition No.725 of 1993.

5. The Committee can also co-opt any other experts as special invitees and also undertake site visits as required.

6. The tenure of the Committee will be for one month from the date of issue of this Order.

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7. The convenor of the Committee will be the Adviser, NRCD in MoEF.
8. The TA/DA and sitting fees for the non official members shall be as per norms.
9. This issues with concurrence of IFD vide diary no. 1491/US (IFD) dated 12-9-2013 and approval of the competent authority.

(S. D. Tiwari)
Under Secretary to Government of India

1. Prof. C. R. Babu, Retd. from Department, University of Delhi- Chairman.
2. Prof. Brij Gopal, Retd. from, JNU-Member.
3. Prof. A. K. Gosain, Serving Prof in IIT Delhi-Member.
4. Chief Secretary, Government of NCT of Delhi.
5. Chief Secretary, Government of UP.
6. Vice Chairman, DDA.
7. Commissioner, East Delhi Municipal Corporation.
8. Commissioner, South Delhi Municipal Corporation.
9. Commissioner, North Delhi Municipal Corporation.
10. Secretary, Department of Environment, Govt. of NCT of Delhi.
11. Secretary, UP Irrigation Department.
12. A. K. Gupta, Chief Engineer, UP Irrigation Department.
13. Managing Director Delhi Metro Rail Corporation.
14. Chairman, CPCB.
15. Member Secretary, CPCB.
16. CEO, Delhi Parks and Garden Society.

Internal Circulation:

1. PPS to Secretary (E&F)
2. PS to Additional Secretary (SS), MoEF.
3. JS (HSMD)/ JS (MS)/Adv (BS)/Adv (RH)/ Dir (SV)/DD (AR).

ANNEXURE-19
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BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Application No. 06 of 2012

Manoj Mishra Vs. Union of India &Ors.

CORAM : HON'BLE MR. JUSTICE SWATANTER KUMAR, CHAIRPERSON
HON'BLE MR. U.D. SALVI, JUDICIAL MEMBER
HON'BLE DR. D. K. AGRAWAL, EXPERT MEMBER
HON'BLE MR. P. S. RAO, EXPERT MEMBER
HON'BLE MR. RANJAN CHATTERJEE, EXPERT MEMBER

Present: Applicant: Mr. Ritwick Dutta, Advocate
Respondent No. 1: Ms. Neelam Rathore, Advocate, Mr. Vikramjeet, Adv. And Ms. Syed Amber, Adv.
Respondent No. 2&5: Mr. Vivek Kumar Tandon, Advocate
Respondent No. 3: Mr. Sangram Patnaik Advocate, Mr. Deepak Kumar, Adv with Ms. Poonam Diwan, Director DDA
Respondent No. 4: Mr. Narender Pal Singh, Advocate
Respondent Nos. 6 & 7: Mr.Ardhendumauli Kumar Prasad, Advocate
Respondent No. 8: Mr. BalenduShekhar, Advocate for East and North MCD
Respondent No. 10: Mr. Tarun Johri, Adv.
Respondent No. 11: Ms. P.L. Gautam, Adv.
Ms. Pinky Anand, Sr. Advocate with Mr. Balendu Shekhar, Adv. for South MCD
Mr. M. Dutta, Adv for CPWD
Local Commissioners : Mr. Aniruddha Deshmukh, Adv. And Mr. Salim Mushtaq, Adv.

Date and Remarks	Orders of the Tribunal
Item No.8 July 17, 2013	The Local Commissioners have filed their respective Reports. Despite specific Orders of the Tribunal and the claim of the Public Authorities, State Government including NCT of Delhi that the Orders are being executed in their true spirit and substance, still dumping continues on the river Bank of Yamuna particularly at Geeta Colony site. Debris have not been lifted from that site and mainly the debris have been dumped at the bank of the river Yamuna. In fact, according to the Local Commissioners, near the water. Mainly debris are in front of residential block of the Delhi Metro Rail Corporation and in the Geeta Colony. We direct the NCT of Delhi and all public authorities/ Corporations to ensure that these debris are removed immediately as well as no further debris are permitted to be dumped at the river bank of Yamuna under any circumstances. We direct the NCT of Delhi to post Police to prevent dumping of debris and the Home Secretary of Delhi to ensure posting of Police Guards towards river bank of Geeta Colony at all openings; and the warning Boards which have

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weeks from today.

There is an utter confusion in regard to the co-ordination and cooperation between various public authorities, Departments, State Government and with the Ministry of Environment and Forests.

We had directed submission of final beautification programme of river bank Yamuna, which is not being finalized on the one pretext or the other. According to the learned counsel appearing for public authorities, the Departments and State Government have not responded and in fact some of them even not filed Affidavit in response to our Order dated 23rd May, 2013.

We reiterate our specific directions issued to the Authorities which are not complying with the Orders particularly the State Government of Uttar Pradesh.

Let all public authorities including the State Government of Uttar Pradesh be present on 11.00 A.M. tomorrow with the Secretary of MoEF who shall hold meeting every day thereafter and submit a final beautification programme along with the course of action to be adopted for removal of debris and cleaning of the river bank to this Tribunal.

We make it clear that the beautification Plan should be prepared in a way so that the river bank is protected from the menace of dumping of garbage and debris or any other material with specific attention of the Committee to the protection of flood plain area.

We make it further clear that in the event of default, we will be compelled to impose exemplary costs which shall be recoverable from salary of the responsible Officer/s concerned and shall not be imposed on the Learned counsel appearing for the parties.

List on Monday i.e. 22nd July, 2013 for further progress of the matter.

The Commissioner of East Delhi Corporation shall ensure that no debris are thrown on the Geeta Colony site of river bank of Yamuna.

All interim Orders passed in this Application shall continue.

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	Stand over to 22nd July, 2013. .....,CP (Swatanter Kumar) .....,JM (U.D. Salvi) .....,EM (Dr. D. K. Agrawal) .....,EM (P.S. Rao) .....,EM (Ranjan Chatterjee)

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Minutes of the first meeting of the three-member Expert Committee constituted by MoEF, Government of India, as directed by NGT, to examine the Yamuna Front Development Plan of DDA

The first meeting of the Expert Committee was held on 21st September 2013 at 10:30 A.M. in Room No. 402 of the Paryavaran Bhavan, C.G.O. Complex, New Delhi. The members attended the meeting is annexed. Professor A.K. Gosain, one of the Expert Member, could not attend the meeting as he was out of the country. After welcoming all the members to the first meeting of the Expert Committee, Dr Sikka explained briefly the terms and conditions of the Expert Committee constituted, and then he requested the Chairman to conduct the meeting. The Chairman requested Mrs Savita Bhandari, Addition Commissioner (Landscape) of DDA to present the proposed Yamuna River Front Development Plan. She made a presentation on the Yamuna Front Development Plan of DDA with some details for each subzone recognized. Members of the Committee and the representative of CPCB raised few questions with respect to the dynamics of the river course vis-s-vis the flood plain, about the hydraulics of the river and the water quality in relation to the proposed plan.

It was decided that the office of the Additional Commissioner (Landscape) of DDA would provide to the members the copies of documents relevant to the proposed Yamuna River Front Development Plan of DDA and other details specified by the members to the three expert members within five days. Since it takes time to get: (i) relevant inputs from different sources, (ii) high resolution maps, and (iii) site visits, the Committee decided to request MoEF to get three months time from NGT for submission of the final Report instead of one month time given to the Expert Committee.

It was agreed to have the next meeting on 7th October 2013 at Paryavaran Bhavan.

The meeting ended with vote of thanks to the Chair.

(Dr. Brij Gopal) Member	(Prof. C. R. Babu) Chairman	(Prof. A.K. Gosain) Member

ANNEXURE – I

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies, University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, 41B, Shiv Sakti Nagar, Jagatpura, Road, Jaipur-302017
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

Ministry of Environment and Forests

1. Shri. Brijesh Sikka, Adviser, NRCD, MoEF
2. Dr. A. Senthil Vel, Director, NRCD, MoEF
3. Shri. Ajay Raghava, Deputy Director, NRCD, MoEF

Govt. Of Delhi

1. Shri. Om Prakash , CE(N), Delhi Development Authority
2. Shri. D. P. Singh, CE (E), Delhi Development Authority
3. Ms. Savita Bhandari , Additional Commissioner (LS), Delhi Development Authority
4. Ms. Neelema Soni, Deputy Director (LS), Delhi Development Authority
5. Ms. Kanika Bansal, Consultant (LS), Delhi Development Authority

Central Pollution Control Board (CPCB)

1. Dr. Sanjeev Agrawal, Sr. Scientist (CPCB)

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Minutes of the second meeting of the three-member Expert Committee constituted by MoEF, Government of India, as directed by NGT, on Yamuna River

The second meeting of the Expert Committee was held on 7th October 2013 at 3:00 P.M. in Room No. 403 of the Paryavaran Bhavan, C.G.O. Complex, New Delhi. The list of members attended the meeting is annexed.

The minutes of the first meeting were confirmed.

After welcoming the members, the Chairman requested the convener of the Committee to apprise of the action taken on the minutes. He informed the members that NGT, in its, order on 24th September 2013 made the following observations:

(i) "Let the Committee expedite the filing of the Report in relation to Restoration, Preservation and beautification of the entire river banks of Yamuna falling in NCT of Delhi before the Tribunal", (ii) the Report shall not only suggest the methodology and process required to be followed for restoration, preservation and beautification of riverbeds but even state as to who should executed, and (iii) "the Committee has to keep in mind that even if it chooses to inspect the entire Yamuna and find out whether the debris has been completely removed or not, it has to state with certainty the plan for restoration, preservation and beautification which is to be carried out within a time frame to be prescribed by Tribunal".

He informed that NGT also requested an Interim Report from the Expert Committee, and the NGT has allowed the applicant to participate in the proceeding before the Committee. As desired by the Expert Committee and as a part of the action taken on the minutes of the first meeting, he informed the members that MoEF has written letters to NRSC, CWC and NDMA for maps and other relevant data on the River Yamuna.

The Chairman requested the Additional Commissioner (Landscape) of DDA to apprise briefly about the Yamuna Riverfront Development Scheme of DDA for the benefit of Professor A.K. Gosain and others who could not attend the first meeting. She summarized the scheme.

The Chairman apprised the following points to the members present in the meeting:

1. For restoration, preservation and beautification of riverscape, it is important to assess the elevation, floodways, flood inundation, river flow, sedimentation rates and hydrodynamics on spatio-temporal scale. The riverscape in the NCR stretch has the following topographical features: (i) all weather water course or water channel or dry weather water channels, (ii) riverbed exposed during dry season, (iii) the flood plain, (iv) river banks and embankments, (v) wetlands, and (vi) sand bars and islands. These ecological features form the lifeline of the river. Although the morphology of the riverscape is stable but its topographical features are ever changing and depends upon a number of variables such as erosive – transport force and sedimentation rate, volume and flow of water and the elevation. etc.

2. The Central Water Commission (CWC) developed the flood zoning model and there are1:50,000 scale topographical maps showing flood ways of all the major rivers. Maps of the Yamuna river showing (i) layers of the floodways, (ii) topographic features, (iii) contours, (iv) land use/cover, (v) sewage discharge points, (vi) discharge of storm water are prerequisite for formulating strategies for restoration, preservation and beautification of the life line of the riverscape. The road and railway bridges, guide bunds and connecting bunds are not only contributing to the changes in the riverscape but also to the magnitude of floods.

3. A technical Subcommittee has been examining various issues relating to rejuvenation of river Yamuna in the Supreme Court case on Maily Yamuna and another Committee, under the Chairmanship of the Secretary of MoEF, Government of India has been looking after the removal of debris. There is a need to utilize the information generated by other two Committees in formulating strategies for restoration, preservation and beautification of the riverscape. Professor A.K. Gosain is also member of the technical Subcommittee on Maily Yamuna River.

4. The DDA brought out a public notice on 28th September 2013 wherein 'O' zone of the Yamuna/River Front that covers about 9700 ha was redefined and delineated into three subzones by GIS unit of DDA based on ground realities as per MPD 2021 guidelines. The three subzones are: (a) Riverbed, (b) River flood plain, and (c) river front. As per the proposed delineation, the riverfront is an area outside embankment and the permitted

activities in the riverfront are recreational, tourism oriented infrastructure, transportation facilities, utilities, additional facilities for Samadhi Complex, etc. It also mentions that no construction can take place within 300 m on either side of the river as per order of High Court of Delhi on 29 March 2006 vide WP(C) No. 2112/2002 and WP(C) No. 689/2004 except in some cases where construction was already done within 300m but separated by embankment.

Professor Gosain explained that the river has life and has energy, and the river can create havoc to urban settlements if it is not allowed its natural course. The Yamuna riverscape is highly degraded and he is in agreement what has been said by the Chairman. There is a need to have data on flood inundation and flood zoning and also the impacts of bridges on the riverflow. He also informed that the technical Subcommittee has been working on the issues relating to pollution and discharge of sewage. He also explained about the interceptor sewer system that is being developed and suggested Engineers India Ltd. may be invited to present the details of interceptor system and the work done so far. He emphasized that no development or structure should be allowed in the floodway. He also suggested that Central Water and Power Research Station should be approached for study to assess the current pattern of flood inundation in the light of road and railway bridges, guide bunds and connecting bunds and embankments.

Professor Brij Gopal also emphasized that in the public notice issued by DDA there is not only reduction in 'O' zone Yamuna/River front area from 8070 to 4961 but also an area of 1700 ha is not accounted (i.e the difference between current estimated area of 9700 ha and 8070 ha mentioned in Public Notice, 9700-8070=1700 ha). He also pointed out the anomaly in the public notice regarding the delineation of river front as outside the embankment. He also emphasized the need for high resolution contour map and map of flood zoning before assessing any development programme in the riverscape. He and his students have published papers on the riverscape, particularly in 22 km stretch downstream of Wazirabad barrage to Okhla barrage.

The representatives from Central Water Commission, National Disaster Management Authority and Indian Scape Research Organization expressed that their organizations would provide the necessary inputs and the MoEF should write to the Competent Authorities of the Institutes for the required data.

The representatives of DDA mentioned that they would bring to the notice of concerned officer(s) in DDA about the issue of proposed delineation of 'O' zone based on ground reality and studies undertaken by GIS Unit of DDA.

The members expressed that flood zoning, flood inundation and contour maps of riverscape are must before formulating any river front development programme.

The following decisions are taken:

(i) The following geospatial data at high resolution and other quantitative data on hydraulics should be procured (if already available) or generated for formulation of action plans on restoration and preservation of Yamuna river.

(a) A map in cadastral scale (1:4000) showing boundaries of riverscape on the east and west along the entire stretch of the river in NCR and entry and exit points.

(b) A map in cadastral scale (1:4000) of Yamuna river in the NCR stretch of river with overlay of floodways, topographical features and contour layers.

In case such map is not available, 1:50,000 scale toposheet showing floodways of river Yamuna in the NCR is needed.

(c) A high resolution aerial map of the NCR stretch of river Yamuna with layers of topographic features, contours and floodways may be requested NRSC (ISRO) to generate.

(d) A map in cadastral scale (1:4000) of the entire NCR stretch of Yamuna river having a layer of landuse/cover (wetlands, agricultural fields, plantations, villages, bridges and barrages), layer of topographic features and layer of floodways.

(e) A elevation map (contours interval of atleast 0.2 m) covering on either side of the O zone to find out the influence of back flows through the drains as CWPRS Report mentioned an aflux beyond 20 km in case of the proposed channelization.

(f) A flood inundation map for each year during 15-20 years showing the areas actually flooded at peak discharges passing through Delhi.

The gauge levels for each year at old Railway Bridge and at Okhala should be indicated.

(g) Time series satellite imageries showing the meandering pattern every year for the last 20 years and also an imagery of 50 years ago.

(h) Map in the cadastral scale (1:4000) showing the changes in the river hydrodynamics during last 10 years due to various construction activities along the riverbanks.

(i) Flood zonation map based on the physical model developed by CWPRS with changes in flooding pattern based on the present developmental activities such as road and railway bridges and barrages and associated guard bunds and the connecting bunds.
(j) Details of water depth at every 100 m distance across the width of the river and every 500 m long along the entire NCR stretch of the river clearly indicating a reference point or elevation above MSL. The data showed be for every year during the last 10 years.
(k) Details of storm drains and their discharges and details of sewers and their discharges into Yamuna.

Information on items (a), (b), (c) and (d) shall be provided by Revenue and Irrigation Departments of NCT of Delhi and Uttar Pradesh and Noida Authority, and GIS Unit of DDA, NRSC (ISRO) and Survey of India. This will be coordinated by Govt. of Delhi.
Information on (e), (f), (g), (h), (i) and (j) shall be provided by Flood and Irrigation Departments of NCT of Delhi and Uttar Pradesh, NRSC (ISRO), ISRO; CWC, NDMC, GIS Unit of DDA. Information shall also be obtained from CWPRS. This will be coordinated by CWC.
Details on (k) shall be provided by DJB, MCD, Irrigation Department of NCT of Delhi and Uttar Pradesh and Noida Authority and PWD.

(ii) The applicant be invited to present his views in the next meeting scheduled for 17th October 2013. In the same meeting DJB and representative of Engineers India Ltd. should also be invited to present the details of interceptor system and review the work done.
(iii) Site Visits be made on afternoon of 17th and 18th October 2013.
(iv) It is difficult to submit an interim Report on the next date of hearing the case on 28th October 2013, as more time is needed to analyse the geospatial data which are not readily available. Formulation of action plans taking into the ground reality and the issues of Maily Yamuna also require sometime. Consequently, the Committee would provide the progress achieved to MoEF for filing to the Tribunal.

The meeting ended with vote of thanks to the Chair.

(Dr. Brij Gopal)
Member

(Prof. C. R. Babu)
Chairman

(Prof. A.K. Gosain)
Member

ANNEXURE – I

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies, University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, 41B, Shiv Sakti Nagar, Jagatpura, Road, Jaipur-302017
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

Ministry of Environment and Forests

1. Shri. Brijesh Sikka, Advisor, NRCD, MoEF
2. Dr. A. Senthil Vel, Director, NRCD, MoEF

Delhi Development Authority

1. Mr. D. P. Singh, CE (E), Delhi Development Authority
2. Ms. Savita Bhandari , Additional Commissioner (LS), Delhi Development Authority
3. Ms. Poonam Diwan, Director (LS), Delhi Development Authority
4. Ms. Neelema Soni, Deputy Director (LS), Delhi Development Authority

Indian Space Research Organisation (ISRO)

1. Ms. Jyotsana Chuchra, Research Scientist, RRSC(W), ISRO, Department of Space
2. Ms. Ila Agnihotri, Research Scientist, RRSC(W), ISRO, Department of Space
3. Ms. Divya Mishra, Research Scientist, RRSC(W), ISRO, Department of Space

National Disaster Management Authority (NDMA)

1. Mr. Shagan Shah, Consultant, NDMA, New Delhi

Central Water Commission

1. Mr. Bhupesh Kumar, SE, HOC, CWC, Noida
2. Mr. R.P. S. Verma, EE, UYD, CWC, New Delhi

Minutes of the third meeting of the three-member Expert Committee constituted by MoEF, Government of India, as directed by NGT, on Yamuna River

The third meeting of the Expert Committee was held on 17th and 18th October 2013. On 17th October 2013, the meeting was held in Room No 403 of the Paryavaran Bhavan, C.G.O. Complex, New Delhi from 10:30 A.M. to 2:00P.M. The list of members attended the meeting is annexed.

The minutes of the 2nd meeting were confirmed.

After welcoming the members, the Chairman requested the convener of the committee to apprise the action taken on the minutes of the 2nd meeting. He informed the members that the MoEF has written letters to the relevant Departments for providing necessary information/data as per the decision taken in the second meeting.

Due to some personal commitments, Shri Manoj Mishra (applicant) could not attend the meeting and requested the committee to provide another slot for his presentation in the next meeting.

The representative from Delhi Jal Board made the presentation on the Interceptor System. He informed that the interceptor sewer project is exclusively meant for unsewered sewage discharging into three major drains – the Najafgarh, the supplementary and the Shahdra drains, all three of which discharge their contents directly into river. These drains also receive discharge from existing sewer system. There are altogether 18/19 drains that discharge their contents into Yamuna river along the stretch of 22km between Wazirabad and Okhla barrages. The river water in this stretch is characterised by 40-50 mg/ml BOD, zero DO level and 2,40, 00,000/ml total coliforms against the norms of 3mg/ml BOD, 4 to 6 mg/ml DO and 5000 total coliforms. Through interceptor sewer system, augmentation of treatment capacity of sewage treatment plants and enhancing quality standard of treated effluent may contribute further reduction in existing levels of BOD and total coliform density. The representative of Engineers India Ltd. clearly specified that interceptor sever system does not link to the storm

drain system. It may be noted that most of the drains were originally storm drains and now carries treated and untreated sewage.

The representative of the Central Pollution Control Board mentioned that the challenge is to bring the BOD levels of downstream Yamuna river water to 3 mg/d which can be achieved if the STPs are functioning efficiently and have advance technologies. He also highlighted that both IIT Roorkee and IIT Delhi are preparing a consolidated proposal on Maily Yamuna case of Supreme Court (SC).

Professor A.K. Gosain, as a member of the Technical subcommittee on Maily Yamuna case of SC, presented the view of IIT Delhi. He emphasized that the IIT Delhi Report's objective is to: "(i) assess the currently prevailing Yamuna waters management practices and their integrated impacts on its water quality, and (ii) also to evaluate alternative measures to rehabilitate and nurse the system back to health in order to realize acceptable water quality standards across the Yamuna river basin system". He has also outlined some of the problems in the current sewage management system. He suggested that the plan for water resource utilization should be congruous with the need for conservation, restoration and management of the environmental system along with associated ecological and cultural resources. With respect to waste effluent management, the action plan should include the dedicated plan for flow management for abatement of pollution caused by the: (i) drains, (ii) domestic effluents, (iii) industrial quality waste effluents from businesses in residential area, (iv) solid wastes, (v) domestic and business waste from unauthorized and regularized colonies, and (vi) mixing of storm and sewerage system at many locations.

The representatives from the GIS Unit of the Planning Division of DDA made presentation on the redefinition and delineation of Yamuna/river front in the 'O' zone of MPD 2021, based on the ground reality and GIS studies. Professor Brij Gopal brought to the notice of DDA officials that there is a difference in the area under Yamuna/ river front between MPD 2001 and the new public notice. It was explained that discrepancy might be due to use of maps of different resolutions for estimating the total area. There was no response from DDA to the question how the 'O' zone was defined? However, it was explained that, for the first time, river bed, flood plains and riverfront were delineated within Yamuna/riverfront.

From 2:00 P.M. to 6:00 P.M., the Expert Committee accompanied by the MoEF officials and DDA officials visited the right bank of the downstream of Okhla barrage upto Jaitpur and

also the reservoir proper. On 18th October 2013 the Expert Committee along with MoEF and DDA officials visited the downstream of DND flyover and upstream upto Nizamuddin Road Bridge from 10:00 A.M. to 2:00 P.M. From 2:00 P.M. to 3:30 P.M., the Expert Committee had a meeting in Convenor's Room for discussion on the segments of the river examined.

The following are the major findings during the field visits of the Committee:

A. **Downstream of Okhla Barrage:**

(i) On the western bank, a ghat on an elevated flood plain, a guide bund and religious structures on the elevated flood plain form the topography of the flood plain close to the riverbed/water margin; there is a network of elevated roads made of solid waste not only to the above infrastructure built but also to the agricultural fields. At least two fresh dumpings of solid waste were observed. The flood plain of the entire ghat area is filled up with solid waste; there are small patches of low lying areas. Prefabricated system of DMRC is located on the elevated floodway. Housing construction is also observed on the floodways close to the river. There are agricultural fields interspersed with wild growth of *Prosopis*. All these riverscape features are located on the inner side of the road that lead to Jaitpur; outside the road, which is also an active flood plain, a part of Jaitpur cluster of villages, and agricultural fields interspersed with marsh lands which are invaded by *Prosopis* and other weeds are located. There is a massive embankment further west to the road and this is vegetated by weeds and *Prosopis*. This embankment demarcates the active flood plain from the inactive floodplain which is fully urbanized. The construction of roads within the embankment led to massive encroachment close to the river bed and with no floodway at some places. There is a major storm drain which carries sewage discharging from several sewers originating from different villages/colonies/residential blocks; solid waste was also dumped inside the drain; there are two small sewers directly discharging their contents into the river.

(ii) The gates of Okhla barrage was opened at the time of the visit, and the water released was muddy as if the ratio of water to mud (silt) is mixed in almost equal proportion, and the river bed is completely silted leading to the formation of sand bars. Flocks of painted storks were observed on these sand bars. There is a religious construction at the meandering portion of the river with stone pitched embankment which led to the massive erosion on the ghat side. There are cement structures left out inside the river bed and these are also responsible for siltation.

B. Upstream of Okhla Reservoir:

(iii) The Okhala reservoir basin is highly silted and a road forms the right embankment of the river; some constructions on the silted reservoir basin was also observed. The entire basin is under eutrophication and may soon become terrestrial ecosystem. Near the barrage, the basin is highly constricted and somewhat widened upwards and then again constricted at DND flyover. The western portion of the whole basin near old Okhla barrage (weir), which is buried under sediment, looks like marsh covered with sewage water; there are patches of *Typha* and *Phragmites* and mats of water hyacinth in these polluted marshes suggesting that these may be silted flood plains. In this area only a small portion of floodway is left out and this is also fragmented by a road; outside the road the floodway is already encroached and there are plans to make the road as a bund road.

C. Downstream of DND Flyover:

(iv) The downstream of DND flyover has two guide bunds on the western side fragmenting the floodway and restricting the width of floodway. Within these guide bunds there are wetlands which are highly silted due to discharge of raw sewage from the surrounding colonies. There are solid waste dumps and network of roads outside the guide bund that connects to human settlement at Okhla Barrage area. These lowlying areas harbour *Prosopis* and other weeds. On the east bank, there are extensive flood plains connected by network of channels which are silted. Some portions of flood plains are used for cultivation. One leaf of DND flyover where Toll post is located, infact, forms the eastern embankment of the river. There are few trees along the fringes of wetlands located close to the road.

D. Upstream of DND Flyover:

(v) On the western bank, there are guide bunds which have fragmented floodway and one of them is located close to the river bed making the river channel highly constricted. There are wetlands interspersed by agricultural fields. The road that connects the Nizamuddin new bridge (National Highway 24) forms the embankment. Within this embankment there are dumps of solid waste and buildings. It is here that Barapula drain discharged its contents into the river. The sewage from this drain can be channelized through network of wetlands. There are *Eucalyptus* plantations and extensive agriculture fields. There are several silted wetlands with network of channels in the area.

E. **Downstream of Nizamuddin Bridge:**

(vi) On the western bank (near Sarai Kalan) there are massive dumps on the inner side of the outer ring road which forms the western embankment of the river. There are flood plains on which Salix plantations are maintained. Some encroachment of floodplain was also observed. A sewer also enters into this area. Outside the ring road, the floodway is now converted into Sarai Kalan Bus station and Millennium Park.

F. **Upstream of Nizamuddin Bridge:**

(vii) On the right bank, the entire portion inside the ring road was flood plain and now occupied by Millennium Bus Depot. A bund road was constructed, which form the new embankment of the river channel and no flood plain is left out in this area except for a small triangular portion close to the road bridge. Within this flood plain there is a small guide bund which is encroached. The entire floodplain is occupied by a big nursery which extends upto the waterfront. There is a heavy encroachment in this area. Agriculture is also practised.

(viii) From DND flyover upto Nizamuddin bridge, the river channel and its floodway are highly constricted, and the channel is also sedimented; and the water is highly polluted and dark coloured with high sediment load.

Based on the field observations, the following are the decisions taken by the Expert Committee:

(i) There has been rampant changes in the land use of floodway of the river Yamuna which have resulted not only in the restriction of natural meandering of the river but also contributed to the reduction or complete loss of floodway. These ecologically hazardous changes are consequences of the construction of network of embankments, roads and guide bunds of road/railway bridges and barrages. Whatever the active floodway left out is being continuously encroached by reclamation. These ecological changes are not only lead to reduction or total elimination of ecosystem services of the riparian system but may also result in

ecological disasters as it has happened in Uttarakhand. There is urgent need to conserve whatever the floodway that is left out.

(ii) The river channel/bed is highly sedimented due to discharge of raw sewage and also high sedimentation rate. In the absence or restricted floodway, heavy monsoon in the catchment areas can result in flood hazards. In fact it has been pointed by CWPRS that any constriction of the river by claiming the flood plains is going to increase the flux (rise in the water level). It has been mentioned that there shall be a rise in water level to the tune of 2.5m in river Yamuna in Delhi, if the flood of the magnitude of 1978 shall have to be passed after constricting the river width to 800 m.

(iii) The floodplains have wetlands connected by channels, most of which are either silted or converted into agricultural fields. These wetlands and their channels must be restored and preserved and used for storage of flood waters, recharge of ground water, purification of the sewage and habitat of aquatic flora and fauna.

(iv) To prevent further degradation of the floodplain and its landscape features, it may be desirable to issue an interim order stating that no construction activity of buildings, roads and embankments and dumping of solid wastes, and conversion of wetlands into agriculture is allowed all along the NCT of Delhi stretch of the river till the Hon'ble Tribunal give final verdict based on the Report of the Expert Committee.

(v) Since the data required is not readily available, it may be necessary to request NRSC/Space Application Centre of Ahmedabad to map the riverscape at high resolution. This will be obtained through GIS Unit of DDA. Further, site visits also require more time. The Committee requires at least 6 months to finalize the Report with action plans for restoration, preservation and beautification of Yamuna.

(vi) It may be desirable that DDA may take final decision on the recent public notice relating to the redefinition and delineation of Yamuna/Riverfront of Zone 'O' of MPD 2021, after the Hon'ble Tribunal gives judgment on the restoration, preservation and beautification of river Yamuna based on the Final Report of the Expert Committee.

ANNEXURE – 1

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies, University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, 41B, Shiv Sakti Nagar, Jagatpura, Road, Jaipur-302017
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

Ministry of Environment and Forests

1. Shri. Brijesh Sikka, Advisor, NRCD, MoEF
2. Dr. A. Senthil Vel, Director, NRCD, MoEF

Delhi Development Authority (DDA)

1. Mr. Tapan K. Mondal, Director (Planning), DDA
2. Mr. D. P. Singh, CE (E), DDA
3. Mr. S. P. Pathak, Additional Commissioner (LS), DDA
4. Ms. Savita Bhandari , Additional Commissioner (LS), DDA
5. Ms. Poonam Diwan, Director (LS), DDA
6. Ms. Neelima Soni, Deputy Director (LS), DDA
7. Mr. Himadri Shekhar Dey, Planning Officer, GIS Unit, DDA
8. Mr. Irshad Khan, GIS Expert, GIS Unit, DDA

Central Pollution Control Board (CPCB)

1. Mr. R. M. Bhardwaj, Sr. Sc., CPCB, Delhi
2. Mr. Vishal Gandhi, Sc. 'C', CPCB, Delhi

Delhi Jal Board (DJB), Govt. Of Delhi

1. Mr. V. K. Babbar, Technical Advisor, DJB
2. Mr. R. S. Tyagi, Member (Drainage), DJB

Uttar Pradesh

1. Mr. A. K. Gupta, CE, UP Irrigation Department
2. Mr. Kunal Kulshreshta, SE, UP Irrigation Department
3. Mr. Durn Kumar, Assistant Engineer, UP Irrigation Department.
4. Mr. R. D. Sharma, UP Irrigation Department.

Engineers India Limited (EIL)

1. Mr. Ashwani Nayyer, EIL
2. Mr. Anjesh Garg, EIL

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Minutes of the Fourth meeting of the three-member Expert Committee constituted by MoEF, Government of India, as directed by NGT, on Yamuna River

The fourth meeting of the Expert Committee was held on 7th and 8th November 2013. On 7th November 2013 the meeting was held in Room No. 403 of the Paryavaran Bhavan, C.G.O. Complex, New Delhi from 10:30 A.M. to 2:00 P.M. The list of members attended the meeting is annexed.

The minutes of the 3rd meeting were confirmed.

After welcoming the members, the convener of the Committee explained to the members that the Status Report of the three-member Committee had been filed before the Hon'ble Tribunal. He mentioned that Tribunal desires that the Report of the Committee should be filed atleast 3 days in advance to the next date of hearing and the copies to be circulated to the members of the Committee.

The Chairman, after welcoming the members, informed that only Status Report-II can be submitted to MoEF before the next date of hearing. He reiterated that the Committee requires atleast 6 months for finalization of Report from the date of constitution of the Committee (i.e. by 12th March, 2014), as it involves field trips and generation of high resolution maps and their detailed analysis.

The applicant, Shri Manoj Misra, was invited to present views before the Committee. He had given his audio-visual presentation on the Yamuna riverscape. In his introduction he mentioned that Zone 'O' is unparalleled anywhere in the world and it is important to make it the most unique urban biodiverse space in the world. He explained with the help of Google maps of 2013 how the flood plains of river Yamuna have been reclaimed from time to time. He designated the riparian zone within the NCT of Delhi as the Zone 'O' or river zone and it should be treated as a special zone and should not be altered without scientific and ecological rationale. He divided the river zone into two zones – the rural stretch of 26 kms. upstream of Wazirabad barrage upto Palla and the urban stretch of 22 kms. downstream of Wazirabad barrage upto Okhla barrage and 2 kms. downstream of Okhla barrage that falls under Noida urban area. He analysed rural stretch further in detail, particularly stretches at Palla, Burari, Jahangir puri – Mukherjee Nagar and Jagatpur stretches. Although embankments on both the banks reduced the floodways, the rural stretch of Zone 'O' is relatively free from encroachment except in areas like Sonia Vihar, Balswa, Jagatpur, Burari and other clusters of villages. He also showed that the existing area within the embankments is always covered with flood waters even in floods of 2013.

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He highlighted the environmental and ecological issues of river zone (Zone 'O'), his vision of the riverscape, the principles that need to be adopted in formulating any action plan for the restoration and preservation of river zone, suggestions of Yamuna riverscape that will have its past glory having: (i) biodiverse and forest spaces in natural settings, (ii) generate food and water, (iii) ameliorate air, (iv) drain the city, and (v) will have education and recreation values. He emphasized that it should have legal sanctity. The major points that emerged out from his presentation are: (i) whatever the active flood plain that is left out must be legally protected, (ii) some the existing wetlands within the flood plains should be used for holding flood waters and some for treatment of treated sewage water, (iii) natural riparian buffer (fringe) on both banks must be preserved, with forests in some sections, (iv) biodiversity parks in south of DND flyover as part area of Okhla bird sanctuary, (v) development of flood plain forests, (vi) no for riverfront development as proposed by DDA, (vii) extra land available with DMRC and DND authorities must be given back to the river, (viii) relocation of DTC bus stop, (ix) special status to human settlements outside the embankment, and (x) declaration of Zone 'O' as ecologically sensitive area.

He also explained how DDA used 300 m from both the sides of river in redefining Zone 'O' and emphasized that Zone 'O' should be retained as defined in MPD 2021, and pointed out that some of the areas in Zone 'O' should be retained within Zone 'O' by giving special status rather than excluding them from it.

The expert members interacted with the applicant on the issues of special areas, the discharge of untreated sewage and flood zoning and informed him that the issues projected in the presentation will be duly considered while finalising the Report of the Committee.

The GIS division of DDA mentioned that they do not have high resolution maps having different layers and many of these maps have to be generated with datasets available with Irrigation and Flood Control Department by GSDL. It was reiterated that GIS division of DDA will coordinate with Irrigation and Flood Control Department and GSDL, and generates the desired maps and make them available to the Committee. It was also decided that MoEF would write a letter to the Vice-Chairman of DDA to this effect, and GSDL would be in touch with Professor A.K. Gosain to get any further clarifications on the maps desired by the Committee.

The representative from Central Ground Water Board submitted the Report prepared on the ground water potential of the Yamuna flood plain in NCT of Delhi. He mentioned that the total active flood plain including riverbed is about 97 sq.km., out of which about 16.5 sq.km. is under water and the remaining 80.5 sq.km. has very shallow water and tubewells located in the area augments water supply of NCT of Delhi to the tune of 35 MGD. The flood plain has yield potential of 153 MM (92 MGD) with recharging potential of 95 MCM annually. It has a total fresh water of 615 MCM. Professor Brij Gopal brought to the notice of the Committee that recent studies by Vikram Soni and Diwan Singh (2013), who also revealed the

remarkable features of flood plain aquifers that have natural storage and natural recharge even in the absence of sufficient rain fall recharge.

Field Visits:

From 2:00 P.M. to 6:00 P.M. on 7th November, 2013, the Expert Committee accompanied by the MoEF officials and DDA officials and CEO of the Society for Parks and Gardens visited the west bank of the downstream of the Wazirabad upto Nizammudin Railway bridge. On 8th November 2013, the Expert Committee together with other members of the above team visited the east bank from DND flyover to Wazirabad from 10:00 A.M. to 4:30 P.M. After the field visit, the Expert Committee along with MoEF officials had a brief meeting on the finalization of the minutes of 4th meeting and draft of the Status Report-II for submission to Hon'ble NGT. It was decided to meet on 24th November 2013 at IIT, Delhi to finalize the Status Report-II.

The following are the major findings during the field visits to the Yamuna riverscape by the Committee:

A. Downstream stream from Wazirabad barrage upto Signature Bridge:

(i) On the western side, the outer ring road is the embankment for the river. Enclosed within the embankment are: (i) low lying criss-crossed elevated water pipelines supported by pillars, (ii) dysfunctional and silted supplementary drain channel, and (iii) a bathing Ghat with some temporary structures on the elevated flood plain. A road made of solid waste is also found. *Saccharum benghalensis, Prosopis* and *Phragmites* are common plants in the area.

(ii) Just a little ahead of bathing Ghat, on the west bank, is Sur bathing ghat. It is located on a huge patch of the flood plain which was reclaimed by filling and concretization; it has also a Parking area and few buildings. An enclosed cemented waterbody was created for bathing and the water is brought to fill the waterbody from Sonia Vihar Water Plant through the pipeline; this is definitely misuse of flood plain. Ahead of the Sur bathing Ghat, there is a patch of flood plain covered with grasses; close to this patch of flood plain is the outfall of the combined Najafgarh and supplementary drains. The outfall of treated and untreated sewage is blackish in colour with 30 to 40 mg BOD/l, highly turbid and with undesirable odours. The channel has already been silted. In this area, close to the mouth of the outfall between signature bridge and outfall, there are elevated land strips which appear to be old alluvium, and these are highly fragmented due to erosion and due to changes brought out by road construction. There is a Masjid on the elevated structure close to the active flood plain; the entire area is covered with *Prosopis* and *Ehretia*.

(iii) The river channel splits into two channels – the right channel carries some water and the left channel is active only during monsoon. Enclosed between the two channels is a massive

island covered with *Saccharum* and it is used for seasonal agriculture. Sand bars are common in this area.

(iv) On the eastern bank of the river, the area between approach road to barrage and approach road to Signature bridge includes a vast flood plain within the marginal bund road; agriculture, *Eucalyptus* plantations, religious structures and *Dalbergia- Eucalyptus* plantations are common in the active flood plain.

(v) On the east bank, a road was constructed parallel to the river separating plantations from the flood plain close to the river. This flood plains is also used for seasonal agriculture.

(vi) A crematorium was recently constructed close to the Wazirabad barrage on the eastern bank and some of the gates of barrage are buried under silt.

(vii) Roads are also being constructed across the river bed for Signature Bridge.

B. Downstream of Signature Bridge to ISBT flyover

(i) On the right bank, whatever the flood plain left out within the ring road embankment is occupied by Tibetan refugee colonies; however, there is a continuous narrow strip of flood plain with solid waste dumps and agricultural fields.

(ii) At Majnu Ka Tila, the flood plain was reclaimed by filling it with solid waste. Dumping is still continuing. Some houses are constructed on the reclaimed area. The dumping of solid waste into the active flood plain needs to be stopped immediately by DDA and dumped material should be removed. From Majnu Ka Tila to Monastery, the flood plain harbours woodland with *Prosopis juliflora* and *Ficus* as dominant species. There are also sports clubs in this area.

(iii) There is a Pantoon bridge which is dysfunctional and the channel is highly sedimented and almost covered with solid waste in this section. A road was constructed on the flood plain leading to Pantoon bridge. Flood plain was also filled and the elevated area is encroached. In this segment of the river, there are islands and sand bars within the channel and the gradient of riverbed and flood plain is almost similar.

(iv) Qudesia Ghat is located in this segment; a vast portion of the flood plain has been filled up and used for parks and houses around it. Ghariwala Park is located on the elevated flood plain by filling. The flood plain in this section is highly constricted. There are several drains that enter into the river directly in this segment of the river.

(v) On the eastern bank, Pusta Road forms an embankment. There are extensive wetlands all along the Pusta Road which are silted; some of the wetlands are filled up with solid waste;

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construction of spurs with metalled roads on their tops upto the river channel also fragmented the wetlands. The solid waste dumps, which were removed by the Irrigation and Flood Control Department of UP, were dumped inside the flood plain again along the boundary wall. These new dumps within the flood plain are being encroached.

(vi) There are two villages (Garhi Mandu Village, Usmanpur Village and Chilla Khadar) within the flood plain on the eastern bank; these are surrounded by wetlands and agricultural fields. Near these villages, one wetland was fragmented by a newly constructed road and solid waste dumps are abundant in the wetlands located close to the villages and along pusta road.

(vii) There are dairies and few encroachments right on the edge of waterfront and agriculture is practised right upto the water edge in the eastern bank.

(viii) There is a road which separates the slightly highly elevated flood plain from low lying flood plain. There are strips of forests which are being developed as a part of compensatory afforestation; many exotics are being planted; one wetland, which attracts migratory birds also exist in this area.

C. Downstream of ISBT road bridge upto old railway bridge

(i) On the western bank, the narrow strip of left out flood plain was filled up for the construction of night shelters. Nigambodh Ghat and electric crematorium are located in this area; the entire narrow strip of flood plain all along the road upto old railway station bridge is used up for make shift temples and ghats.

(ii) Chat Puja Ghat is also located close to Nigambodh ghat.

(iii) Metro bridge is also located in this area.

(iv) Many drains discharge sewage/storm water directly into the river.

(v) On the eastern bank, the Shastri Park Metro Station and DMRC Depot are inside the flood plain on the elevated ground; similarly the CRPF barracks/tents are also located on the active flood plain. The active flood plain is restricted; there are wetlands and woody vegetation patches, orchards and agriculture.

D. Downstream of old railway bridge upto Geeta Colony Bridge

(i) The ring road separates the active flood plain on the west and pusta road delimits the active flood plain on the east. The river takes meandering on the eastern side leading to the formation of vast flood plain on the west. Some of the flood plain is under criss-crossed

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flyovers with open areas supporting plantation; there are also plantations along the margin of approach roads to flyover; these plantations are mostly composed of ornamentals.

(ii) The active flood plain on the western bank has Golden Jubilee Park, dumps of solid waste, agricultural fields and wetlands. Encroachments also exist in this area.

(iii) Some roads and structures are being constructed in Golden Jubilee Park by DDA. Agriculture is practised right upto the water front.

The samadhis are located within the flood plains. The vast area on the back side of samadhis, which is fragmented by roads, is actually the flood plain and separated from the active one by elevated road; wetlands are located within this area; agriculture is also practised; dense vegetation consisting of *Prosopis* covers substantial portion of the area.

(iv) DTC Bus Depot is also located on fly ash filled inactive flood plain. Behind the DTC Bus Depot, there are natural wetlands and fly ash dykes of the power plant. In fact the Power Plant itself is located on the elevated inactive flood plain and there is channel from the river that supplies water to the Power Plant.

(v) The river front development programme envisage construction of roads/paths and structures on this area. For example, roads and structures have already been constructed in Golden Jubilee Park. These activities lead to the encroachment of whatever left - out active flood plains.

(vi) On the eastern side, there are vast active flood plains which have wetlands, orchards, encroachments and nurseries.

E. Downstream of Geeta Colony up to ITO barrage (Vikas Marg)

(i) On the western bank, the flood plain was restricted due to construction of Delhi Secretariat, Power plants and extension of Rajghat.

(ii) On the eastern bank, within the marginal bund, there are extensive flood plains with wetlands. Most of the flood plain is under cultivation; nurseries and orchards also located in the area; the wetlands are extensive and connected to the river channel; there are also wooded patches, encroachments do exist.

F. Downstream of Vikas Marg (ITO barrage) up to Nizamuddin Railway Bridge

(i) On the western bank, abandoned power plant exists on the elevated flood plain; a narrow strip of active flood plain exists in some sections and no flood plain is found insome sections; nurseries and encroachments are found in this area.

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(ii) On the eastern bank, there are vast flood plains; a Metro station and railway infrastructure are located in this area; greater part of the flood plain is under agriculture and dairies; encroachments do exist; wetlands are also common; a bund was created to prevent floods in the area where Akshardham and CWG village are located.

G. Downstream from Nizammudin Railway bridge up to DND flyover (Eastern bank only)

(i) There are extensive flood plains and wetlands; some spurs and roads fragmented the flood plains; agriculture is extensively practiced; wetlands are drained and converted into fields.

(ii) The area is extensively covered by dairies and permanent constructions; there are orchards and nurseries; solid waste dumps are also located in this area.

Based on the presentations made by the applicant, the GIS Division and the Central Ground Water Board and the field visits, the following observations are made taken by Expert Committee:

(i) Construction of metaled and unmetaled roads, embankments, bunds and buildings within the active flood plains on both the banks is continuing in many segments of the river, which needs to be stopped.

(ii) Filling and construction in and around ghats and religious structures located within the flood plain in many zones of the river is continuing, and such activities should not be allowed till the Committee submits its Final Report.

(iii) A number of drains are located within the flood plain and some of them are situated close to the water front. The excreta of the animals from these dairies are making the already polluted water into some kind of toxic slurry. These drains would need to be relocated as early as possible.

(iv) A number of encroachments and villages are located within the active flood plain and these human settlements are dumping solid wastes into flood plains and also discharging untreated sewage directly into the river. These would need to be removed.

(v) There are regular villages within the active flood plains and these villages would need to be relocated.

(vi) There are still small and large solid waste dumps within the active flood plain. In fact, the waste removed from the dumps as per the NGT order was again dumped within the flood plain along the wall of Pusta road in a way that it is being encroached. All the solid waste

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dumps should be removed and surveillance must be strengthened to prevent dumping in the flood plains.

(vii) The GIS Division of DDA has been requested to make available the high resolution maps of the riverscape on GIS platform having different layers of geospatial datasets through coordination with the GSDL and other agencies. These maps are needed for the formulation of scientifically sound action plans for the restoration, preservation and beautification of the riverscape.

(viii) On visiting the Sur Ghat it was found that the structure put in place cannot qualify to be a Ghat from any angle. It is in fact a structure that has been put in place by encroaching the flood plains of the river to create a water pool totally disconnected from the river. Such a pool could have been created anywhere else beyond the flood plain and could have still served the same purpose.

(ix) On the Eastern bank alongside Pusta road, there are series of spurs and most of them have metaled road on top facilitating the encroachment of the flood plain with permanent construction activities.

(x) The morphology of the river has been altered significantly by barrages, flyovers (with extensive guide bunds) embankments and buildings. The river channel has become very narrow and has lost its natural meandering. The flood carrying capacity of the river has decreased significantly and groundwater levels have declined in the absence of recharge in the flood plains. Further developments on the flood plain in the name of riverfront development and any reduction in the area of the zone 'O' will completely destroy the river- especially its water quality and the flood carrying capacity that will in turn threaten the city on both sides. The riverfront development Plan as proposed by DDA should not be implemented till the Hon'ble NGT delivers its judgement on the restoration, preservation and beautification of river Yamuna based on the final report of the Expert Committee. On the other hand flood plain should be restored in an ecologically sound manner to enhance its water retention capacity, improve flow conditions, eliminate organic sludge and support biodiversity characteristic of the river basin and wetlands that hold flood waters and synergise the waste assimilation in the river.

(xi) The preparation of geospatial maps, the visits to different segments of the river, detailed analysis of data and formulation of action plan for restoration, preservation and beautification of the Yamuna river will take time. Therefore, the Expert Committee would require a period of six months from its date of constitution (i,e. upto 12th March, 2014) for submission of its Final Report.

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ANNEXURE

List of Participants of the 4th meeting of the three-member Expert Committee

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies, University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, JNU
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi

Ministry of Environment and Forests

1. Shri. Brijesh Sikka, Advisor, NRCD
2. Dr. A. Senthil Vel, Director, NRCD
3. Shri. Ajay Raghava, Deputy Director, NRCD

Central Ground Water Board (CGWB)

1. Mr. A. D. Rao, Regional Director, New Delhi

Delhi Development Authority (DDA)

1. Ms. Savita Bhandari , Additional Commissioner (LS)
2. Mr. Sabyasachi Das, Director (Planning), D Zone, GIS
3. Mr. T. K. Mondal, Director (Planning), AP (E&O)
4. Ms. Poonam A. Diwan, Director (LS)
5. Ms. Neelima Soni, Deputy Director (LS)
6. Mr. N. C. Gupta, Executive Engineer
7. Mr. Himadri Shekhar Dey, Planning Officer, GIS Unit
8. Mr. Irshad Khan, GIS Expert, GIS Unit

Delhi Parks & Garden Society, Govt. of Delhi

1. Dr. S. D. Singh, CEO, DPGS, Environment Department, Delhi Government

Irrigation & Flood Control Department, GNCTD

1. Mr. V. K. Jain, S.E., I&FC
2. Mr. N.S.P. Patwal, E.E., I&FC
3. Mr. A. Suran Kumar, Assistant Engineer, I&FC
4. Mr. K. Sambhamurti, SSW, I&FC
5. Mr. Renoy. G, Advisor, GSDC, (Geospatial Delhi Ltd)

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U.P. Irrigation Department

1. Mr. Kunal Kulshreshtha, S.E., IIIrd Circle, Okhla
2. Mr. Durn Kumar, Assistant Engineer, HWDAC, Okhla

Petitioner

1. Mr. Manoj Mishra, Yamuna Jiye Abhiyan

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Minutes of 5th meeting of the Expert Committee constituted by MoEF as directed by NGT (in the case of application no. 6 of 2012 on the matter of Manoj Mishra V/s Union of India & Ors) on Yamuna river

The 5th meeting of the Expert Committee was held on 30th December 2013 in Room No. 402 of the Paryavaran Bhavan, Ministry of Environment & Forests, Government of India, New Delhi. The list of participants of the meeting is annexed.

The convener informed the members that the high resolution maps (hard copies and soft copies) generated by GSDL, as directed by DDA on the advice of the Expert Committee, were submitted and the soft copies were distributed among the members and the hard copies were also given to the Chairman, who brought the hard copies to the meeting for examination by the committee.

The Chairman, after welcoming all the members, informed that he appeared personally before Tribunal on 18th December 2013 and requested the Hon'ble Tribunal for extension of the date of submission of the Report of the Expert Committee on the restoration, preservation and beautification of Yamuna River in NCT of Delhi. The Tribunal passed an order which states "We grant time to the learned members of the committee till 15th February 2014 and we hope that efforts would be made to collect and analyse the data in order to suggest us the fruitful measures by that time. If some more time is justifiably required we may consider that request on that date"; and

"The Committee shall make the existing features of the Yamuna River front in the map which they would prepare. A Status Report be submitted regarding the aforesaid on 15th February 2014."

After confirmation of the minutes of 4th meeting of the Expert Committee, the Chairman took up the issues relating to delineation of boundaries of riverscape. He explained that the terms 'River Zone' and 'River front' should be defined along with the definition of river.

The 'O' zone defined in MPD 2021 should also be examined, as the applicant used River zone for 'O' zone defined in MPD 2021. Re-delineation of 'O' zone by DDA as issued in public notification should also be examined. It was mentioned that northern most and southern most boundaries of river stretch within NCT of Delhi should be demarcated. It was decided that the committee restricts its Report only to the river stretch of NCT of Delhi on

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both western and eastern banks. It was also discussed that the boundaries of the river should be with respect to the time scale, as the morphology of the river changes over a time period.

With respect to the maps generated by GSDL, the representatives of GSDL explained that the maps generated by them are in 1:2000 scale and for different segments of the river and for different layers. Regarding the flood level, the GSDL took the highest flood of 2010 as it is close to the average of three years flood levels (2002, 2007 and 2013) i.e. 207.3 to 207.49 m above mean sea level. After some discussion on the maps generated by GSDL and 'O' zone of MPD 2021 and its re-delineation, it was decided to have the following set of maps for three years 2002, 2007 and 2013 for analyses.

Set I: A map of 'O' zone defined by DDA in MPD 2021 with the following layers overlaid on it:

(a) contours,

(b) land use / land cover,

(c) lowest, medium and highest flood levels,

(d) subzones of 'O' zone as defined in the MPD 2021, and

(e) embankments, bunds, bund roads and guide bunds.

These maps would aid in the: (i) identification of the areas to be preserved with no activity; (ii) area of settlements where development is regulated; (iii) areas of settlements that have to be relocated; (iv) areas from where dairies/solid waste dumps and their recycling units /encroachments in the form of workers colonies/ farm houses should be removed / relocated.

Set II: Contour map overlaid with the following layers:

(a) bunds/embankments/ bund roads/ roads

(b) flood zoning with flood ways, flood fringe and its limit (regulatory flood plain), primary flood hazard (outer limit of flood fringe) and secondary flood hazard (standard project flood limit)

(c) topographic features such as water course, dry weather channel, flood plain, wetlands, low lying areas, floodplain forest, grasslands, agriculture, riparian islands and connecting

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channels between wetlands and between wetlands and river channels, and roads that disrupt the connecting channels or fragmentation of wetlands.

(d) outfall points of sewers, storm drains, ghats, crematoria, samadhies, canals discharging fresh water (western Yamuna canal) and Hindan river.

Set III: Contour map overlaid with the layers:

(a) bridges (road and railway), barrages, and their guide bunds, metro lines, reservoir basins.

(b) ash dykes and their effluents, bus depots, nurseries, sport complexes, recreational parks, bird sanctuary

(c) flood zoning

(d) bore wells in the flood plain within and outside the embankments

Set IV: Contour map overlaid with:

(a) depth of the water

(b) silted areas in the channel

It was also decided that flood zoning maps / flood data should be obtained from the Central Water Commission. In case it is not available, the flood data available with Irrigation and Flood Control Department should be provided by them to Professor Gosain who has agreed to develop the model for flood zoning.

Since the maps provided by GSDL only covers the area of the river that belongs only to NCT of Delhi but not to that of U.P., it was decided that the map provided by the Irrigation and Flood Control Department of U.P should be digitized and integrated with that of NCT of Delhi. The Irrigation and Flood Control Department of U.P./GIS Division of DDA will get the map digitized and integrate with maps available for portion belonging to NCT of Delhi.

For formulation of alternatives to Riverfront Development Scheme of DDA, after taking into account the elevation model and flood zoning, maps having the following layers are required:

Set V: Contour map overlaid with:

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(a) flood zoning

Bhatnagar

(b) proposed riverfront development project for different segments as given in the project document (the maps have to be digitized)

(c) re-delineation of 'O' zone by DDA.

Set VI: Map of NCT of Delhi with the following layers:

(a) sewerage infrastructure including STPs

(b) zones with no sewerage infrastructure

(c) 'O' zone of MPD 2021

(d) contour of 'O' zone

GIS Division of DDA/ Landscape division of DDA may provide through GSDL the requisite digitized maps.

Regarding the outline of the structure of the Report, the following preliminary outline has been suggested for writing the Report

Preface

Acknowledgements

Executive Summary

Action Plan

1.0 Introduction

1.1 River Yamuna and its origin and its morphology within the NCT of Delhi over a time period

1.2 Present Status and Issues

1.3 History of Litigations

1.4 Constitution of the present committee and its terms and conditions

2.0 Review of the work done to address the issues

2.1 Committees constituted and action plans proposed and implementation

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2.2 Court cases and orders of different courts and their impact

2.3 Yamuna Action Plans I, II and III

2.4 Yamuna Development Authority

3.0 Maily Yamuna Case and its Status

4.0 Riverfront Development Scheme

5.0 Present Status of the river as revealed by field visits

6.0 Analysis of geospatial data generated and scientific observations on the river zone 'O' delineation, Riverfront Development Project and Maily Yamuna case in the light of geospatial data analysed.

7.0 Action Plan drawn based on the geospatial data analyses for restoration and preservation and beautification of Yamuna river zone

8.0 Implementation of Action Plan

9.0 Policies for long-term preservation

10.0 References

11.0 Figures

Based on the above mentioned observations and discussion, the following decisions are taken:

(i) The different sets of maps required for the Report would be worked out by Professor A.K. Gosain, Professor C.R. Babu and representatives of GSDL at Professor Gosain's Lab/Room on 11th January, 2014. These would be finalized in the subsequent meeting of the Expert Committee scheduled for third week of January, 2014.

(ii) To incorporate the U.P. portion of the river Yamuna in the stretch of NCT of Delhi, the Irrigation and Flood Control Department of U.P. may provide digitized maps for their portion for integration with the maps of NCT of Delhi from GSDL.

(iii) The flood zoning map/ flood data will be provided by Central Water Commission for overlaying on the contour maps generated by GSDL.

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(iv) A semi-final draft of the Report and final Status Report, which have to be submitted to NGT before 15th February, 2014 should be made ready by 30th January 2014.

The meeting ended with vote of thanks to the Chair.

(Dr. Brij Gopal)
Member

(Prof. C. R. Babu)
Chairman

(Prof. A.K. Gosain)
Member

ANNEXURE

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies, University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, 41B, Shiv Sakti Nagar, Jagatpura, Road, Jaipur-302017
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

Ministry of Environment and Forests

1. Shri. Brijesh Sikka, Advisor, NRCD
2. Shri. Ravi Sinha, Director, NRCD
3. Shri. Ajay Raghava, Deputy Director, NRCD

GeoSpatial Delhi Ltd (GSDL)

1. Mr. Renoy G, Advisor, GSDL

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Report on the field visits to Yamuna river by the Expert Committee during 10th and 11th December 2013 in connection with NGT

Field visits to some segments of the river Yamuna were conducted by the Expert Committee along with officials of DDA and Irrigation and Flood Control Department of U.P. on 10th and 11th December 2013. On 10th December 2013, the Expert Committee visited the downstream of Okhla barrage upto northern boundary of Faridabad of Haryana on the western bank and on the eastern bank upto Farm Houses of NOIDA. The Expert Committee also examined Okhla Bird Sanctuary of U.P. On 11th the Expert Committee visited the upstream of Wazirabad barrage upto Palla on the western bank and Badarpur Khadar on the east. During this visit, the Applicant Shri Manoj Misra also joined the team.

The major findings of the Expert Committee during field visits to river Yamuna are summarized below:

A. Okhla barrage and its surroundings including Okhla Wildlife Sanctuary

The reservoir basin spreads upto DND flyover and includes the Delhi portion of the basin and also the portion of U.P., although the Sanctuary belongs to U.P. and managed by it.

(i) The western boundary of the reservoir is the elevated road lined by high rise mesh, and the canal colony of U.P. is located on the elevated portion of the reservoir. Inspite of high rise mesh all along the bank of reservoir, solid waste dumps were observed at more than one site suggesting dumping is the rule rather than exception.

(ii) The portion in front of the regulator of old Agra canal was almost sedimented and nearly dysfunctional. The new Agra canal is located close to the barrage. The mouths of the regulators of both the canals are infested with water hyacinth and copious plastic waste. Ahead of old Agra canal, a boat club is located on the elevated portion of the reservoir. Birds were rather rare and no activity of fish was observed.

(iii) The water quality is almost similar to that of raw sewage with foetid odours and high suspended particulate matter with light compensation level almost restricted to the surface only. In other words, the aquatic ecosystem is nearly dead on the western side as evident by the absence of phyto-and-zooplankton which form the food base of fish and birds.

(iv) There are islands and these islands also do not support any characteristic vegetation such as *Phragmites*, Typha and others; water hyacinth is also common on these islands suggesting that these are also submerged when the reservoir level rises. Few clumps of *Prosopis juliflora* are observed on some of the islands, the contours of which are above the submergence level.

(v) The eastern side of the reservoir was demarcated by an embankment topped with road that serves as guide bund. This separates some part of the active reservoir basin and made it into inactive one and has been invaded by *Prosopis* and *Leucaena*. Both the sides of the embankment harbour exotic species, particularly *Leucaena leucocephala* and *Prosopis juliflora*. The embankment has also a spur projected into the reservoir which also harbours *Prosopis*.

(vi) Within the reservoir basin there are patches of marshes which are putrified and have water which is predominantly composed of humic acids. In these marshes Typha and *Phragmites* exist. In some of the marshes water hyacinth was dried up due to extreme anoxic conditions.

(vii) There are extensive wetlands in the upper end of basin close to DND flyover. Most of these wetlands have been silted and support *Prosopis*; some of these wetlands are converted into agriculture fields. All these wetlands have to be restored.

(viii) The entire reservoir (pondage) emits foetid odours and does not give an appearance of waterbody but represents a massive storage of sewage water where even water hyacinth cannot survive. There are no characteristic marsh plants such as *Scirpus*, *Eleocharis* and *Cyprus*. In one marsh, *Pistia* and duck weeds were observed suggesting the potential for positive response to treatment. Except two or three flocks of 20 to 50 birds (ducks) no other birds were observed.

(ix) The entire Okhla Bird Sanctuary is highly degraded and nearly dead. This evident by: (i) high sedimentation of the reservoir, (ii) the polluted water contaminated with plastics, (iii) presence of solid wastes dumps, (iv) invasion of *Prosopis* on silted wetlands, (v) infestation of water hyacinth, (vi) low number of migratory birds, (vii) low species diversity , and (viii) near absence of phyto-and-zooplankton.

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B. Downstream of Okhla barrage upto the northern boundary of Faridabad

(a) Western Bank:

(i) An embankment cum-road that runs longitudinally from the Okhla barrage junction to Jaitpur extension fragments the flood plain between river channel and the original old embankment. This road has given rise to Jaitpur on the western side of it and Jaitpur extension on the eastern side of it in the flood plain belonging to Delhi (DDA). The flood plain to the west of the road is composed mostly of built up area interspersed with agricultural fields; there are wetlands which can be restored and serve as storage of rainwater in this area. These require desilting.

(ii) On the east of the bund road, the first 2 to 3 km stretch of the active flood plain belongs to U.P. and the remaining 8 km stretch of it belongs to Delhi.

Within the U.P. stretch, an elevated ghat by the side of guide bund was constructed close to the river. There are fresh solid waste dumps in the ghat area. The roads leading to the temple located close to the river are being widened by solid wastes. The manufacturing unit of DMRC's prefabricated structures is located in this area and filling the flood plain with solid waste is also common at this segment of the flood plain. From DMRC unit upto the northern boundary of Delhi's area, the flood plain is mostly invaded by *Prosopis;* there are agricultural fields; there are roads with solid waste dumps on either side of them. A drain originating from settlements directly discharges its contents into the river.

(iii) The DDA's portion of flood plain is encroached by Jaitpur extension and a large part of the flood plain has already been built up, some part of the flood plain is covered with solid waste dumps and is filled up for road and house construction. A number of houses are being constructed close to the river; only a small portion of the flood plain is left for cultivation.

(iv) Within the flood plains belonging to DDA, there is a flat old flood plain patch, the elevation of which is higher than the rest of flood plain, and is located close to the river. This area is fenced and will be used for construction of buildings by a private builder.

(v) An effluent originating from the flyash dyke of Badarpur power plant carrying high sediment (flyash) load discharges its content into the river. The water with high sediment is

used for irrigation. This effluent forms the boundary between flood plain belonging to Delhi and Haryana.

(vi) The Haryana portion of the flood plain is also encroached and the construction activity is rampant in the area.

(b) Eastern Bank:

(vii) On the eastern bank, the active flood plain within the road embankment spreads from 2 to several km wide depending on the meandering of the river, and the entire active flood plain belongs to NOIDA of U.P. (NCR). The downstream stretch from Okhla Barrage upto 8 to 10 km length is occupied by solid waste dumps consisting of excavated material, construction waste, demolished building waste and soil; some part of solid waste is used for recycling, and non-recyclable waste is used for filling up of the flood plain; bore wells are dug to get the water for washing the recycled material before lifting for construction; the effluent carrying the coloured water from recycled solid dumps with high sediment load containing cement and other fine particulate matter from crushing of stones and bricks is discharged into the river.

The discharge from these effluents almost made the river channel sedimented to the level of flood plain and the sedimented river channel itself is red coloured. The only water in the channel is from the effluents originating from solid waste recycling units and effluent from the Badarpur power plant. There is no spill over from the barrage. This is also evident form the fact that the low lying depression in the channel located at downstream of the solid waste recycling units holds the polluted water.

The labour engaged in these solid waste recycling units have no protection against the dust emission during the operation of crushers and transport. There are no water facilities for them and their hutments are covered with thick layers of dust. The labour colonies are also located on the active flood plain.

The remaining stretch of flood plain extending from solid waste recycling units to few kilometers downstream are occupied by agriculture fields and farm houses.

C. Wazirabad Reservoir and its surroundings

The reservoir has huge basin with embankment roads enclosing: (i) vast flood plain which is submerged during floods and (ii) the fresh water reservoir, which supply water to the city, is relatively small with two wide channels and an island right in the mouth of the reservoir. There are three regulators – two on the western bank and one on the eastern bank where Sonia Vihar water treatment plant is located on filled up flood plain.

(a) Western Bank:

(i) On the western bank, the Wazirabad-Jagatpur bund separates all authorized and unauthorized human settlements located in the flood plain from the active flood plain. The active flood plain is under seasonal agriculture and roads are constructed indiscriminately to the fields; there are solid dumps along the roads; dung from livestock are stored and making and drying of cow dung cakes is widely practiced on the active flood plain. There are also guide bunds and roads to religious structures.

(ii) Ram Ghat has been built and a road has been constructed to the ghat in the active flood plain.

(iii) The reservoir and the channels close to its mouth are dredged and the dredged material is usually lifted but some of it is used for bunding within the flood plain.

(iv) There are extensive silted wetlands/marshes on western banks in the reservoir basin. These wetlands can store huge amount of flood water. There are islands and the dredging of these islands also enhances the storage capacity of the reservoir.

(b) Eastern Bank:

(v) Close to the reservoir, there are a large number of wetlands on the eastern bank; most of them are silted. Some of these wetlands are contiguous with wetland located on the eastern side of the Sonia Vihar bund road. These need to be connected through culvert.

D. Upstream of Wazirabad reservoir to Badarpur Khadar

(a) Eastern Bank:

(i) On the eastern side of the reservoir and the river, the active flood plain is separated by Sonia Vihar to Badarpur-Khadar embankment road. This embankment road fragments the vast flood plain and its wetlands; flood plain on the eastern side of the embankment is now occupied by a vast number of settlements like Sonia Vihar of Delhi and many sub urban areas in U.P. including Tronica City; within these human settlement there are number of wetlands which are disconnected from those located in active flood plains. These have to be restored and preserved for recharging ground water.

(ii) Within the Delhi segment of eastern bank, a number of guide bunds/water breaks have been widened using solid waste dumps; dumping of solid waste is being continued. The tops of some guide bunds are being converted into concrete structures for recreation purposes. In other words these recreational areas are source of solid waste pollution of the river, as the river channel is almost close to these guide bunds. The river meanders in the area. On the western side of the embankment road, a parallel road was laid using solid waste dumped. This road has already been encroached. Fresh dumping of solid waste along and on the parallel road is most common practice in the area.

(iii) In the upstream of Delhi's segment of flood plain from the Wazirabad reservoir, the flood plain widens for several kilometres and widens maximum at Badarpur Khadar. In the U.P. segment of flood plain the embankment road separates the inactive flood plains, which are inhabited by rapidly expanding townships and cities similar to that of NOIDA, from the active flood plain. There are guide bunds which extend upto the river front on the western side of the embankment. Sand mining is practiced in the active flood plain; there are farm houses within the active flood plain close to wetlands; seasonal agriculture is practiced. Some plantations of *Populus* and *Euclyptus* are also observed. There are several wetlands in the active flood plain which are silted and all of them have to be restored.

(iv) The Badarpur Khadar village is located on the active flood plain. Filling of and construction of houses in the active flood plain are continuing in the area. The guide bund extends upto river front and interconnecting bunds, which resulted in fragmentation of the flood plains and loss of connectivity between the wetlands, are common.

(v) Around Badarpur Khadar village there are wetlands and many of these wetlands are drained and converted into agricultural fields. Some of the wetlands are filled up for house

construction. Filling the wetlands and flood plain and construction of houses in flood plains is being practised. This must be stopped forthwith and the village has to be relocated. The village belongs to Delhi but most of the flood plains belong to U.P.

(vi) There are many bore wells in this area which depletes the ground water. To enhance the recharging of the ground water in the unconfined aquifers, all the wetlands should be restored together with their interconnecting channels and they should be sustained and preserved.

(vii) A drain from Tronica City has been constructed to discharge the sewage from the city into the river, and the embankments of the drain were made with flyash. Since there is no permission for discharging the sewage into river Yamuna, the entire embankment is eroded and the flyash is being washed into the river. The eroded embankments should be repaired and stone-pitched.

(b) Western Bank:

(i) From Wazirabad barrage upto Jagatpur, embankment road (bund road) separates the inactive floodplain occupied by human settlements such as Jagatpur, Burari and others from active floodplain which has large number of wetlands; most of the wetlands are silted and converted into agriculture fields. About 157 acre inactive flood plain is now ecologically restored to river basin forests and wetlands and this area is designated as the Yamuna Biodiversity Park Phase I by DDA.

(ii) The active flood plain is fragmented by roads that lead to religious structures and guide bunds and their interconnecting bunds. Roadside dumping of solid waste from human settlement is common. Huge heaps of dung and dung cakes are stored on the flood plain. Many of the wetlands are converted into agriculture fields and their connectivity is lost.

(iii) From Jagatpur, the embankment road joins Palla road which runs parallel to the active flood plain on its east, and on its west is the inactive flood plain occupied by many authorized and unauthorized human settlements. As the road approaches towards Palla, the active flood plain becomes smaller in width as the river meanders at this stretch of the river. There are number of bore wells that are dug by DJB along the embankment road to supply water both for domestic use and agriculture. Marigold is widely cultivated besides wheat. The watercourse has also become narrow in this segment.

(iv) Close to Jagatpur and enclosing between Palla bund road and Jagatpur bund road is the Yamuna Biodiversity Park Phase II of DDA where floodplain forests and grasslands are being developed. Most of the wetland has already been desilted and holding large volumes of flood water.

(v) There are interconnecting bunds on the western side of Palla road that separates Bhalswa lake and a cluster of villages and golf course, farmhouses and Institutes. All these are located in the flood plain.

(vi) Downstream of Palla, the water course is narrow and most of the riverbed is dried. The western Yamuna canal discharges its contents into the river a little ahead of a guide bund. This is the only source of water during lean period for downstream of the river. The river in the upstream of western Yamuna canal is completely dried up.

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Based on the observations presented above, the following conclusions are drawn:

Conclusions

(i) The entire Okhla reservoir and Bird Wildlife Sanctuary requires immediate restoration which involves (i) desilting of reservoir, marshes and wetlands, (ii) replacement of invasive weeds by fruit yielding species, (iii) creation of treatment wetlands on the upstream of Okhla barrage on the western bank to enhance the quality of water; (iv) introduction of phyto-and-zooplankton, and (v) sedimentation of suspended particulate matter by chemical and biological treatment.

(ii) The ongoing dumping of solid waste and road building activity within the active flood plain of U.P. on the western side should be stopped forthwith; the manufacturing unit of DMRC's prefabricated structure should be relocated; the road leading to the unit should be dismantled; the temple and crematorium situated in the flood plain should be relocated.

(iii) The entire flood plain of U.P. on the western side should be made into flood plain forests and wetlands, after eradication of *Prosopis*.

(iv) The Jaitpur extension and its religious structures should be relocated. The house construction activities, dumping of solid wastes and road construction in the flood plains of Delhi should be stopped immediately.

(v) The patch of flood plain located near Jaitpur extension, which has higher elevation than the rest of the flood plain, should be converted into flood plain forest and lease given for construction of buildings should be cancelled.

(vi) The NTPC should be directed to treat the effluent of flyash dyke in tailing ponds before discharging into the river.

(vii) All the solid waste dumps and the recycling units and the workers colony located on the entire stretch of flood plain from downstream of Okhla barrage up to farmhouses on the eastern bank belonging to U.P. should be removed and relocated.

(viii) The river channel should be desilted and minimum ecological flow should be allowed in the downstream of Okhla barrage. The contaminated sediments from the river bed should be treated before dumping it elsewhere.

(ix) The Wazirabad reservoir is continuously dredged and the dredged material should be lifted completely. The islands in the mouth of reservoir also needs to be dredged so that it holds larger quantity of flood water. The numerous wetlands located within the reservoir basin on both western and eastern banks should be restored for storage of flood water. The wetlands located in the inactive flood plain should be identified and restored by connecting them to the wetlands of active flood plains through culvert. These wetlands should be preserved and suitable regulations for their preservation should be formulated.

(x) The guide bunds should not be widened and the solid waste dumps along the embankment roads and guide bunds should be removed. The flood plain forests should substitute some of the guide bunds and hence these bunds should not be widened nor strengthened. Interconnecting of guide bunds should be banned.

(xi) The vast flood plain and reservoir basin should be developed into flood plain forests that protect the Wazirabad barrage and embankments. These forests also help in preventing the siltation of reservoir and water courses.

(xii) Sand mining from vulnerable sites in the flood plain, particularly from where river meanders should be stopped to prevent heavy erosion; and regulated sand mining for local use may be permitted from sites that are heavily silted, particularly the dried channel and islands.

(xiii) Storage of dung from the livestocks and making dung cakes on the active flood plain should be stopped.

(xiv) The crematoria, the religious structures and the roads leading to religious structures should be removed. The unauthorized drains that carry untreated sewage from towns and cities of U.P. located on the eastern bank should be closed and the eroded flyash embankments of the drain from Tronica City should be repaired and pitched with stones.

(xv) The Badarpur Khadar village should be relocated; the filling of the flood plain and wetlands near the village should be stopped; the ongoing construction activities should also be stopped.

(xvi) The islands along the river channel should be dredged to hold larger volumes of flood water.

(xvii) Minimum ecological flow from Hathnikhund barrage in Haryana segment of the river should be allowed in the downstream of Delhi segment. This would enable to dilute the sewage and reduces its BOD levels.

(xviii) The numerous of bore wells operating in Palla segment of Delhi and Haryana segment of the river might be taking recharged water from the runoff of the western Yamuna canal water discharged into river.

(xix) The Yamuna Biodiversity Park Phase I and II should be replicated elsewhere and these should be preserved for posterity and ecological sustainability of upper riparian ecosystems.

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Minutes of 6th meeting of the Expert Committee constituted by MoEF, Government of India, as directed by NGT on Yamuna River (relating to Application No. 06 of 2012)

The 6th meeting of the Expert Committee was held on 17th and 18th January, 2014 in Room No. 207, Block IV, Civil Engineering Department, IIT Delhi from10:30 P.M. to 6:00 P.M. on both days. Besides the three Expert members, representatives of MoEF, Government of India, GSDL and Irrigation and Flood Control Department of Government of NCT of Delhi also participated. Two students of Professor A. K. Gosain assisted the committee in analysing the maps prepared by GSDL using geospatial data. The list of participants of the meeting is annexed.

The Chairman welcomed the members and then confirmed the minutes of the 5th meeting of the Expert Committee. He informed the members that the task before the committee is to finalize the maps using the available geospatial data sets and produce different sets of maps of 1:2000 resolution having different layers in different combinations. Professor Gosain explained that his team has been working for the last 15 days and he himself has been in constant touch with GSDL and Irrigation and Flood Control Department of U.P. to get the necessary data and check the accuracy and compatibility of the data sets generated. The issue that has yet to be addressed by Professor Gosain is to integrate the U.P. portions of the river zone with the stretch of NCT of Delhi, so that the maps depict the river in totality. It was pointed out that the data on the river for the UP side are not available at the same resolution and will have to be extrapolated from the available maps.

Professor Brij Gopal explained about the delineation of river boundaries in terms of frequency of highest floods. 1 in 100 years highest flood is usually taken for delineating the river zone (that includes the river channel and the floodplain; and often known also as river corridor). Because most of the floodplain in the NCT Delhi stretch has already been isolated by embankments, the entire area between the two main embankments on the eastern and western side is known to have been flooded by the 1978 peak flood. Therefore, for the stretch of NCT of Delhi, the frequency of highest flood - 1 in 40 years, i.e. the flood that occurred in 1978, with somewhat similar floods repeated even in 2010 and 2013, may be used to demarcate the river zone. Annual floods, frequency of highest floods- 1 in 2 years /1 in 5 years / 1 in 10 years / 1 in 15 years / 1 in 20 years /1 in 30

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years should then be taken into account for defining the limits for various activities within the boundaries of the river zone. The portion of river within the present embankments / roads / bunds constitutes the river boundary horizontally and its northern limit is near Palla where the river enters the NCT-Delhi, and southern limit lies downstream of Jaitpur where the river exits NCT. The members also discussed flood zoning and Professor Gosain explained that his team would develop a digital model based on the data sets and this can be used in flood zoning. The GSDL representative explained the methodologies followed in generating 1:2000 resolution maps with different layers on GIS platform.

The members of the Expert committee divided the river stretch into 12 segments using grids for convenience, though the 'O' zone of MPD 2021 is divided into 8 subzones. Professor Gosain explained that his team would link both so that the information can also be analysed at the subzone level also. The GSDL and Irrigation and Flood Control Department of NCT of Delhi informed the members that total survey of the entire 'O' zone was undertaken and the data set would be available only in the month of February 2014. This data set is essential to understand the 2013 land use / land cover, the river zone left-out between two embankments and the topographic features. As soon as the data set of 2013 is available, Professor Gosain would utilize the data for generating land use and land cover map of river zone for 2013.

Regarding Maily Yamuna case, it was decided to generate maps showing the outfalls of major drains and also mark higher elevated portions within the embankments, particularly along the western bank, for the development of cascade of wetlands through which the outfall of major drains pass through before releasing sewage into Okhla reservoir with low BOD levels. Further, the members also discussed the feasibility for the construction of small wetlands along smaller drains to reduce BOD levels of sewage entering into main drains.

Regarding restoration, it was decided to have detailed riverscape so that an action plan can be prepared.

On the riverfront scheme, as the area falls within the 1:40 year peak flood zone, the entire riverfront scheme is untenable. Instead, depending on the topographic feature and

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elevation, a mosaic of wetlands, floodplain forests, grasslands and interconnected channels (corridors) should be developed. Nature trails passing through the restored riverscape may be provided for recreational access to the public.

The discharge from different barrages should also be taken into account while flood zoning and also enable to find out depth of the water. On the re-delineation of 'O' zone as noted in the Public Notice issued by the DDA, the members discussed the definitions of river bed, flood plain and riverfront used by DDA and observed that the landuse areas noted therein do not appear to be correct and have be recalculated. Also, the definition of riverfront as provided by DDA excludes the riverfront development scheme proposed by them within the embankments. All encroachments within two embankments should be relocated. Those settlements located in areas which have been separated from active flood plain by bunds may be included within 'O' zone with regulatory regime for development activities in these settlements. The members also expressed that the present agricultural activity should be regulated. The issue of development around ghats and crematoria was also discussed. Mining of sand in areas which are vulnerable should be banned.

The construction of spurs and their beautification, connecting guide bunds and roads within the flood plain was discussed. It was decided to examine that how many of these spurs/guide bunds are actually required to strengthen the existing infrastructure and only those that are essential should be retained and others should be removed. Culverts should be created to facilitate the movement of flood waters into wetlands located outside the embankments.

The solid waste dumps, recycling units of solid waste dumps, temples with the roads that connect to them and solid waste used to widen the existing roads should be removed from the active flood plains. The issue of dairies was also discussed and the members were of the opinion that they should be relocated.

The members also examined critically all the photographs and videos taken during field visits by DDA and Irrigation and Flood Control Department of U.P. and selected the relevant photographs to be inserted on the 1:2000 resolution maps showing boundaries of riverzone and land use / land cover, flood levels and bunds to be presented to NGT.

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It was also decided that copies of maps to be included in the Status Report and Final Report should be made by Professor Gosain's team and the entire expenditure should be borne by MoEF. It was also decided that those students of Professor Gosain, who worked for the analysis of geospatial data sets and generated maps on GIS platform may be provided with suitable remuneration and also duly acknowledged in the Report.

On the time lines, it was decided that the Status Report should be submitted by 5th February, 2014, so that it can be filed in the NGT on time. It was also decided that the NGT may be requested for extension upto 12th March, 2014 for submission of the final Report.

Based on the observations and discussion during two-day meeting, the following decisions are taken:

(i) Different sets of maps of 1:2000 resolution with data sets of 2010 having different layers be prepared by Professor Gosain and his team as per the discussion in the meeting.

(ii) Map of 2013 showing land use / land cover and topographic features be prepared by Professor Gosain and his team as soon as the total survey data are made available to him by GSDL and Irrigation and Flood Control Department of NCT of Delhi. Other alternatives were also discussed.

(iii) The portion between two embankments of the river should be taken as river zone and 1 in 40 years of highest flood should be basis for such delineation.

(iv) Flood zoning of the riverscape would be done using digital model. Discharges from different barrages should also be taken into account for flood zoning.

(v) The riverfront development scheme proposed by DDA is untenable as the area is annually flooded and also does not come under riverfront in the proposed re-delineation of 'O' zone of DDA. Instead of riverfront development, a mosaic of wetlands, flood plain forest and grasslands with interconnected watercourses should be developed. Nature trails should be provided in such a way that the landscape features and biodiversity is accessible for public.

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(vi) The need for all the spurs and guide bunds should be re-examined and all those guide bunds that are essential for strengthening should be retained. Culverts should be provided to facilitate movement of water into wetlands separated /fragmented by bunds.

(vii) All human settlements and temples with connecting roads located within the embankments should be relocated.

(viii) The solid waste dumps and recycling units of solid waste dumps should be relocated elsewhere. The expansion and beautification of existing spurs should be stopped. The construction of new spurs and roads should be banned. Widening of existing bund roads using solid waste should be also banned.

(ix) The elevated areas along the western bank may be developed into cascade of wetlands through which the outfalls of drains pass before releasing into Okhla reservoir for reducing BOD levels and cleaning of water. Wetlands should also be constructed on smaller drains before discharging the sewage into main drains /river.

(x) Sand mining, particularly in areas which are vulnerable for erosion should be stopped.

(xi) Dairies should be removed and agricultural activities should be regulated.

(xii) Bore wells and Ranney wells should also be regulated.

(xiii) Wetlands and their interconnecting channels should be de-silted to hold flood waters.

(xiv) Regulatory regime for development activities in human settlements of 'O' zone should be prescribed and monitored.

(xv) The Expert Committee submits its Status Report III by 5th February, 2014 for filing in NGT. The NGT may be requested to extend the time up to 12th March, 2014 for submission of the Final Report.

C. R. Babu

ANNEXURE

Expert Committee

1. Prof. C. R. Babu, Centre for Environmental Management of Degraded Ecosystem Ecosystems, School of Environmental Studies; University of Delhi – 110007
2. Dr. Brij Gopal, Ex-Professor, 41B, Shiv Sakti Nagar, Jagatpura, Road, Jaipur-302017
3. Prof. A.K. Gosain Professor of Civil Engineering, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

Irrigation & Flood Control Department, GNCTD

1. Mr. A. Suran Kumar, Assistant Engineer, I&FC

GeoSpatial Delhi Ltd (GSDL)

1. Mr. Renoy G, Advisor, GSDL

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ANNEXURE-10

DELHI DEVELOPMENT AUTHORITY

(MASTER PLAN SECTION)
PUBLIC NOTICE

Public Consultations regarding Re-delineation and Rezoning of the Zone 'O'

1.0 BACKGROUND

The NCT of Delhi has been divided into 15 zones (divisions) in the Master Plan for Delhi – 2021 (MPD-2021). The Zone 'O' – River Yamuna/ River Front covers an area of about 8070 Ha. The other provisions in para 16.1 are reproduced below;

- *The area is approximate and the re-delineation and rezoning of the zone can be done with the approval of the authority.*
- *Mapping of the NCT of Delhi would be done using remote sensing and GIS tools and will also be updated from time to time to have valuable data as regards ground situation and also to have inputs to detect and prevent unauthorised development and encroachment on public land and to facilitate the protection of greens.*

2.0 REVIEW OF MPD-2021

MPD-2021 provides for periodic review and monitoring in phases. The first five-year review has been undertaken since September 2011. A High level committee/ Advisory Group (AG) was set up under the Chairmanship of the Hon'ble Lt. Governor, Delhi for periodic review and monitoring. As proposed in MPD 2021, Eleven (11) Management Action Groups (MAG) have been proposed for greater participatory planning.

The suggestions were invited from the public, RWA and various other stakeholders by organizing Open House Meetings, workshop and issue of public notices in newspapers. Large no. of suggestions were received to transfer the residential areas, villages etc. in Zone 'O' to adjoining zones E, F, PII etc. as the residents are unable to get basic, physical and social infrastructure.

2.1 The salient points of the reasons cited as part of Review of MPD-2021 by the persons and the RWAs residing in builtup area of Zone 'O' are as under:

- The dwellers of Meethapur and Jaitpur village and unauthorised colonies are not getting any permission for reconstruction/ repair of their buildings from the MCD on the ground that there is total embargo imposed in Zone 'O' by Hon'ble L.G.
- The permissions to construct facility buildings like School, Dispensary and Community Hall etc. are being given by the MCD in other unauthorised colonies falling in other zones, whereas, no such permission is being given by the MCD in the colonies falling in Zone 'O'.
- Some of the colonies claiming to be existing/ situated away from the river.

The issue of redefining the boundary of Zone-'O' has been discussed in the meetings of Management Action Groups (MAG) and the Advisory Group under the Review of MPD-2021. The minutes of these meetings are available on DDA website (www.dda.org.in).

3.0 STUDIES FOR EXISTING SITUATION

GIS Unit of DDA has undertaken studies based on information such as built up area, location of villages and colonies, embankment, major drain meeting points, and the boundary for the

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ZDP of Zone 'O' provided by Deptt. of Environment, GNCTD, prepared by GeoSpatial Delhi Ltd. (GSDL).

The already constructed embankments have been taken as the boundary of the redefined Zone 'O' for which data has been obtained from satellite imagery of the year 2010 available on web portal and GIS maps obtained from Deptt. of Environment, GNCTD, prepared by GeoSpatial Delhi Ltd. (GSDL).

4.0 PROPOSALS

4.1 In view of provisions in MPD-2021 explained in para 1.0 above and ground realities, a planning exercise has been undertaken by the GIS unit of DDA to delineate-

a) River bed,
b) River flood plain and
c) River front i.e., the area outside the embankments

It is proposed to transfer the area outside the river bed/ flood plain and area separated by embankment to adjoining planning zones (divisions). The details of the zone-wise areas as per MPD-2021 and proposed to be modified is given below:

Planning Zones	Name of the Zone	Zone Area according to MPD-2021 (HA.)	Proposed to be deducted from current Zone 'O' (HA.) and added to adjacent Zones	Proposed area in MPD-2021
A	Old City	1,159	(+) 213	1,372
C	Civil Line	3,959	NIL	3,959
D	New Delhi	6,855	(+) 150	7,005
E	Trans Yamuna	8,797	(+) 971	9,768
F	South Delhi- I	11,958	(+) 1,390	13,348
P - II	North Delhi	8,534	(+) 385	8,919
	Sub Total		+3109	
O	River Yamuna / River Front	8,070	(-) 3,109	4,961
	Total	49,332	-	49,332

Details of Localities deleted from Planning Zone 'O and added to the adjacent Planning Zones

Sl. No.	Land Parcels to be Excluded from Current Zone 'O'	Area to be excluded from current zone 'O' (Ha.)	Excluded areas to be included in adjacent Zones
1	Rajghat	213	A(Walled City)
2	I P Power Stations	112	D
3	Millenium Bus Depot	33	D
4	Sonia Vihar Area	718	E
5	Shahtri Park DMRC Land	104	E
6	Akarshardham Temple, CWG	109	E

	Village		
7	Yamuna Bank DMRC Land	40	E
8	Batla House Area	73	F
9	Jaitpur ,Meethapur, Okhla	1,310	F
10	Jagatpur	385	P-II
11	Area Under Circulation	12	D & F

In view of above, the area of zone 'O' (River Yamuna) will be 4,961 ha. in place of 8,070 Ha. as computed by GIS Unit, DDA.

4.2 Guiding Principles and Follow-up Actions

I. In view of increase in area of respective zones, the notified Zonal Development Plans (ZDP) will be modified for the additional area based on following guiding principles:
   - Based on the ground realities, GIS maps, existing settlements such as villages (including extended lal dora), regularised colonies, unauthorised colonies in the process of regularisation etc. to be incorporated.
   - The provision for physical and social infrastructure facility areas for the additional population in respective zones and to meet deficiencies of the zone.
   - Connectivity/ linkages at zonal level from adjoining road network as per MPD 2021 norms.
   - Earmarking of 300 M wide belt from river, based on orders of Hon'ble High Court of Delhi on 29.03.2006 vide WP (C) No. 2112/2002 and W.P.(C): NO. 689/2004. *No construction to take place within 300 metres on either side of Yamuna River.*
   - The 300 meter zone can be identified from normal/ average water course/ level.
   - DTC, DMRC have constructed embankments/ raised the level of land for locating depots so that they are not affected by floods though located within 300 meters from River Yamuna. In view of this, the similar areas/ locations, based on ground realities could be examined for excluding from 'no construction zone'.
   - Incorporating land uses based on the Change of Land Use (CLU) notifications by the Central Government.
   - The updated information from Deptt. of Environment, I & FC Deptt., GSDL and other Departments of GNCTD.
   - The balance area to be treated as River Front Area and to be proposed for Recreational, Tourism Oriented Infrastructure, Transportation facilities, Utilities, additional facilities for Samadhi Complex etc.

II. Government of NCT of Delhi will take suitable action to construct missing segments described in para 3.2 (ii) and for further strengthening of the existing embankments from time to time.

III. Government of NCT of Delhi and DDA will initiate suitable action regarding clarification of court order dated 29.03.2006

Based on above Guiding Principles, Planning Wing of DDA will modify the respective Zonal Development Plans in consultation with all the stakeholders. These will be individually processed as per the provisions of Delhi Development Act 1957. The details and drawings are available on the DDA Website www.dda.org.in.

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PUBLIC NOTICE

The following modifications which the Delhi Development Authority/ Central Government proposes to make to the Master Plan for Delhi-2021, under Section- 11(A) of Delhi Development Act, 1957, are hereby published for public information. Any person having any objections/ suggestions with respect to the proposed modifications may send the objections/ suggestions in writing to the Commissioner-cum Secretary, Delhi Development Authority, 'B' Block, Vikas Sadan, New Delhi-110023, within a period of forty-five days from the date of issue of this notice. The person making the objections or suggestions should also give his/ her name, address and telephone / contact number(s) which should be readable.

Modifications:

In view of above the following modifications are suggested in MPD 2021-

Chapter/ Para 16.0 Land Use Plan, Table 16.1

Zone	Name of Zone	Area as per MPD-2021 (Ha)	Proposed area after Re-delineation (Ha)
O	River Yamuna/ River Front	8,070	River Yamuna 4,961
A	Walled City	1,159	1,372
C	Civil Line	3,959	3,959
D	New Delhi	6,855	7,005
E	Trans Yamuna	8,797	9,768
F	South Delhi-1	11,958	13,348
P II	North Delhi	8,534	8,919

*Zone 'O' to be designated as 'River Yamuna' in place of River Yamuna/ River Front

The plan indicating the proposed modification is available for inspection at the office of Dy. Director (MP), Delhi Development Authority, 6TH Floor, Vikas Minar, I.P. Estate, New Delhi on all working days during the period referred above.

Sd/-
(D.Sarkar)

File No.: F.20(12)/2013-MP

Date: 28/09/2013

Commissioner-cum-Secretary
Delhi Development Authority

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Consignee Rahul Choudhary.

Tel./Mobile

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Date: 18/04/014 DEL To.
Consignee: Vivek Ko Toradownm Cha-Uol, DHC.
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Tel./Mobile
Date: 18/04/14 DEL To.
Consignee: Pattnayak And Assd. Lajpat Nagar Del
Tel./Mobile
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I declare that this consignment doesn't contain any contraband, cash, Jewellery etc.

Signature

THE PROFESSIONAL COURIERS

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Date : 18 | 04 | 014 | DEL | To,

Consignor V/CMD

Consignee MR Balandin Stakhanov
109, DMC.

Tel./Mobile

Tel./Mobile

Received by consignee in good condition

Signature

Name : Dt :

Relationship Time :

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BEFORE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, NEW DELHI

O.A. NO. 06/2013

IN THE MATTER OF:-

MANOJ MISHRA .....APPLICANT

VERSUS

UNION OF INDIA AND OTHERS .....RESPONDENTS

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NDoH 5-08-2014

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Respondent No.3- DDA

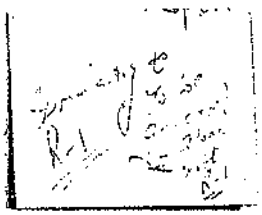
Through

KUSH SHARMA
(Advocate)
385, Lawyers Chamber-II
Delhi High Court,
New Delhi
(M) 9311399002

Date- 2-08-2014

Place NEW DELHI

NATIONAL GREEN TRIBUNAL
NEW DELHI
DY. No.: 2331/14
DATE: 2/8/14
Sign. of receiving Officer



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RESTORATION AND BEAUTIFICATION OF RIVER YAMUNA IN NCT OF DELHI

Report of Expert Committee constituted by Hon'ble NGT under the Chairmanship of Additional Secretary MoEF and Vice-Chairman, DDA by the order dated 30.5.2014 & 17.7.2014 passed in the case O.A. No. 06 of 2012, O.A. No. 300 of 2013 and O.A. 344 of 2013 titled as Manoj Kumar Mishra & Anr. Vs Union of India & Ors. and Ashok Mittal & Anr. Vs NCT of Delhi & Ors.

The Hon'ble NGT vide its order dated 30.5.2014 & 17.7.2014 passed in O.A. No. 06 of 2012, O.A. No. 300 of 2013 and O.A. 344 of 2013 titled as Manoj Kumar Mishra & Anr. Vs Union of India & Ors. and Ashok Mittal & Anr. Vs NCT of Delhi & Ors., constituted an Expert Committee under the chairmanship of Addl. Secretary, Ministry of Environment & Forest and Vice-Chairman of Delhi Development Authority appropriate and submit its report on the subject of restoration and beautification plan of Yamuna River Banks. The Expert Committee deliberated and discussed the subject matter as assigned to the Committee in its several meetings and accordingly has prepared the report with Prof. Brij Gopal, Expert Member, and Prof. A.K.Gosain, of IIT Delhi, on the subject of restoration and beautification \plan of Yamuna River Banks which is reproduced as under:

Definitions

Restoration refers to bringing back the biophysical characteristics and ecological functions of an ecosystem, as far as possible, to their earlier desirable state by addressing the root causes of degradation.

Rivers are complex and dynamic ecosystems characterized by the flow of water and sediments which also carry nutrients and organisms from their source to the mouth. The flow of water invariably changes continuously through the day and seasonally during the year.

All rivers carve out their own course and form channels bounded between two 'banks'. However, areas with a low gradient (slope), rivers do not flow through the entire year within the channels; seasonally, high flows (often called as flood) that exceed the channel capacity spill over the banks flooding areas on either side — the floodplains. Because of large inter-annual variability over long periods, the area occupied by a river at least once in 100 years is globally acknowledged to be the river's floodplain. Floodplains are therefore an integral part of the river for carrying peak flows.

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Floodplains play a critical role in the ecological functions of a river. They (i) moderate flood peaks through retention and spread of water and fresh sediments, (ii) enhance groundwater recharge and improve groundwater quality, (iii) provide suitable habitats for characteristic flora and fauna (biodiversity) besides serving as indispensable feeding and breeding grounds for fish, turtles, crocodiles, birds and other animals; (iv) filter sediments, chemicals and nutrients from upslope sources, and thereby improve river water quality, and (v) offer opportunity for seasonal farming (without requiring fertilizers and irrigation) and pursuance of spiritual, religious and recreational activities by humans.

According to an Australian river expert, D. Mussared (1997):

"Flood plains are as important to rivers as bark is to trees. Most of the processes that drive life in rivers happen around their edges. Just as the sap flows through the outermost ring of trees, not through its centre, the lifeblood of river ebbs and flows on its flood plains. The vegetation growing there isn't mere decoration; it is a river's roots and leaves."

Restoration of a river requires interventions to improve its channels and floodplains, flow regime, water quality (by effective control on wastewater discharge) and biodiversity at the same time in a coordinated manner.

Beautification of a river requires the removal of all garbage, debris and filth, prevention of pollution from domestic and industrial wastes, improving flow and water quality for human use. As the river is passing through the city, the recreational needs of the people are required to be integrated in the restoration plan of the floodplains.

RIVER YAMUNA IN NCT OF DELHI

The 54-km stretch of River Yamuna passing through the NCT –Delhi, from village Palla in the north to village Jaitpur in the south, forms inter-state border between Delhi and UP, both in north and in south. Therefore the entire area of river Yamuna, including the floodplains, lying in both the states have to be necessarily considered together for restoration, and is designated here as the 'River Zone'.

At present, the 26-km stretch of the river from village Palla to Wazirabad is largely rural in character and generally in its natural state, except continuous embankments (marginal bunds) raised on the two sides, and growing urbanization mostly on the U.P. side. The river and its floodplains on the two sides together span 1.5 km to 4 km.

The next 22 km stretch Wazirabad Barrage to Okhla Barrage is the highly urbanized stretch where the river and its flood plain have been greatly compromised. The flow of the river within this stretch is further impeded by the barrage at ITO, and 9 bridges and flyovers. The river and the flood plain together are restricted to as low as 800 m strip in some places in this section.

The last 4-5 km stretch from Okhla barrage to village Jaitpur, has also developed rapidly during the last decade, both on Delhi and UP sides , and the remaining floodplain is either being encroached by settlements (Jaitpur Extension) or is intensively degraded by stone crushers (on UP side). The river and floodplain together have been reduced to strips varying from 800 m to 1.5 km in width.

Whereas the river Yamuna has turned into a sewer due to lack of freshwater flow and discharge of untreated or partly treated domestic sewage from Delhi, its floodplains are highly truncated and degraded with depletion of most of its natural biodiversity.

GENERIC RECOMMENDATIONS FOR THE RIVER ZONE

A. RESTORATION AND BEAUTIFICATION OF FLOOD PLAINS

1. The entire river zone is regularly flooded almost every year at the time of peak flow discharge. The flood carrying capacity of the river has been greatly reduced by encroachments and waste dumps on the remaining floodplains, as also reported by NEERI (2005). Therefore, the river bed should be restored to its previous level (through suitable dredging of accumulated sediments and solid wastes).
2. The floodplains within the River Zone (NCT and UP) should be restored with the goal of conserving the riverine ecosystem as a model of an ecologically sound urban riverscape, which also meets the cultural, spiritual and religious needs as well as environmental education of the city dwellers on principles of eco-tourism. It should be ensured that the floodplain fulfills its primary role of passage of flood waters and recharge of ground water.
3. Create new wetland habitats for biodiversity conservation (biodiversity parks which aim to protect, restore & conserve the riverine ecosystem while providing healthy & connected habitats for its flora & fauna) in suitable locations e.g. sub zone IV, sub zone VI, etc.
4. To conserve and restore all the natural / existing wetlands in a manner that they act as sources of ground water recharge and supply of surface water to the city in times of need e.g. wetlands at north of Wazirabad, near Garhi Mandu, and also in Sub Zone VI and VII. These would also act as sites for natural recreation like birding areas, boating facilities, etc. Dredging and de-silting are also recommended at various appropriate locations in large areas for water storage and augmentation. New wetlands to be similarly created, wherever feasible. Inter-connected-ness between wetlands for water movement and exchange to be promoted.

5. A riparian fringe of 50-100 m shall be left to nature on either bank of river channel for natural processes, vegetation like grasses sedges and bushes. This fringe shall improve water quality and act as sites of nature education for school children.
6. Plantation on the riverbed floodplains is recommended to be of various native plant communities based on elevation gradient and their submergence potential, suitable to soil and water conditions like, riparian fringes, grasslands, floodplain forests and other river basin communities, which can also stabilize river banks against erosion and on the other, provide suitable habitats for birds and other animals.
7. As the existing bridges and roads in the active flood plain currently act as cross embankment in the river and cause ponding of water, suitable openings (culverts) should be constructed to allow easy flow of water downstream, particularly during the floods.
8. All sites of fly ash dumps (from power plants) in the floodplain should be removed on priority as they are a source of arsenic toxicity in the river, e.g. the area retrieved from Millennium bus depot in the river bed to be dredged and restored to the floodplains.
9. Appropriate treatment wetlands should be developed at the mouths of various drains falling into the river, for improvement of water quality before it meets the river.
10. Green areas being developed in certain portions of the floodplains shall enhance the restoration of the same.
11. Sites of mythological (Nigambodh ghat) and historical/heritage importance (Qudsia ghat, Yamuna bazaar ghats, Majnu Ka Tila, Samadhis, Salimgarh fort, Old railway bridge etc) lying within the active flood plain should be developed with great care so as to minimize adverse impact on the river zone.

B. REMOVAL OF ENCROACHMENTS

1. All encroachment and dumps of MSW (municipal solid waste) and C&D (construction and demolition) debris in the river zone should be expeditiously removed. The encroacher may be fined under the 'polluter pays' principle.
2. To check any instance of encroachment/unauthorized construction and dumping of waste into the river zone, a division of Land Management of DDA under a Director level officer should be posted at site to inspect and inform the Enforcement Branch on a day to day basis for immediate remedial action. The UP state may be directed for similar action for land in river Zone which is under their jurisdiction.
3. It should be ensured that no debris, construction debris or any other material including MSW is thrown into the river banks or along the drains of the city and the same is not used for human evacuation.
4. Quantification of debris and MSW to be removed from the river floodplain is required to be done technically by using the10-15 year old cross-sections of the river available with the Irrigation and Flood Control department.

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C. REGULATION OF AGRICULTURAL PRACTICES

1. The agricultural use of the river bed at suitable locations and away from the riverine fringe should be regulated for farming (by the bona fide members of two existing peasants co-operative societies) of organically grown vegetables, seasonal fruits and flowers.
2. A mechanism for execution and enforcement of the same and for checking of the lease should be framed. All other unauthorized presence including agriculture in the river bed/floodplain should be treated as an encroachment and removed as per the rules and policy framed for the purpose.

D. PROVISION OF ENVIRONMENTAL FLOW IN THE RIVER AND PREVENTION OF ITS POLLUTION

1. Environmental flow requirements of the river should be assessed through scientific studies and their provision should be ensured expeditiously.
2. Waste water (sewage, domestic) from the city should not be permitted at all to enter the river without tertiary level of treatment.
3. No industrial waste should be permitted to enter into the river zone.
4. All natural drains of the city out falling into the river should be restored as natural tributaries of the river and they may serve to carry only storm water. Such drains should not be concretized and covered.
5. Already identified and operational locations within the floodplain as per Hon'ble High Court Orders to collect and to safely dispose religious offerings to be retained.

E. LEGAL STATUS

The available floodplains of river Yamuna within Delhi as on date, still have the potential for recharging large amounts of water as also estimated by the Central Ground Water Board (2013). This fact together with other functions of floodplains, as noted above, calls for their legal protection. Therefore, steps should be taken under the DDA Act, 1957 and the relevant ovisions of U.P. Govt. (under which the respective master plans are prepared and regulated) and the Environment Protection Act (EPA), 1986 to provide legal protection to the river zone which should be notified as an Eco-Sensitive Area (ESA) under the EPA.

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INSTITUTIONAL MECHANISM

An apex body, under the chairmanship of Lt Governor of Delhi, with relevant officials from GOI (MoEF, MoWR), CWC, CGWB, DDA, Govt of Delhi, DJB, I&FC and Govt. of UP and non-official members / experts may be constituted to oversee the protection, restoration and beautification of the flood plains within the river zone (Delhi and UP) on the lines suggested and to look into all related aspects such as maintenance of environmental flow in the river and restoration of natural stormwater drains (earlier Yamuna tributaries).

(Balvinder Kumar) 1.8.14
Vice Chairman,
Delhi Development Authority

(Shashi Shekhar) 1.8.14
Additional Secretary,
Ministry of Environment, Forests &
Climate Change

(A)

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IN THE HON'BLE NATIONAL GREEN TRIBUNAL , PRINCIPAL BENCH
AT NEW DELHI

OA NO. 06 OF 2012

IN THE MATTER OF:

MANOJ MISHRA .....PETITIONER

VERSUS

UNION OF INDIA & OTHERS ....RESPONDENTS

INDEX NDOH- 15.10.2014

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1.	Final Report dated 13.10.2014	1392-1396
2.	Map of Natural Drains as per 1976 Drainage Master Plan is Appended herewith as **Appendix No.1.**	1397-
3.	Map of Storm Drains Carrying Sewage is Appended Herewith As **Appendix No. 2.**	1398
4.	Details of STP's and their capacity provided by DJB are appended herewith as **Appendix 3.**	1399-1402
5.	Action Plan for Implementation of Directions by NGT for unsewered areas is appended herewith as **Appendix No.4.**	1403-1425
6.	Map of 148 locations Identified by the DJB is appended herewith as **Appendix No.5.**	1426

Copies Shall be Served to the Respondents in the Court.
14/10/14

Respondent No. 3

Delhi Development Authority (DDA)

Through-

Kush Sharma
Advocate
A-448 LGF, Defence Colony
Delhi-110023
Mob: 9311399002
Landline: 41669002

GREEN TRIBUNAL
NEW DELHI
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14/10/14
Receiving Officer

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FINAL REPORT

The 4/09/2014 Order passed by Hon'ble NGT

A) The Committee constituted by this Tribunal shall expeditiously and in any case not less than one week from today hold a meeting and provide a clear answer on the following to the Tribunal:

1) Taking the 1976 drainage map of Delhi as the basis, the two maps submitted by Prof. A.K. Gosain today before the Tribunal, one showing natural drains and other natural drains carrying sewage, are the correct documents to be the foundation for further progress of the Project.

2) Whether the drainage carrying sewage, (the storm water drainage) should or should not be permitted to carry sewage in any part of Delhi.

3) How many STPs are required and in what capacity?

4) There are nearly 201 natural drains and the majority of which are also carrying sewage, which ultimately joins into the River Yamuna through 22 outfall points. Whether it will be technically feasible, taking all aspects into consideration including the geographical and economical parameters, to lay down a separate pipeline/open lined channel to carry the sewage from these 22 points to an appropriate distant place in Delhi where an STP of an appropriate capacity should be established with proper utilisation of the remnant water or whether it will be more advisable to construct STPs on most of the drains carrying sewage to ensure that the same sewage waste is treated prior to its joining River Yamuna.

5) Lastly, the Committee should state as to what is the best methodology to be adopted to ensure that the sewage from the colonies where sewage treatment system does not exist as of today is appropriately brought to the STP plants and/or to the point of the major drains collecting the sewage. This is more particularly in relation to the unauthorised colonies of Delhi.

B) This Committee shall also suggest a common authority/body which should be responsible for maintenance, cleaning and all other matters in relation to the drains afore-noticed. This Committee may also consult MoEF to take into account the works done and proposed to be done under the Yamuna Action Programme

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13.10

The specific issues raised by Hon'ble NGT as given above vide their order passed on 04/09/2014 have been addressed by the committee in various meetings held on 11/09/2014, 13/10/2014 at DDA as well as meetings of a sub-group held on 10/09/2014, 25/09/2014, 7/10/2014 at IIT Delhi. Following is the response of the committee to the issues raised by the Hon'ble NGT:

1) In response to Hon'ble NGT order as to (i) how many storm drains are natural and (ii) which are the storm that carry sewage in NCT of Delhi, respective departments have submitted the information that was translated into maps and presented before Hon'ble NGT on 4/09/2014. The maps have since been updated with the information received after the date, however they are still not complete in all respect. Only 157 of the 201 drains have been identified and mapped (see Appendix 1- Natural_Drains_1976 and Appendix 2- Storm_Drains Carrying_Sewage). There are still 44 drains that remain to be located/reconciled between I&FC and the respective departments. The maps are the correct documents as per the information provided by the respective departments under whose jurisdiction these drains come. Therefore, these maps can be taken as the foundation for all the subsequent tasks.
2) Natural storm drains are ecological sub-systems of a river system that play an equally diverse range of environmental functions as played by a river. Therefore, it is imperative that these precious systems are maintained and preserved to allow them to keep

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playing their role for the benefit of the society. Moreover, by making these storm drains free of sewage shall also ensure that Yamuna is free of sewage as well.

3) The details of STPs and their capacity has been provided by DJB – Please see Appendix 3

4) The committee is of the view that trapping the sewage at the 22 outfall points to enter Yamuna and taking the sewage away to a downstream location outside Delhi is not an advisable solution because by doing so the drains of Delhi shall remain polluted. Therefore, it is important to ensure that no sewage enters any of the natural storm drains. Some of the major issues are highlighted below.

   a) The natural drains are ground water recharge zones. Any pollution flowing through them shall pollute the ground water and thus be a potential health hazard

   b) Natural drains support the biodiversity which shall be impacted if pollutants are allowed to flow through them

   c) Use of storm drains to carry sewage shall also result in flooding of the local areas because of the reduction of the carrying capacity of these drains to carry the storm water when needed.

   d) Having decentralized STPs in Delhi shall also be useful in making the treated waste water available for reuse that can reduce the demand on water and also rejuvenate the water bodies and the river Yamuna which is not getting any water from upstream during lean flow period.

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5) An elaborate exercise has been done to formulate a plan with an objective that no sewage from any of the unauthorized /unsewered colonies should enter the natural storm drains even without having the primary sewerage network implemented. As per DJB, laying up of the primary sewer lines is going to take a very long period (may be about 20 years) because of various reasons. Therefore, the recently formulated sewerage master plan of 2031 has been relooked into and suitably modified to ensure that the sewage from these areas is intercepted and taken into the proposed secondary or trunk sewer even when the primary sewers are not in place. A detailed plan for each of the zones has been provided in the Appendix 4 - "Action_Plan_for Implementation of Directions NGT for Unsewered Areas", along with the timeline and the tentative budget requirement. It may be noted that it is possible to implement this within 3 years subject to the timely availability of land from land owing agencies and requisite resources are made available.

6) The issue of handling the sewage in the sewered areas of Delhi is equally important and needs to be addressed as well. The affidavit given by the concerned departments in response to the order of Hon'ble NGT and translated on to a map has shown that majority of storm drains, whether natural or manmade, in the sewered areas of Delhi are carrying sewage. This is unacceptable in a sewered area. DJB has made a detailed investigation and has identified two major causes, (i) punctured sewers allowing

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sewage to enter storm drains (DJB has already identified around 148 such locations and are located on map attached at Appendix 5), and (ii) storm drains culminating into sewer lines (that are not designed as combine sewers to carry sewage as well as storm water, as in Old Delhi) thus surcharging the sewers to overflow and flood the areas with sewage during the monsoon period (344 such locations have also been identified by DJB and communicated to respective agencies for taking remedial action).

Both of these issues, sewage flowing into storm drains and storm water entering the sewer lines needs to be attended to immediately. A plan is being formulated by the DJB for ensuring that no sewage flows into the storm water drains for which they require about three months to finalize. All the three municipalities, DSIDC, NDMC, PWD and Cantonment Board are in the process of preparing detailed plans for ensuring that storm water does not enter the sewerage network for which they also require about three months to finalize.

7) Hon'able NGT has also directed the committee to suggest a common authority/body which should be responsible for maintenance, cleaning and all other matters in relation to drains. The committee after deliberating the issue has come to a consensus that the Irrigation & Flood Control Department is best suited to take care of all the drains that are 4 feet and above provided they are strengthened appropriately. The small drains should be under the jurisdiction of the respective agencies.

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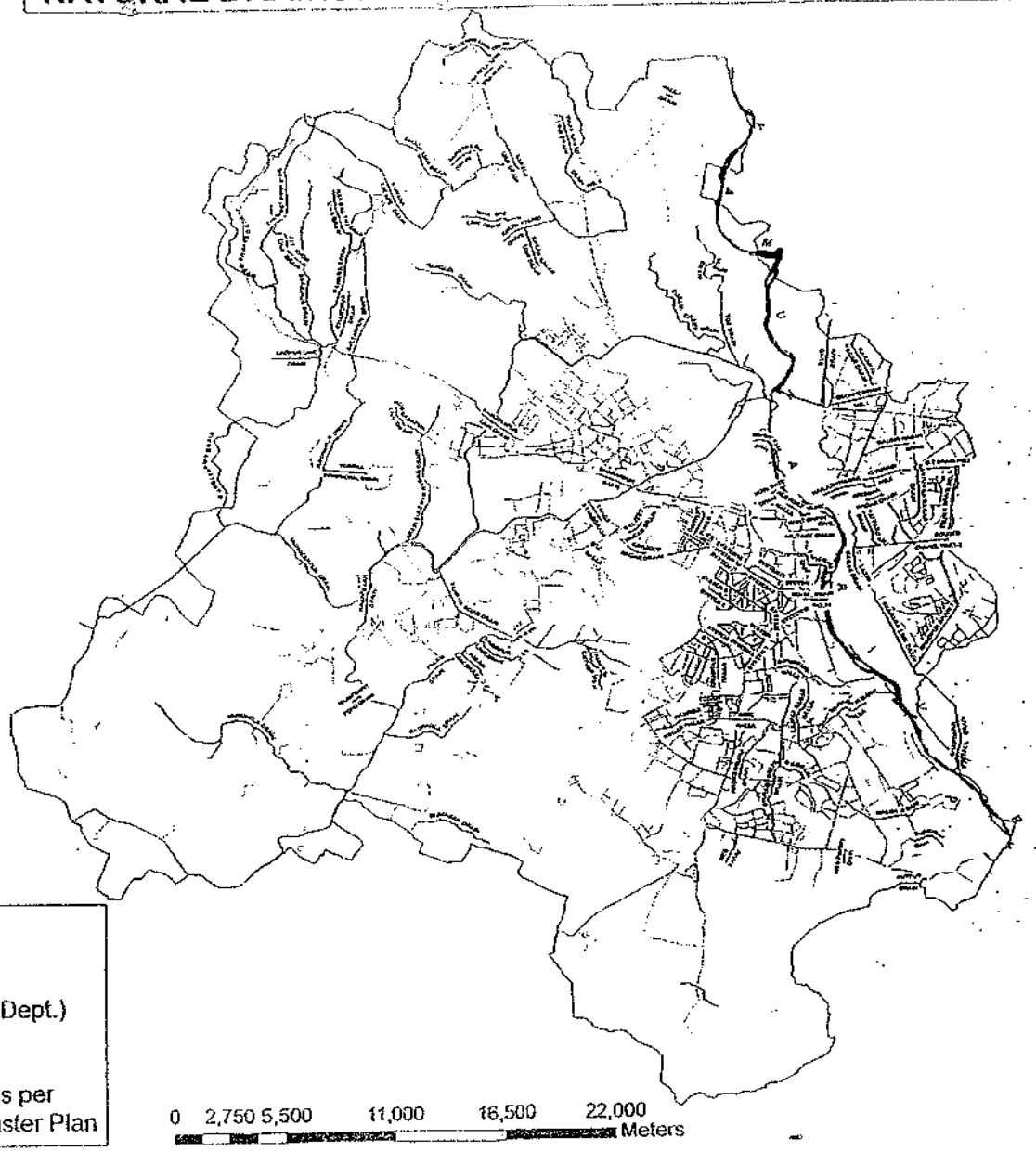
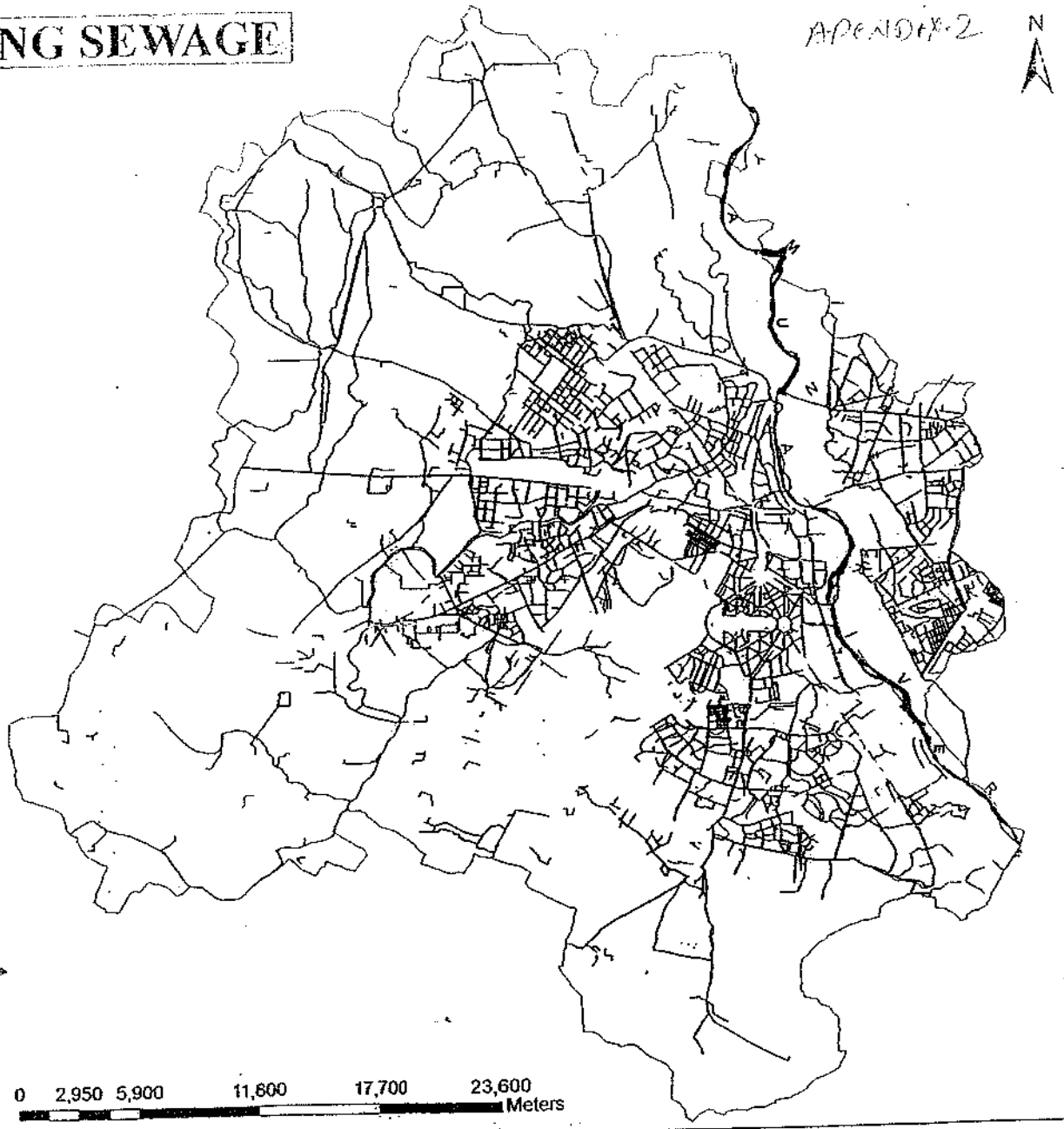
NATURAL DRAINS AS PER 1976 DRAINAGE MASTERPLAN

APENDIX V 2.3



DRAINS CARRYING SEWAGE

APENDIX-2



APPENDIX No. 5

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Status of working/ under construction/ Proposed STPs in DJB with Details such as name, location, capacity, utilization, Technology, and parameters (Designed and achieved)

S. No.	Name & location of STP	Year of Commissioning	Present Capacity (MGD) / Utilization capacity (MGD)	Designed parameters BOD SS (ppm)/ Achieved Parameters BOD SS (ppm)	Technology on which plant is working	Total Utilization likely by 2017	Action Plan for optimum utilization
1.	Keshopur Phase-I	2012	12 / 10	20 : 30/ <20:30	Activated Sludge Process (ASP)	72	
	Keshopur-phase-II	1975	20 / 15	30 : 50/<30:50	ASP		
	Keshopur-phase-III	1990	40 / 30	30 : 50/under Stabilization	ASP		
2.	Nilothi Phase-I	2002	40 / 12	30 : 50/<30:50	ASP	60	20 MGD S.T.P is under construction is likely to be commission by 31.12.2014
	Nilothi Phase-II	Under construction	Under construction				
3.	Najafgarh	2002	5 / 1	30 : 50/<30:50	Extended Aeration	5	
4.	Pappankalan Phase-I	2002	20 / 15	30 : 50/ Results needs improvement	ASP	40	20 MGD S.T.P is under construction is likely to be commission by 31.12.2014
	Pappankalan Phase-II	Under construction	Under construction				
5.	Bakkarwala	Taken over from MCD in 2000	0.66 /0.01	30 : 50/<30:50	FAB	0.66	

6.	Rithala Phase-I Rithala Phase-II	1991 2001	40 / 15 40/36	30 : 50 /<30:50 15 : 20/<15:20	ASP ASP	80	
7.	Coronation Pillar - phase-I Coronation Pillar - phase-II	2000 2001	20/15 20/5	30 : 50 /<30:50 30 : 50 /<30:50	ASP ASP	80	40 MGD STP is proposed and is likely to be commissioned by 2017
8.	Narela	2000	10/1	30 : 50 / <30:50	ASP	10	
9.	Rohini	2002, Partly commissioned	15/2	30 : 50/Partly commissioned	ASP		
10.	Oxidation Pond Timar Pur	1947	6/2	30 : 50/Proposed to be closed	Oxidation Pond	6	Proposed to be closed
11.	Okhla Phase-I Okhla Phase-II Okhla Phase-III Okhla Phase-IV Okhla Phase-V Okhla Phase-VI	1937 1982 1993 1993 2001 2012	30 12 37 45 16 30 (129)	30 : 50 / 40 : 39 30 : 50 / 21 : 33 30 : 50 / 15 : 18 30 : 50 / 20 : 30 20 : 30 / 18 : 24 20 : 30 / 10 : 10	ASP ASP ASP ASP ASP ASP	170	
12.	Kondli Phase-I Kondli Phase-II Kondli Phase-III Kondli Phase-IV	1987 1989 2001 2014	10 / closed 25 / 11 10 / close 45 / 18	Under Rehab. 20 : 30 / 19 : 29 Under rehab. 20 : 30 / 10 : 12	ASP ASP ASP ASP	90	2 X 10 MGD STP is closed due to inadequate sewerage

13.	Yamuna Vihar Phase-I Yamuna Vihar Phase-II Yamuna Vihar Phase-III	1998 2002 Under construction	10 / 7 10 / 8 Under construction	20 : 30 / 17 : 35 20 : 30 / 32 : 56 10 : 10	ASP ASP ASP	45	25 MGD STP is likely to be commission by 31.12.2014
14.	Mehrauli	2003	5 / 3	20 : 30 / 11 : 14	Extended Aeration	5	
15.	Vasant Kunj Phase –I Vasant Kunj Phase – II	1998 1998	2.2/ 2 3 /2	30 : 50 / 9 : 12 30 : 50 / 10 : 15	Extended Aeration Extended Aeration	5	
16.	Ghitorny	2003	5/0	30 : 50 / 0-0	— ASP	5	Not commissioned as sewer is not available at present and is likely to be commission by 31.12.2015
17.	Delhi Gate Phase-I Delhi Gate Phase-II	1999 Under construction	2.2 / 2.4 Under construction	10 : 10 / 7 : 10 10 : 10	Densadeck Filtration ASP	17.2	15 MGD Phase-II Plant is likely to be commission by 31.12.2014
18.	Sen Nursing Home	1998	2.2 / 2.4	10 : 10 / 7 : 10	Densadeck Filtration	2.2	
19.	Commonwealth	2010	1 / 0.17	2 : 1 / 1:6	Membrane Bio-Reactor (MBR Process)	1	

	Games Village						
20.	Molar Bandh	2009	0.66 / 0.66	30 : 50	Fluidized Aerated Bed/ (Bio-Reactor FAB)	0.66	
21.	Kapashera	2014	5 / 1	10 : 10 / 7 : 9	Sequencing Batch Reactors (SBR)	5	
22.	Chilla	2014	9 /.9	10 : 10 / 10 : 17	Sequencing Batch Reactors (SBR)	9	
23.	Delhi Cantt.	Proposed		10 : 10	Sequencing Batch Reactors (SBR)	8	8 MGD STP is proposed and tenders are likely to be invited shortly
	Total		603.72/ 350 to 360			*731.72 *Excluding this decentralized STPs Proposed for unsewered areas under Sewerage Master Plan-2031	

OSD TO V.C (DDA)

Chief Engineer (Dr.) Proj-I

APPENDIX No. 4
276. 1403

ACTION PLAN

FOR

IMPLEMENTATION OF DIRECTIONS OF NATIONAL GREEN TRIBUNAL (NGT)

DELHI JAL BOARD
Govt. of NCT of Delhi

AECOM

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NATIONAL GREEN TRIBUNAL (NGT)

SEWERAGE MASTER PLAN-2031

NCT Delhi has an expanding population that has grown by more than 300% since 1971 when it stood at 4.066 million, increasing to the current level of around 20 million. As per Census 2011, Delhi had a population of 16.753 Million and as per the Delhi Master Plan 2021, the population of Delhi is projected to be 23 Million. Presently, approximately 50% of Delhi is not connected with sewerage system as shown in ***Figure 1***. The wastewater services in next twenty years are likely to worsen drastically unless remedial measures are taken today.

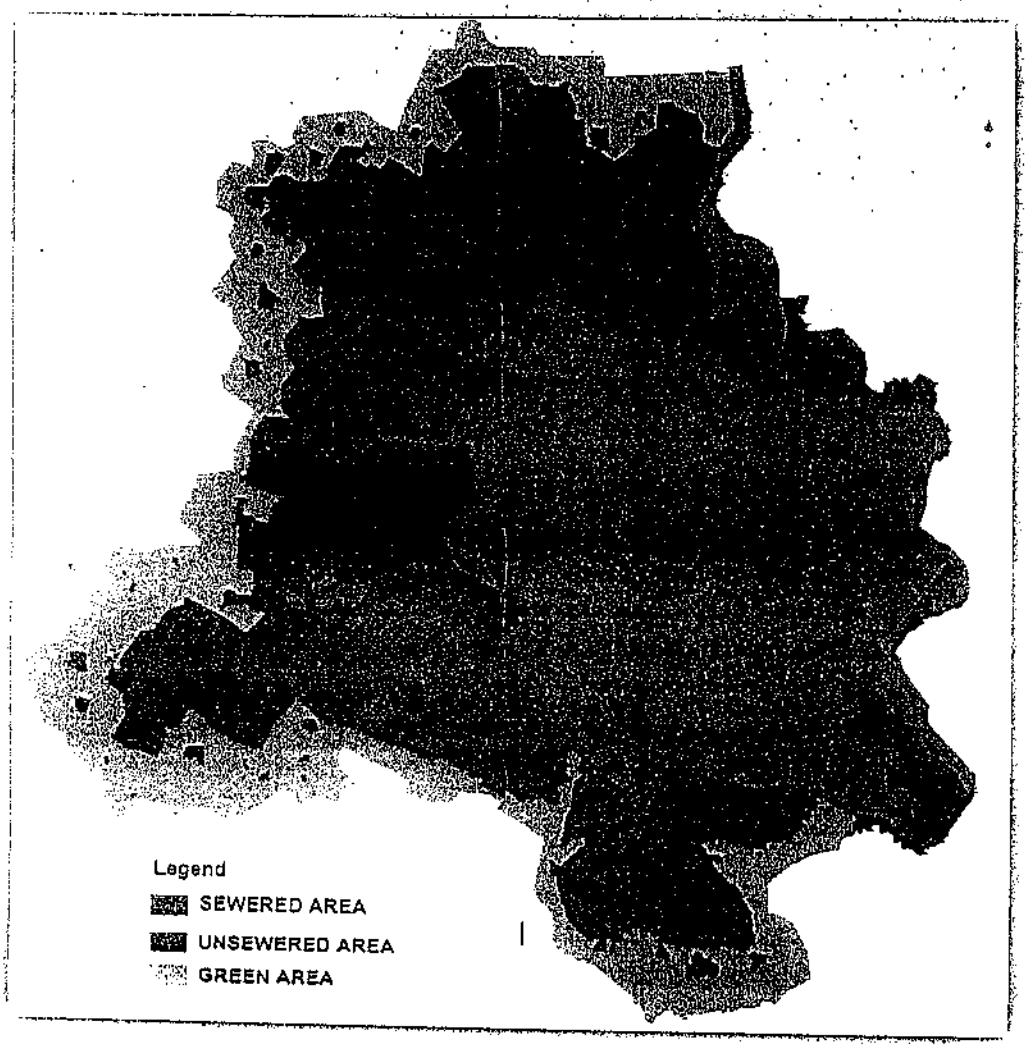


Figure 1: Sewered & Unsewered area of NCT of Delhi

For unsewered areas of Delhi, DJB got developed a holistic, integrated and sustainable Master Plan for design horizon of 2031. This master plan shall ensure that the comprehensive, technically and financially viable plans (CAPEX & OPEX) are in place for the implementation of sewerage works in unsewered areas of Delhi by integrating with existing network and sewerage infrastructure so as to bring the latter to their optimum utilization state.

As per SMP-2031, the whole NCT of Delhi has been delineated into 12 (twelve) drainage zones as listed and shown in Figure 2 below:

- Shahdara Drainage Zone (SHD)
- Okhla Drainage Zone (OKH)
- Keshopur Drainage Zone (KSP)
- Rohini- Rithala Drainage Zone (RR)
- Coronation Pillar Drainage (COR)
- Dwarka Drainage Zone (DWK)
- Najafgarh Drainage Zone (NJF)
- Nilothi Drainage Zone (NLT)
- Narela Drainage Zone (NRL)
- South Delhi Drainage Zone (SD)
- Outer South Delhi Drainage Zone (OSD)
- Kanjhawala-Bawana (KB)

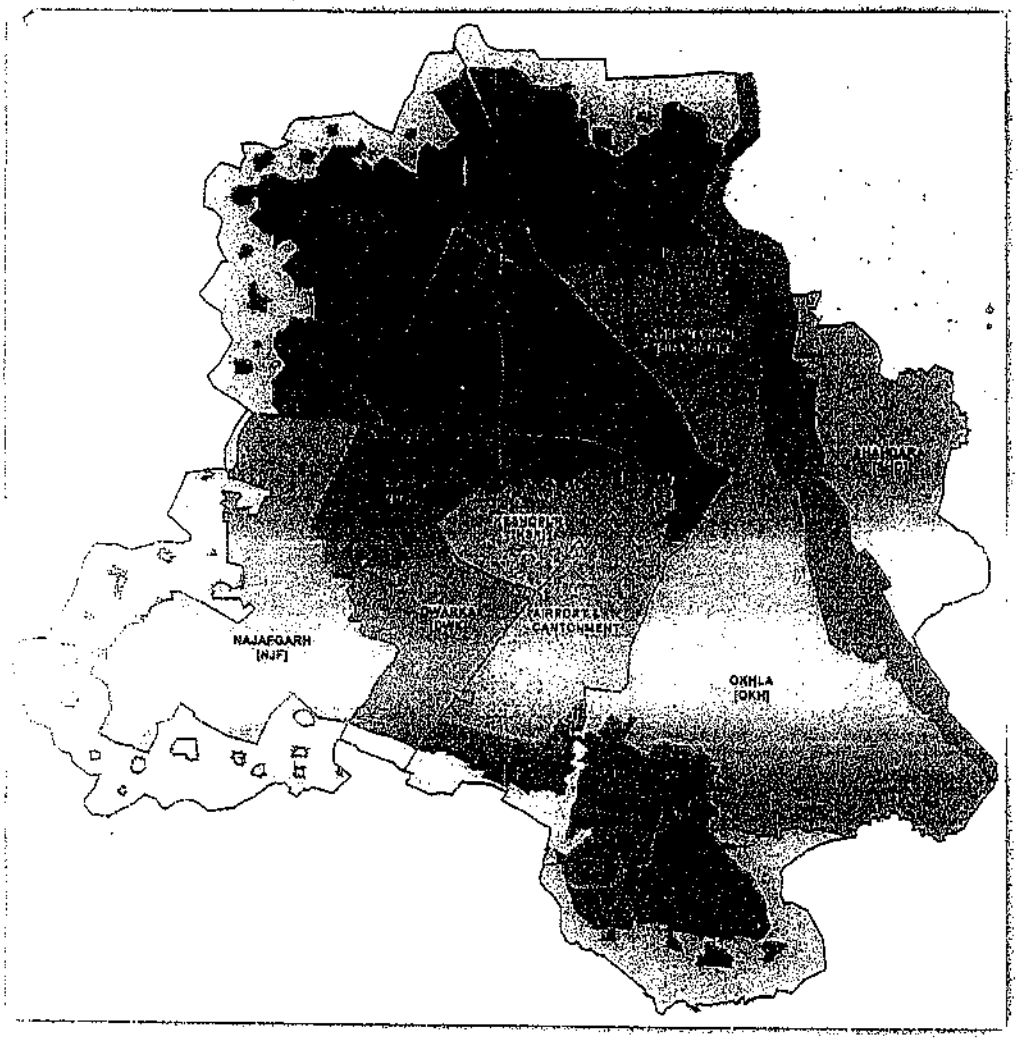


Figure 2: Proposed Drainage Zones – NCT Delhi

The Sewerage Master Plan for design year 2031 (SMP-2031) has been developed by AECOM with the need to lay additional sewerage network of around 10,000 Km. Unsewered areas of Delhi has complex situation with congestion and lesser space left for laying the sewerage utility. In view of this, trenchless technology methods such as Microtunnelling and HDD have been proposed for laying new networks as appropriate. As an immediate measures a techno-feasible option has also been convened which is to trap the sewage flowing in the drains from un-sewered areas by implementing Interceptor Sewer system. This shall cut off untreated sewage contamination in the drains towards river Yamuna. This shall be a short term immediate relief for the betterment of sanitation condition and hence quality of river Yamuna. The master planner, AECOM with inputs of DJB has wisely taken up the proposed infrastructure in the SMP-2031 by integrating with these proposed interceptor sewers. The proposed sewerage schemes under SMP-2031 shall be implemented in various phases as per intended priority over next few years.

Ramifications of SMP will ensure that the comprehensive, techno-economical plans are in place for the implementation of sewerage development and improvement works. Ramifications will also upgrade the sewerage infrastructure leading to improved sanitation conditions and also enhance the water quality in river Yamuna.

DRAINAGE MASTER PLAN FOR DELHI

IIT Delhi and National Green Tribunal (NGT) are working jointly on holistic Storm Water Drainage Master Plan of Delhi. The concern of NGT is to ensure that no untreated sewage should flow into storm water drains and thus leading to rejuvenation of these drains. About 201 Storm Water Drains (SWD) have been identified as natural drains as per Drainage Master Plan-1976. Most of them are carrying sewage from sewered and unsewered areas of Delhi and there is a need to provide system to isolate sewage from SWD on immediate basis. It was suggested to prioritize the part of proposed sewerage schemes for immediate implementation to cut off sewage flow in natural SWD.

APPROACH & METHODOLOGY FOR UNSEWERED AREAS IN DELHI

Following key activities have been carried out by AECOM to prioritize the part of sewerage scheme proposed under SMP-2031 for immediate implementation to cut off sewage flow in storm water drains:

- Superimposition of 201 natural drains provided by IIT-Delhi, on proposed sewerage schemes under SMP-2031.
- Conceptual analysis of superimposed drains in co-orelation with proposed sewerage schemes under SMP-2031.
- Approach for prioritization of part of proposed sewerage networks for immediate implementation works for revival of natural drains.
- Identification and tentative prioritization of proposed sewerage infrastructure comprising Waste Water Treatment Plant (WWTP), Waste Water Pumping Station (WWPS) and associated structures for implementation.
- Estimation of anticipated broad cost for execution of prioritized works as discussed above.

Map showing overall proposed sewerage schemes for unsewered areas of Delhi under SMP-2031 along with superimposed 201 natural drains has been attached. Proposed sewerage schemes for individual drainage zones have been analyzed in co-relation with superimposed natural drains. Tentative prioritization of part of sewerage networks for proposed drainage zones has been carried out and shown as highlighted portion in the maps. The maps are attached and listed below:

1. Superimposed Drains over all proposed sewerage schemes under SMP-2031
2. MAP showing tentative prioritization of overall proposed sewerage schemes
3. Shahdara Drainage Zone
4. Okhla Drainage Zone
5. Keshopur Drainage Zone
6. Rohini- Rithala Drainage Zone
7. Coronation Pillar Drainage
8. Dwarka Drainage Zone
9. Najafgarh Drainage Zone
10. Nilothi Drainage Zone

11. Narela Drainage Zone
12. South Delhi Drainage Zone
13. Outer South Delhi Drainage Zone
14. Kanjhawala-Bawana (KB)

Proposed aspects for further consideration toward stipulated objectives of NGT:

- Implementation of sewerage schemes proposed under SMP-2031 has been taken up by DJB at various drainage zones. It is suggested that an option of prioritizing the implementation schedule of contractors for execution of proposed sewerage network to cut off sewage flow in natural drains on immediate basis, can be looked into.
- It is further suggested to execute the prioritized sewerage network of proposed schemes, in the vicinity of area where other schemes are already under implementation by DJB.
- Neighboring states also contributes to the sewage flow in natural storm drains. Thereby it is necessary to take this issue on priority basis in parallel.

SUMMARY OF TENTATIVE PRIORITIZED SEWERAGE NETWORK, WWPS AND WWTP AS PER SMP-2031

- Proposed Sewerage length (Tentative): Approx. 600 km
- Proposed Pumping Stations: 26 Nos.
- Proposed Waste Water Treatment Plant Capacity: 119 MGD (32 Nos.), Capacity Range: 0.6 – 10 MGD)

ANTICIPATED BROAD COST

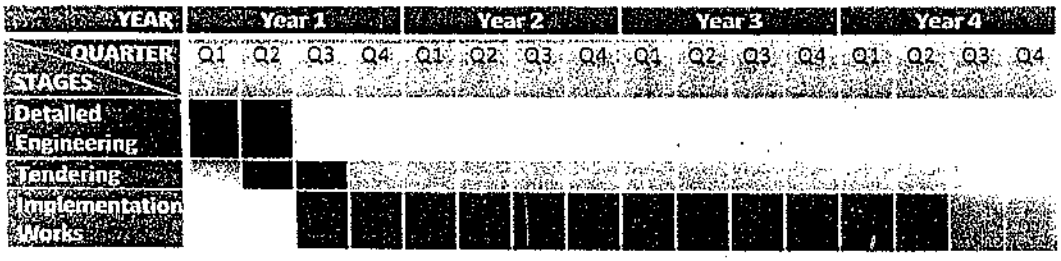
The anticipated broad cost for execution of works prioritized above has been estimated as INR 4,000 Crores (approx.) considering an escalation factor of 8.5% per year for 3 years. The cost has been derived based on aspects as mentioned above and is tentative only. The actual cost may vary as per detailed engineering/ study to be conducted.

TIMELINES

The proposed sewerage works are likely to be completed in a period of 2 to 3 years from the actual start of the works at site. The implementation of the works where only sewer lines are to be laid can be completed in two years whereas the works involving the construction of WWPS and WWTP, may take three years.

Implementation Schedule for prioritized works:

Time required/ schedule for each stage of works has been represented as follows:

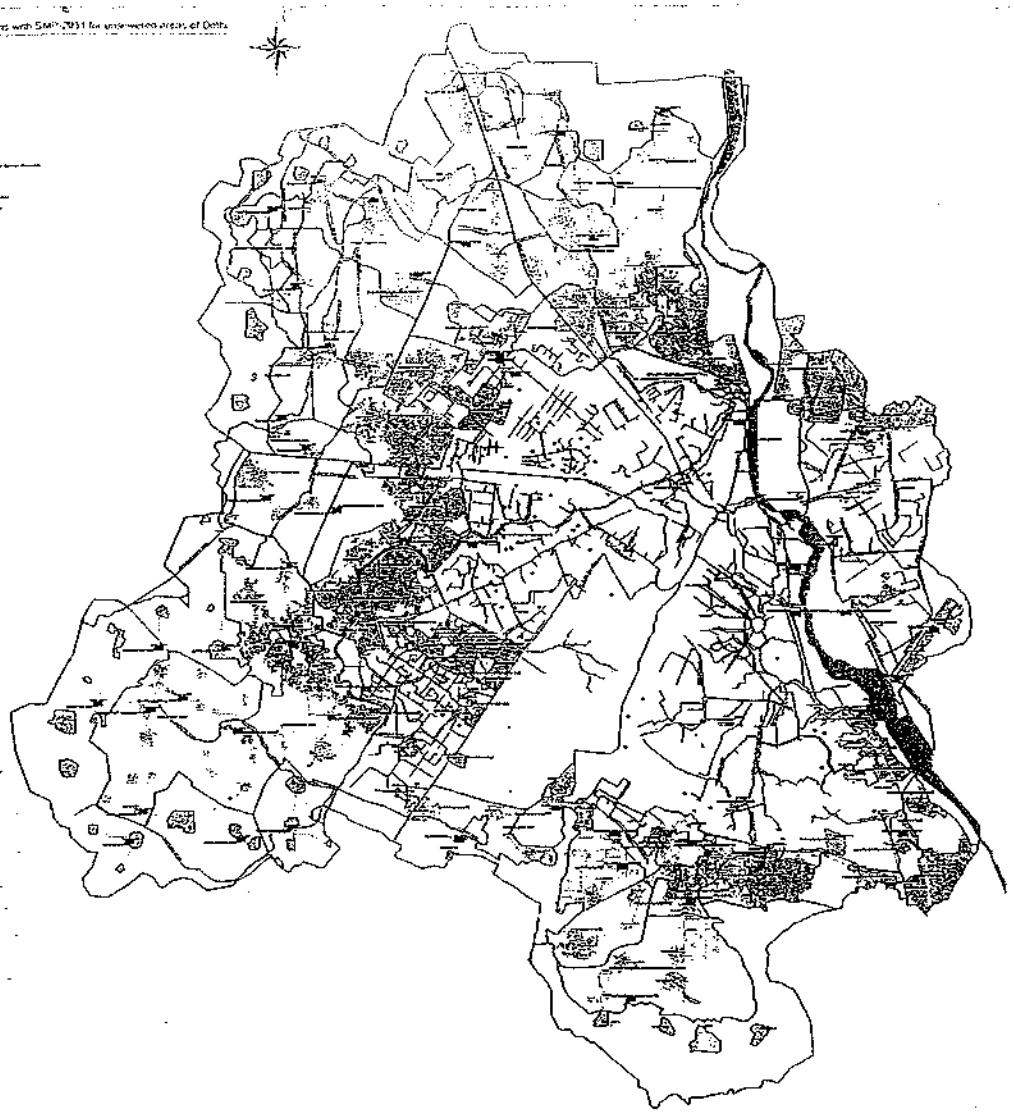


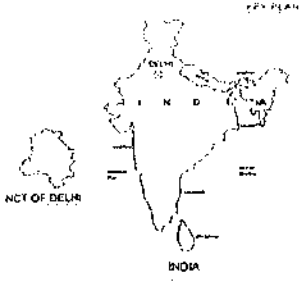
DISCLAIMER

The above exercise has been carried out considering the following aspects:

- Superimposition of 201 Natural drains over proposed schemes under SMP-2031 has been carried out based on the data provided by IIT-Delhi.
- Sewerage network prioritized is part of sewerage schemes proposed under SMP-2031 for unsewered areas of Delhi. In view of stipulated objective of NGT, further study may be carried out wherever required, to ascertain re-routing, inclusion/ exclusion of proposed networks, hydraulic design as per site feasibility. This may require additional Topographical Survey to be conducted along with GIS integration.
- The cost estimated for prioritized works excludes the cost of sewerage works already under implementation by DJB.

Superimposition of Drains with SMP-2031 for unserviced areas of Delhi





DRAINAGE ZONES AS PER SMP-2031

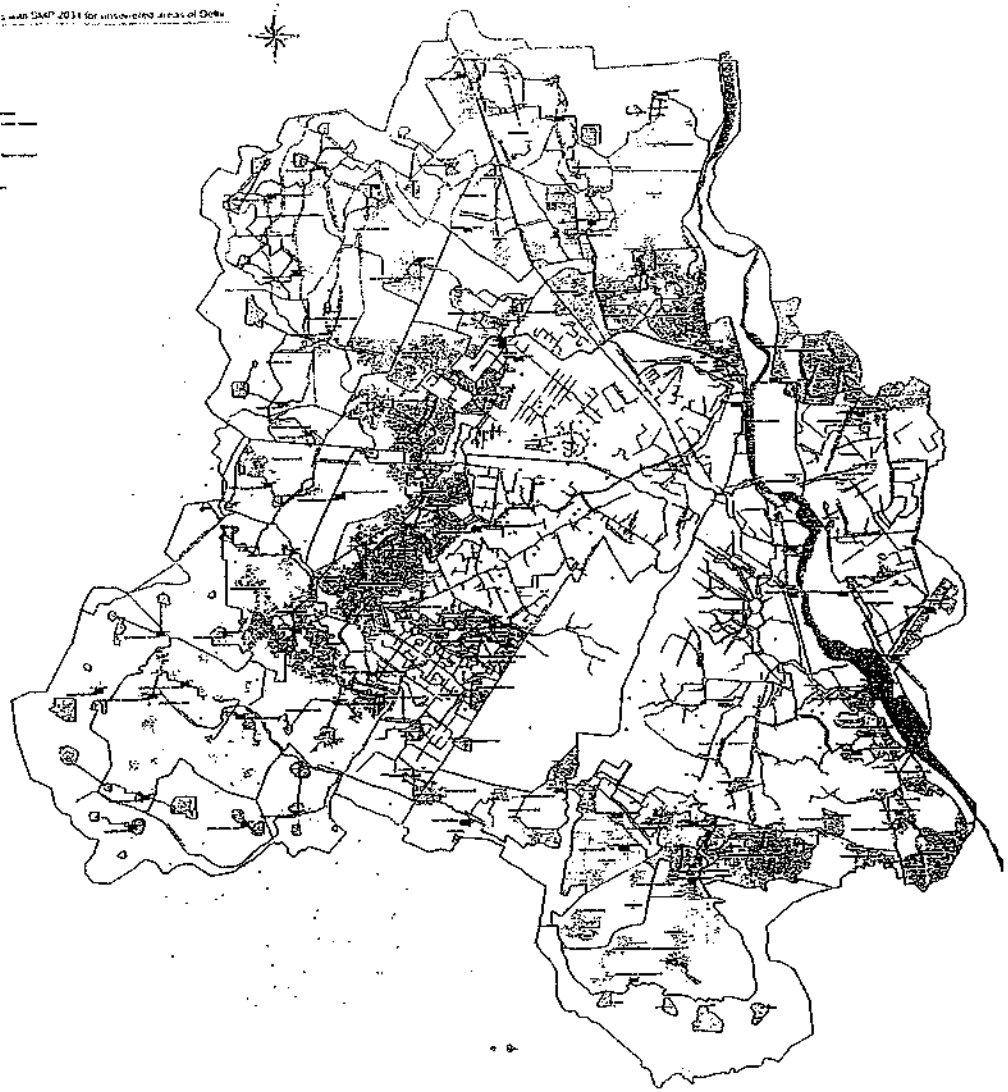
PLANNED		DESIGNED	
GIS INTEGRATION		APPROVED	
APPROVED & CHECKED		DATE	

AECOM

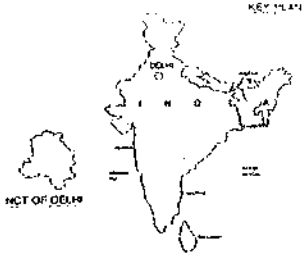
Client: DELHI JAL BOARD

Project Title: ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- DRAINAGE ZONE: SUPERIMPOSED DRAINS OVER ALL PROPOSED SEWERAGE SCHEMES UNDER SMP-2031

Superimposition of Drains with SMP-2031 for uncovered areas of Delhi



KEY PLAN



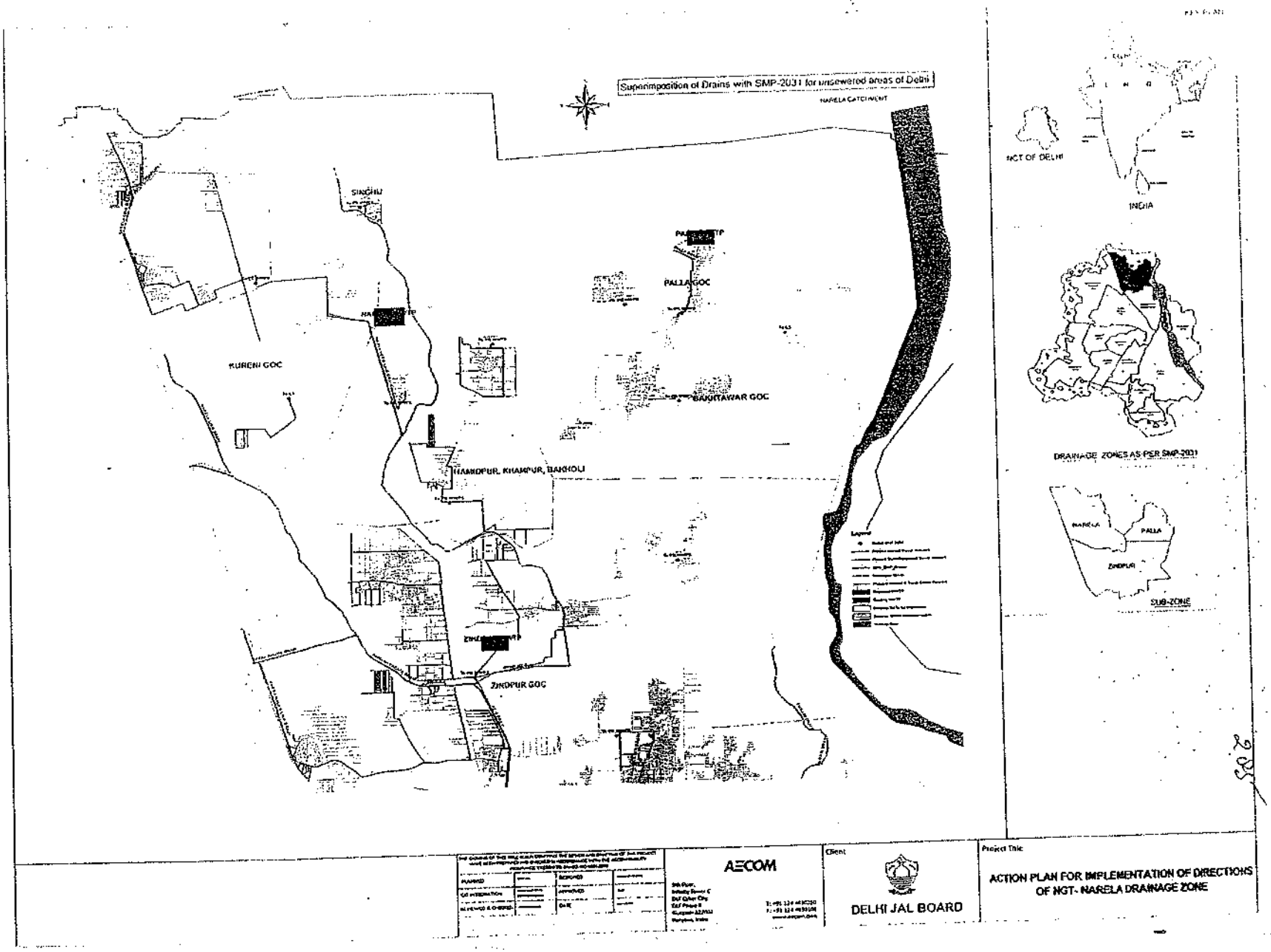
DRAINAGE ZONES AS PER SMP-2031

PLANNED		DESIGNED	
AS-BUILT DRAWING		APPROVED	
REVISED & CHECKED		DATE	

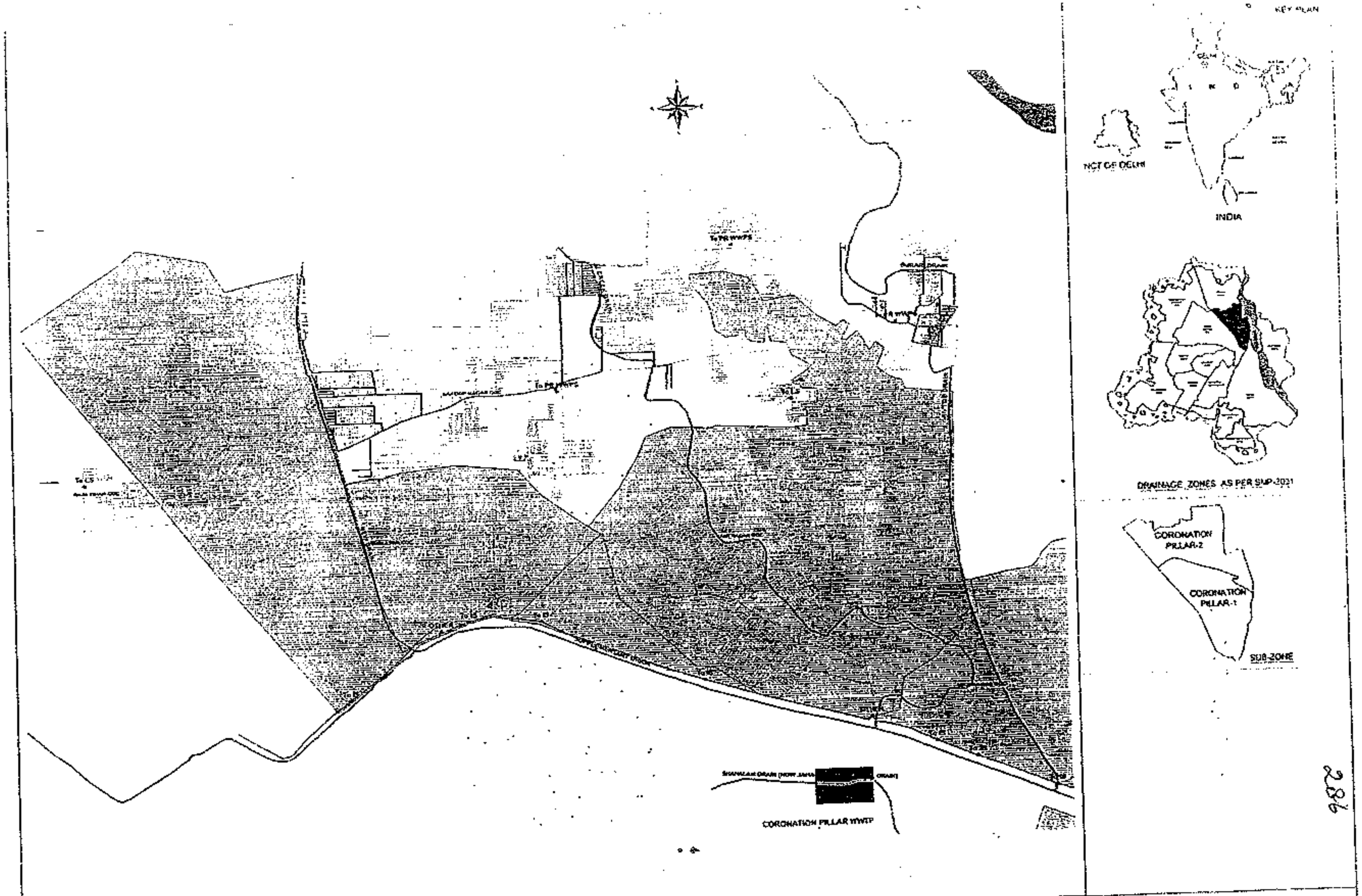
AECOM

Client: DELHI JAL BOARD

Project Title: ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- DRAINAGE ZONE: TENTATIVE PRIORITIZATION OF OVERALL PROPOSED SEWERAGE SCHEME UNDER SMP- 2031


Superimposition of Drains with SMP-2031 for unsewered areas of Delhi
NARELA CATCHMENT
SINGHU
KURENI GOC
PALLA GOC
BAKHTAWAR GOC
NANGLOI, KHAMPUR, BAKHOLI
ZINDPUR GOC
Legend
NCT OF DELHI
INDIA
DRAINAGE ZONES AS PER SMP-2031
NARELA
PALLA
ZINDPUR
SUB-ZONE
AECOM
Client
DELHI JAL BOARD
Project Title
ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- NARELA DRAINAGE ZONE

286



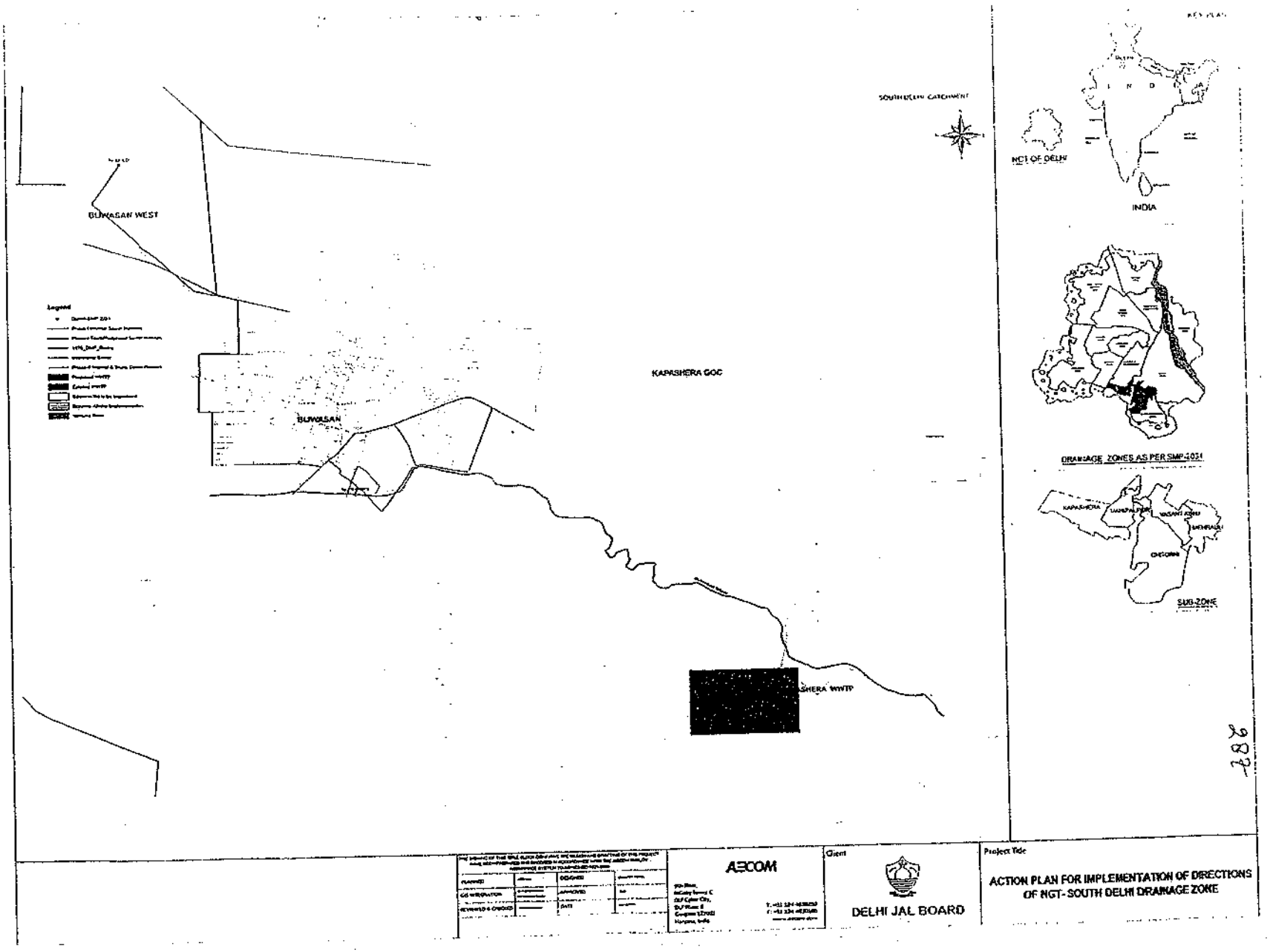
AECOM

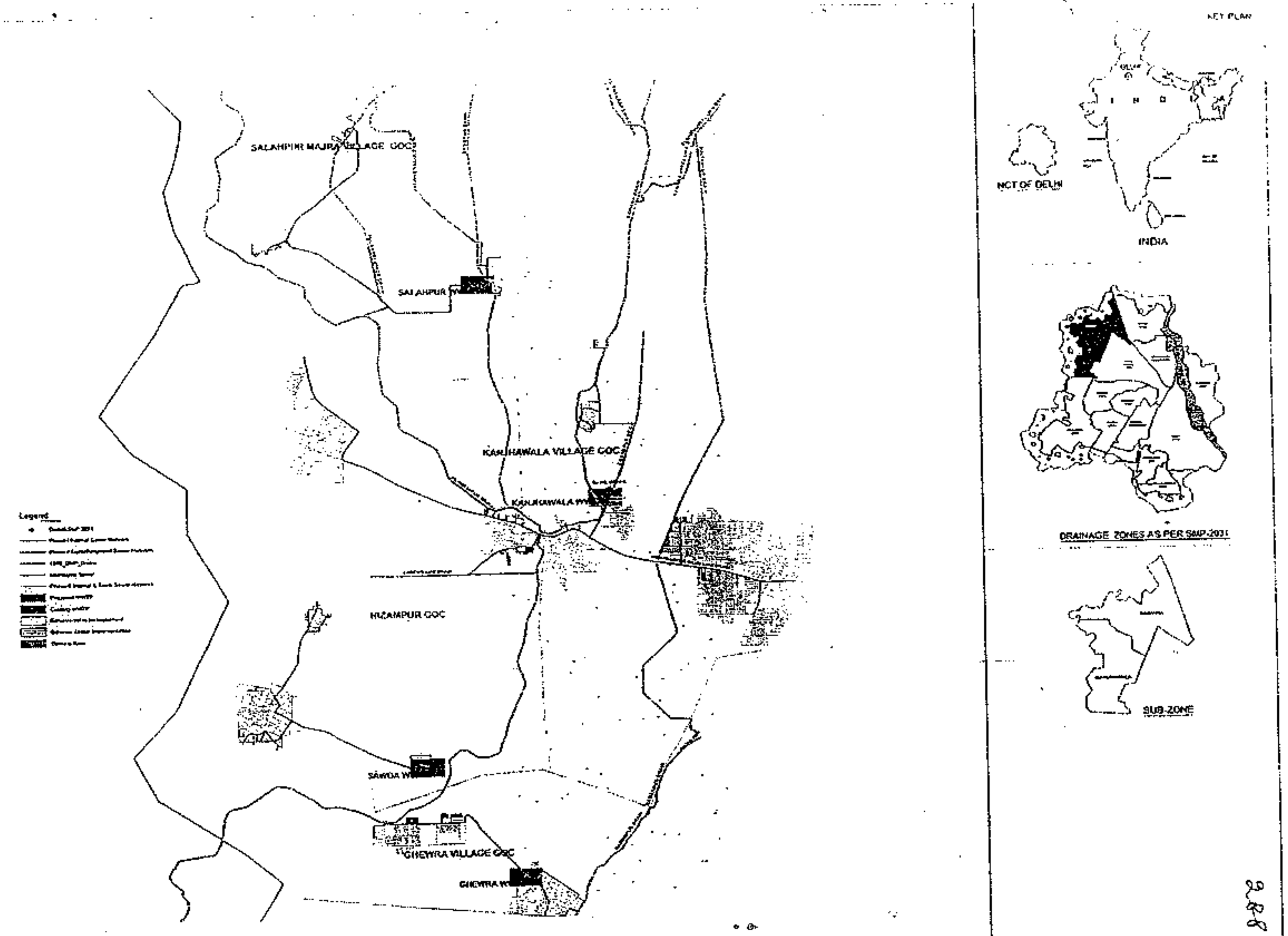
Client

DELHI JAL BOARD

Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- CORONATION PILLAR DRAINAGE ZONE


SOUTH DELHI CATCHMENT
BUWASAN WEST
KAPASHERA GOC
BUWASAN
SHERA WWTP
KEY PLAN
NCT OF DELHI
INDIA
DRAINAGE ZONES AS PER SMP-2021
SUB-ZONE
AECOM
DELHI JAL BOARD
Project Title
ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- SOUTH DELHI DRAINAGE ZONE



AECOM

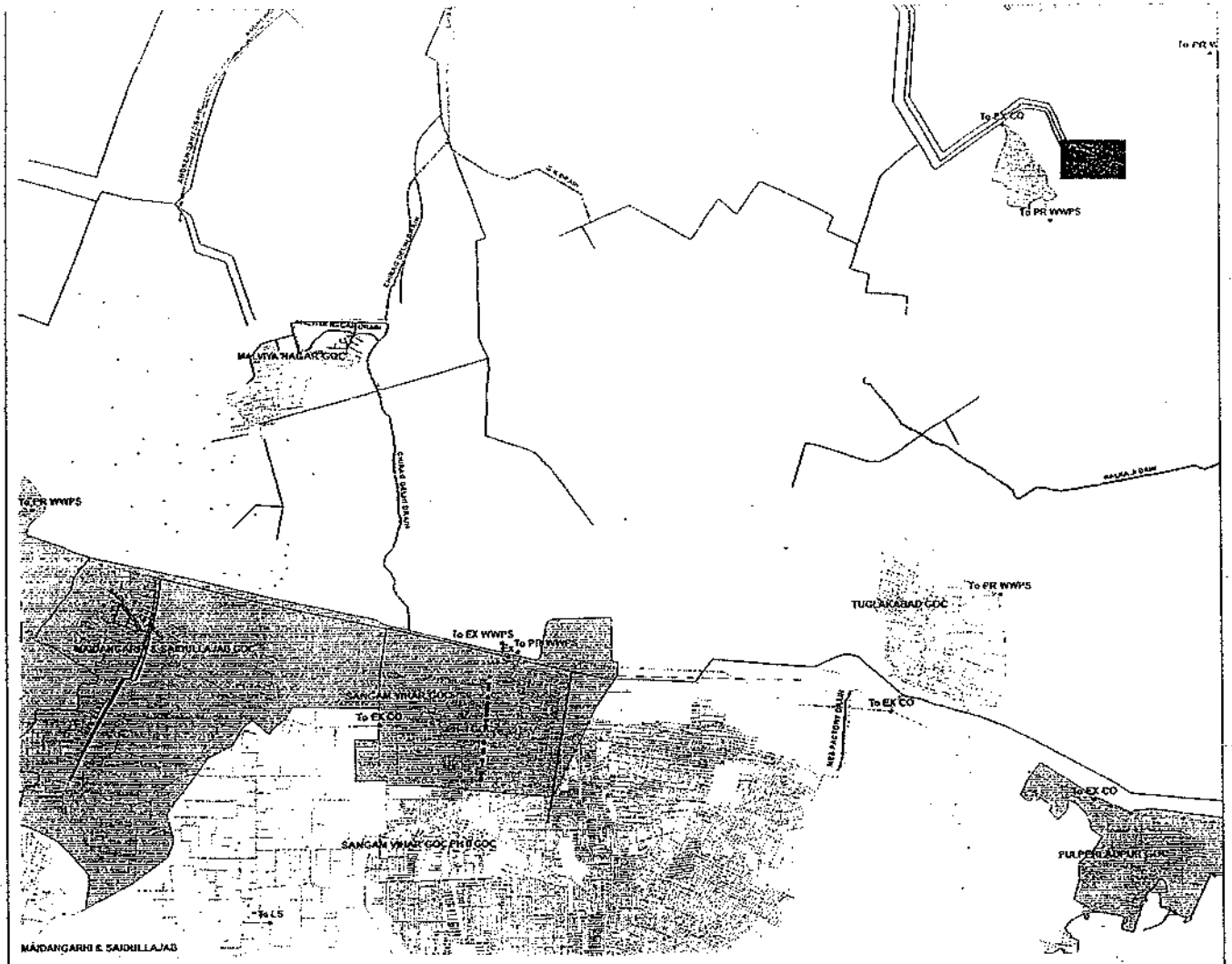
Client

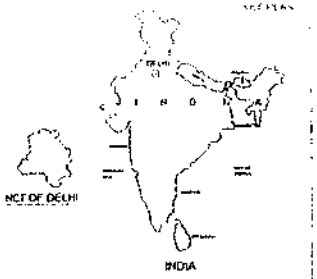
DELHI JAL BOARD

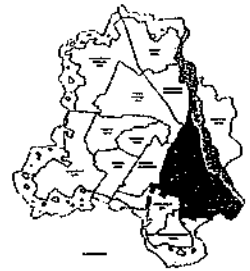
Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- KANJHAWALA DRAINAGE ZONE

288







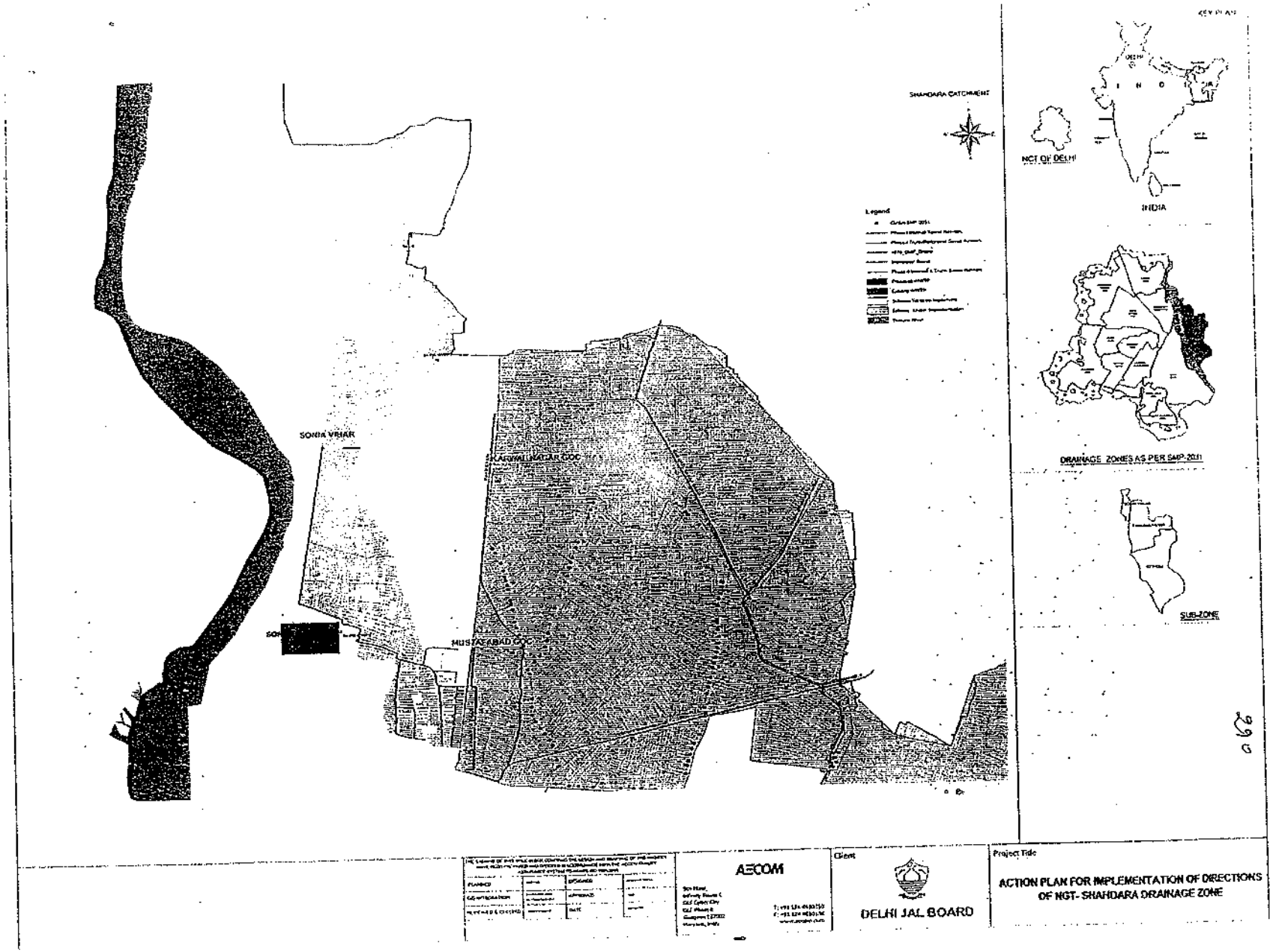
DRAINAGE ZONES AS PER SMP-2031

SUB-ZONE

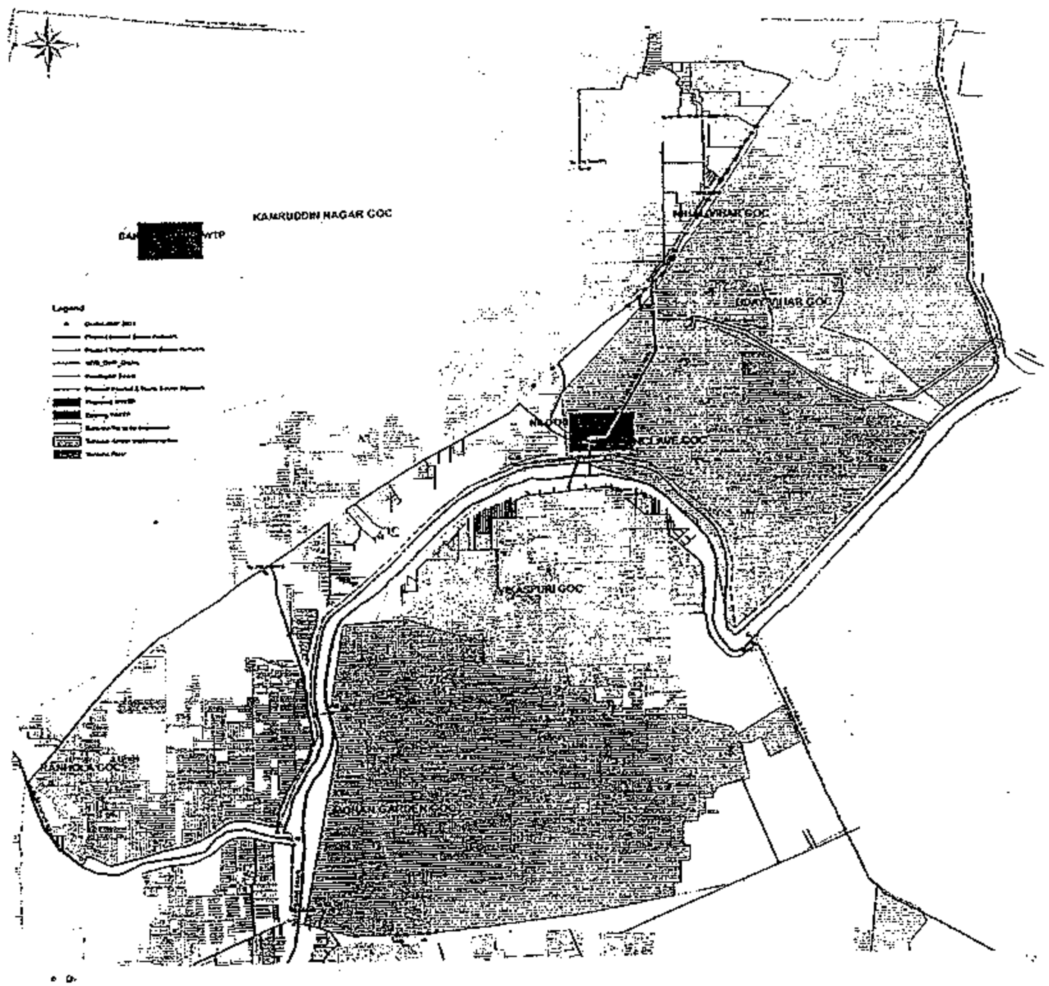
AECOM

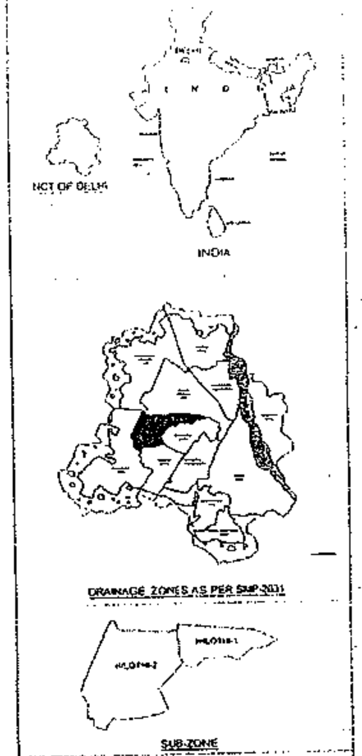
Client: DELHI JAL BOARD

Project Title: ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- OKHLA DRAINAGE ZONE


SHAHDARA CATCHMENT
SONIA VIHAR
AGRWAL KATRA GOC
MUSTAFABAD GOC
KEY PLAN
NCT OF DELHI
INDIA
DRAINAGE ZONES AS PER SMP-2011
SUB-ZONE
AECOM
Client
DELHI JAL BOARD
Project Title
ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- SHAHDARA DRAINAGE ZONE

291





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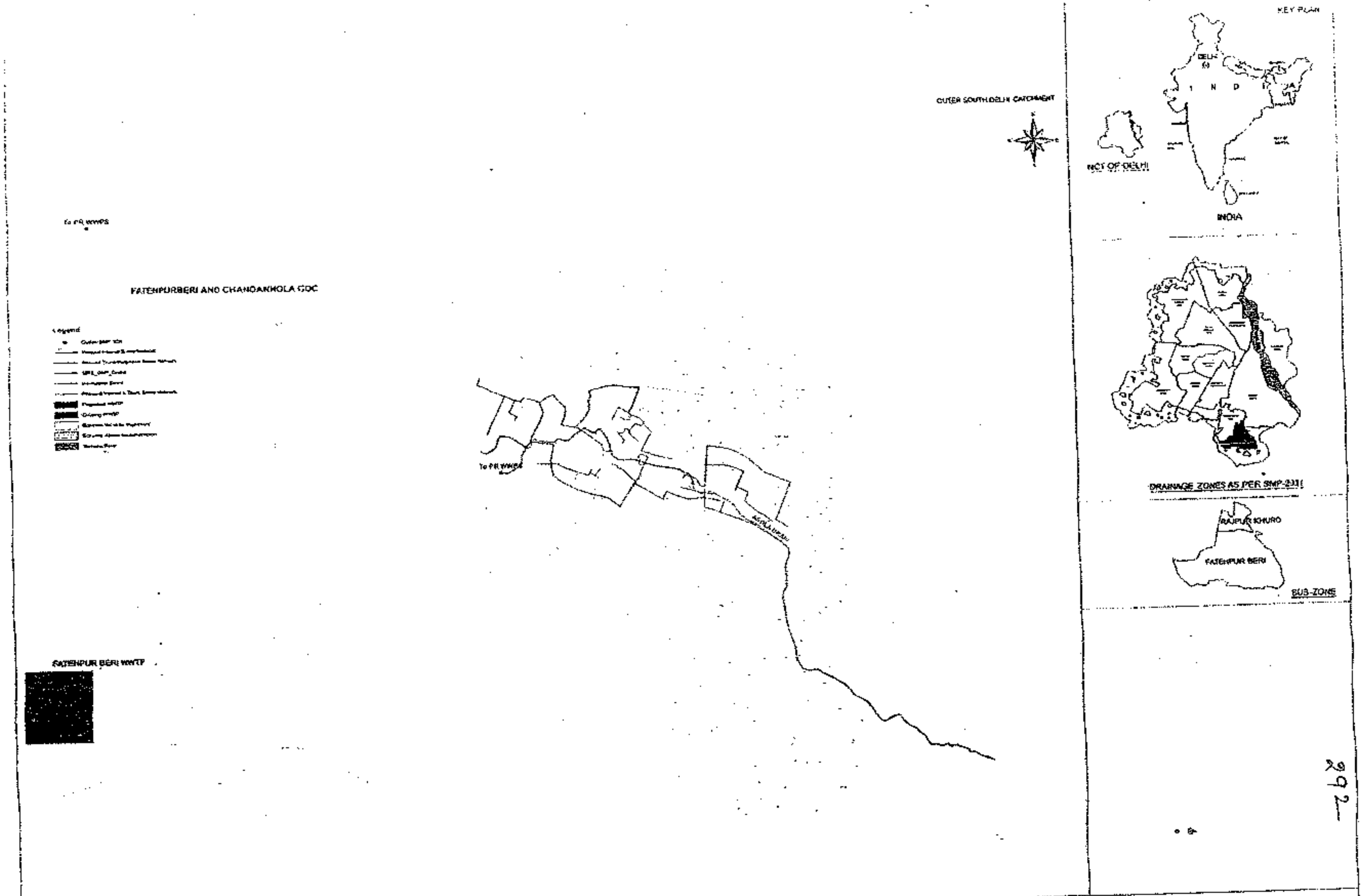
DELHI JAL BOARD

Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- NILOTHI DRAINAGE ZONE

232 177

292



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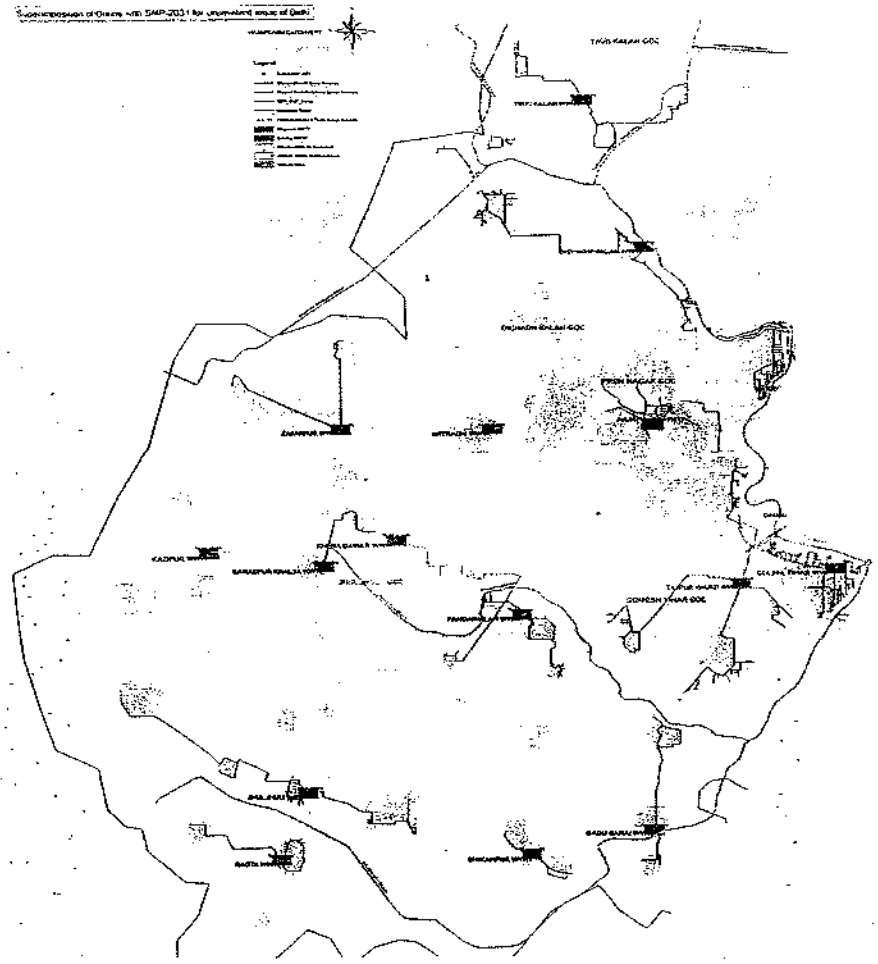
Client
DELHI JAL BOARD

Project Title
ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- OUTER SOUTH DELHI DRAINAGE ZONE



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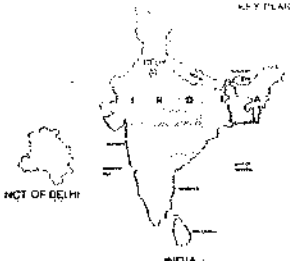

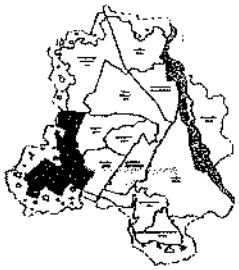

DRAINAGE ZONES AS PER SMP-2031

SUB ZONES

293

AECOM

DELHI JAL BOARD

Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- NAJAF GARH DRAINAGE ZONE

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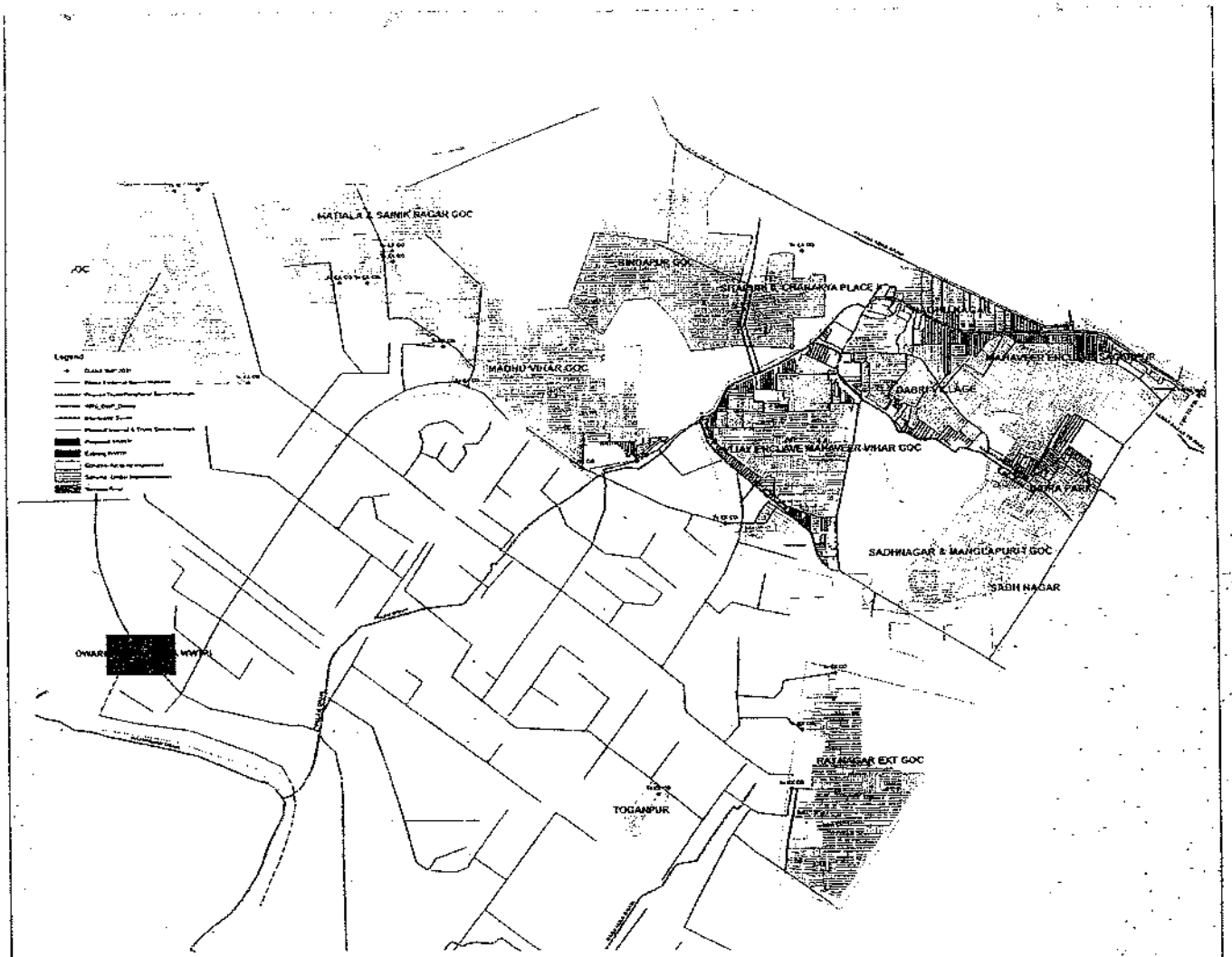

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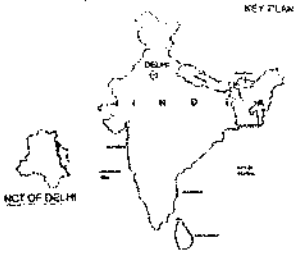
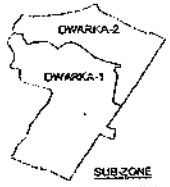


DRAINAGE ZONES AS PER SMP-2031



SUB ZONE

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GIS INTEGRATION		APPROVED	
REVIEWED & CHECKED		DATE	

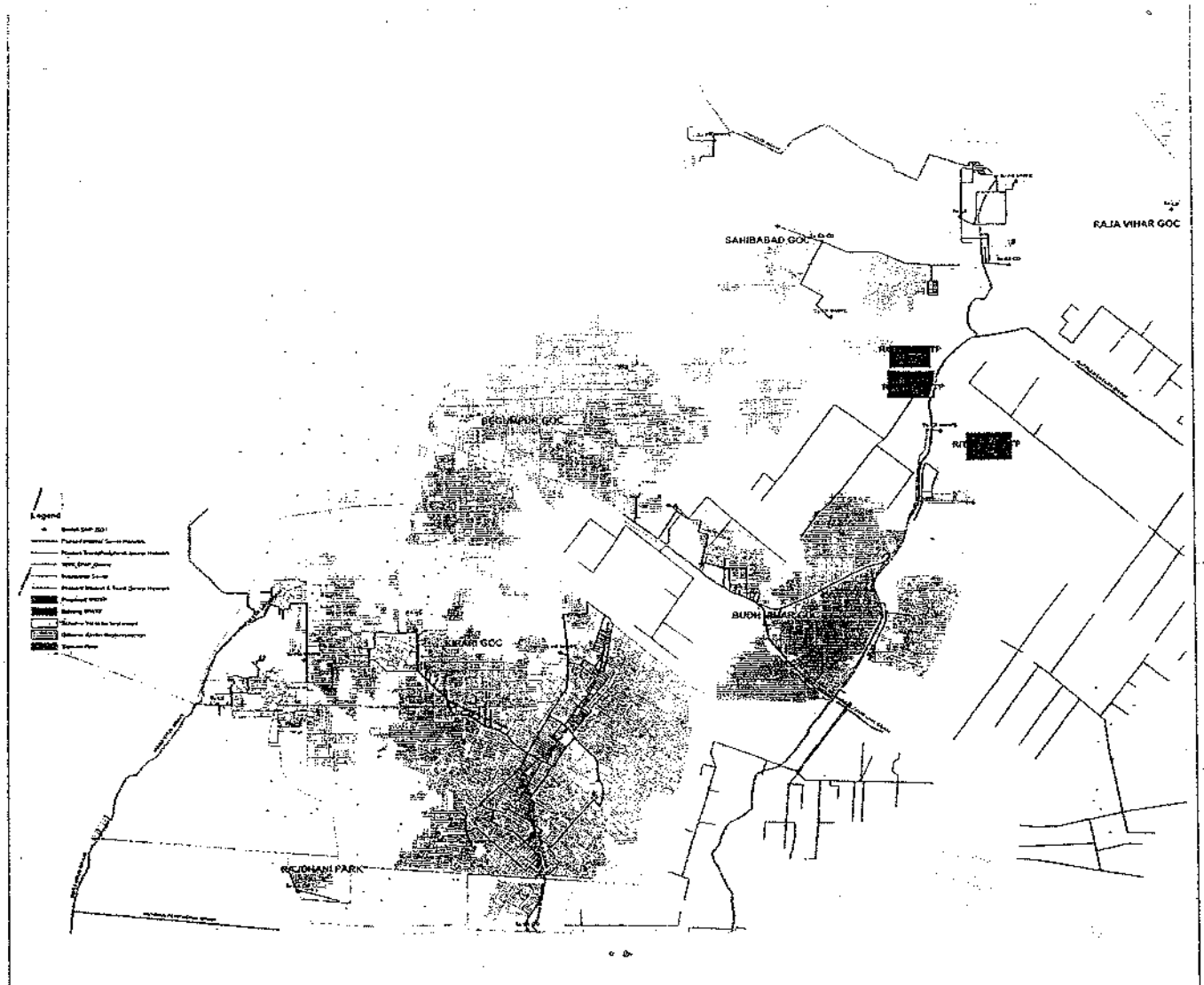
AECOM

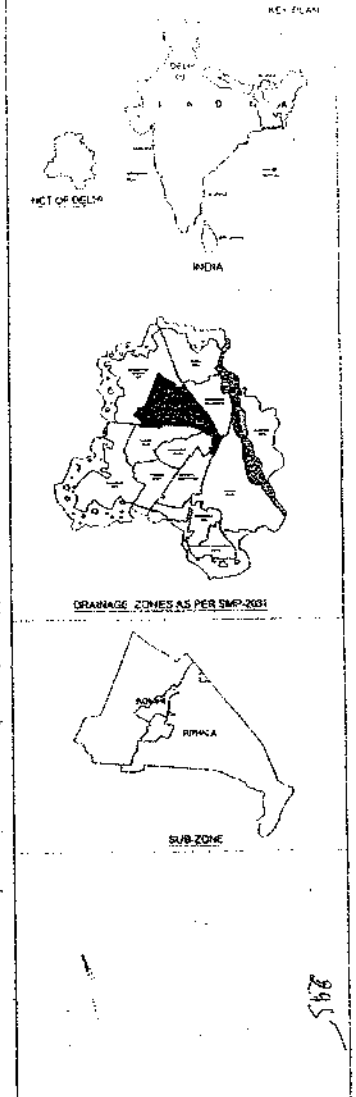
Client

DELHI JAL BOARD

Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- DWARKA DRAINAGE ZONE



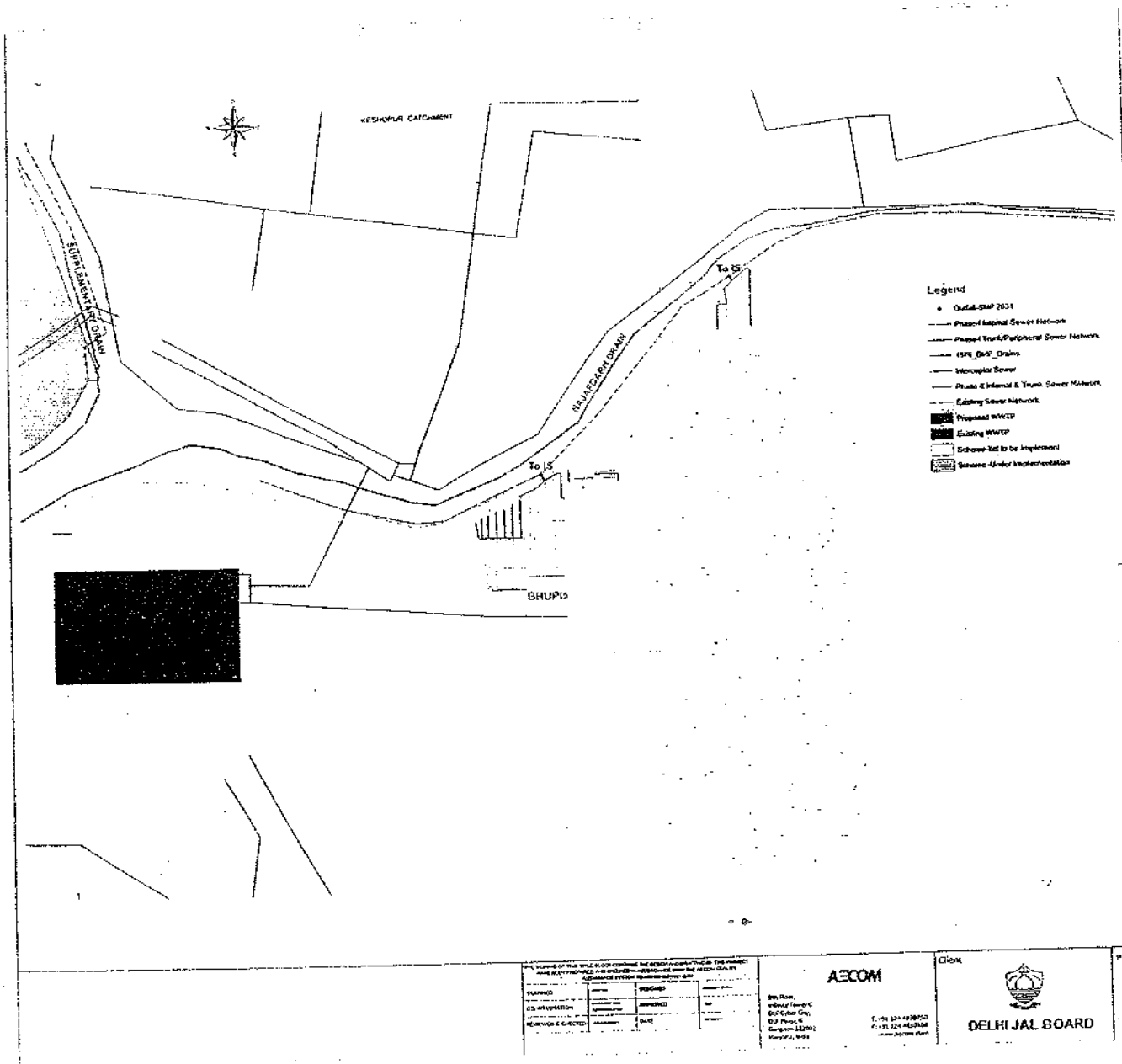


AECOM

DELHI JAL BOARD

Project Title

ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- ROHINI-RITHALA DRAINAGE ZONE



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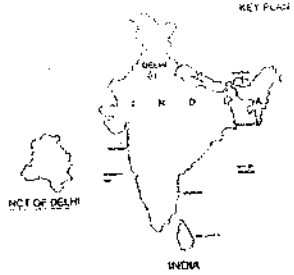

DRAINAGE ZONES AS PER SMP 2031

SUB-ZONE

PLANNED		REVIEWED	
CO-ORDINATED		APPROVED	
REVIEWED & CHECKED		DATE	

AECOM

Client: DELHI JAL BOARD

Project Title: ACTION PLAN FOR IMPLEMENTATION OF DIRECTIONS OF NGT- KESHOPUR DRAINAGE ZONE

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