GOVERNMENT OF INDIA
MINISTRY OF MINES

Sand Mining Framework

March 2018

नरेन्द्र सिंह तोमर
NARENDRA SINGH TOMAR

सत्यमेव जयते

ग्रामीण विकास,
पंचायती राज और खान मंत्री
भारत सरकार
कृषि भवन, नई दिल्ली
MINISTER OF RURAL DEVELOPMENT,
PANCHAYATI RAJ AND MINES
GOVERNMENT OF INDIA
KRISHI BHAWAN, NEW DELHI

FOREWORD

Transparency, sustainability, equity and growth have been the cornerstones of the policies and procedures governing the industrial and other development activities of this Government. The Ministry of Mines have taken several policy initiatives to make available natural resources in transparent manner and their exploitation sustainable & economical using technological interventions. A paradigm shift occurred by way of a major step taken by the Ministry of Mines in bringing in the MMDR Amendment Act 2015 which brought in the Auction process for allocation of minerals. While clearly laying down the framework for Major minerals and some provisions for the minor minerals, the devolution of authority to the States for minor minerals is of substantial nature. Sand is a minor mineral.

Sand is an essential component for housing, infrastructure & construction activities. There have been various issues across the country in the mining activities related to sand i.e. environmental degradation, non-availability of sand, high sand prices, illegalities in sand mining, etc. To address these issues, a Committee chaired by the Union Secretary, Ministry of Mines comprising of officials of State Governments has been constituted to study the existing system of sand mining in various states and to submit a report.

Intensive consultations have been carried out with the State Government officials and other stakeholders. A sand mining framework has been prepared. This will help the States to frame their policies taking into consideration their objectives, endowments and state deployment of resources. A commendable work; I hope this report shall provide the framework to address the challenges which States face in addressing this important economic activity in their jurisdiction.

15/3/18

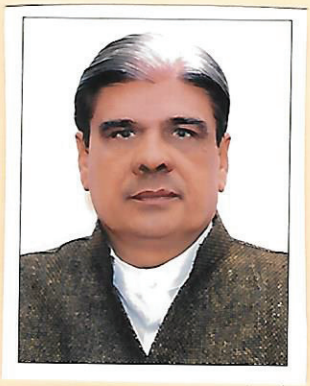
(Narendra Singh Tomar)

Office : 'G' Wing, Ground Floor, Krishi Bhawan, New Delhi - 110001
Tel. : 011-23782373, 23782327 Fax : 011-23385876
Resi.: 3 Krishna Menon Marg, New Delhi-110001
Ph.: 011-23794697/98, Fax : 011-23794696

हरिभाई परथीभाई चौधरी
HARIBHAI PARATHIBHAI CHAUDHARY

खान एवम् कोयला राज्य मंत्री
भारत सरकार
नई दिल्ली-110011

Minister of State for Mines and Coal
Government of India
New Delhi-110011



Foreword

Sand is an essential mineral and is used along with cement primarily in construction and its demand is continuously increasing with increasing infrastructure development of the country. As per estimate, the demand of sand is increasing at the rate of 6-7%. Production and supply of sand is not uniform and its availability depends upon rain and replenishment rate of sand in rivers. Due to uncertainties in supply, the price of the material varies significantly with shortages tempting its illegal mining. Its supply from other sources is very scanty in India.

The issue of unregulated extraction has been a matter of concern for environmental sustainability. There have been various judicial interventions by the Hon'ble Supreme Court (SC) and National Green Tribunal (NGT) in regard to environment protection. To address these issues, a committee was formed under the chairmanship of Secretary (Mines), including officials from various State Governments to study the existing system of sand mining in various states and prepare a uniform set of framework that can be followed by states as per their suitability and applicability.

Based on this extensive exercise and deliberations of the committee, a Framework Document has been developed for assisting the States to arrive at an appropriate policy and administrative system for addressing the needs of this sector. The framework charts out suggestions for various elements of the process chains starting from objectives of the states, demand-supply situation, operations, monitoring, transportation, sales of sand etc.

We would look forward to expeditious and synchronised implementation of the suggested initiatives by various State Governments as per their local needs. This should greatly help in resolving the pertinent issues and to help in the growth of the infrastructure and construction sector.

Haribhai Chaudhary

(Haribhai.P.Chaudhary)

Room No. 39, Udyog Bhawan, Maulana Azad Road, New Delhi-110011
Tel : 011-23062066, Fax : 011-2306 2067, E-mail : haribhai.p@gov.in

अरुन कुमार, भा.प्र.से.
सचिव

ARUN KUMAR, I.A.S.
Secretary

सत्यमेव जयते

भारत सरकार
खान मंत्रालय
शास्त्री भवन
डा. राजेन्द्र प्रसाद रोड़
नई दिल्ली–110 001
Government of India
Ministry of Mines
Shastri Bhavan
Dr. Rajendra Prasad Road
New Delhi-110 001

20th March, 2018

Preface

Sand is classified as a "minor mineral", as defined under MMDR Act, 1957. The legal and administrative control over minor minerals is devolved to the State Governments. The natural endowment of sand across many states is unable to meet the demand, coupled with the ease of extraction issues of environmental degradation, pricing and illegalities in sand mining have arisen. In consultation with the States, a committee was formed under the chairmanship of Secretary, Ministry of Mines, Government of India on 18.05.2017, for Sand mining.

2. Given the varying objectives of the States, their endowments, administrative structures, market dynamics, our approach was to provide a framework to assist states in arriving at the best possible options before them. States need to manage sand supplies keeping the environmental imperatives in mind. The framework in the report addresses the issues of State objectives, Demand- Supply assessment, measures to sand availablity, allocation models, transportation and monitoring mechanism, suggestions for faster clearances/approvals and using IT interventions in the complete process chain of sand mining. This framework also lays emphasis on the alternatives of sand i.e; Manufactured sand, sand from mined overburden, and import of sand, for reducing our dependency on river sand. Best practices across States have been documented as a pointer for adoption, or further study which the States may need. I hope the States find this report useful.

3. I would also like to express my gratitude to the Committee members, our teams of officers and various stakeholders who gave their valuable time and support, which has made this report possible.

(ARUN KUMAR)

320, 'A' Wing, Shastri Bhavan, New Delhi-110 001, Tel. : 2338 5173/2338 2614, secy-mines@nic.in,www.mines.gov.in

Acknowledgement

The *Sand Mining Framework* has been prepared after extensive study of systems in consultation with Mining Departments of the States and other stakeholders over a period of the last ten months. Detailed analysis of various policy and procedures of the states was done and best practices identified in the study. The framework assimilates the knowledge and experience of stakeholders, miners, technical institutions, and consumers. Framework suggestions are based on the objectives of sustainability, availability, affordability and transparency in sand mining, and to improve the effectiveness of monitoring of mining and also the transportation of mined out material. The policies and practices recommended in the framework may be adopted by the states with suitable customisations.

At the outset, I would like to extend my sincere gratitude to the Secretary, Ministry of Mines, Shri Arun Kumar for his constant guidance as the Chair of the committee. From laying down the contours of the study across different aspects, to the analysis and recommendations, his guidance was fundamental to the evolution of this comprehensive framework.

The task of the Committee has been quite onerous, and in discharging it every member contributed substantively in shaping this report. The contributions of all Committee members for this intense endeavour are gratefully acknowledged.

I would like to place it on record that the Sustainable Sand Mining Guidelines, 2016 of the MoEFCC and their circulars from time to time, give valuable documents and have been kept in the mind while preparing the framework. The co-operation and suggestions extended by the MoEFCC were of immense value, needless to state, environment concerns need to be carefully addressed while undertaking mining.

The support extended by the State Governments and the concerned institutions by providing the required data, inputs and insights is duly acknowledged. The Department of the State Governments and the Institutions that I would specifically like to mention are as follows-

1. Department of Mines & Geology, Andhra Pradesh
2. Directorate of Geology & Mining and Department of Environment and Forest, Assam
3. Directorate of Geology & Mining, Chhattisgarh
4. Commissioner of Geology & Mining, Gujarat
5. Mines and Geology Department, Haryana
6. Department of Mines & Geology, Karnataka
7. Directorate of Geology and Mining, Madhya Pradesh
8. Revenue and Forest Department, Maharashtra
9. Mining Department, Punjab
10. Department of Mines & Geology, Rajasthan
11. Department of Geology & Mining, Tamil Nadu
12. Department of Mines & Geology, Telangana
13. Directorate of Geology & Mining, Uttar Pradesh
14. Geology and Mining, Uttrakhand
15. Cement Manufacturing Association
16. National Council for Cement and Building materials (NCCBM)

I express my sincere gratitude to the team of officials from Indian Bureau of Mines (IBM) & Ministry of Mines, and consultants of WAPCOS, who have conducted the field visits and assisted in preparation of the report which comprises the following:

1. Ms Kirti, Assistant Director, Ministry of Mines
2. Shri Abhay Agrawal, Regional Controller of Mines, IBM
3. Shri Pushpendra Gaur, Deputy Controller of Mines, IBM
4. Shri Satnam Singh, Consultant
5. Shri Manish Singla, Consultant
6. Shri Arvind Kumar Gahlot, Consultant
7. Shri Yash Raj Singh, Consultant

In essence, this report is the result of enormous efforts put in by the Chairman, Members, Consultants and the intellectual inputs drawn from a large number of experts and stakeholders. I gratefully appreciate and acknowledge all these inputs and support, without which this report would not have been possible.

New Delhi

(Prithul Kumar)
Member Secretary
Director, Ministry of Mines

Abbreviations

Acronym	Full Form
AP	Andhra Pradesh
ADMG	Assistant Director, Mines and Geology
CAGR	Compounded Annual Growth Rate
CCTV	Close Circuit Television
C&F Agent	Carry and Forwarding Agent
CFE	Consent for Establishment
CFO	Consent for Operation
CG	Chhattisgarh
CGST	Central Goods and Services Tax
CGM	Commissioner of Geology & Mines
CTO	Consent to Operate
DEAC	District Environment Appraisal Committee
DEIAA	District Environment Impact Assessment Authority
DFO	District Forest Officer
DGM	Department of Geology & Mining
DLSC	District Level Sand Committee
DMG	Department of Mines and Geology
DSR	District Survey Report
EC	Environment Clearance
EIA	Environment Impact Assessment

EMD	Earnest Money Deposit
EMP	Environment Management Plan
FY	Financial Year
GJ	Gujarat
GO	Government Orders
GPS	Global Positioning System
GR	Geological Report
GST	Goods and Services Tax
GVA	Gross Value Added
GWSDA	Ground Water Survey and Development Agency
Ha.	Hectare
HC	High Court
HR	Haryana
I&C	Industries and Commerce
IBA	Indian Banks' Association
IBM	Indian Bureau of Mines
ISO	International Organization for Standardization
IT	Information Technology
JIR	Joint Inspection Report
KTK	Karnataka
MCR	Mineral Concession Rules
MH	Maharashtra
ML	Mining Lease

MMDR	Mines and Mineral (Development and Regulation) Act, 1957
MMT	Million Metric Tonnes
MMTPA	Million Metric Tonnes Per Annum
MoEFCC	Ministry of Environment, Forest and Climate Change
MoM	Ministry of Mines
MP	Mining Plan
MP	Madhya Pradesh
MPSMC	Madhya Pradesh State Mining Corporation
M-sand	Manufactured Sand
MSS	Mining Surveillance System
NA	Information Not Available
NAC	National Academy of Construction
NCCBM	National Council for Cement & Building Materials
NGT	National Green Tribunal
NIT	Notice Inviting Tender
OB	Overburden
PB	Punjab
PCB	Pollution Control Board
PWD	Public Works Department
QL	Quarrying Lease
QP	Quarrying Permit
RBI	Reserve Bank of India
RJ	Rajasthan

RLO	Reach Level Officer
RQP	Recognised Qualified Person
RTG	Real Time Governance
SC	Hon'ble Supreme Court
SEAC	State Environment Assessment Committee
SEIAA	State Environment Impact Assessment Authority
SGST	State Goods and Services Tax
SHG	Self Help Group
SMC	State Mining Corporation
TP	Transport Permit/ Temporary Permit
TSMDC	Telangana State Mining Development Corporation
TSP	Technical Staff Person
TN	Tamil Nadu
USGS	United States Geological Survey
UK	Uttarakhand
UP	Uttar Pradesh
VAT	Value Added Tax
WALTA	Andhra Pradesh's Water Land and Tree Act, 2002
WCL	Western Coalfields Limited

Contents

1. Executive Summary 19

1.1 Background & Approach 19

1.2 Framework across the process chain 20

1.2.1 State objectives 20

1.2.2 Demand – Supply estimation 21

1.2.3 Alternate options for natural sand 23

1.2.4 Sand from Overburden of coal mines 25

1.2.5 Import of sand for coastal cities 26

1.2.6 Gap Assessment 27

1.2.7 Rules & Regulations 27

1.2.8 Identification of Resources 28

1.2.9 Allocation or Business Model followed for allocation 30

1.2.10 Clearances & approvals, Suggestions for MoEFCC 33

1.2.11 Operations 34

1.2.12 Sales & Transportations 35

1.2.13 Monitoring 37

1.3 Best practices across the process chain 39

1.3.1 Best practices in the notified or controlled pricing model 39

1.3.2 Best practices in the market model 41

2. Introduction 45

2.1 Background 45

2.1.1 Regulatory provisions for sand (minor mineral) 45

2.1.2 Executive Summary of MoEFCC's Sustainable Sand Mining Management Guidelines, 2016 46

2.2 Formation of a committee for sand mining framework 50

2.3 Understanding the objectives of the framework 51

2.3.1 Sustainable sand mining 51

2.3.2 Availability of sand 52

2.3.3 Affordability 52

2.3.4 Transparency 53

2.4 Approach and Methodology 53

2.4.1 Detailed approach and methodology 53
3. State-wise policy and process analysis 63
3.1 Andhra Pradesh 63
3.2 Assam 67
3.3 Chhattisgarh 70
3.4 Gujarat 73
3.5 Haryana 76
3.6 Karnataka 80
3.7 Madhya Pradesh 83
3.8 Maharashtra 88
3.9 Punjab 91
3.10 Rajasthan 96
3.11 Tamil Nadu 99
3.12 Telangana 102
3.13 Uttar Pradesh 107
3.14 Uttarakhand 110
4. Detailed Comparative Analysis 115
4.1 Regulatory and Legal 115
4.1.1 Rules, regulations and policies 115
4.1.2 Royalty Collection and units applicable 118
4.1.3 Identification 120
4.1.4 Clearances and approvals 122
4.2 Business Model 124
4.2.1 Allocation model and realization to State Government 124
4.2.2 Operations control 128
4.2.3 Sales rights 130
4.2.4 Types of Sand Concessions 134
4.3 IT System Analysis 137
4.3.1 Use of IT in Allocation 137
4.3.2 Use of IT in Ordering 139
4.3.3 Use of IT in Monitoring 140
4.3.4 Use of IT in delivering 142
4.4 District Survey Report 145

4.5 Illegal Mining 147
4.6 Production and Revenue comparison 149
4.7 Reservations offered in States 150
4.8 Type of Mining (Manual/ Mechanized) across the States 153
4.9 Best practices across the process chain 154
4.9.1 Best practices in the notified or controlled pricing model 154
4.9.2 Best practices in the market model 156
5. Framework 159
5.1 State objective 159
5.1.1 Demand – Supply estimation 160
5.2 Gap Assessment 164
5.3 Alternate Options 165
5.3.1 M-Sand 167
5.3.2 Sand from Overburden of coal mines 170
5.3.3 Import of sand for coastal cities 171
5.4 Rules & Regulations 172
5.4.1 Administrative control of sand mining 172
5.4.2 Separate Policy 173
5.4.3 Area and timelines 173
5.5 Identification of Resources 173
5.5.1 Classification of the rivers 173
5.5.2 Identification of river sand sites/ blocks 174
5.6 Allocation 177
5.7 Clearances and approvals and suggestions for MoEFCC 180
5.7.1 Suggestions for faster clearances – delegations of power to DEIAA/SEIAA 181
5.8 Operations 182
5.9 Sale 182
5.10 Transportation & Stockyard 185
5.11 Monitoring 186
6. Annexures 191
6.1 Annexure I: Formation of Sand Mining Committee 191
6.2 Annexure II: Extension notice for Sand Mining Committee 193
6.3 Annexure-III: States visit plan 194

6.3.1 Meeting Schedule 194
6.3.2 List of documents required from the States 195
6.3.3 List of data required from the States 195
6.3.4 List of questions for discussion with the States 196
6.4 Annexure IV Joint Inspection Format 199
6.5 Annexure V Monitoring Mechanism of Andhra Pradesh 200
6.6 Annexure VI: State Introduction 201
6.7 Annexure VII: Note on M-sand 208
6.8 Annexure VIII Assessment of M-Sand as an alternate to river Sand 234
6.9 Annexure IX - M-sand policy of Karnataka as mentioned in the KMMCR 236
6.10 Annexure X- G.O. of Andhra Pradesh for promotion of M-sand 240
6.11 Annexure XI – Section 9 of G.O. 3 of Telangana dated 08.01.2015 248
6.12 Annexure XII – M-Sand related bullet points in G.O. 38 of Telangana dated 12.12.2014 249
6.13 Annexure XIII Assessment of Sand obtained by segregation of Coal Overburden as an alternate to river sand 250

List of Tables

Table 1 Suggested threshold area for sand mining in a State* 28
Table 2 Details of state visits 55
Table 3 Summary of sand mining policy in Andhra Pradesh 65
Table 4 Summary of sand mining policy in Assam 68
Table 5 Summary of sand mining policy of Chhattisgarh 71
Table 6 Summary of sand mining policy of Gujarat 74
Table 7 Summary of sand mining policy of Haryana 78
Table 8 Summary of sand mining policy of Karnataka 82
Table 9 Summary of sand mining policy of Madhya Pradesh 85
Table 10 Summary of sand mining policy of Maharashtra 90
Table 11 Summary of sand mining policy of Punjab 93
Table 12 Summary of sand mining policy of Rajasthan 97
Table 13 Summary of sand mining policy of Tamil Nadu 101
Table 14 Summary of sand mining policy of Telangana 105
Table 15 Summary of sand mining policy of Uttar Pradesh 109
Table 16 Summary of sand mining policy of Uttarakhand 112
Table 17 Rules followed by the States 115
Table 18 Royalty applicable in different States 118
Table 19 Identification details for each State 121
Table 20 Environment clearance approving authority for mining lease 123
Table 21 Clearances and responsibility 123
Table 22 Summary of Pros and Cons of business models followed in different States 125
Table 23 Summary of business models followed in different States 126
Table 24 Operational control of sand mining 129
Table 25 State-wise details of sales rights 130
Table 26 State-wise details of the types of concessions 134
Table 27 Use of technology in allocation of sand concession across the States 138
Table 28 Use of technology in sand ordering across the States 139
Table 29 Use of technology in monitoring across the States 141
Table 30 Use of technology in sand delivery across the States 143

Table 31 Use of technology across the process chain of sand mining 144
Table 32 Status of District Survey Reports 146
Table 33 Status of inter-state transport by State Governments 148
Table 34 Production and Revenue from Sale of Sand 149
Table 35 Reservations in Sand Mining in different States 150
Table 36 Types of Mining (Manual/ Mechanized) 153
Table 37 State-wise details for M-Sand 168
Table 38 Suggested threshold area for sand mining in a State* 173
Table 39 Summary of the business models followed by the States 179
Table 40 Proposed clearances and their approving authority & timelines 180

1. Executive Summary

1.1 Background & Approach

1.1.1 Sand is classified as a “minor mineral”, minor mineral means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the Official Gazette, declare to be a minor mineral; as defined under Section 3(e) of The Mines and Minerals (Development and Regulations) Act, 1957 (MMDR Act). Under the MMDR Act, the legal and administrative control over minor minerals vests with the State Governments, who have the powers to make rules to govern minor minerals. Accordingly, different State Governments have made different rules for awarding, regulating and administering the sand concessions granted under those rules.

1.1.2 At a macro level, there is shortage of sand and this is the situation in many developed/ developing countries. As per a rough estimate, the demand of sand in the country is around 700 million tonnes in FY17 and it is increasing at the rate of 6-7% annually. The quantity of natural generation of sand is static. Moreover, production of sand is not uniform across seasons with a shortage faced in many jurisdictions. Due to uncertainties and inadequateness in supply, the selling rate of the material varies significantly leading to black marketing and illegal mining of the mineral. Illegal and uncontrolled extraction of sand has adverse environmental impact. Consequently, there have been various judicial interventions by the Hon’ble Supreme Court (SC) and National Green Tribunal (NGT). The Ministry of Environment, Forest and Climate Change (MoEFCC) has released “Sustainable Sand Mining Management Guidelines 2016” to promote scientific mining of sand and encourage environmental friendly management practices.

1.1.3 Issues of illegal mining, environmental damage, high sand prices and quality of sand that are interlinked with each other are prevalent across many States. A committee chaired by the Union Secretary, Ministry of Mines comprising of officials of State Governments was constituted vide order dated 18th May 2017 to look into the various issues relating to sand mining and to prepare framework that can be adopted by States while undertaking sand mining. A group with Indian Bureau of Mines (IBM) officials along with the consultants was constituted who were asked to visit various States to understand the ground situation, interact with States/district authorities, lessees and consumers. Feedback from public at large was also solicited by publication of a draft report.

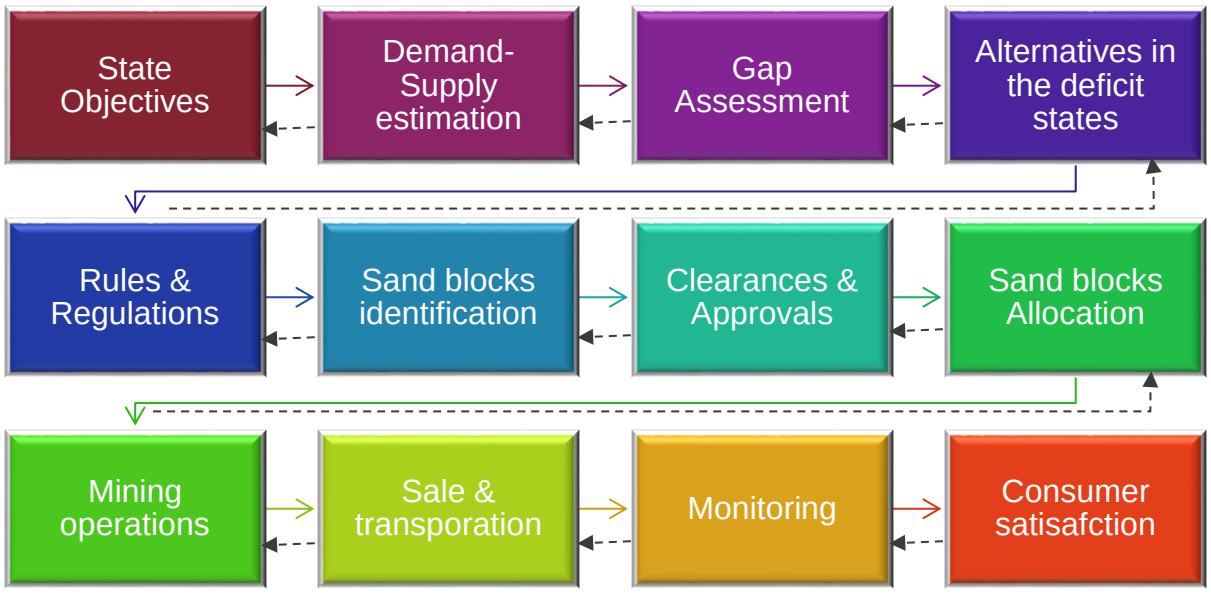
1.1.4 States face different geological endowments, demand & supply scenario and have different objectives of their sand policies. The group visited 14 States and experience was gathered by the visits of the group to the field to document existing/ best practices, as well as to analyze and evaluate the field situation. States which were visited by the group are Assam, Andhra Pradesh, Chhattisgarh, Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan,

Tamil Nadu, Telangana, Uttar Pradesh and Uttarakhand. Relevant data and documents were sought from all States/UTs. Based on this exercise and deliberations of the committee, a framework has been developed to assist the States to study this report and arrive at an appropriate policy and administrative system to best address their State specific needs.

1.2 Framework across the process chain

The policies and the processes governing sand mining in States have been studied across different elements in the process chain. Once the State's objectives are set, the process needs to be designed as per the paradigm below. However, a reverse flow of information, analysis and feedback is also essential for setting/ modifying State objectives.

Figure 1- 1 Key elements in the process chain of sand mining



1.2.1 State objectives

1.2.1.1 The policies of the State, rules and regulations thereof, shall be dependent upon the objectives, demand-supply assessment and alternatives available for natural sand. Objectives of the State drive the policy formulation for sand mining. States define their own objectives for the sand policy depending upon factors such as demand supply situation in the State, resources available in terms of manpower and related infrastructure and revenue targets of the State. Based on analysis of the policies of the States, it can be interpreted that while some States aim to maximize revenues from sand resources e.g. Haryana, Gujarat, Karnataka, Punjab, Uttar Pradesh, Uttarakhand, Assam, Maharashtra and Rajasthan, others aim to keep the sand prices controlled for the public and they are ready to forego potential revenue from sand e.g. Andhra

Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. There are few States that are earning reasonable amount of revenues from sand and at the same time keeping the pricing controlled for the public e.g. Telangana.

1.2.2 Demand – Supply estimation

1.2.2.1 Demand Assessment

Different States follow different methodologies for sand demand estimation. From the 14 States analyzed for this study, only few States such as Haryana, Gujarat, Karnataka, Punjab, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh have carried out demand assessment. However, even where States estimate demand, the methodology adopted does not appear to be robust and estimates vary except in case of four States. Also there are huge variations in estimations undertaken by majority of these States, as compared to estimation using scientific methods.

1.2.2.2 Demand estimation methodologies

Scientific demand-supply assessment and the resultant gap can help the State Government to frame policy for allocation of sand reaches and to adopt business models along with framing policy for alternatives of sand. Further, the following two methods are suggested for estimation of sand demand:

1.2.2.3 RBI Index based methodology

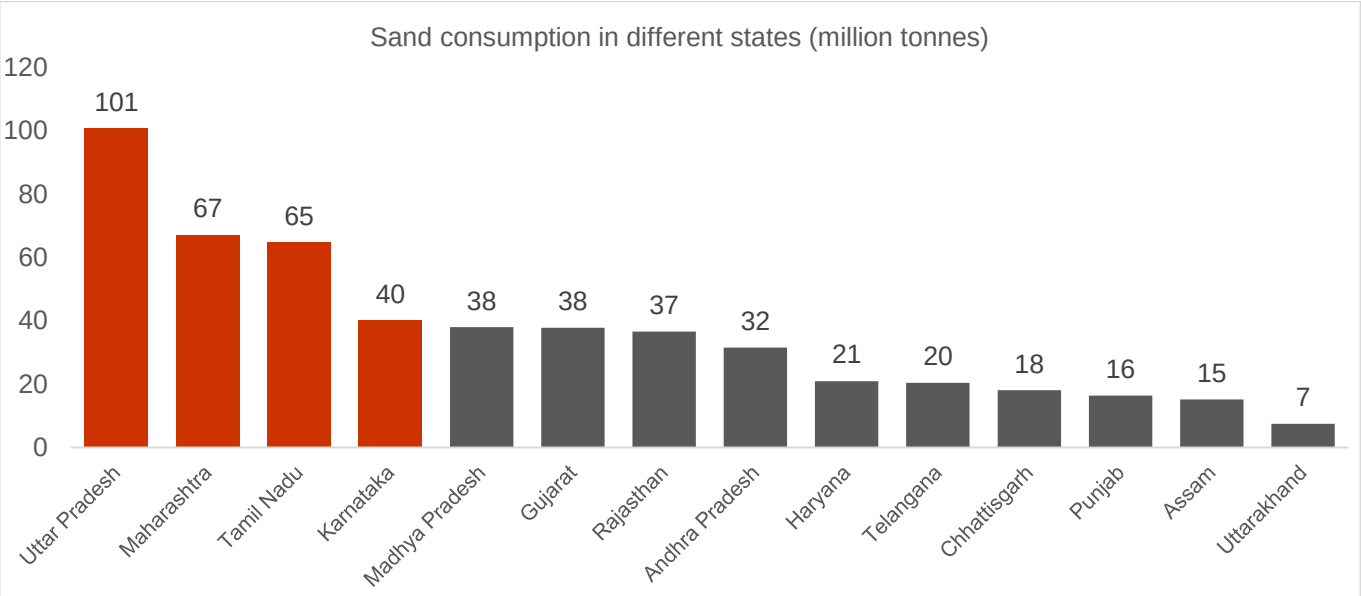
The State-wise demand of sand in India for FY17 has been estimated based on the following factors:

- India's construction GVA [RBI's Handbook of Statistics on Indian Economy]
- India's State-wise construction GVA [RBI's Handbook of Statistics on Indian Economy]
- Conversion factor- Normative cement to sand mixture ratio of 1:2.5

In this method, based on the data released by RBI *(Handbook of Statistics on Indian Economy)*, ratio of construction GVA of State with construction GVA of India is calculated. Further, that number is multiplied by the cement sales in India. Once cement consumption of the State is known, the same is multiplied by the factor of 2.5 to derive the sand consumption. Further, normalization has been done based on the population of the States.

Based on the above methodology, demand of each State has been calculated which may be seen in the table below:

Figure 1- 2 Estimation of State-wise sand consumption in FY17



Source: RBI, Analysis

Further to refine the estimate, another methodology can be adopted which has been described below, for which data needs to be collected by the States. This method can be used for calculating district wise demand as well.

1.2.2.4 Cement consumption based methodology

In this method, the demand of sand in a State or district is based on cement consumption in that State/ district multiplied by a conversion factor in terms of assuming a normative cement to sand consumption ratio. Following inputs are required for estimation.

Inputs:

1. Cement consumption in the State/ district
2. Conversion factor - cement to sand consumption ratio

Cement consumption in the State can be obtained from cement sales considering any of the following sources:

1. Sales data from sales tax officials/ GST officials (State Revenue department/ Tax Department)
2. Cement companies for the sales data of the districts and the State
3. Sales data from cement dealers present in the State

Conversion factor has been considered, as 2.5, as explained in detail in the previous methodology using RBI data. Based on this, a district-wise demand of sand can be derived. This is another suitable, and indirect method for demand estimation of sand.

E.g.: Cement consumed in a State is 10 million tonnes, which is based on cement sales by the companies, and hence the sand consumption shall be 25 million tonnes multiplying cement by the conversion factor of 2.5.

1.2.2.5 Supply Assessment

Data related to supply of sand is being maintained by all the States surveyed as part of this study. Some of the States consolidate the data captured by the district officers based on returns filed by the lessees, while some States use IT tools to capture the supply data. Then, there are other States that calculate based on the royalty collected. Also few States estimate the resources available in the district/ State based on their already prepared District Survey Reports (DSRs).

1.2.2.6 Supply estimation methodology

Estimation of accurate supply in the State is necessary for better planning by the State. States need to develop process flow for data collection from different sources of sand supply using IT tools e.g. every sand lessee in the State shall upload online return every month in the portal which needs to be developed by the State Government. This will enable States to analyse the production trend in the State, lease-wise, month-wise, district-wise, etc. Further, for estimation of resources available in the State and production potential for each year, DSR data of districts need to be consolidated.

1.2.3 Alternate options for natural sand

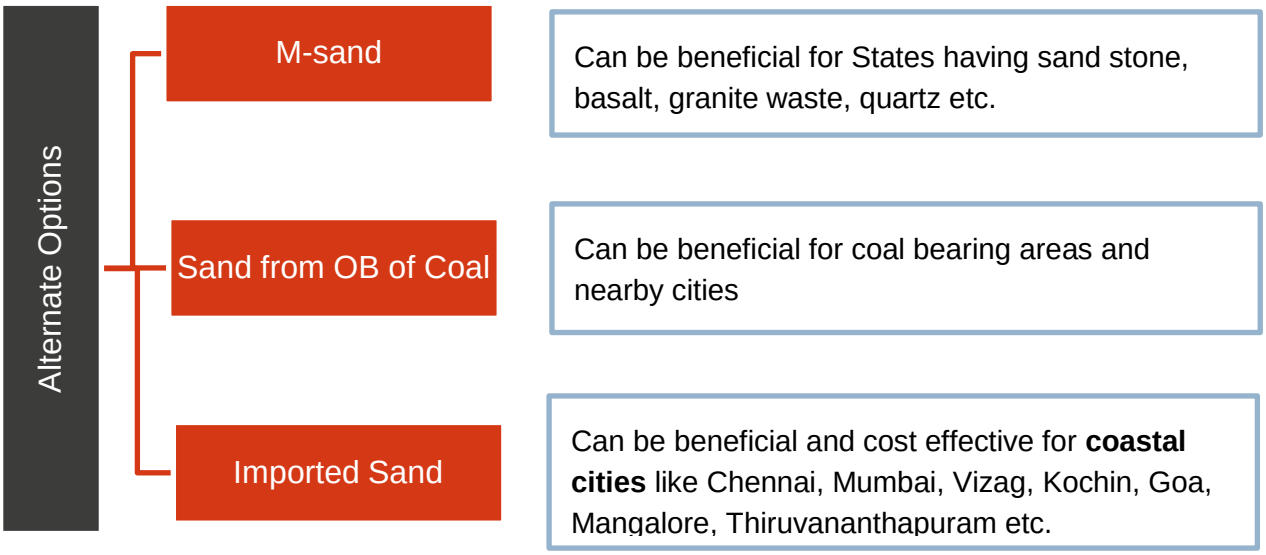
After estimation of gap derived from demand supply assessment, States need to analyse the alternate options for sand, available with them. Considering the large deficits in demand and supply of sand, alternate options need to be promoted, as:

- ✓ Alternate options can cater to the needs of monsoon season/ peak season
- ✓ Alternate supply option will reduce dependence & demand on river sand
- ✓ Supply of alternatives may reduce prices of river sand
- ✓ Supply of alternatives may lead to conservation of natural resources.

The following three alternatives are proposed:

- ➢ M-sand
- ➢ Sand segregation from overburden of coal mines
- ➢ Import of sand

Figure 1- 3 Alternate options for river sand



1.2.3.1 M-Sand

1.2.3.2 Characteristics

Manufactured Sand (M-sand) is the most common alternate of river sand, which has already gained prominence in some of the southern States. It is produced by crushing of rocks, quarry stones to a stipulate size of 150 microns. To arrive at the required grain size, existing coarser hard rock deposits are crushed in a series of crushers and the crushed material is segregated in different fractions as suited to various construction activities. The sand obtained through this process is further refined by removing fine particles and impurities through sieving and washing. As per IS-383, the chemical characteristics and strength are similar to the river sand, and same type of applications can be served using M-sand. The bulk density and specific gravity of both are comparable as well as the chemical characteristics and strength of M-sand are similar to that of river sand as per IS-383. M-sand has a silt content of around 0.2% and water absorption of 1.6%, as compared to 0.45% and 1.15% respectively, in river sand. **M-sand concrete has a marginally higher bond strength, and mortar made of M-sand shows higher compressive strength and modulus for masonry, over those of river sand.**

1.2.3.3 Feasibility Analysis

To prove technical aspects of M-sand, tests were carried out on M-sand by competent agencies for its durability, water permeability, and shrinkage. All the test results concluded with superior positioning of M-sand over river sand. The Rapid Chloride Permeability Test (RCPT) conducted to test the durability of M-sand mixes indicate the RCPT values for concrete with M-sand are less than 1000 coulombs, which indicate a very low chloride permeability and good quality dense concrete. Similarly, water permeability and drying shrinkage tests were conducted for M25 and M40 grades of M-sand. The former test indicated very good dense structure of concrete, and the

latter indicated that shrinkage are within values estimated from Drying Shrinkage estimation curve. **M-sand is economically feasible, cheaper and is superior as compared to river sand in many of the urban centers in India e.g. Bangalore**.

1.2.3.4 Current Status of M-sand in India

Due to the deficit of natural sand supply, Karnataka has intensified the efforts for production of M-sand. The State has 164 M-sand manufacturing units and produces 20 million tonnes of M-sand per annum. Karnataka has separate section for M-sand in the State Minor Mineral Concession Rules and has widely promoted it resulting in wide-spread adoption of M-sand in the State. Apart from Karnataka, the other States working in the direction to promote M-sand are Andhra Pradesh, Gujarat, Tamil Nadu and Telangana. Andhra Pradesh and Telangana also have separate policy for M-sand. Andhra Pradesh and Telangana offer multiple incentives through their G.O.s for setting up M-sand production units. The total M-sand production in Karnataka, Telangana, Tamil Nadu, Andhra Pradesh and Gujarat is 20 MMT, 7.2 MMT, 3.24 MMT, <1 MMT and <1 MMT respectively.

It is suggested that there is a need to promote M-sand units on pan-India basis and to create awareness for M-sand usage given the overall environmental and illegal mining concerns associated with river sand mining. Further, reductions in cost of M-sand will make it a more attractive alternative. M-sand can be promoted by States by having separate policies for M-sand units similar to policies and incentives given by Telangana, Andhra Pradesh and Karnataka.

1.2.4 Sand from Overburden of coal mines

1.2.4.1 Characteristics

The overburden spread over in situ coal seam needs to be removed for extraction of coal to an external dump till sufficient space is created for internal back filling by acquisition of land nearby coal bearing area. Further, this overburden dump needs to be re-handled at the time of closure of mine for land reclamation. As per mine closure plan, 80% of the extracted overburden is used for backfilling the excavated area and remaining 20% overburden can be used for producing sand.

1.2.4.2 Feasibility

Studies conducted by the Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles. The theoretical tradeoff between sand recovery and its quality should be quantified through laboratory tests. Western Coalfields Limited (WCL) has already taken the initiative to segregate sand from the overburden. WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur. WCL has committed to supply sand at one fourth of the market price to NIT Nagpur,

which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY).

This option is implementable in all coal bearing States, namely, Jharkhand, Bihar, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Maharashtra, Gujarat, etc. Further the option is scalable as well with proposal of WCL to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur.

Based on our assessment, the current annual demand of sand in Maharashtra and Gujarat is 100 million tonnes, and WCL alone can provide 45.36 million tonnes of sand per annum (specific gravity of 1.89) which is 45% of the total annual sand demand. Considering the fact that Maharashtra is a sand deficit State and consequently the price of sand in the State is extremely high, the option can be beneficial for the State.

Further, if all the seven subsidiaries of Coal India Limited are instructed by the Government to process and segregate sand from the overburden left out, around 150 million cubic metres (283 million tonnes) of sand can be processed, which is around 35% of the total sand consumed in the country at present. Besides meeting the requirement of sand, this would also ensure that a productive use of otherwise waste material is done.

1.2.5 Import of sand for coastal cities

Another way to meet the demand could be to import sand. Some of the south-east Asian countries e.g. Malaysia/ Indonesia have ample sand available in their country, which if not removed could lead to floods. The sand could be sourced from these countries and imported to Indian ports to meet the deficit. However, it needs to be considered that while importing sand from other countries, sand should qualify for IS 383 quality standard as well as be free from any phyto-sanitary issues. To ensure this, the imported sand should have quality checks at the following two points.

a. In the country from where sand is sourced.
b. At the port where the sand comes.

Karnataka has already formed rules to allow sale of imported sand in the State and have already started the imports. Tamil Nadu is preparing to import sand. Kerala also has permitted imports of sand from Malaysia and the imported sand is sold in loose at the port at a price of Rs. 2300 per tonne. Imported sand, however, tends to be costly and is therefore suitable only for high deficit areas.

1.2.6 Gap Assessment

Based on analysis of demand supply situation in the State, a gap assessment should be done and accordingly policy and rules/regulations need to be framed. Based on the gap assessment, a State can be classified as follows:

a. Sand surplus State
b. Sand sufficient State
c. Sand deficit State

Sand sufficient States shall soon turn into deficit states as the natural availability of sand shall not increase. These States need to plan activities for future years to enable sufficient supply either through natural sand or alternatives.

1.2.7 Rules & Regulations

Rules and regulations and policies related to sand form a very important part of the process chain of sand mining. In some States, there are separate policies and rules specifically for sand or M-sand e.g. Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand. Further, Andhra Pradesh, Telangana and Karnataka has separate M-sand policy or rules.

1.2.7.1 Administrative control of sand mining

Handling of sand related activities in most of the States surveyed is taken care of by the mining department except in Assam and Maharashtra. The advantage of having the control with the mining department is that the staff in the technical department are well versed with mining and consequently there is no operational gap between the regulating body and those taking care of operations.

1.2.7.2 Separate Policy

Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor minerals. Also sand is different from other minor minerals in its direct usage by the general public. A separate policy for sand mining is extremely crucial considering the volume of sand consumed every year and its socio-economic significance. States that have separate Sand Mining Policy and Rules are better able to manage this sector. It is suggested to the State to have separate Sand Mining Policy. It is further suggested that only the State Mining Department should be entrusted for regulating sand mining in the State.

1.2.7.3 Area and timelines

States need to define the area limits for the grant of concession in their rules and policies. Mining methods shall be as per the approved environment clearance/ Mining Plan and as per notifications

of the MoEFCC. Also, the minimum area can be fixed at 5 Ha for better supply and better control from State Government's point of view. Sand deficit States offering large areas may result in delays in the process of obtaining clearances and approvals and hence may offer smaller areas as per limits of DEIAA and SEIAA.

Table 1 Suggested threshold area for sand mining in a State*

S. No.	Parameter	Minimum area	Time period of allotment
1	For Individual	5 Ha.	5-10 Years
2	For Co-operative society	5 Ha.	5-10 Years

**In case a State Government needs to allot smaller or larger areas, the State is free to do so as per their minor mineral concession rules.*

1.2.8 Identification of Resources

1.2.8.1 Classification of the rivers

Before identification, States need to classify the rivers based on the stream orders i.e. stream orders I, II, III, IV and above. Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams. When two first order streams come together, they form a second order stream and with each successive downstream junction, stream order increases. Telangana and Andhra Pradesh do the classification of the rivers based on the streams viz. I, II, III, IV etc. order streams. Other States are also suggested to follow the below process for classification of different streams and sand extraction:

1.2.8.2 I, II and III order streams

If the order of the stream is I, II and III, sand may be allowed to be extracted by manual means for local use in villages or towns bordering the streams for bonafide purposes other than commercial operations/public trading/stocking etc. States need to frame the operational rules or guidelines for stream I to III. The State Government may notify over exploited areas in terms of ground water micro basins from where no sand can be extracted even for local use. The extracted sand can be transported only through a bullock cart or a tractor within the jurisdiction, and the block/ district shall be treated as a unit for movement of sand within the jurisdiction. For IV and V order rivers, mechanized means of extraction is appropriate, though one is aware that there is certain lack of clarity on mechanized mining.

1.2.8.3 Identification of river sand sites/ blocks

For order IV and above streams, identification deals with the preparatory work before a sand block is allocated or bid out for mining. The department should estimate the gap in demand-supply of

districts and hence come out with the requirement of further allotment. Based on the requirement, the process of identification of sand reaches may be taken up by the relevant department responsible for sand mining in the State.

Figure 1- 4 Process to be followed for identification of sand bearing areas

1.2.8.4 Gap assessment based on demand estimation and supply (from District Survey Report)

The District Survey Report (DSR) shall be prepared by the State Government as per the MoEFCC's Sustainable Sand Mining Management Guidelines 2016. As per the guidelines, States need to undertake the replenishment study, which shall provide the following outputs:

- Annual deposition rates of sand from a river
- Deposition stretch of the rivers
- Total Resources available in the State for sand

The above outputs shall help in estimating the annual quantity of sand available in a particular district, for which the States need to complete the replenishment study.

While the need for undertaking the replenishment study is well understood, such assessments are presently not being undertaken in a comprehensive manner at the State level. It is envisaged that there is a need to inter-alia build capacity at the State level that trains the relevant staff in undertaking replenishment studies. As a short term measure, States need to identify colleges/ institutions with expertise related to Geology/ Environment/ Hydrology, and these colleges/ institutions could be handed over the responsibility of capacity building for replenishment study as well as conducting the first few rounds of replenishment studies.

1.2.8.5 Joint Inspection Report

A Joint Inspection Report (JIR) should be prepared by the following departments/concerned officials:

- District Collector (Chairperson)
- Revenue department

- Public Works department
- Water Resources department
- Mines and Geology department
- Geologist
- Environment & Forest department
- any other relevant department, as per State's requirement

The purpose of JIR is to provide a comprehensive assessment of the sand available in each identified block and overall provide a go-no go decision. The JIR team responsible for identification should fill the format containing the various parameters of sand mining as prescribed in the State's rules and MoEFCC guidelines. During the identification stage itself, the details should be noted down and based on those details and other considerations that the States may be facing, it should be decided whether the block should be allocated for mining or not. Further, once the decision is taken, the entire format along with considerations based on which the decision has been taken should be uploaded on the departmental website which shall be available for public view. The responsible officers should submit the joint inspection report with clear recommendations to the concerned authority in charge of sand mining in the State.

1.2.8.6 Technical Report/ Geological Report

A detailed technical report/ geological report containing details of the area, DGPS survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status (if any), geological mapping, laboratory studies of the samples etc. of each sand block should be prepared by the Assistant Geologist/ Geologist, before putting it for auctions/ allotment. The potential areas of the quarry lease should be identified and demarcated using DGPS, topographic and geological maps prepared using Total Station. The area thus identified should be physically demarcated preferably by erecting boundary pillars.

1.2.9 Allocation or Business Model followed for allocation

1.2.9.1 Current business models followed by States

The business model followed by a State depends primarily on the objective of the State Government and the prevalent conditions in sand mining in the State. Essentially there are two types of business models being followed by the States:

1. Notified or controlled pricing model
2. Market model

The most common method of allocation followed across the country is the market model where private contractors are allocated sand mines through competitive bidding while a few States follow

notified or controlled pricing model where sand mines are allocated to State agencies on nomination basis.

1.2.9.2 Notified or controlled pricing model

In this model, the State Governments allocate their sand blocks to State mining corporations or SHGs or Panchayats on nomination basis. Clearances and approvals are procured by the State/PSUs only and mining operations are handled either directly by the Government agency or by the raising contractors that are hired by the Govt./Govt. agency. Further, the sale of sand is undertaken by the State Government or the State Government agency and revenue is accrued accordingly. Sale prices are notified by the Government under this model. State has to deploy resources to manage the systems and constant efforts are required to manage the operations. The States following this model has been shown in Figure 1-5.

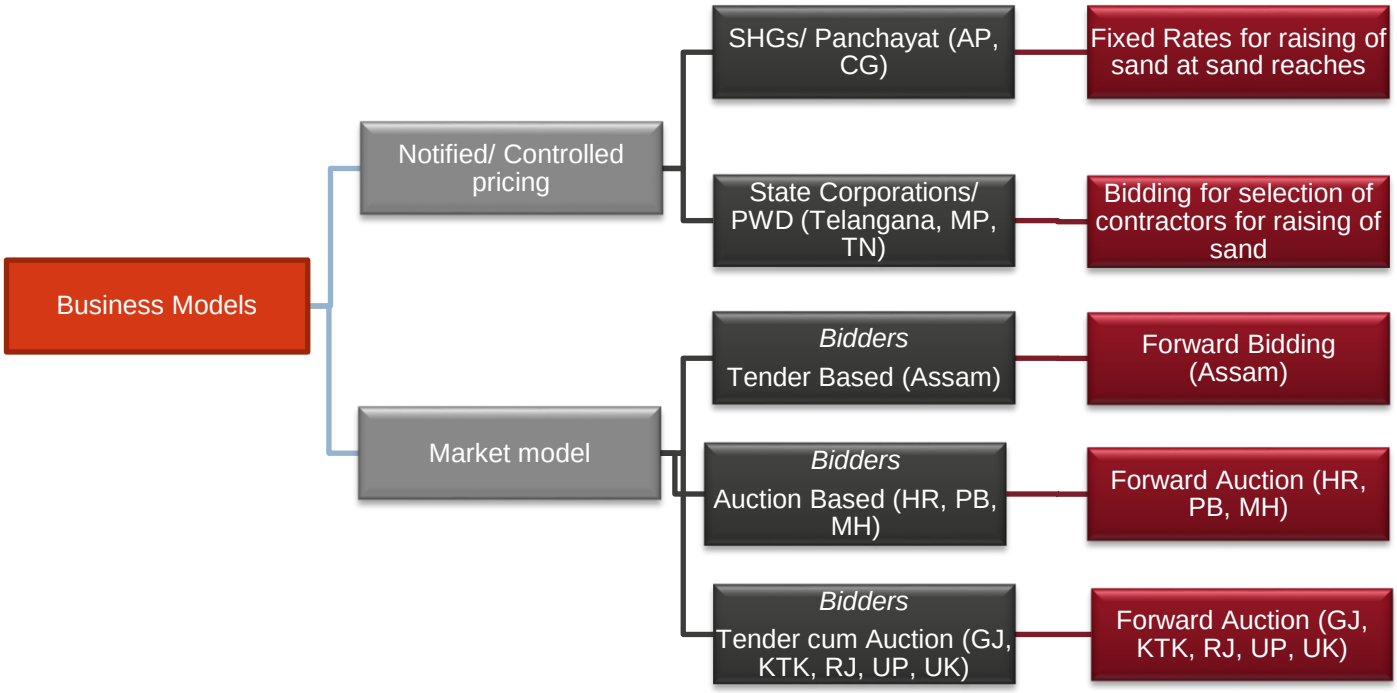
1.2.9.3 Market model

In market model, allocation is undertaken using one of the following methods:

a) Tender
b) Auction
c) Tender cum auction mode

i. In tender, the price or premium against the bidding parameter is quoted by the bidders and the highest bidder gets the mineral concession. In this model, the State earns a fixed amount quoted by the bidder.
ii. In auction, the bidder is aware of the ongoing or highest price or premium quoted by the other bidders and can continuously revise its bid till conclusion of the auction process. The bidder quoting the highest bid wins the sand block. The realization to the State in this model is high, as the State retains the royalty as well as the auction premium. However, the model also leads to increase in prices for the end consumers, as the State Government doesn't have any control on the prices at which the successful bidder sells the sand.
iii. The tender cum auction is a two stage process similar to the one followed in the case of major minerals auctions, where in the first stage, along with the technical bid an initial price offer is also submitted. Subsequently, only a selected number of bidders (50% of the technically qualified bidders or as per the notification inviting tender) go to the auction stage. The method has similar benefits and downsides as in the case of simple auctions discussed above. This allocation method is followed in the States of Gujarat, Karnataka, Rajasthan, Uttar Pradesh and Uttarakhand. This system has been stipulated for major mineral block auction and have been adopted by the States for auctioning of sand blocks as well.

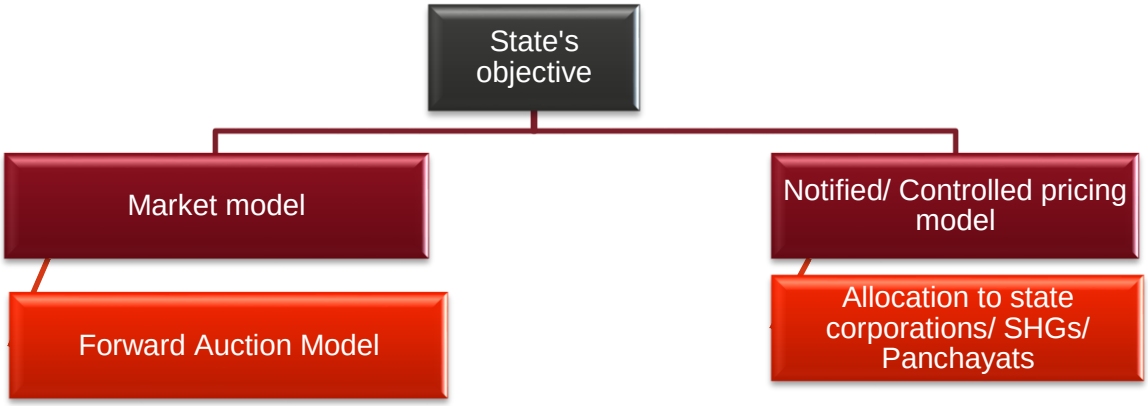
Figure 1- 5 Types of Business Models followed by the States



1.2.9.4 Suggested business models

It is suggested that the allocation model to be considered by a State should depend on the objectives of the State. If the State's objective is revenue maximization then it can follow the market model (simple forward auction), however if the State desires to keep the prices and operations under control, then it can follow the notified/ controlled price model.

Figure 1- 6 Suggested allocation model for sand mining



States are free to choose the model as per their demand-supply situation. In case of abundant supply, the auction model is best suitable.

1.2.9.5 Market Model adoption

States may adopt simple forward auction model, subject to technical and financial eligibility of the bidders. Bidding parameter can be any of the two a) revenue share or b) production linked payments. There should be a strict monitoring mechanism to compute the exact quantity of sand extracted and dispatched from the sand blocks.

1.2.9.6 Notified or controlled pricing model adoption

Sand blocks should be notified by the State only after getting the mining plan approved and obtaining the environment clearance. The blocks can be allocated to any relevant State corporation or co-operative societies of the village for the purpose of excavation and loading work with the main control being with the mining department/ State Corporation only. Prices and selling under this model remains with the State/ State nominated agencies. For this model also to be successful, strict monitoring of sand mining operations is required. Further, the State Government should also specify the rates of transportation, and keep the sand supplies sufficient so that the prices are not increased artificially by the transporters.

In this model if sand blocks are allotted to PSUs, there should be a robust disclosure mechanism devised by the department/ State Government for better monitoring and control over supply.

1.2.10 Clearances & approvals, Suggestions for MoEFCC

Clearances and approvals are procured by the State mining department/State Govt. Agency in Andhra Pradesh, Maharashtra and Telangana while in most of the other States it is left to the project proponents.

It is suggested that the responsibility seeking the clearances and approvals should be given to the lessee/contractors only and department should play the role of facilitator/ regulator only. A fixed time line should be attached for all the clearances required, and the responsible person should get it done within the specified timeline. Further, the applications for getting the clearances/ approvals should be online. In some States specifically where there are State departments/PSUs carrying out mining, obtaining clearances may continue as per the existing process.

1.2.10.1 Suggestions for faster clearances- Delegation of powers to DEIAA, SEIAA

As an administrative mechanism, projects for environment clearance are divided into sub-categories (B1, B2, A etc.) by MoEFCC based on the area of the lease. For minor minerals including sand and gravel, mining lease (in case of individual) for B2 categories (0-5 Ha.) the grant of EC will be done by the DEIAA headed by the District Magistrate or District Collector and for B2 (5-25 Ha.) and B1 (25-50 Ha.) (in case of individuals) categories the grant of EC will be done by SEIAA. Further the projects of A category (>=50Ha.) the EC is granted by MOEFCC. It is suggested to the MoEFCC that area limits for taking projects by committee e.g.

DEIAA/SEIAA/MoEFCC should be increased to double from the current i.e. 0-10Ha for DEIAA, 10-100 Ha for SEIAA and >=100 for MoEFCC. This will enable faster clearances for the mining projects. Further, considering the large number of projects related to all minerals, a single SEIAA is not sufficient to cater the current needs and MoEFCC may consider forming multiple **regional branches of SEIAA** in each State for faster clearances without impacting the protection of environment, as the guidelines are now available to guide the bodies/ authorities entrusted for grant of clearances. Criteria is suggested below:

- **Urban centers**: Urban centers having population of more than 10 Lakhs as per 2011 Census of India should be having one SEIAA regional branch to cater the needs of urban population and hence enabling faster clearances. E.g. Uttar Pradesh have large urban centers and only one SEIAA at State level may not be sufficient. Considering the same 5-6 SEIAA regional branches may be constituted in Uttar Pradesh based on the population of Urban Centers, which are major consumption centers and would have institutions and expertise to discharge the responsibilities of a branch of SEIAA.
- **Distance**: Few States where population concentration is low and distance between the capital where SEIAA headquarter is present are far away from the districts due to large distance. A regional branch of SEIAA may be proposed for easy access for these States. E.g. States like Arunachal Pradesh/ Rajasthan having large size and access to the capital city for many of the districts take multiple days to reach due to connectivity and economic issues. It is suggested that wherever the distance between the urban center and current SEIAA is more than 400 kms for plain areas and more than 250 kms for hilly States, a regional branch may be constituted in an appropriate place.

1.2.11 Operations

The control of operation in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding model the control over operations is with the lessee/contractor who is the successful bidder. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or through a raising contractor.

It is suggested that irrespective of the allocation model and whoever has the control over operations, sand mining should take place only in accordance with the terms and conditions of the environmental clearance, conditions of the lease deed or license, and methods approved in the mining/ quarrying plan. Mechanized mining may be allowed in stream IV order and higher order rivers as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. MoEFCC guidelines should be reconsidered. Till then mining should be undertaken, as per the guidelines laid down in the *Sustainable Sand Mining Management Guidelines 2016* by the MoEFCC, and circular issued thereof.

1.2.12 Sales & Transportations

1.2.12.1 Sales

We propose two mechanisms for online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

1.2.12.2 Under market model

In case of market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

1. Mobile app
2. Online portal
3. Customer care/ telephone call
4. Licensed traders

The consumer needs to register on the portal and login using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

1.2.12.3 Controlled market prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State/ district based on the quality and transportation lead. A consumer after logging in, may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

1.2.12.4 Online Sale

Provision for online sale of sand should be made in case of municipality limits/cities/towns etc. as per definition of Urban Ministry/ Census. The States should try to adopt online ordering of sand in the next one year which may be extended further depending upon the State's infrastructure capabilities.

1.2.12.5 Offline Sale provisions

The exceptions for online sale need to be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity. These low demand centers should have the provision to be supplied by local licensed/registered traders/dealers through offline means who may in turn order sand online.

1.2.12.6 Transportation & Stockyards

Transportation is the last step in the process chain of sand mining, and it needs to be regulated to ensure supply of sand to consumers at reasonable prices. It is more important in States that are sand deficit and need to transport sand over long distances to reach the consumption hubs.

The supply of sand to consumers should be through stockyards that should be maintained by all individual leaseholders/ raising contractor/ State corporations etc. as the case may be. The stockyard should be established in the vicinity of the reach within a distance of 500 meters from the motor-able road/pucca road. In case of small size leases or cluster of leases, a single stockyard for a group of sand reaches may be established. The size of the stockyard should be such that it has the capacity to store the stock of 3 months of extraction from the reach, this would also help in maintaining supply during monsoon. The leaseholder/ raising contractor should be responsible for transportation of sand from excavation site/ reach to the stockyard through a limited number of GPS/ RFID enabled vehicles and those vehicles should be used only for transportation of sand from the reach to the stockyard.

The limited number of vehicles entering the reach is extremely important from the point of view of sustainability and environment as the riparian habitat is greatly affected by too many vehicles entering the sand reaches. The use of GPS/ RFID enabled dedicated vehicles for the purpose, will also help in evaluating the exact quantity of sand extracted from the reach. Further mandating the maintenance of stockyards by all individual leaseholders/ raising contractor will ensure continuous supply of sand to consumers even during monsoons and prevent price escalation during non-mining period.

For transportation of sand from stockyards to end consumer:

The stockyards should be delineated by fixing the geo-coordinates or by geo-fencing, to trigger an alarm in case of entry of any unauthorized vehicle in its premises. There should be provision

of weigh bridges at the stockyard and all the vehicles transporting sand to the consumers should pass through it to keep a track of exact quantity of sand in the vehicle as per the loading capacity of the vehicle prescribed by the transport department.

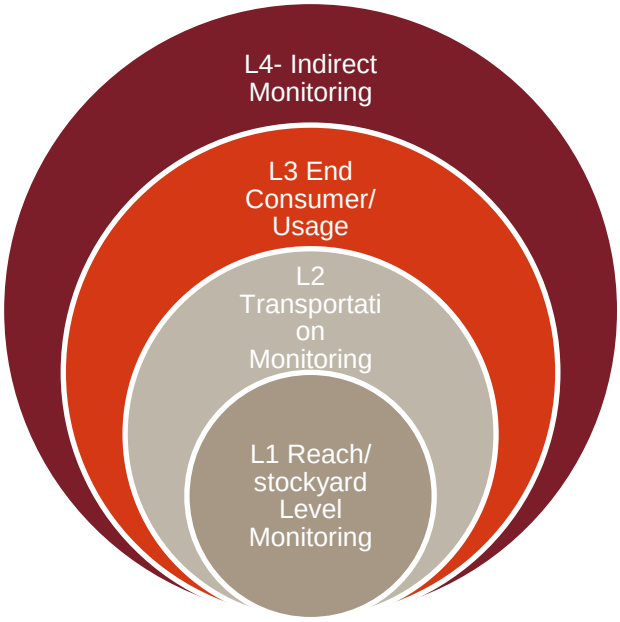
All sand carrying vehicles should have a valid transport permit. The transport permit for transportation of sand should be generated at the stockyard after verification of the payment. The transport permit should have a scan code to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team should have a scanning device/mobile based app to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., should be available.

The responsibility of transportation of sand from the stockyard to end consumer should be handled to the stockyard owner. The States may fix up a time frame for delivery from the ordering period and the State departments need to establish grievance's portal and mechanism also for resolving complaints related to ordering and transportation of sand.

1.2.13 Monitoring

Monitoring is extremely crucial to ensure that sand mining operations are legal and environmentally compliant. Accordingly, the State / State agencies need to create and establish a robust system to monitor and measure the mined out mineral at each lease location and its transportation in the State. In that regard, a 360 degree monitoring mechanism should be put in place, as follows.

Figure 1- 7 Four-level monitoring mechanism



1.2.13.1 Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

a. Quantity of sand to be extracted from the reach should be based on the quantity of sand assessed in the reach by the Joint Inspection Team.
b. The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.
c. De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.
d. After every two year, a mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.
e. Mandatory e-pass/ e-permit should be made available at reach level for transportation of any sand by any GPS enabled vehicle with provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ mobile number. Also provision should be made available for stockyards/ stockiest of sand. In case of nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.
f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weigh bridge.
g. Real time data capture for transportation

1.2.13.2 Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicles (tractors/ trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Online weighbridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established near all major consumption centers to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain any of the security feature mentioned under section 5.11 so that one permit cannot be re-used by generating photocopies of the permit.

1.2.13.3 Level 3 - End consumer monitoring/ bulk consumer

For end consumer monitoring, a customer grievance redressal center should be established to enquire about the grievances faced by the sand consumers. The telephone number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Additionally, profiles of customers should be analyzed such as delivery of sand at the

same address, usage pattern and its comparison with the estimated usage, as mentioned in purpose, etc. Further, surprise checking should be conducted by the district level committee staff as per instructions of the monitoring agency.

1.2.13.4 Level 4 - Indirect monitoring

Indirect monitoring can be done by determining sand consumption through quantum of cement sales in the State, as sale of cement is quite organized and data is easily available at the State level and district levels for the same. From district-wise cement consumption, further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be analyzed further.

Note: The above monitoring mechanism is just a suggestion and the States may visit Andhra Pradesh and Telangana to study the monitoring mechanism in greater detail.

1.3 Best practices across the process chain

1.3.1 Best practices in the notified or controlled pricing model

1.3.1.1 Demand Supply assessment

Of the 14 States surveyed for this study, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana follow controlled pricing model. Further, only Telangana and Tamil Nadu have undertaken demand estimation. The estimation by Telangana is within the range of estimation done using RBI data based method.

1.3.1.2 Alternates to natural sand

Out of the five States following notified pricing model, Andhra Pradesh and Telangana have separate M-sand policy. Tamil Nadu is in the process of drafting the M-sand policy.

1.3.1.3 Rules & Regulations

Andhra Pradesh and Telangana have well defined rules and regulations for sand mining and alternative materials such as M-sand. These States have separate policies for sand, distinct from other minor minerals. Further, the mining departments/ State agencies in these States handle the regulations and overall administration of sand mining operations. Lastly, these States have been regularly updating their policies for sand and other minor minerals taking into account the developments in the sector.

1.3.1.4 Identification

In States like Andhra Pradesh and Telangana identification process is detailed and joint inspection report is prepared and followed for identification of the concessions.

1.3.1.5 Clearances and approvals

Prior clearances and approvals before auctioning or allocating the blocks helps minimize risks for the bidders and reduces the lead time for development. In States such as Andhra Pradesh and Telangana, the mining department/ Corporation procures the environment clearance and mining plan approvals. Only well administered States may follow the model of obtaining clearances/approvals themselves.

1.3.1.6 Business model

If the objective is to keep prices affordable and accordingly regulated, then notified or controlled pricing model can be adopted as is the case with Telangana and Andhra Pradesh. States however miss out on revenue generation even where consumers have the capacity to pay.

1.3.1.7 Operations & Monitoring

Telangana is doing better in terms of control over sand mining operations, as TSMDC appoints raising contractors through competitive bidding to extract sand on its behalf, and it can mandate stricter compliance with environmental norms as part of its contracting.

The monitoring mechanism should not only be limited to physical checking by identified personnel but should include the use of technology in checking the transport permit, keeping the record of sand consumers for verification and monitoring the excavation sites. In view of this, Andhra Pradesh follows a 360° monitoring starting from the reach level to delivery of sand to the end consumers.

1.3.1.8 Transportation

In Andhra Pradesh, all sand carrying vehicles are registered with the State mining department and are GPS enabled. Further, all the vehicles carrying sand have a valid transport permit generated online along with a scan code or a hologram mark to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team has a scanning device to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., are displayed on the scanning device. The transit pass generated at the reach/stockyard also contains the route of delivery from the origin to the destination, and the same can be cross checked with the GPS device at the check points if there is any deviation in the route designated and the actual route followed. Further, through the GPS device, any unauthorized entry of a transportation vehicle near the reach/ stockyard can also be checked.

1.3.1.9 Sale of sand

Andhra Pradesh has constituted a five member district committee in all the districts which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation

department and ADMG under the chairmanship of District Collector. The committee notifies the price of sand for the district including transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call centre, which gives a call to all the consumers to enquire whether the amount that is charged for sand is within the Government's notified limit. Consequently, the landed price of sand in the entire State has been under control.

Apart from Andhra Pradesh, Telangana is also relatively well placed in terms of sale of sand in the State, where only TSMDC can sell the sand. Further, the sale can only be through the online portal developed by the mining corporation. Anyone who wishes to purchase sand in the State has to register on the online portal and subsequently login to place its order. After logging in, the portal displays the entire list of reaches/ stockyards along with the sand available in those reaches/ stockyards and the corresponding quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on location, quality and price and book based on the most suitable lease/ stockyard.

1.3.1.10 Consumer satisfaction and quality

Getting quality sand at reasonable prices is a major concern for consumers. Out of the States following nomination model, the consumer satisfaction is measured only in Andhra Pradesh by calling consumers through the call center for the delivery of sand at notified prices. However, regarding the quality aspect the consumers are not aware and infrastructure for testing facilities are not adequate.

1.3.2 Best practices in the market model

1.3.2.1 Demand Supply assessment

States following market model are Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand. Out of these States Gujarat, Haryana, Karnataka, Punjab, Rajasthan and Uttar Pradesh have done demand estimation. The estimation of the Gujarat and Punjab is within range of estimation done using the RBI data based method.

1.3.2.1 Alternates to natural sand

Out of the nine States following market model Gujarat and Karnataka have M-sand units established. Karnataka has separate M-sand policy chapter in their minor mineral concession rules.

1.3.2.2 Rules & Regulations

Karnataka has well defined rules and regulations for sand mining and alternative materials such as M-sand. The State has separate policy for sand distinct from other minor minerals. Further, the mining department in the State handles the regulations and overall administration of sand

mining operations. Lastly, the State has been regularly updating its policy for sand and other minor minerals taking into account the developments in the sector.

1.3.2.3 Identification

Gujarat prepares a detailed geological report through a technically qualified person for each identified sand block and puts the sand blocks for auctions based on the quantity of resource established by the report. Apart from establishing the resource quantity, the report contains details of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

1.3.2.4 Clearances and approvals

The clearances and approvals need to be processed at a faster pace and in order to achieve that objective the applications for getting the clearances/ approvals should be made online.

1.3.2.5 Business model

If the objective of the State Government is revenue maximization, then simple forward tender cum auction model as is being followed in Gujarat can be adopted where the sand bearing areas are notified for auction after preparation of detailed geological report containing the estimated quantity of sand reserves in the block. Haryana received maximum revenues amongst the States following market model.

1.3.2.6 Operations & Monitoring

Operations in the market model is in the control of lessee/ contractors and the State Government has minimum control over it. Further the States following the market model are in the process of developing monitoring mechanism which is IT based. Few States have started issuing e-pass for transportation of sand and others are still under developing this system. Gujarat has developed applications for checking and has grievance cell for consumers from monitoring aspect.

1.3.2.7 Transportation

Transportation of sand in the market model is controlled by contractors and department/State Government has no control over it. The transport of sand may be integrated with the online sale mechanism.

1.3.2.8 Sale of sand

Sale of sand in the States following market model is direct by lessee/contractors and by offline means only. State Government has no control over the sale of sand or the prices of sand. The States should endeavor for the online sale of sand for doorstep delivery service.

1.3.2.9 Consumer satisfaction

Getting quality sand at reasonable prices is major concern for consumers. In the market model, market dynamics decide the sale prices of sand. In Haryana and Gujarat, prices are comparatively lower due to more supply.

2. Introduction

This chapter briefly describes the background of the study, need and objectives for the sand mining framework as well as the approach of the study.

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. It is one of the most widely used commodity for different purposes with majority in construction activities. Sand and gravel are mined world-wide and account for the largest volume of solid material extracted globally. It is used primarily in construction of houses, buildings and other infrastructure projects (e.g. bridges, roads, airports etc.) thereby provides both economic and social benefits to the country. Based on a rough estimation, the total sand consumption in India is around 700 million tonnes in 2016-17 which has been derived from the cement consumption. Sand is mainly found in the oceans, rivers, lakes & reservoirs, streams, flood plains, and hills & mountains. In India, the main source of sand is from river plains, in-stream mining, coastal areas and agricultural fields. Among all the sources, river bed is the most common and prevalent source of sand in the country. Sand is mined / removed from these areas either manually or through mechanical extractors.

2.1 Background

2.1.1 Regulatory provisions for sand (minor mineral)

Sand is classified as a minor mineral and it is defined in the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), as follows:

"*minor minerals means building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes, and any other mineral which the Central Government may, by notification in the official gazette, declare to be a minor mineral"*.

The term `ordinary sand' used in clause (e) of Section 3 of the MMDR Act, 1957 has been further clarified in rule 70 of the MCR, 1960 as:

(iv) Purposes of stowing in coal mines,

(v) For manufacture of silvicrete cement,

(vi) Manufacture of sodium silicate and for

(vii) Manufacture of pottery and glass.

Further, Section 15 of the MMDR Act empowers State Governments to make rules for regulating the grant of mineral concessions in respect of minor minerals. The regulation of grant of mineral concessions and complete administrative control for minor minerals is, therefore, within the

legislative and administrative domain of the State Governments. Hence, under the power granted, the State Governments have framed their own minor minerals concession rules and policies related to the same. Further, Section 23C of the MMDR Act, 1957 empowers State Governments to frame rules to prevent illegal mining, transportation and storage of minerals.

It has been observed that the demand of sand has increased over the years due to significant infrastructure development in the country. The legitimate supply of sand is not enough to cater to the demand. There are many instances of illegal mining noticed and reported. Also constitutional bodies like Hon'ble Supreme Court, High Courts of the States and National Green Tribunal (NGT) have taken up illegal mining issues to prevent the damage to the environment. This has further constrained the supply of this commodity. Since in majority of the States, sale prices are not regulated, supply crunch makes the prices of sand to increase and in many cases exorbitantly.

Ministry of Environment, Forest and Climate Change (MoEFCC) has issued *Sustainable Sand Mining Management Guidelines, 2016*, in March 2016 which, inter-alia, addresses the issues relating to regulation of sand mining and provides a detailed program for ensuring that mining of river sand is done in a sustainable manner. The guidelines emphasize on the preparation of District Survey Report (DSR) which needs to be prepared for each district. The guidelines also present a set of rules to be followed for operations and monitoring part. These further emphasize on making resources available, mapping of these resources at the district level, identification of appropriate sites for extraction, appraisal of the extraction process, putting in place the required environmental safeguards, and rigorous monitoring of the volume of extracted material. Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. Usage of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation is also part of the guidelines issued by MoEFCC.

2.1.2 Executive Summary of MoEFCC's Sustainable Sand Mining Management Guidelines, 2016

Below is the executive summary of the *Sustainable Sand Mining Management Guidelines, 2016* issued by MoEFCC.

"

Executive Summary

The sand and gravel are one of the most important construction materials. Ensuring their availability is vital for the development of the infrastructure in the country. There are different sources of sand and gravel, the most important among them is the river. As the requirement of these construction materials is on rise, they also are very vital for the health, physical character of the river and the different important functions of the river. The extraction of sand and gravel

from the river bodies has to be regulated and done with adoption of required environmental safeguards.

For making available these resources, a mapping of these resources at the district level, identification of appropriate sites for extraction, appraisal of the extraction process, putting in place the required environmental safeguards, and rigorous monitoring of the volume of extracted material is required to ensure sustainability of the entire process.

The district is the unit of administration which is best placed to do the mapping of these resources, adopt the best environmental practices for extraction of these materials and monitor its extraction and movement. The large number of leases which are awarded, the scattered geographical location of the availability of these materials and decentralized requirement and usage of the sand and aggregates also places districts in a unique position to play a vital role in adoption of environmental safeguards needed for sustainable extraction of river sand and gravel.

Recommendations for management of sustainable sand extraction are the key objective of the Guidelines. Emphasis is given to the setting up of monitoring plans that will provide data on profile changes and sediment transport capacity to enable the authorities to evaluate the long-term effect of the mining activities both upstream and downstream of sand extraction sites.

Special emphasis is given on monitoring of the mined out material, which is key to the success of environment management plan. So use of IT and IT enabled services for effective monitoring of the quantity of mined out material and transportation along with process reengineering has been made a part of the Guideliness. The Guidelines proposes delegation of responsibility and authority to the cutting edge level i.e. the District Environment Impact Assessment Authority along with streamlining the process of impact assessment, environment management plan and environment clearance in cluster situation.

Promotion of manufactured sand, artificial sand and alternative technologies in construction materials and processes are also required for reducing the dependence and demand on naturally occurring sand and gravel. Development of slag sand, sand from stone chips and there certification under BIS is an important step in this direction."

Following are the few references to the notification/circulars issued by MoEFCC which need to be referred by the States along with other notification/circulars/orders issued by MoEFCC.

a) The Environment (Protection) Act and Rules, 1986
b) MoEFCC Notification 27th Jan 1994
c) MoEFCC Notification 14th Sep 2006
d) Amendment of MoEFCC Notification (14Sep2006) dated 1st December 2009
e) MoEFCC OM dated 18.05.2012
f) MoEFCC Notification dated 24th June, 2013
g) MoEFCC Notification dated 9th September 2013
h) MoEFCC Notification dated 24th December 2013

i) MoEFCC Notification dated 7th October 2014

Despite the different measures taken by the Central Government and the State Governments, issues with regard to sand mining affecting the ecology of rivers, high sand prices and lack of availability, remains. There has been many instances of mining ban by the courts viz. Hon'ble Supreme Court, respective High Courts of the States and NGT. Following are some recent instances where courts had intervened e.g.:

- **Rajasthan:** In November 2017, the Supreme Court put a blanket ban on mining of sand and bajri in Rajasthan as the mines were operating without the environmental clearance.
- **Tamil Nadu:** In November 2017, Chennai High Court ordered to shut down the sand quarries in Tamil Nadu within a period of 6 months.
- **Uttar Pradesh**: In June 2017, the National Green Tribunal directed the Uttar Pradesh Government to ensure that no mechanized sand mining is carried out in the Yamuna riverbeds in Kanpur district. Further, in May 2016, the NGT banned illegal extraction of sand through mechanized mining in Gonda and Faizabad districts of Uttar Pradesh and ordered a probe into the unauthorized activities there.
- **Uttarakhand**: The Uttarakhand high court on 28th March 2017 put a four-month ban on mining in the State during which no fresh lease or prospective licence for mining can be issued.
- **Haryana**: The new rules in Haryana in 2012 were framed addressing the observation/directions of the Hon'ble Apex Court as contained in orders dated 27.02.2012 passed in the case of Deepak Kumar.
- **Maharashtra**: NGT order dated 30th May 2017 regarding illegal sand mining in the middle river Bhima, District Sholapur, Maharashtra

The issues related to sand mining are as under:

Figure 2- 1 Issues related to sand mining

i. Rampant mining of sand without regard for the resource

Since many years, sand and gravel have been used in the construction of roads and buildings; and their demand continues to increase. With the increased demand of sand, over exploitation of existing resources is taking place leading to adversely affecting the physical characteristic of the stream.

There have been several attempts by the Central Government, State Governments and judiciary to curb instances of illegal sand mining, most notably the Supreme Court order in 2012 that banned all sand mining, including that on land less than five Ha, without the approval of Ministry of Environment, Forest and Climate Change (MoEFCC) department. Hon'ble Apex Court in Deepak Kumar's case (supra) extensively examined the environmental concerns, in the context of mining of minor minerals, considering its impact on the environment. The Apex Court observed that extraction of alluvial material from within or near a streambed has a direct impact on the stream's physical habitat characteristics. These characteristics include bed elevation, substrate composition and stability, in-stream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on both in-stream biota and the associated riparian habitat. NGT in 2013 issued notices against violators of SC orders, existing mining leaseholders to get environmental clearance from MoEFCC, giving them a time of 3 months to do so.

ii. Non-availability of sand in many cities

Construction is expected to grow at 6% during the years 2016-2020, as compared to 2.95% during 2011-2015*. Consequently, the demand for sand is poised to grow further at an expeditious rate. However despite the magnitude of the demand, supply of sand has been dwindling continuously over the past few years owing to environmental restrictions imposed by the Centre and other governing institutes. One of the major factors for unavailability of sand in some cities is that sand is not available near to some of the major consumption hubs and transportation of sand across long distances tends to be uneconomical.

**Source – India Brand Equity Foundation*

iii. Sky-rocketing prices and quality of sand

Non-availability of sand and sky-rocketing price of sand are two sides of the same coin. Due to the population growth and the resultant construction activity, there is a huge demand for sand in the country. In some of the cities, where there are no nearby sand reaches, it creates a huge demand-supply mismatch. This mismatch coupled with cartel formation among the miners & transporters and in absence of robust monitoring mechanism or regulation by the Government has led to sky-rocketing prices of sand in these cities, such as the prices of sand in Bangalore and Mumbai are in the range of Rs 70,000 to Rs.1,00,000 for a single truck of 30 tonnes. High sand prices, has led to mixing of low quality sand with the usable sand that is delivered to consumers who are generally not aware about the quality of sand. The low quality sand is not suitable for construction purpose and poses a risk to human lives using the structures made by it.

iv. Cartel formation in sand mining

Although State Governments have started allocating the blocks on auction basis to bidders in the States, but to manipulate the supply and to control the prices, bidders may form cartels to keep

their margins high. In absence of any robust mechanism, its tough to control cartelization unless the sale rights are with the State Governments.

There is a need for increased regulation and improved monitoring processes in sand mining. Some of the States have been able to restrict illegal mining or regulate the prices or improve the availability through different policy interventions. Further, some of the States have utilized IT systems in the process chain of sand mining for improving the sand mining and sales management system. However, to cater to the issues discussed above, it is extremely important to have a more focused policy framework across all the States. This includes adopting the best practices across the process chain by different States which may help to control illegal mining, improve sand availability and control prices in the market.

In view of the issues discussed above, a committee was constituted to study the existing system of sand mining in various States and to prepare a sand mining framework. The details of the committee are discussed in the following section.

2.2 Formation of a committee for sand mining framework

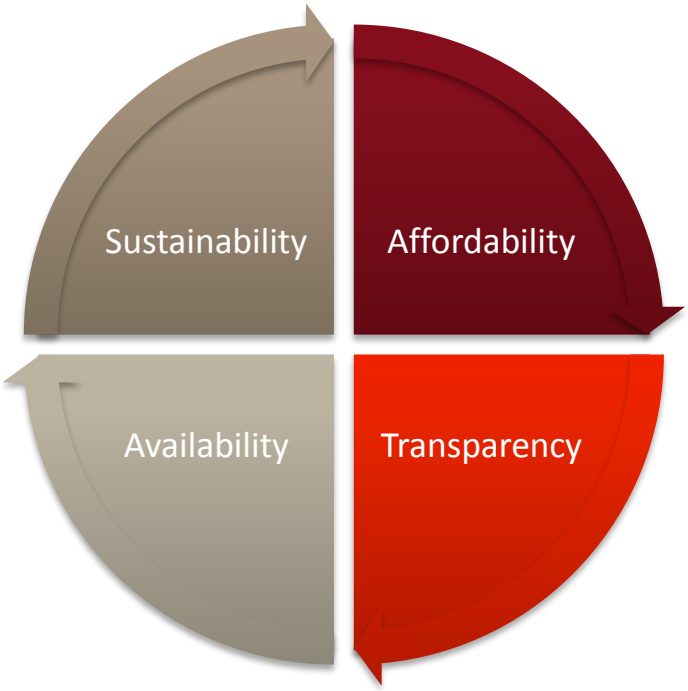
Due to various issues in sand mining and in pursuance to the deliberations of the State Mining Minister's Conference held on 4th May 2017 held at New Delhi, a committee chaired by the Secretary, Ministry of Mines, Government of India along with officials from State Governments was constituted by order dated 18th May 2017, to study the existing system of sand mining in various States and prepare a sand mining framework which addresses the concerns of this sector. The committee comprised of officials of the State Governments, Controller General of IBM and Director, Ministry of Mines as member-secretary. The notice for committee formation (Annexure-I) and extension of time period of the committee (Annexure II) is annexed. The terms of reference to the Committee was to suggest sand mining framework with a view towards a transparent and sustainable system for extraction of sand for ensuring supply of adequate sand at reasonable rates in the States. Initially committee was constituted for a period of 3 months. During the course of discussion in various meetings, the scope of work of the committee had been extended from what was envisaged initially, hence the period of the committee was extended upto 31st March 2018 on 1st March 2018.

The committee met on 2nd June 2017, 22nd August 2017, 13th Feb 2018 and 8th March 2018 in New Delhi and discussed on various matters related to the existing challenges in the sector, issues at hand, information required for the study, etc.

2.3 Understanding the objectives of the framework

Based on issues concerning the sand mining, review of various related documents and also discussion with various stakeholders, four main objectives are expected to be achieved through the framework, as depicted below.

Figure 2- 2 Objectives of the framework



2.3.1 Sustainable sand mining

Sand mining in India has reached to a level that it is threatening the environment and ecosystem. Hence, sustainable mining is extremely important to promote environmental protection, limit negative physiological, hydrological and social effects underpinning sustainable economic growth. This should be carried out for the following:

(i) To ensure the conservation of the river equilibrium and its natural environment by protection and restoration of the ecological system.

(ii) To ensure availability of adequate quantity of aggregate.

(iii) To improve the effectiveness of monitoring of mining and transportation of mined out material

(iv) To avoid aggradation at the downstream reach especially those with hydraulic structures such as jetties, water intakes etc. and to ensure the rivers are protected from bank and bed erosion beyond its stable profile

(v) To ensure there is no obstruction to the river flow, water transport and restoring the riparian habitats

(vi) To avoid pollution of river water leading to water quality deterioration
(vii) To prevent depletion of groundwater reserves due to excessive draining out of groundwater
(viii) To prevent ground water pollution by prohibiting sand mining on fissures where it works as filter prior to ground water recharge
(ix) And to maintain the river equilibrium with the application of sediment transport principles in determining the locations, period and quantity to be extracted.

2.3.2 Availability of sand

Sand and gravel have long been used as aggregate for construction of roads and building. Availability of sand to meet the growing pace of urbanization and infrastructure development has become an issue and a grave point of concern. Thus, the framework of sand mining should take into account the factors responsible for this scarcity and to implement control steps so as:

(i) To ensure that sand is available to suffice the needs of citizens & Government for construction activities throughout the year by sustainable mining practices only
(ii) To promote alternatives i.e. manufactured sand, artificial sand and alternative technologies in construction materials processing for reduced dependence on naturally occurring sand and gravel
(iii) To analyze the feasibility of imported sand from other countries such as Malaysia and Philippines

2.3.3 Affordability

Sand, a key construction material, has been a source of angst for developers. Booming construction activity and scarcity of sand has resulted in high prices. Hence, it is extremely important for the framework:

(i) To ensure availability of sand at reasonable prices throughout the year by increasing supply
(ii) To control the price from supply side rather than through administrative mechanism
(iii) To provide appropriate pricing models for keeping the prices under check
(iv) To reduce illegal mining, closure of quarries and smuggling of sand to neighboring States that are major factors influencing quick escalation of sand price
(v) To establish responsive check on these factors to make sand prices reasonable for use in construction activities
(vi) To create awareness for alternatives of river sand and to promote production and usage of alternatives of river sand through incentives.

2.3.4 Transparency

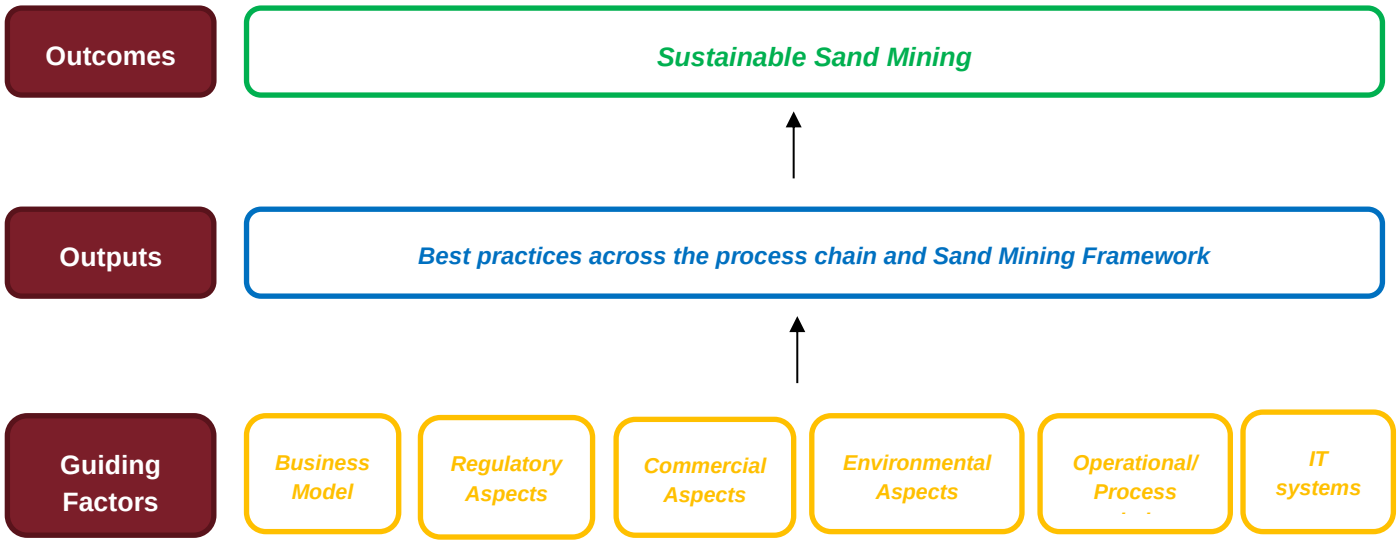
Transparency in any process is a measure of control of flaws in the system and also builds trust among the stakeholders. It is extremely important to have utmost transparency in the entire process including allocation, operations and sale of sand so as to tackle the challenges facing the sector. To enhance transparency, the states should consider increased usage of information technology systems in the sand mining process limiting human interventions and chances of discretion.

Based on understanding of the objectives, an approach and methodology towards execution of the study was devised and finalized in consultation with the relevant stakeholders. The same is discussed subsequently.

2.4 Approach and Methodology

The approach has been designed as a three-layered framework keeping in view the goal and objectives of the study. The approach identifies key guiding factors providing direction to the assignment and providing the right perspective for achieving the outputs/ deliverables. The following framework describes our overall approach.

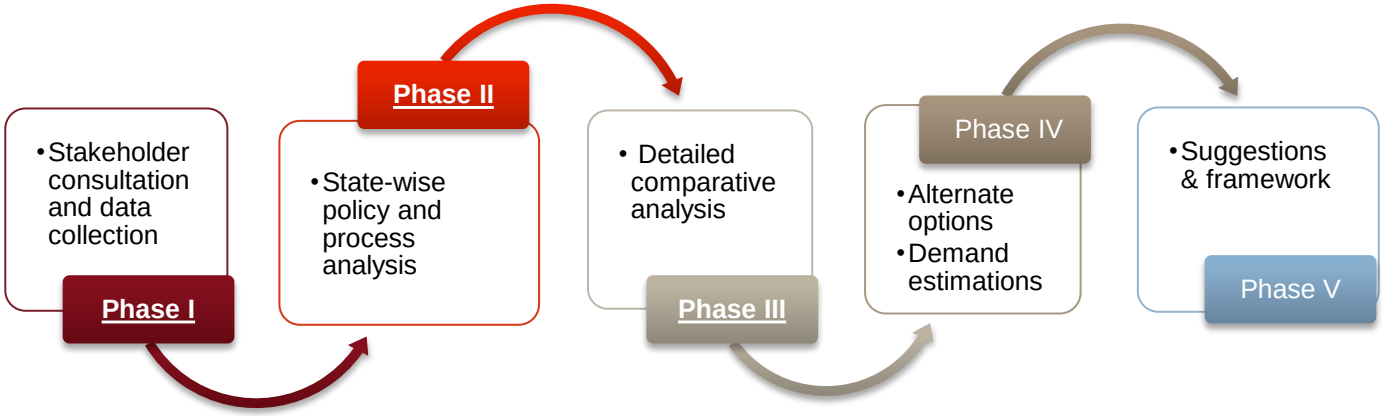
Figure 2- 3 Overall approach



2.4.1 Detailed approach and methodology

A systematic methodology was formulated to carry out the study. The below mentioned tasks were executed in a phased manner right from data collection and stakeholder consultations to the final suggestions. The phases of execution are shown in the figure below.

Figure 2- 4 Phases of execution



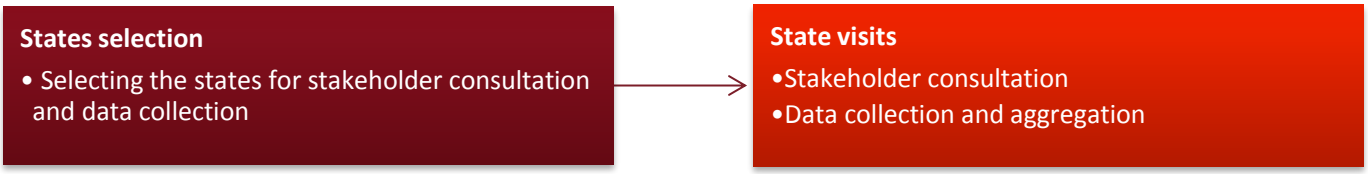
The approach and methodology was developed to comprehensively cover all required aspects of the study, as discussed below.

2.4.1.1 Phase I: Stakeholder consultation and data collection

Phase I: Stakeholder consultation and data collection
Objective: To understand the sand mining policies and procedures across the chain in different States and to collect relevant data for detailed review and analysis
Key Outputs: 1. ***State Visit Plan*** 2. ***Data and documents collected - Latest mineral concession rules, relevant Government orders, sand mining policies, policies and data related to alternatives of sand, sand mining and sales process related data, etc.***

The main activities carried out in this phase are shown in the figure below:

Figure 2- 5 Activities in Phase - I



2.4.1.1.1 States selection

This phase began with the preparation of a list of States for data collection and stakeholder consultations. The list was finalized to cover most of the regions of the country i.e. central, west, north, south and north-east. The following 14 States were selected:

Table 2 Details of state visits

Region	Name of the State			
South	Telangana	Andhra Pradesh	Tamil Nadu	Karnataka
Dates of visit	15th & 16th December	20th to 22nd November	13th & 14th December	11th & 12th December
West	Rajasthan	Maharashtra	Gujarat	
Dates of visit	19th to 21st November	8th & 9th November	22nd & 23rd November and 29th & 30th January	
North	Punjab	Haryana	Uttarakhand	
Dates of visit	13th to 15th November and 29th & 30th January	13th to 15th November	8th to 10th November	
Central	Chhattisgarh	Uttar Pradesh	Madhya Pradesh	
Dates of visit	13th & 14th November	6th & 7th December	27th to 29th November and 29th & 30th January	
North-east	Assam			
Dates of visit	13th to 15th December			

A detailed plan was prepared for each State visit that included stakeholders to be met, date of meeting, detailed discussion areas, list of data and documents required, etc. The detailed visit

plan is attached as Annexure – III. Two teams were formed having members from IBM and the consultant. Seven states were covered by each team as per the plan.

2.4.1.1.2 State Visits

Each State was visited by the respective teams as per the detailed State visit plan. The visit mainly covered stakeholder consultations and the data/ document collection for the detailed analysis in the subsequent phases. The discussion points covered the following areas:

- Applicable rules and regulations for sand mining
- Baseline and present condition of sand mining
- Issues and challenges facing the sand mining activity
- Problems related to sand mining that the policy has helped to resolve and those that still exist
- Process of award of sand reaches, and any gap/loophole in the process
- Understanding the roles of various stakeholders involved in sand mining like District Level Sand Committee members, State Level Committee members, Self Help Groups (SHG), if any, etc
- Views of stakeholders on the existing policy and how to fill the gaps, if any
- Status of royalty and taxes applicable for sand and M-sand, if applicable
- Status of illegal mining and efforts to stop the same.
- Information on the demand-supply assessment undertaken by the State and methodology adopted for the same
- Information on business models followed by the State
- Information related to transparency in the process of sand mining/ online methods
- Information on resource availability, production level and other technical details
- Information on pricing policy followed by States for deciding the sale prices of sand and revision interval for sand prices

2.4.1.2 Phase - II: State-wise policy and process analysis

Phase II: State-wise policy and process analysis
Objective: To understand the sand mining policies and procedures in different states based on study of the information received in the previous phase
Key Outputs: ***Detailed review of sand mining policies and procedures***

In this phase, a detailed study of the following aspects was carried out:

Figure 2- 6 Aspects covered in State wise analysis

The data obtained from the different States was analyzed in detail to present the existing sand mining and sales management systems for each State. The areas covered under each aspect are:

2.4.1.2.1 Legal and regulatory framework

In this section, the existing legal and regulatory framework of sand mining in the selected States was reviewed, focusing on two main aspects i.e. the presence of appropriate legal and regulatory measures and its effectiveness. The following aspects were looked into:

- applicable acts, rules and regulations governing the sector and the processes of sand mining and sales, amendments/ notifications/ Government orders, responsible authority for various provisions
- latest policy and legal changes brought-up/proposed in the States to carry out sand mining in a sustainable way
- internal as well as external environment that affects the functioning of sand mining and sales, directly or indirectly by analyzing the past trends and also from the view of various stakeholders discussed during phase-I
-
- steps taken to prevent adverse impact of mining of sand on the environment
- legal framework and steps taken to curb illegal mining and transportation of sand

2.4.1.2.2 Sand mining process mapping

Standardization of the processes are extremely important and brings efficiency in the system. However, the States follow different sand mining processes. Hence, our goal in this section was to map the complete process chain of sand mining in each State and use the information for formulation of the framework with standardized processes. To do the same, detailed information on the process chain was gathered during the States visit. In addition, a number of reaches were also visited. The whole section included mapping of the tasks being carried out right from the identification of the reaches to the sale of sand to the end user. In addition to this, a responsibility matrix was also prepared mapping the responsibilities of individuals within the process. Some of the details that have been captured are:

- Sand demand in the State
- Alternate sources of natural sand in the State

- Rules & regulations related to sand in the State
- Agencies involved in identification of sand reaches
- Process of allotment of sand reaches
- Process of appointment of contractors/excavators for sand mining (if required)
- Responsibility of monitoring & surveillance of sand mining
- Transportation mechanism of sand
- Mode of sale of sand in each State
- Use of technology in the processes such as allocation, monitoring, dispatch etc.

2.4.1.2.3 Sand pricing, royalty and taxes

Pricing

In this section, an in-depth study was conducted to understand the sand pricing mechanism being followed in different States. The team interacted with the stakeholders to assess the reasons of the pricing mechanism followed in the State as well as the prevailing prices of sand at the end-user level. The pros & cons and irregularity in the prices under different pricing mechanism was also assessed. The questionnaire developed in the previous phase was used for getting the information and views from different stakeholders.

Royalty

In this section, the data on royalty and taxes related to sand mining operations were collected from each State. An in-depth study on the royalty structure was conducted. This included study of trend in royalty and taxes to understand the impact on the demand, supply and prices of sand. In addition, the concept and method of royalty calculation in each of the States was focused upon and the pros and cons of every concept was analyzed from the perspective of the Government since royalty constitutes a major source of revenue for the States.

Since this is one major source of revenue collection for the States, the issues with the design of the royalty structure and its implementation in each State was also analyzed as this could hinder the realization of what could otherwise be achieved.

2.4.1.2.4 Monitoring Mechanism

In this phase, the team gathered information on the experience of each of the State in illegal mining. Information such as number of approved sand reaches, operational sand reaches, location and area of the reaches, etc. were collected for all the States. The reaches were shortlisted from where illegal mining activities have been reported and detailed analysis was done to understand the impact of illegal mining in the respective reach. Further, special emphasis was

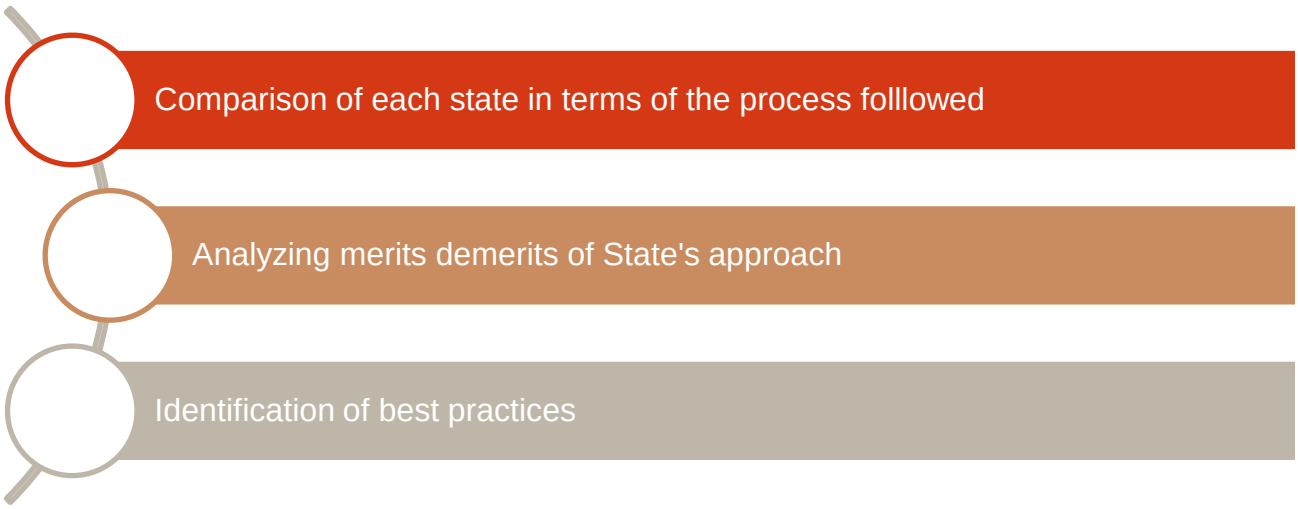
given on the steps taken by the respective authorities to curb illegal mining in the States and its effects. These outcomes play an important role in formation of the sand mining framework.

2.4.1.3 Phase - III: Detailed comparative analysis

Phase III: Detailed comparative analysis
Objective: To find best practices in sand mining policies and practices
Key Outputs: ***Comparison of the States and best practices***

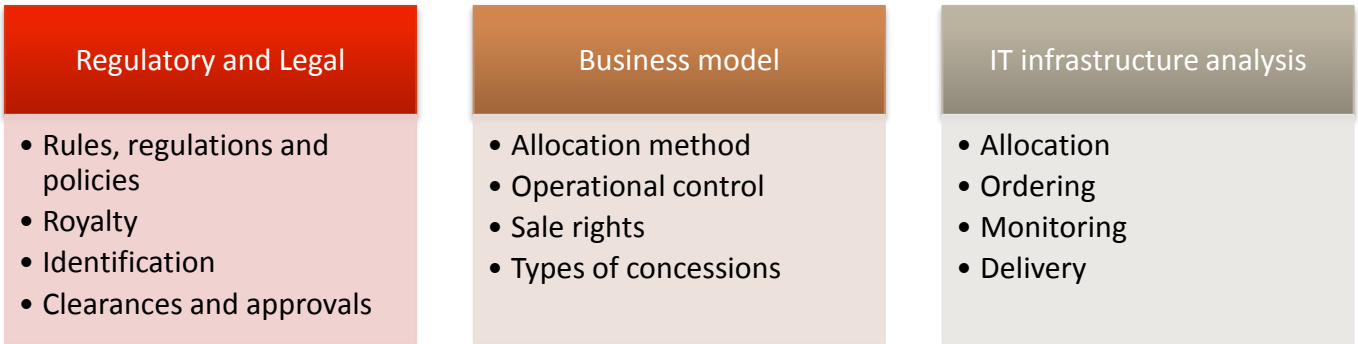
This phase involved comparison of States against different parameters across the sand mining chain to identify best practices.

Figure 2- 7 Approach of the analysis



The main areas that are used for comparison between the States' sand mining policies are:

Figure 2- 8 Areas covered for comparison



Key tasks carried out in this phase are:

- The team compared the rules and regulation followed by different States and assessed their impact on prices, demand and supply situation of the State.

- The team compared the entire process chain of sand mining from identification of sand reaches to sale of sand followed in different States. The team analyzed the data collected through State visits and benchmarked the practices. The information collected was compiled into standard templates and matrices.

- The team identified the technological requirements for different stages of sand mining including new generation technologies for transportation and tracking illegal sand mining. The level of transparency brought in the complete process of sand mining in the States because of the usage of technology was also evaluated. After finalization of areas where technical up-gradation is required, different business models for technical enablement were analyzed and the pros and cons were also captured to help the Government in selection of the appropriate business model that can best fit as per the requirements and functioning of the States.

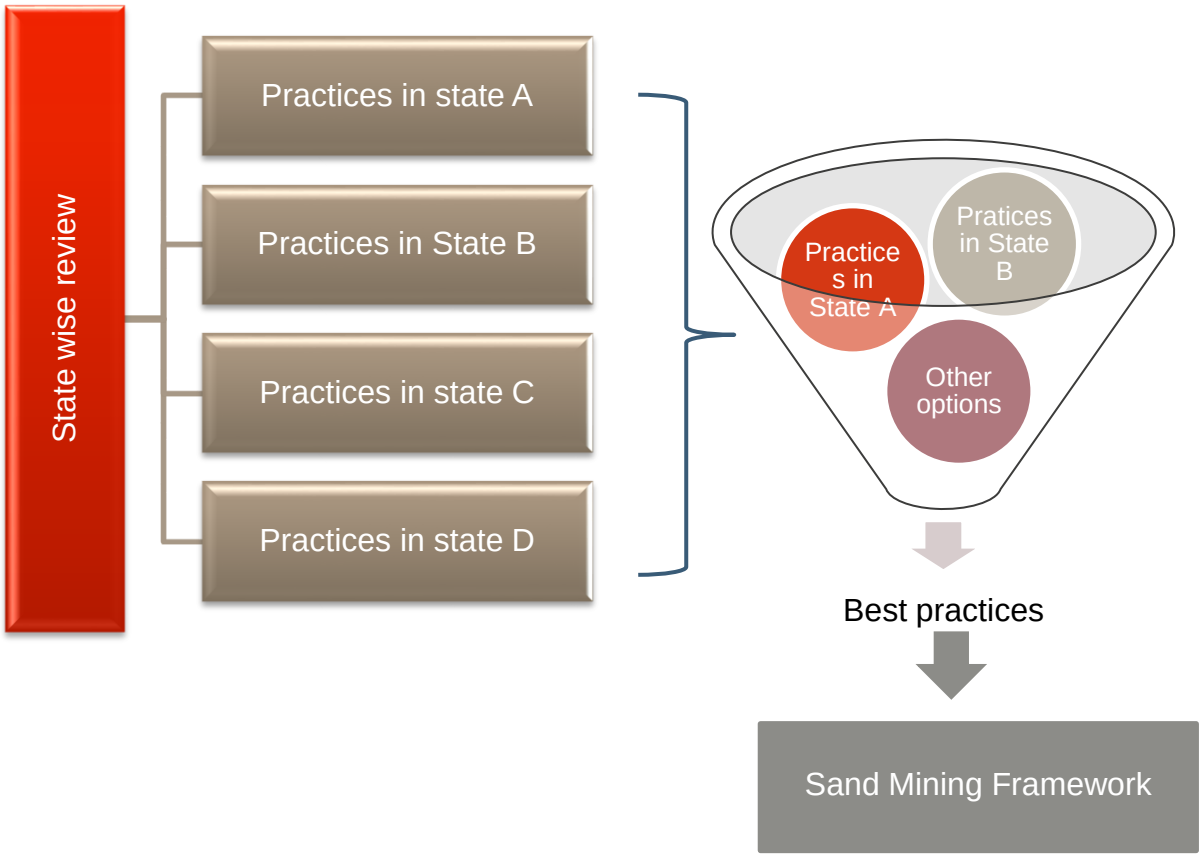
- Pricing mechanisms followed by different States including their royalty structures were analyzed. The team analyzed the different mechanisms followed by States and analyzed the factors which hinder and encourage the revenues of the Government from sand mining.

2.4.1.4 Phase - IV: Suggestions

Phase IV: Suggestions
Objective: To provide suggestions for the policies and practices to be followed by the States along with proposing alternatives of river sand and methods for demand estimation
Outputs: ***Sand Mining Framework***

Specific suggestions to act upon in order to control illegal mining, carry out mining in a sustainable and environment friendly way, ensure availability of sand, and make best utilization of available technologies have been made. Along with the above, the alternate options of river sand are analyzed and method to estimate the demand of sand in the State is proposed.

Figure 2- 9 Overview of Approach and Methodology



3. State-wise policy and process analysis

This chapter provides an overview of the policies, procedures and practices being followed by the States visited. It discusses the types of concessions granted for sand, allocation methods, pricing & royalty rates, clearances and approvals, and overall operations and monitoring mechanism being followed in different states.

3.1 Andhra Pradesh

Regulatory provisions

The minor mineral rules applicable in the State are the *Andhra Pradesh Minor Mineral Concession Rules, 1966* and its amendments issued by the Government Orders from time to time. The responsibility of the minor mineral "sand" is with the Department of Mines & Geology. For sand, there is a separate policy, which was framed in 2015, *"New Sand Mining Policy*". Later on this was changed in 2016 to *"Free Sand Policy".*

Business Model

In the Free Sand Policy, the Government notifies the sand reaches from where sand can be excavated free of cost (i.e. without paying any royalty or other taxes but only payment of extraction cost, which has been fixed by the Government for each district). There are also various Self Help Groups (SHGs) working to load sand on the transporting vehicles at the notified reaches. The department has issued instructions to notify small reaches to facilitate public to get the sand. The time period for notified reaches is one year or till exhaustion of lease, whichever is earlier. Also the department has fixed maximum landed rates in each district including transportation cost for consumers.

Types of sand concessions	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Notified Sand reaches	No restriction	No restriction	No restriction	Till exhaustion of sand or one year period, whichever is earlier

Business Model	Sub-model	Process followed	Separate accounting	Production FY17	Revenue FY17

			for royalty (Yes/ No)	(MMT)	(Rs. Crores)
Notified or controlled pricing model	Notified sand reaches for extraction by public or by SHGs	Notification for extraction to SHGs or public on their own	Not Applicable	NA	Not Applicable

The Assistant Director, Mines and Geology, has the responsibility to prepare the Mine Plan for feasible sand bearing areas duly dividing the sand reaches having an extent of above 5 Ha into small reaches. Further the department has the responsibility to get the environmental clearance from the appropriate body based on the size of the notified area.

Monitoring

For monitoring, the department has deployed technical assistants (TAs) on all the active reaches who provide real time data from all the reaches with photographs of all the sand carrying vehicles. The technical assistant notes down the details of the driver of the sand carrying vehicle and the sand consumer. Further, these details get uploaded to the system on real time basis and software tracks the movement of GPS based vehicle. The software issues alerts in case of discrepancies between the consumer address and destination.

Sales

The State has already developed a mobile application for sand, which is expected to be operational very soon, and once it gets fully functional, all the bookings for sand in the State will be done through the app. All the sand carrying vehicles in the State are registered with the department and the State has also released a G.O. to mandate the installation of GPS in all sand carrying vehicles by February 2018.

The Government has constituted a five member district committee in each district which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation department and ADMG, under the chairmanship of District Collector. The committee notifies the price for sand in the district including the transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call center, which enquires all the consumers whether the amount charged for sand is within the Government’s notified limit. Consequently, the landed price of sand in the State is under control.

DSR Status

District Survey Report is not being prepared in Andhra Pradesh. State prepare their own reports which are similar to DSR reports as per the department.

Demand-Supply Assessment

No proper demand-supply assessment has been carried out by Andhra Pradesh. However, since the State is sand deficit, it ensures through proper monitoring mechanism that no sand from Andhra Pradesh is transported across the border to other States. However, there is no restriction on import of sand from other States. Further, to take care of sand deficit, Andhra Pradesh has given industry status to M-sand producing units in the State and has granted certain incentives for production of M-sand to encourage the manufacturers of M-sand.

Online Portal

Andhra Pradesh maintains an online portal, namely pushkrishna.sps.ap.gov.in/sandapp/dashboard/aspx. The portal is an important part the monitoring mechanism of the State. The portal helps in real time governance of the active sand reaches.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 3 Summary of sand mining policy in Andhra Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Level Committee	• Joint inspection to fix the boundaries • Assess the sand in terms of quantity • Study the environmental aspects	1 month	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	District Level Committee	• Preparation of feasibility report • Obtain clearance from Ground Water Department as per WALT Act & Rules • Clearance from River Conservator in case of underwater extraction • Preparation of mining plan, mine closure plan, environment plan (EIA/EMP)	2-3 months	Offline

		• Submission of approved mining and environmental study (EIA/EMP) to authority for issue of environmental clearance		
Notification of sand reaches	Department of Mines & Geology, Andhra Pradesh	• The department notifies the sand reaches for public after getting all the required clearances	1 month	Online
Operations and Monitoring	(Operations) SHGs/ Consumers	• After DGM notifies the area, anyone can excavate and load sand from the notified reaches • At some of the reaches, Self Help Groups are working to load sand on vehicles in lieu of the loading charges to be borne by the consumer	Continuous	Offline
	(Monitoring) Monitoring Committee	• Overall monitoring responsibility lies with Monitoring Committee	Continuous	Offline & Online
Transportation	Transporters	• Delivering sand to the consumer after paying loading charges • Collecting money from consumer after delivery of sand	Continuous	Offline
	Department of Mines & Geology, Andhra Pradesh	• Getting all the transportation vehicles registered • Issuance of “Weighment Slip” by the department. • Mandatory installation of GPS in all sand carrying vehicles	Continuous	Online
Sales	Department of Mines &	• Ordering is offline only and platform for booking of sand is being developed	Continuous	Offline

	Geology, Andhra Pradesh			

3.2 Assam

Regulatory Provisions

The minor mineral rules applicable in the State are *Assam Minor Mineral Concession Rules, 2013* and the responsibility lies with the District Forest Officers (DFOs) under the Department of Environment and Forest of the State. The types of concessions, which are allotted in the State are mining lease (ML), mining contracts (MC) and mining permit (MP). Assam is currently changing its rules and post amendments of the rules, the Directorate of Geology & Mining shall be handling the responsibility of the minor minerals as well.

Business Model

The allocation of concessions is through offline tender route with a reserve price equal to the royalty rate of the sand (Rs 140/cum from 2015 onwards). The highest amount discovered in bidding becomes the premium to be paid by the bidders. From 2018 onwards, the State will be adopting e-auction model for grant of concessions post amendments of its rules.

Mining lease is granted for a period of 10 to 20 years. Further, there is no restriction on the maximum area for allotment or holding of maximum area by any individual as per the State Rules. Mining Contract is granted for a period of 7 to 10 years and there is no restriction on the minimum area or the maximum area for allotment or neither there is any limit on holding maximum area by any individual. Mining permits are granted for a period of less than two years and for area of less than 5 Ha (maximum limit). However, there is no minimum limit for the area to be granted.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Mining Contracts, Mining Permits	1 Ha	No restriction	No restriction	Mining Lease: 10-20 years Mining contract 7-10 Years Mining Permit: 2 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Offline tender	NA	5.6	30-35*

**Rough estimate, as calculated from data provided for all the leases*

The lessee has the responsibility to prepare the mine plan and get the environment clearance from the relevant body depending on the size of the sand block, and to also procure consent for operation and consent for approval from Assam Pollution Control Board.

Sales

The sale price of sand at pit head is Rs 250-300 per cubic metre and the price in Guwahati at a distance of around 70-80Km from sand reach is around Rs 800 to 900 per cubic metre. However, during monsoon period, the sand price in Guwahati shoots up to Rs 1200 to1500 per cubic metre.

There is no significant use of technology in the entire process of sand mining in the State and even the monitoring is done by offline means.

DSR Status

Assam has still not started preparation of District Survey Report (DSR). There are 33 districts and sand mining is prevalent in all the districts.

Demand Supply assessment

No specific details are available with the State regarding the State's sand demand, consumption, replenishment, etc. Since export of sand is also allowed to other States, it is really difficult to assess the demand of sand. However, the production of sand in FY17 is estimated to be around 3 million cubic metres.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 4 Summary of sand mining policy in Assam

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Forest Officers of the Environment & Forest	• Identification of sand-bearing area and preparation of Initial Report	3-4 months	Offline

	Department, Assam	• Fixing boundary and assessment of quantity of sand		
Allotment of sand reaches	Environment & Forest Department, Assam	• Conduct of tender process and selection of successful bidder • Issuance of LoI to the successful bidder	1 month + 1 month for issue of final acceptance letter/ LoI	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan, mine closure plan, environment plans (through RQP) • Obtain approval of mine plan, mine closure plan from DMG and environment plan (EIA/EMP) • Submission of approved mining and environmental Study (EIA/EMP) to authority for issue of environmental clearance	1-2 month (if area is less than 5 Ha.) 6-12 months (If area is less than 25 Ha.) 12-36 months (If area is 25 Ha.)	Offline
	Lessee	• Application for Consent of for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1 month	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Environment & Forest Department, Assam	• Overall monitoring is being done by the Environment & Forest department of the State	Continuous	Offline

Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of "Permit" by the contractor/ permit holder	Continuous	Offline
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.3 Chhattisgarh

Regulatory Provisions

Chhattisgarh amended the Minor Mineral rules in the year 2015 and the current rules applicable in the State are *Chhattisgarh Minor Mineral Rules 2015*. The responsibility of the minor mineral "sand" is with the "Directorate of Geology & Mining, Chhattisgarh", and as per article 3 (vi) of the CMMR 2015, sand mining in the State is governed by the *Chhattisgarh Minor Mineral Sand Excavation and Trade Regulation Order 2006*.

For sand mines, areas are notified by the State, however the time period is not defined. Extraction is permitted as long as the environment clearance permits. There is also no restriction on the size of the area that can be granted for sand concessions in the State.

Business Model

The allocation of sand reaches in Chhattisgarh is on nomination basis to the Gram Panchayats on submission of application by the Panchayat to the District Collector. The royalty applicable in the State is Rs. 50 per m^3 and the royalty collected in the State is retained by the panchayat department for development expenses.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Notified Areas	No restriction	No restriction	NA	As long as EC permits

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled pricing model	Nomination	Allocation to Panchayat	Yes	10.0	10.6

The Department of Mines and Geology gets the environment clearance and prepares the mine plan on behalf of the panchayat, which reduces the time for obtaining the clearances. The operations control and sales right, for sand is with the gram panchayat in the State.

Sales

There are no charges applicable on sand in the State apart from royalty, and anyone can go to reach with a vehicle and load sand at his own expense after paying the royalty amount to the panchayat. The State has sufficient sand available and the price which the consumers have to pay for sand varies from Rs 250 to 700 per cubic metre (i.e. around Rs 132 /tonne to Rs 370/tonne for a bulk density of 1.89 g/cm^3) depending on the distance of the consumption point from the reach. There is limited use of technology in any of the sand mining processes in the State but geo-tagging of the sand reaches is done which makes physical monitoring of the sand reaches easier.

Demand Supply assessment

No demand-supply assessment of sand is being done, however, the State has sufficient sand to meet the demand. Further, there is no restriction on transport of sand outside the State. However, a recent issue on transportation of sand to other State through railway wagon caught media attention, post which the State had issued a notification to discourage transport of sand to other states.

DSR Status

District Survey Report is prepared in all the 27 districts of Chhattisgarh.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 5 Summary of sand mining policy of Chhattisgarh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage

Identification of sand reaches	Directorate of Geology & Mining, Chhattisgarh	• Identification of sand-bearing areas and preparation of Site Appraisal Reports • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas	Usually takes 1 month	Offline
Allotment of sand reaches	Directorate of Geology & Mining, Chhattisgarh	• On nomination basis to Gram Panchayats	Not defined, but after application, the collector immediately notifies the area	Offline
Clearances & Approvals (Mining Plan, Environment clearance)	Directorate of Geology & Mining, Chhattisgarh	• Preparation of mining plan, mine closure plan, environment study (EIA/EMP) • Obtain approvals of mine plans, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance.	Depending upon the area of the concession	Offline
Operation and Monitoring	Gram Panchayat	• Mining and loading operations are conducted by the Panchayat or the end user directly	Continuous	Offline
	District Collector	• Overall monitoring lies with the District Collector	Continuous	Offline
Transportation	Customer/ End user	• Hiring of transporting vehicle • Hiring of labourers for loading/unloading or payment to villagers working at the reach for the same	Continuous	Offline

Sales	Gram Panchayat	• Issuance of transport permit upon payment of royalty	Continuous	Offline

3.4 Gujarat

Regulatory Provisions

The minor mineral rules applicable in Gujarat are *Gujarat Minor Mineral Concession Rules, 2017* and the responsibility of the minor mineral "sand" is with the Commissioner of Geology & Mining (CGM) under the Industries and Mines Department. Sand is part of Part A of the Schedule III of the Rules.

Business Model

From 2017 onwards, the allocation of sand reaches in the State is based on competitive bidding/ open auctions. The business model used is "Tender cum forward auction model" with a base premium, which is 5-6% of value of the mineral dispatched. The bidders quote the premium to be paid in terms of % over and above the base premium with an increment of 0.5%. The value of mineral of sand published by the State Government is Rs 240/ tonne for the State. The period of the concession granted for sand is five years.

The mining operation and sale of sand in the State is undertaken by the lessee. The concession granted for sand is quarry lease for which the minimum area that can be granted is 1 Ha and maximum area to be granted is 50 Ha.

Types of sand concessions	Minimum Area	Maximum Area	Limit for holding maximum area by one individual in the State	Time period
Quarry Lease, Quarry Permit and Quarry Parwana	1 Ha	50 Ha for QL 0.2 Ha for QParwana	50 Ha	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)

Market Model	Competitive Bidding	Online tender cum forward auction	Yes	49.64	160.34

The Lessee has the responsibility of preparing the mine plan and taking the environment clearance from the relevant body depending on the size of the block and Consent to Operate from the pollution control board.

Most of the sand is transported through tractor and trucks and the State is in the process of making GPS installation in all sand carrying vehicles mandatory.

Sales

Sale rights are with the lessee with orders directly placed by consumers or agents. There is no provision of online purchase of sand for the consumers. There is restriction for the export of sand to other States and from others States to Gujarat. The sand prices vary in the State from Rs. 80/ tonne to Rs 800/ tonne depending upon the districts and infrastructure projects nearby.

DSR Status

Gujarat is in the process of preparation and finalization of DSRs for all the sand related districts (32 out of total 33 districts) for which data are being collected by the district level officer. DSR for Baroda district has already been approved and for rest of the districts, it is either under preparation or under approval.

Demand Supply assessment

No specific data is available with the State regarding the State's sand demand, consumption, replenishment, etc. However, there is no shortage of sand in the State and it is able to meet the demand of sand through natural sand excavated in the State.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 6 Summary of sand mining policy of Gujarat

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches/ Mines/concessions	CGM, Industries and Mines Department, Gujarat	• Identification of sand-bearing area and preparation of Geological report (GR) • Fixing boundary and assessment of quantity of sand	3-4 months	Offline

Allotment of sand reaches	CGM, Industries and Mines Department, Gujarat	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	T0 + 105 days from issue of final acceptance letter/ LoI	Online
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan, mine closure plan, environment Study (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	6 months or 1 year depending on the size of the sand reach	Offline
	Lessee	• Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board. • Other relevant clearances and approvals	1 month	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline

	CGM, Industries and Mines Department, Gujarat	• Overall monitoring lies with the District Monitoring Committee	Continuous	Offline & Online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Lessee	• Issuance of "royalty pass and permit"	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.5 Haryana

Regulatory Provision

The minor mineral rules applicable in Haryana are *Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012* and the responsibility of the minor mineral "sand" is with the Mines and Geology Department, Haryana.

Business Model

The allocation of sand reaches in the State is through forward e-auction, with a reserve price which is a lump sum amount based on the area of the block and based on the previous auctioned value of the same block/area. The rate of royalty in the State is Rs 40/ MT but there is no provision of royalty collection on per tonne of sand extracted in case of mining contract, as the highest bid offered in the auction becomes the annual contract money and the contractor is liable to pay monthly installment of that annual highest bid. The contract money expires after every three years period, and is enhanced by 25% of the previous contract money after the expiry. The time period of the contract granted in the State is 7 to 10 years.

There is no pre-defined annual limit of extraction of sand from sand blocks in the contracts which are auctioned. The limit for extraction of sand is defined in the mining plan/ environment clearance and the responsibility of preparing the mine plan and taking the relevant clearances and approvals lies with the contractor to whom sand mines are allocated/auctioned.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Mining Contracts, Quarrying Mineral disposal permit	1 Ha	Not defined	1000 Ha	7-10 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Forward auction	No	9.8	265.9*

**Production data is for the calendar year 2017-2018.*

The operation and sale of sand in the State is done by the contractor with no regulation from the State Government. There is no restriction on the maximum size of the block that can be allocated through e-auction.

Other than the limited use of CCTVs and auction of the blocks, IT infrastructure has no major role in operations or monitoring of sand mining in Haryana. The State is in the process of developing an IT system for monitoring of its mines and implementing e-Ravana system on the lines of the notification of MoEFCC. Further, to check cases of illegal mining, the State has given its consent to the Government of India to implement MSS for minor minerals also for which the State has already provided the details of each mine as well as the cadastral maps/ khasra maps duly demarcated to the Bhaskaracharya Institute of Space Application and Geo Informatics (BISAG) at Gandhinagar.

Sales

There are no notified rates for the transportation of sand in the State and transportation is completely owned by private transporters and managed by the contractors only. Since sale and delivery rights are with the contractors, they are free to use own transporters for delivery of sand.

The price of sand in the State is around Rs 500 to 550 per metric tonne at pit head and is sold at Rs 600 per tonne in Karnal district which is at a distance of around 25 to 30 kms from mining

area, including the transportation charges. In Panchkula district, the rates of sand are Rs. 20-22/ft3 (i.e. around 600-650/ tonne) at a distance of around 20-25km from sand mines.

DSR Status

Haryana is in the process of preparation and finalization of DSRs for which data are being collected by the district level officer. District Survey Report is getting prepared for the sand bearing districts i.e. 15 out of total 23 districts. DSR report is yet to be approved from the authority. Once all the reports are ready and approved by the authority, total resource assessment of the State can be done.

There is no specific data available with the State regarding the State's sand demand, consumption. However, the State has surplus sand and also caters to sand requirements of Delhi to some extent. There is no restriction on the transport of sand to other States and from others States to Haryana. Based on production returns of contractors of sand mines in the State, the demand is estimated at 8.5 million tonnes in 2017.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 7 Summary of sand mining policy of Haryana

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Mines and Geology Department, Haryana	• Identification of sand-bearing areas and preparation of initial feasibility report • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas • Forest area demarcation and approval	2-3 months	Offline
Allotment of sand reaches	Mines and Geology Department, Haryana	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents • Conduct of auction and selection of successful bidder • Issuance of Letter of Intent to the successful bidder	1-2 Months +3 months for issue of Lease	Online

Clearances & Approvals (Mining Plan, Environment clearance, CFE/CFO)	Contractor	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plans • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board. • Other relevant clearances and approvals	2-3 months for mining plan approval 6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is 25 Ha.)	Offline
Operations and Monitoring	Contractor	• Mining and loading operations are conducted by the contractor	Continuous	Offline
	Mines and Geology Department, Haryana	• Overall monitoring responsibility lies with the District Monitoring Committee	Continuous	Offline
Transportation	Contractor	• Selection of transporters	Continuous	Offline
	Contractor	• Issuance of “Mineral Transit Pass”	Continuous	Offline
Sales	Contractor	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.6 Karnataka

Regulatory Provisions

Karnataka undertook major amendments to its *Karnataka Minor Mineral Concession Rules, 1994* in 2016 and has added a separate chapter IV-B detailing the permission for quarrying of ordinary sand in river bed, patta land, removal of sand bars in Coastal Regulation Zone areas of coastal districts and special provisions for production of M-sand as well as for transportation of sand and M-sand.

The concessions granted in Karnataka are called quarry lease. There is restriction on the maximum area that can be granted for sand concessions in the State i.e. 50 acres (20 Ha.) for mineral based industry and 10 acres (4 Ha.) for others but the minimum area that can be granted is 5 acres (2 Ha.). The time period for sand concessions is less than 5 years.

Business Model

The responsibility of the minor mineral "sand" is assigned to the Department of Mines & Geology. The model used in Karnataka after amended rules is tender cum forward auction method. The base price is fixed at 20% of the royalty applicable (current rate of royalty in the State is Rs 60/ tonne) and a two stage auction method is followed to arrive at the final price. Prior to 2016, sand mining was carried out by Public Works Department in the State from 2011 onwards.

Further, temporary permit is granted to local communities to remove sand from the coastal area on application basis. The permit is renewed on yearly basis and the environmental official at the district level is responsible to monitor the removal of sand. The State Government studies the accumulation of sand bars and its removal with the help of satellite imageries, GPS, etc.

Apart from this, the State Government may permit sand quarrying in specified patta lands with such terms and conditions as may be specified by the State Government on recommendation of the District Committee regarding the quality of sand and its suitability for construction purposes, with adequate justification. The District Committee has the power to fix the maximum rate at which the holders of license can sell sand at the loading point and indicate this in the license condition, and can also allocate up to 25% of sand for low income housing or government works.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Quarry Lease and Temporary Permit (for local communities)	5 acre (2 Ha.)	20 Ha (mineral based industry)/ 4 Ha for others	20 Ha (mineral based industry)/ 4 Ha for others	< 5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online tender cum forward auction	Yes	4.0	25.2

The successful bidder has the responsibility to submit the approved quarry plan within two months of issuance of letter of intent by the concerned competent authority, and to get the Environment Clearance from the granting authority (DEIAA/SEIAA/MoEFCC) before commencement of quarrying operations.

The operation and sale of sand in the State is taken care of by the lessee with no regulation from the State Government. However, the District Collector may fix the maximum sale price of sand for each district in the tender document itself.

Karnataka has district level and taluk level sand monitoring committees that are responsible for identification and monitoring of sand in the State. The district committee is empowered to establish check post wherever necessary to regulate transportation of sand and make suitable arrangements for patrolling to monitor illegal transportation including river patrol wherever necessary. And the taluk committee is empowered to monitor sand excavation in all the concession areas and to enforce laws and regulate illegal quarrying, storage and transportation of sand.

Sales

The lessee has the responsibility of sale of sand with limited regulation by the State Government. Consequently, the price of sand is very high in the State, especially in cities which are far away from sand excavation areas. In Bangalore, consumers have to shell out Rs. 1 lakh for a 30 tonne truck of sand (i.e. Rs 3500/ tonne).

The State is using technology in allocation of sand reaches as well as in delivery, and all the sand transporting vehicles are GPS enabled. The minor mineral rule applicable in the State mandates the lessee to install the office, computer facility, electricity supply, CCTV camera, weigh bridge, security at dump yard or stock yard of the sand.

DSR status

As per MoEFCC notification No.So:141, dated 15th January 2016, surveys have been carried by DEIAA of the concerned districts and District Survey Reports for all the 30 districts have been prepared. The expenses for the preparation of DSRs comes from the District Corpus Fund, after approval of the District or Taluk committee.

Demand Supply assessment

The estimated production of river sand in the State is only 4 million tonnes out of the total demand of 30 million tonnes (based on DMG data), which has led to deficit of sand in the State and extremely high price. Majority of the deficit is met by the M-sand production in the State. Karnataka is the leading State in production of M-sand. The State has 164 M-sand production units that produce 20 million tonnes of M-sand per annum and 95% of the sand consumed in Bangalore is M-sand only. Further, to take care of sand scarcity, the State has notified a policy through amendment in KMMCR in 2017 for import of sand from other countries. The imported sand is sold only in 50 and 100 kg sealed packets.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 8 Summary of sand mining policy of Karnataka

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Department of Mines & Geology, Karnataka	• Identification of sand-bearing areas and preparation of Site Appraisal Reports • Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas	1-2 month	Offline
Allotment of sand reaches	Department of Mines & Geology, Karnataka	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final	1 month + 1 month for issue of final acceptance letter	Online

		acceptance letter to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Obtain approvals of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental Study (EIA/EMP) to authority for issue of environmental clearance.	Depending upon the area	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the Lessee	Continuous	Offline
	Department of Mines & Geology, Karnataka	• Overall monitoring responsibility lies with the District Monitoring Committee	Continuous	Offline & online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of "Weighment Slip"	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.7 Madhya Pradesh

Regulatory Provisions

The minor mineral rules applicable in the State are *Madhya Pradesh Minor Mineral Rules, 1996* and the responsibility of the minor mineral "sand" lies with the Directorate of Geology and Mining, Madhya Pradesh. Earlier, sand mining in the State was governed by the Sand Mining Policy 2015, however the State has notified a new sand policy by the name, "Madhya Pradesh Sand Mining Policy 2017" in which the sand reaches are allocated to the gram panchayats for sand excavation.

Business Model

The allocation of sand reaches in the State is on application by the gram panchayat to the District Collector and the sale price applicable is Rs 125 per m3 at sand reaches, out of which Rs 50 will go to panchayat department, Rs 50 to the District Mineral Foundation and Rs 25 to MPSMC as processing fee. Further, the royalty collected in the State is retained by the panchayat department for development expenses.

There is no restriction on the upper limit of size of concessions that can be granted. However, the minimum area that can be granted is 1 Ha. The time period for the blocks allotted to Gram Panchayats is five years.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Quarry Lease, Trade Quarry	1 Ha	No restriction	No restriction	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Controlled pricing model	Nomination	Allocation to Gram Panchayat	Yes	49.14	240

The Department of Mines and Geology gets the environment clearance and an RQP prepares the mine plan on behalf of the panchayat, which reduces the time for getting the clearances. The operations control and sales right for sand lies with the gram panchayat in the State. The clearances and approvals are taken in the name of gram panchayat.

Under the recently released sand policy, the State has mandated that no monitoring of sand will take place while transportation and consequently no transport permit is required for transportation of sand in the State.

Sales

The sale price of sand in the State is fixed at Rs 125/m3 at pit head. The sand can be booked through the online portal maintained by MPSMC. Any consumer registered on the portal can book sand though the portal after payment of amount for the sand, excluding transportation and loading/unloading charges. After payment, the consumer receives an entry pass through SMS on his registered mobile number through which he can visit and offtake the booked quantity.

Transportation is provided by private transporters and the State has no role in it. However, the State provides an online platform where all the sand transporting vehicles need to be registered. The State has also mandated that all sand transporting vehicles should be GPS enabled within a period of 6 months post which no vehicle without GPS will be allowed to enter the sand reach. Around 90% of the illegal mining cases closed in the previous year in the State was related to illegal transportation of sand.

DSR Status

District Survey Report is prepared in all the 51 districts of Madhya Pradesh. DSR is prepared as per the notification of the MoEFCC, but the Sustainable Sand Mining Management Framework 2016 released by MoEFCC which prescribes the method, is not followed.

Demand Supply assessment

Madhya Pradesh has not carried out any demand-supply assessment for sand in the State. As per a Government estimate, the demand for sand in the year 2016-2017 was 26 million $m^{3.}$ However, the production figure reported on the e-khanij portal was short of the demand mentioned above by a huge margin. The State does not have any restriction on inter-border transport of sand to and from other States.

Online Portal

Madhya Pradesh maintains an online portal by the name E-khanij for online monitoring of sand production and sale data. The online ordering of sand is done at https://ekhanij.mp.gov.in/AppPrevious/sandmp.aspx.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 9 Summary of sand mining policy of Madhya Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage

Identification of sand reaches	District Collector	• Joint Inspection of the area with representative of Revenue, Water Conservation, Public Works, Environment, Forest and Mining, Departments • DGPS survey of the area • Assessing feasibility of sand mining in the identified areas	1-2 months	Offline/ online
Allotment of sand reaches	Directorate of Geology and Mining, Madhya Pradesh	• On nomination basis • Notification of the sand reach in the name of the Gram Panchayat	Not defined, but after application, the collector immediately notifies the area	Offline
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	District Collector	• Preparation of Mine Plan by a RQP • Approval of the Mine Plan on recommendation of Mining Officer/ Mining Inspector • Environmental Clearance (EC) from State Environment Impact Assessment Authority • Consent for Establishment (CFE)/Consent for Operation (CFO) from	2 months	Offline

		the State Pollution Control Board		
Operations and Monitoring	Gram Panchayat	• Mining and loading operations are conducted by the Panchayat or the end user directly	Continuous	Offline
	State level and District Level, task force team	• Overall monitoring lies with the task force team formed under the chairmanship of District Collector. Some of the initiatives taken by the team are: - Installation of check post and weigh bridges at check post on PPP model. - Mobile app for reporting of illegal mining/ transportation by making a video of the same.	Continuous	Offline & online
Transportation	Transporters	• Setting of transportation charges based on travel distance • Delivering the sand to customers	Continuous	Offline
	Directorate of Geology and Mining, Madhya Pradesh	• Registration of transporting vehicles	Continuous	Online
Sales	Directorate of Geology and	• Getting orders through the online portal	Continuous	Online

	Mining, Madhya Pradesh	• Sending the entry pass on the registered mobile number of customers		

3.8 Maharashtra

Regulatory Provisions

The Minor Mineral rules applicable in Maharashtra are Maharashtra Minor Mineral Extraction (Development and Regulations) Rules, 2013. The responsibility of all the minor minerals in the State is handled by the Revenue and Forest Department, Maharashtra. The State has separate set of rules for sand excavation called, Amended Sand Excavation Policy.

The concessions of sand mines are called quarry lease. The time period for quarry lease is one year. The size of concession in Maharashtra is not pre-defined, and every year after monsoon, in the month of October, assessment of the quantity of sand is done and based on the assessment the size of concessions is decided. Further, there is no minimum or maximum restriction on the area that can be granted for sand concessions in the State, neither any restriction on the area held by an individual.

Business Model

Under the policy, the allocation of sand reaches in the State is through e-tender i.e. forward premium method to be quoted by the bidder. For fixation of off-set price, if the auction of that particular sand block was done in previous year, then the highest bid offered in previous year is accepted. The highest bid divided by quantity available in previous year, multiplied by the quantity available this year is used as off-set price. If the auction was not done for the said block in the previous year, then details of the group auctioned in the previous year on the same river bed is accepted. And if the auction was not carried out in the previous year even in the same river bed, then the Collector shall propose the off-set price by giving justification.

Apart from river sand mining, creek mining is also done in the State where use of dredgers and suction pump is permitted. The blocks for creek mining is allocated through applications by issuing licenses to the person or society of such persons doing such business traditionally by hatpati or dubi means, and the sand extracted by creek mining is auctioned by the collector of the district.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period

Quarry Lease	NA	NA	NA	1 year, ending on 30th September

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online forward tender	No	NA	NA

Currently, royalty rate in the State is Rs 400 per brass but following the allocation method after 2016 rules, the royalty collected is inclusive of the auction premium.

Before conducting the auction of river basin; approval of the Gramsabha in which the river basin lies is required with at least 50% voting in favour of the allocation of the block. Opinion of Ground Water Survey and Development agency is also taken to ascertain the sand stock available in the concerned sand group and whether the excavation of sand under water is necessary to avoid creation of flood condition, and in case of creek area, the opinion from Maharashtra Maritime Board has to be obtained through survey regarding the approximate sand stock available in the concerned sand group, how much deep the excavation has to be done and whether the use of technical equipment for excavation shall be permitted or not. After the auction process, the successful bidder has the responsibility to get the environmental clearance from the concerned body. Mining plan is not followed in the State, as a result, NGT has banned sand mining in Gondia district.

The District Collectors in the State are empowered to make decisions to curb illegal mining and some of them use drones and CCTV cameras to monitor the reaches. However, the overall monitoring in the State is done by a team of Tehsildars, Sub-divisional level officers, RTOs and Revenue department officers by way of physical inspections.

Sales

The use of machinery has been struck down by the NGT in the State. The control of operations as well as sales is with the lessees and the price of sand is market determined. Because of the lack of control of the Government over the sale of sand coupled with the forward auction method of allocation, the price of sand is high and the sale price (landed cost) of sand in Mumbai is around Rs 70,000 for a 30 tonne truck i.e. around Rs 2400/tonne.

DSR Status

District Survey Report is being prepared in all the 36 districts and DSR for all 36 districts is already released. However, the replenishment study has not been taken up in the DSR. Further, the same reach is granted year after year for sand extraction without giving significant time to the reaches for replenishment which may create ecological issues.

Demand Supply Assessment

Maharashtra has not conducted any demand-supply assessment for sand, but overall the State is sand deficit which has led to very high prices for sand in the State, and is therefore considering import of sand from other countries such as Malaysia and Philippines.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 10 Summary of sand mining policy of Maharashtra

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches/ Mines/concessions	District Collector	• Identification of sand-bearing areas, fixing the boundary and assessment of sand in reaches.	1 month	Offline
Allotment of sand reaches	District Collector	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of tender and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 Month + 1 month for issue of final acceptance letter/ LoI	Online

Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Department of Revenue & Forest	• Other relevant clearances and approvals such as recommendation of Gramsabha, opinion of Ground Water Survey and Development agency	15 days for approval of gram sabha, 10 days for ground water survey and developmen t agency	Offline
	Department of Revenue & Forest	• Approval of environment plan (EIA/EMP) • Submission of approved environmental plan (EIA/EMP) to authority for issue of environmental clearance	Depending upon the area of the concession	Offline
Operation and Monitoring	Lessee	• Mining and loading operations are conducted by the lessees	Continuous	Offline
	District Collector	• Overall monitoring lies with the District Collector	Continuous	Offline & Online
Transportation	Lessee	• Selection of transporters	Continuous	Offline
	District Collector	• Issuance of necessary permit/pass-book having bar-coding to the auction holder to the extent of sand stock available for excavation	Continuous	Offline
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.9 Punjab

Regulatory Provisions

The minor mineral rules applicable in Punjab are *Punjab Minor Mineral Rules, 2013* and the responsibility of the minor mineral "sand" is handled by the Mining Department which is under the Department of Industries and Commerce.

Business Model

The allocation of sand concessions in the State is through forward e-auction method from 2017 onwards and the reserve price applicable is Rs. 86 per tonne which includes royalty figure of Rs. 60 per ton, 10% as Environment Management Fund (Rs. 6 per tonne) and 1/3 of royalty as District Mineral Foundation Fund (Rs. 20 per tonne). The bidders quote lump sum amount to be paid annually by them to the Government (inclusive of the royalty) and it increases by 10% every year. Further, the successful bidder also has to pay quarterly compensation to the land owners which is pre-defined in the tender document. The period of a mining contract is minimum of 2 years and maximum 5 years, and there are no restrictions on the area for grant of contracts as well as the maximum area which a person can hold.

Apart from mining contracts, the State also offers short term permit for sand which is granted to excavate a fixed quantity of sand and the permit is granted for a period of less than one year. Short term permit is offered on application by the Director of the mining department and in case more than one applicant proposes to extract the sand quantity, all parties submit their bid through sealed cover tender and the permit shall be given to the highest bidder. The maximum area for which short term permit is granted is 4 Ha.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Grant of Contracts, Short term Permit	No restriction	For short term contracts – 4 Ha	5 Sq km	2-5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online forward e-auction	No	NA	43.8

The State offers reservation to the local community and for the Government works and in case sand is extracted by the land holder in case of private land.

Till last year, the department held the responsibility of preparation of mine plan and getting the environment clearance, but now the responsibility has been given to the project proponent. Further, the lessee has the responsibility of only getting the Consent for Establishment and Consent for Operation from the State Pollution Control Board.

Mining operations are managed by the lessee and there are no notified rates for transportation of sand in the State. Since delivery and sale rights are with the lessee, they are free to use own transporters for delivery of sand. Consequently, the price of sand are quite volatile in Punjab.

Sales

Monitoring mechanism for illegal mining is not very stringent in the State, and no CCTV cameras or check posts are available for the monitoring of illegal sand extraction. The department takes assistance of PESCO (Punjab Ex Servicemen Cooperative organization) for physical checking.

The price of sand in Bathinda district is around Rs 1100/m3 (Rs 500-600 /tonne) for washed (coarse) sand sourced from a distance of around 200+ Km (from Pathankot) and Rs 800/m3 (400-500/tonne) for fine sand (sourced from Zira/ Ferozpur) from distance of 100+ KM. However, the prices escalate during the monsoon period by 20-25%.

DSR Status

Punjab is in the process of preparation and finalization of DSRs for all the sand related districts for which data are being collected by the district level officer. DSR has already been approved for Pathankot District and for rest of the districts, it is either under preparation or under approval.

Demand Supply Assessment

A rough estimate given by the department shows demand of 16 MTPA in the State with supply of around 11.5 MTPA. The net deficit is around 4.5 MTPA.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 11 Summary of sand mining policy of Punjab

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Mining Department, Department Of Industries and	• Identification of sand-bearing areas and preparation of Site Appraisal Reports	1-2 months	Offline

	Commerce, Punjab	• Fixing boundary and assessment of quantity of sand • Assessing feasibility of sand mining in the identified areas		
Allotment of sand reaches	Mining Department, Department Of Industries and Commerce, Punjab	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 Month + 1 month for issue of final acceptance letter	Online
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Responsibility of preparation of mining plan (by Qualified Person), mine closure plan, environment plan (EIA/EMP) • Transfer of Environment Clearance (if any with the previous allottee) • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1-2 month 1-2 month	Offline

	Mining Department, Department Of Industries and Commerce, Punjab	• Approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	2-3 Months for mining plan preparation and approval 6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.) •	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the Lessee	Continuous	Offline
	Mining Department, Department Of Industries and Commerce, Punjab	• Overall monitoring lies with the District Level Committee	Continuous	Offline
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline
	Lessee	• Issuance of “Weighment Slip” in Form T	Continuous	Online

Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.10 Rajasthan

Regulatory Provisions

The Minor Mineral rules applicable in Rajasthan are *Rajasthan Minor Mineral Concession Rules, 2017* and the responsibility of the minor mineral "sand" is with the Department of Mines & Geology, Rajasthan.

Business Model

the Sand is allocated in the State though online tender cum auction and the concession applicable in the State is mineral lease which is granted for five years. Reserve Price for the auction is 20% of the royalty payable on river sand, and currently the royalty for sand in the State is in the range of Rs 30 per tonne/ Rs 35 per tonne.

There is no maximum limit of the area to be held by a particular individual/company/firm.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mineral Lease, Quarry License, Short Term Permit	5 Ha	No restriction	No restriction	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Tender cum forward auction	No	56.8	235.9

Mining is responsibility of the lessee and the department has no control over the operations of the mines. The Government does not regulate transportation or sale of sand. There is limited use of IT in operations or monitoring. Monitoring is done using check posts and physical checking of material under transportation for valid permits.

Sales

Overall, sand prices are quite volatile in the State due to supply constraints, which tends to increase the prices of sand. Sand is available at around Rs 300 to Rs 400 per tonne in cities like Udaipur which are around 40 to 50 km away from sand leases. After ban by the Hon'ble Supreme Court in Nov 2017, the prices have shot upto Rs. 1000-1200/tonne.

DSR Status

The District Survey Report is ready for 23 districts out of 28 sand bearing districts. As per the DSRs, production potential has been calculated which is around 40 MTPA from 23 districts.

Demand Supply Assessment

As per the assessment carried out by the State, a total of 56 MTPA of sand is required in the State. However, demand methodology is not known.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 12 Summary of sand mining policy of Rajasthan

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Department of Mines & Geology, Rajasthan	• Identification of sand-bearing areas and preparation of Mauka Reports • Fixing boundary and co-ordinates, area identification, etc. • Assessing feasibility of sand mining in the identified areas.	1-2 months	Offline
Allotment of sand reaches	Department of Mines & Geology, Rajasthan	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents	1 month + 1 month for issue of Letter of Intent	Online

		• Conduct of online tender cum auction and selection of successful bidder • Issuance of Letter of Intent to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee/ Lessee	• Preparation of mining plan (by RQP), mine closure plan environment plan (EIA/EMP) • Obtain approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance. • Other relevant clearances and approvals	1 month 3 months 6-12 Months (If area is less than 245 Ha.) 12-36 Months (If area is more than 25 Ha.)	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Department of Mines & Geology, Rajasthan	• Overall monitoring lies with the Department	Continuous	Offline
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance	Continuous	Offline

	Department of Mines & Geology, Rajasthan	• Issuance of "Transit Pass" by the department	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivering the sane to respective customers	Continuous	Offline

3.11 Tamil Nadu

Regulatory Provisions

The Minor Mineral rules applicable in Tamil Nadu are *Tamil Nadu Minor Mineral Concession Rules, 1959* and the State has introduced rule 38-A in the concession rules vide G.O.Ms. No. 95 dated 1st October 2003. The responsibility of the minor mineral "sand" is handled by the Public Works Department, Tamil Nadu.

Business Model

PWD is responsible for identification of sand bearing areas in the river stretches and they send a proposal to the District Collector for seeking quarrying permission. The collector conducts a joint inspection of the proposed area and on recommendation of the Joint Inspection Team instructs the PWD to prepare the mine plan.

PWD has the responsibility to prepare the mine plan and the get the environment clearance from the relevant body depending upon the size of the area. After the approval of mine plan and environmental clearance, the district collector grants permission to PWD for sand quarrying on nomination basis. There is no restriction on the size of the concessions and the time period for extraction is up to 3 years.

PWD calls for tenders for selection of contracts from private parties for extraction and loading of sand. All the existing quarries have an area less than 25 Ha and currently only 12 quarries are functioning after the high court ban. In stream sand mining is not allowed in the State. Private persons are allowed to establish stockyards to store sand purchased from PWD.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Sand Quarry	NA	NA	NA	1- 3 years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled pricing model	Nomination	Allocation to PWD	Yes	15.12	86.33

Sand quarrying operations are under the control of the State and the supply of sand to the public is done directly by the Government at the quarry. The PWD is supplying sand to the common public at a notified price of Rs. 540 per unit at pit head, where one unit equals three cubic metres, i.e. Rs 180 per cubic metre but landed rates including transportation cost is much higher than the notified rates.

Sales

The State has constituted District Level and Taluk Level task Force under the chairmanship of District Collector/ Taluk Tahsildar to curtail illegal quarrying and transportation of sand. Further, three regional flying squads have also been formed by the DMG for monitoring. The online Mining Tenement System has already been implemented for the existing sand quarries and the State has released an order to mandate the registration of all sand carrying vehicles in the State with the PWD. The State has also implemented a QR code system to examine the validity of the online transport permit.

After the ban of high court on sand mining in the State, the sale price for sand in Chennai including the transportation fare has increased to more than Rs. 40,000 for a truck of sand of around 30 tonnes i.e. Rs 1300-1400/tonne. Before the ban, sand was available for Rs 20,000 for a truck of sand. The State is in the process to develop a policy for promotion of M-sand in the state.

DSR Status

The District Survey Report has been prepared in co-ordination with the Geological Survey of India for 18 districts. The preparation of report for the remaining 12 districts is in progress.

Demand Supply Assessment

As per the PWD estimate, the demand of sand in the State is estimated at 53.71 MTPA. The total supply of sand in 2016-2017 was 18.36 MT with 15.12 MT from river sand and 3.24 MT from M-sand. And the deficit in the State is estimated at 35.56 MT. Further, recently due to court order, 32 sand quarries have stopped and the deficit is expected to further increase. The Government

is planning to meet this deficit through promotion of M-sand and a proposal has already been sent to the Government for framing M-sand policy in the State.

Online Portal

Tamil Nadu has developed an online portal for ordering and delivery of sand i.e. www.tnsand.in

A summary of other key aspects of sand policy of the State is tabulated below:

Table 13 Summary of sand mining policy of Tamil Nadu

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Public Works Department	• Identification of sand-bearing areas	1-2 month	Offline
	Joint Inspection Team (under District Collector)	• Fixing boundary and assessment of quantity of sand • Recommendation to the District Collector on grant	1 month	Offline
Allotment of sand reaches	District Collector	• Notification of the sand reach in the name of PWD	Not defined but immediately after getting the environment clearance	Online
Clearances & Approvals (Mining Plan, Environment clearance)	Public Works Department	• Preparation of mining plan (by RQP), mine closure plan, and getting them approved by the Deputy/ Assistant Director of the concerned district. • Submission of approved mining and environmental plan (EIA/EMP) to authority for issue of environmental clearance.	Depends on the size of the concession	Offline

		• Other relevant clearances and approvals		
Operation and Monitoring	Contractor	• Mining and loading operations are conducted by the contractor raised by PWD through competitive bidding	Continuous	Offline
	Department of Geology & Mining, TN/ District Collector	• Constitution of District Level and Taluk Level Task Force to curtail illegal quarrying and transportation of sand. • Constitution of regional flying squads for arresting for illegal quarrying/ transportation	Continuous	Offline/ Online
Transportation	Transporter	• Setting of transportation charges based on travel distance	Continuous	Offline
	Public Works Department	• Issuance of online transport permit with QR scan code.	Continuous	Online
	Public Works Department (PWD)	• Registering all the sand carrying vehicles in the State	Continuous	
Sales	Public Works Department (PWD)	• Getting orders through the sand portal • Delivery of sand	Continuous	Online

3.12 Telangana

Regulatory Provisions

Telangana after bifurcation from Andhra Pradesh in 2014, adopted the Andhra Pradesh Mineral Concession Rules, 1966 for minor minerals. The responsibility of the minor mineral “sand” is with the Department of Mines & Geology, Telangana. For sand, there is separate policy i.e. *New Sand Mining Policy 2014*.

Sand extraction and sales in the State other than in respect of I and II order streams and patta lands, is done through Telangana State Mineral Development Corporation Limited (TSMDC). TSMDC Ltd. extracts and supplies sand from III order and above order streams (Sand reaches near the river), and by de-silting of reservoirs and tanks.

Business Model

The allocation of sand blocks is done on nomination basis to TSMDC and further TSMDC selects contractor to carry operations through competitive bidding process. There is no restriction on the size of the concessions and the time period for extraction is one year. However, the period of sand extraction from the allotted area is as per the local conditions, reflected in the Approved Mining Plan and CFO.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease	NA	NA	NA	1 Year

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MMT)	Revenue FY17 (Rs. Crores)
Notified or controlled Pricing Model	Nomination	Allocation to TSMDC	Yes	13.23	434

The Chairman, District Level Sand Committee allots the specified sand bearing area to Telangana State Mineral Development Corporation Limited for extraction of sand on submission of approved mining plan by the Deputy Director of Mines & Geology of the Region concerned, Environmental Clearance from State Environment Impact Assessment Authority, and Consent for Establishment (CFE)/Consent for Operation (CFO) from Telangana State Pollution Control Board.

In case of the sand cast in pattalands, the pattadar is allowed to de-cast sand to make the land fit for agriculture on application to the Assistant Director of Mines & Geology concerned. No one other than the pattadar is allowed to be involved in de-casting process. Before grant of permission to extract sand in patta land the Assistant Director of Mines & Geology takes up joint inspection

of the pattaland with the Tahsildar, to identify the pattaland possessor/ occupier, Mandal Agriculture Officer, to certify that without de-casting the pattaland is not fit for agriculture, Ground Water Department, to record the geo-coordinates of the pattaland as per boundaries fixed by the Tahsildar, assess the thickness, quantify the sand to be de-casted and give specific recommendation on the mode of de-casting i.e. manual or mechanized, Executive Engineer, Irrigation Department, to report on the location of patta land with reference to river course/bed, and the Asst. Director of Mines & Geology certifies the suitability of sand for construction.

In case of I and II order streams, sand extraction is permitted for local use in villages or towns bordering the streams for bonafide purposes other than commercial operations/public trading/stocking etc. The sand extraction from I and II order stream is as per the WALTA Rules 2004, provided that sand extraction is not be permitted in notified over-exploited areas, sand extraction is free of cost, sand extraction for local use in Government projects is on payment of seigniorage fee, and transportation is only by means of bullock carts/tractors within the jurisdiction.

The department takes care of monitoring with the help of the administrative mechanism put in place for enforcement of extraction and transportation of sand. The sand extraction is under electronic surveillance. The transit pass generated online after making payment has the security seal of Telangana State Mineral Development Corporation stamp with date, time and indicates the destination/route for tracking by way of GPS facility which will be developed.

The Government is getting revenue in the form of royalty / tax, DMF, road damage fee, etc. for the extracted sand on actual basis and Telangana is a leading State in terms of revenue collection from sand.

Sales

The booking of sand is done through an online portal www.sand.telangana.gov.in , which ensures transparency in the sale of sand. The Government has notified the stockyard price of sand in all the districts which varies from Rs 550 to Rs 600 per cubic metre of sand, and the notified price is inclusive of Rs 40 per cubic metre of royalty applicable in State.

TSMDC has the responsibility to obtain Mineral Dealer License for the stockyard under Mineral Dealer Rules, 2000 from the competent authority and establish a stockyard near to the lifting point having good road facilities and also additional stockyards near urban habitations, especially the municipal corporations. The validity of Mineral Dealer License is coterminous with the period of agreement.

Transportation is with private transporters. TSMDC provides an online platform where all the sand transporting vehicles are registered and any consumer can book sand on the online portal provided payment for the sand is made, excluding transportation and loading/unloading charges.

DSR Status

Telangana has evolved a system for identification and assessment of sand resources as per the existing WALT Act 2002 and WALT Rules, 2004 in place of the DSR. No Separate DSR is prepared in the State.

Demand Supply Assessment

On an average, sand consumption in the State is 12.5 million cubic metres (~ 22.5 MMT) per annum, while the supply of sand by TSMDC is 7 million cubic metres (~13.23 MMT) only, and there is deficit of 5.5 million cubic metres (~10.5 MMT). The deficit of river sand in the State is being met by use of M-sand (4 million cubic metres, ~7.56 MMT) and import from neighboring States (1.5 million cubic metres, ~2.83 MMT).

A summary of other key aspects of sand policy of the State is tabulated below:

Table 14 Summary of sand mining policy of Telangana

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	District Level Sand Committee (Under chairmanship of District Collector)	• Identification of sand-bearing area as per the WALTA Act & Rules and demarcating the area with definite co-ordinates and depth to be permitted • Examination of the JIR prepared by the Joint Inspection Team • Assessing feasibility of sand mining in the identified areas	1-2 months	Offline
Allotment of sand reaches	Department of Mines & Geology, Telangana	• Allotment of the sand bearing area on submission of statutory clearances on nomination basis		Offline
	TSMDC	• Execution of lease deed in Form-S1 with Assistant Director of	1 month	Offline

		Mines and Geology concerned • Selection of mining contractors to carry out operations through competitive bidding		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	TSMDC	• Obtain approval of the mining plan from the Deputy Director of Mines & Geology of the Region concerned • Obtain Environmental Clearance (EC) from State Environment Impact Assessment Authority • Obtain Consent for Establishment (CFE)/ Consent for Operation (CFO) from Telangana State Pollution Control Board	3 – 6 months	Offline
Operations and Monitoring	Contractor	• Mining and loading operations are conducted by the mining contractors appointed by TSMDC	Continuous	Offline
	Department of Mines & Geology, Telangana	• District Level Task Force under the chairmanship of District Collector periodically review quarrying and transportation of sand.	Continuous	Offline

		• District Collector nominate officers to form check squads to conduct quarry inspection, surprise route checks and imposition of penalty.		
Transportation	Transporters	• Setting of transportation charges based on travel distance • Delivering the sand to customers	Continuous	Offline
	TSMDC	• Registration of transporting vehicles • Issuance of "Weighment Slip" by the department	Continuous	Online
	State Government	• Recently introduced Sand taxi concept: an online mechanism for booking sand with delivery to customer door step		Online
Sales	TSMDC	• Getting orders through online sand portal of TSMDC	Continuous	Online

3.13 Uttar Pradesh

Regulatory Provisions

The minor mineral rules applicable in the State are *Uttar Pradesh Minor Mineral (Concession) Rules 1963* and the responsibility of the minor mineral "sand" is with the Directorate of Geology & Mining, Uttar Pradesh. The said rules were amended from time to time and many amendments have been issued till date. On 14th June 2017 a new "Mineral Policy 2017" was notified which mandates auction of all minerals in the State.

Business Model

The allocation of mineral concession for sand in the State is through tender cum auction model (forward). The base price for the tender is annual royalty applicable for the sand. The lump-sum amount in e-auction is on yearly basis irrespective of the quantity to be extracted and for every consecutive years amount to be paid is enhanced by 10 percent from previous year. Other than premium, the successful bidder has to pay 10% of royalty as DMF, 2% TDS and applicable GST. Dead Rent and Surface rent are subsumed within the premium to be paid by the bidder. The period of a quarry lease concession is five years. Apart from quarry lease, short term permits are also issued in the State for specific purposes, which are valid for a period of six months. Further temporary permits are granted for specific purposes for a period of 90 days only. The royalty applicable for sand in the State is Rs 65 per cubic metre.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Temporary Permit	5 Ha	NR	400 Ha	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online tender cum forward auction	No	5.9	47.7

Training has been given to the team of officers of DGM and the State remote sensing department as per the direction of Ministry of Mines, Government of India to implement mining surveillance system in the State. Five short term mining permits of sand of Sonbhadra district have been digitized and uploaded in the MSS System during the training sessions.

Sales

Sale and transportation of sand in the State is with the lessees and private transporters and there are no notified rates for transportation of sand in the State. Further, there is no restriction on export of sand to other States or import of sand from other States.

DSR Status

As per the MoEFCC notification, DSR is being prepared by the concerned districts. Out of 68 sand bearing districts of the State, DSRs for 35 districts have been prepared and approved. For the rest of the districts, the report is being prepared and expected to be released shortly.

As estimated by the department, the price of sand is around Rs 40,000-50,000 per 10 tyre truck (30 tons) around Lucknow and during the monsoon season, since there is a blanket ban on sand mining, it reaches to around Rs. 1300-1600 per tonne for good quality of sand.

Demand Supply Assessment

A rough estimate given by the department shows demand of 45-50 MTPA in the State against the supply of around 18-20 MTPA from existing leases. However, the supply is expected to increase after production starts from the new leases that were recently auctioned.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 15 Summary of sand mining policy of Uttar Pradesh

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Directorate of Geology & Mining, Uttar Pradesh	• Identification of sand-bearing areas and preparation of Valuation Reports • Fixing boundary and assessment of quantity of sand	1 month	Offline
Allotment of sand reaches	Directorate of Geology & Mining, Uttar Pradesh	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/ Bid Documents • Conduct of two stage forward auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder	1 month + 1 month for issue of final acceptance letter/ LoI	Online
Clearances & Approvals	Successful Bidder	• Preparation of mining plan, mine closure plan, environment plan (EIA/EMP)	1 month for Mining Plan	Offline

(Mining Plan, Environment clearance, Consent to operate)		• Approval of mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance	3- 6 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.)	
Operations and Monitoring	Lessees	• Mining and loading operations are conducted by the lessees	Continuous	Offline
	Directorate of Geology & Mining, Uttar Pradesh	• Overall monitoring lies with the District Monitoring Committee.	Continuous	Offline cum Online
Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Directorate of Geology & Mining, Uttar Pradesh	• Issuance of “royalty Pass/E-rawana by the department	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

3.14 Uttarakhand

Regulatory Provisions

The Minor Mineral rules applicable in the State of Uttarakhand are *Uttarakhand Minor Minerals (Concession) Rules, 2001* and sand is governed by the Uttarakhand Minor Mineral (sand, bajri, boulder, brisk etc.) Policy, 2015. The responsibility of the minor mineral "sand" is with the Geology and Mining unit under the Directorate of Industries, Uttarakhand.

There are two types of sand concessions in the State:

Mining Lease - A mining lease is granted for revenue land for a period of five years and for private land for a period of one year. Size of the concessions vary from 5 Ha to 50 Ha, however, the maximum limit of area of mining lease which a person can hold in the State is five mining leases or 400 acre.

Mineral picking works - The short terms contracts are allotted for temporary period from 1st Oct to 15th June. These are allotted through lottery process. Size of concessions allotted for mineral picking works can be more than 5 Ha.

Business Model

Allocation of the mining leases for sand reaches in the State is planned through online tender cum forward auction model. Reserve price is based on the quantity of sand available in the area multiplied by the royalty applicable, which is lump sum in "Rs/annum" which is calculated based on the extractable quantity of sand from the particular area. The auction and tender documents are still not available and are expected to be released shortly.

Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Mining Lease, Short term picking contracts	5 Ha	50 Ha	400 acres or 5 MLs	5 Years

Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Market Model	Competitive Bidding	Online Forward auction	No	NA	335.3*

**Revenue figures are for total RBM (River Bed Material).*

Sales

Operations and sale of sand is with the lessees. There are no notified rates for transportation of sand in the State. There is no restriction for export of sand to other States and from other States to Uttarakhand.

DSR Status

The State is in the process of preparation and finalization of DSRs for all the sand related districts for which data are being collected by the district level officer. DSR has been prepared approved for one district i.e. Tehri Garwal District and for rest of the districts it is either under preparation or under approval.

Demand Supply Assessment

There are no specific details/data available with the State regarding the State's sand demand, consumption, replenishment etc. Since there is surplus sand available in the State, the prices are not very high with the sale price being around Rs. 260 per tonne at the sand ghat and Rs. 1000 to Rs. 1200 in Dehradun. However, during the monsoons when the sand availability is scarce, the price shoots up to Rs. 1500 to 1700 per tonne.

A summary of other key aspects of sand policy of the State is tabulated below:

Table 16 Summary of sand mining policy of Uttarakhand

Activity	Responsibility	Sub-Activity	Timelines	IT Usage
Identification of sand reaches	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Identification of sand-bearing areas and preparation of Joint Inspection Reports • Fixing boundary and assessment of quantity of sand	1-2 months	Offline
Allotment of sand reaches	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Selection of IT Platform/ vendor for conduct of auction • Issue of NIT/Bid Documents	1 month + 1 month for issue of final acceptance letter	Online

		• Conduct of auction and selection of successful bidder • Issuance of provisional acceptance letter and final acceptance letter to the successful bidder		
Clearances & Approvals (Mining Plan, Environment clearance, Consent to operate)	Lessee	• Preparation of mining plan (by RQP), mine closure plan, environment plan (EIA/EMP) • Getting approved mine plan, mine closure plan and environment plan (EIA/EMP) • Submission of approved mining and environmental plans to authority for issue of environmental clearance	6-12 Months (If area is less than 25 Ha.) 12-36 Months (If area is greater than 25 Ha.)	Offline
	Lessee	• Environment clearance • Application for Consent for Establishment (CFE) and Consent for Operation (CFO) to District Pollution Control Board • Other relevant clearances and approvals	1 month	Offline
Operations and Monitoring	Lessee	• Mining and loading operations are conducted by the lessee	Continuous	Offline
	Geology and Mining unit under Directorate of Industries, Uttarakhand	• Overall monitoring responsibility lies with District Monitoring Committee	Continuous	Offline

Transportation	Lessee	• Selection of transporters • Setting of transportation charges based on travel distance.	Continuous	Offline
	Contractor	• Issuance of “e-rawana” by the contractor	Continuous	Online
Sales	Lessee	• Getting orders through different sources (Agents/ direct consumers etc.) • Delivery of sand	Continuous	Offline

4. Detailed Comparative Analysis

This chapter presents a comparison of the sand mining policies and practices followed by different States across a range of related parameters such as regulatory framework, types of concessions, pricing mechanism and royalty structure, operations and monitoring, sales and transportation and usage of IT in the process.

Based on information presented in the preceding chapter, a detailed comparison of mining polices of different states has been carried out, and best practices identified accordingly. The different parameters selected for comparison are listed below.

Figure 4- 1 Parameters for comparison

Regulatory and Legal	Business model	IT infrastructure
•Rules, regulations and policies •Royalty •Identification of sand blocks •Clearances and approvals	•Allocation method •Operational control •Sale rights •Type of concessions	•Allocation •Ordering •Monitoring •Delivery

4.1 Regulatory and Legal

4.1.1 Rules, regulations and policies

In exercise of powers conferred by section 15 of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), the State Governments have made rules for regulating minor minerals in their respective States. The rules defined and followed by States along with the entities/ departments responsible for sand mining activities in the States are mentioned in the table below. In addition, the table also presents whether there is a separate sand policy available in the State.

Table 17 Rules followed by the States

State	Latest rule applicable	Department controlling sand mining activities	Separate Sand Mining Policy
Andhra Pradesh	Andhra Pradesh Minor Mineral Concession	Department of Mines & Geology, Andhra Pradesh	Free Sand Policy, 2016

	Rules, 1966 and its amendments.		
Assam	Assam Minor Mineral Concession Rules, 2013	Department of Environment and Forest, Assam	No
Chhattisgarh	Chhattisgarh Minor Mineral Rules, 2015	Directorate of geology & Mining, , Chhattisgarh	Chhattisgarh Minor Mineral Sand excavation and Trade Regulation Order 2006
Gujarat	Gujarat Minor Mineral Concession Rules, 2017	Industries and Mines Department, Gujarat/ Commissioner of Geology & Mining ((CGM)	No
Haryana	Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012	Mines and Geology Department, Haryana	No
Karnataka	Karnataka Minor Mineral Concession (Amendment) Rules, 1994 and amendments in August' 2016, and 2017	Department of Mines & Geology, Karnataka	Separate chapter in KMMCR for sand
Madhya Pradesh	Madhya Pradesh Minor Mineral Rules, 1996 and its amendments. Latest amendment issued in 2013.	Directorate of Geology and Mining, Madhya Pradesh	Sand Mining Policy 2017
Maharashtra	Maharashtra Minor Mineral Extraction (Development and Regulations) Rules, 2013	Revenue and Forest Department Government of Maharashtra	Amended Sand Excavation Policy 2017
Punjab	Punjab Minor Mineral Rules, 2013	Department of Industries and Commerce, Mining Department, Punjab	No
Rajasthan	The Rajasthan Minor Mineral Concession Rules, 2017	Department of Mines & Geology, Rajasthan	No

Tamil Nadu	Tamil Nadu Minor Mineral Concession Rules, 1959 and its amendments. Latest amendment: Rule 38-A introduced vide GOMs 95 in 2003	Department of Geology & Mining / Public Works Department, Tamil Nadu	No
Telangana	Andhra Pradesh Minor Mineral Concession Rules, 1966 and its amendments. The latest amendment issued on 26.07.2016	Department of Mines & Geology, Telangana/ TSMDC	New Sand Mining Policy 2014
Uttar Pradesh	Uttar Pradesh Minor Mineral (Concession) Rules 1963 and its amendments. The latest (42nd) amendment issued in 2017.	Directorate of Geology & Mining, Uttar Pradesh	No
Uttarakhand	Uttarakhand Minor Minerals (Concession) Rules, 2001	Geology and Mining unit under Directorate of Industries, Uttarakhand	Uttarakhand Minor Mineral (sand, bajri, boulder, etc.) Policy - 2015

Minor Mineral Concession Rules

It is observed that most of the States have amended the rules from time to time. Many of the States surveyed have changed their concession rules in the last three to four years including after amendments in the MMDR Act in 2015.

Department controlling sand mining activities

Except for a few states, sand is governed by the Department of Mines and Geology in most of the States. In Assam, Environment and Forest Department regulates sand mining activities. However, Assam is in the process of amendment of its minor mineral rules and once notified, the control will be with its Department of Mines and Geology. In Maharashtra, Revenue and Forest Department has control over sand mining. In Gujarat, Tamil Nadu, Uttarakhand and Punjab, matters related to sand mining are handled by the Industries Department. The disadvantage of not having the control with the mining department is that the staff in other department are not well versed with technical aspects of mining and related environmental concerns, and consequently there is a gap between the regulating body and those taking care of operations.

Specific Sand Mining Policy

Some of the States have a separate policy applicable for sand mining. Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor

minerals considering high demand-supply deficit. Also sand is different from other minor minerals in its usage by the general public. Keeping these in mind, many States have formed a separate policy of sand such as Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand and Karnataka. Andhra Pradesh has framed a separate sand policy in the year 2015 and since March 2016, free sand policy is applicable in the State. Sand mining in Chhattisgarh is governed by the Chhattisgarh Minor Mineral Sand Excavation and Trade Regulation Order 2006. Madhya Pradesh brought a separate policy for sand in 2015 and has again notified a new policy to regulate sand mining in the State. Maharashtra has Amended Sand Excavation Policy. Telangana has separate Sand Policy 2014 and related GO. Uttarakhand has separate policy for the river bed material. Karnataka has introduced a separate chapter (IV-B) in its minor mineral concession rules for sand mining.

Separate M-sand policy

A few States have separate policies to promote M-sand such as Andhra Pradesh, Telangana and Karnataka. Andhra Pradesh and Telangana have granted industry status to M-sand producing units in their State. Karnataka has reserved few blocks for M-sand plants only as end user category. Tamil Nadu's M-sand policy is under formulation. Recently, Gujarat has also reduced royalty for M-sand units to promote production of M-sand.

4.1.2 Royalty Collection and units applicable

Royalty forms a vital part of the fiscal regime for mining and is an important means of revenue realization for the Government. However, it also increases the price of sand for consumers. The royalty being collected by different States is shown in the table below.

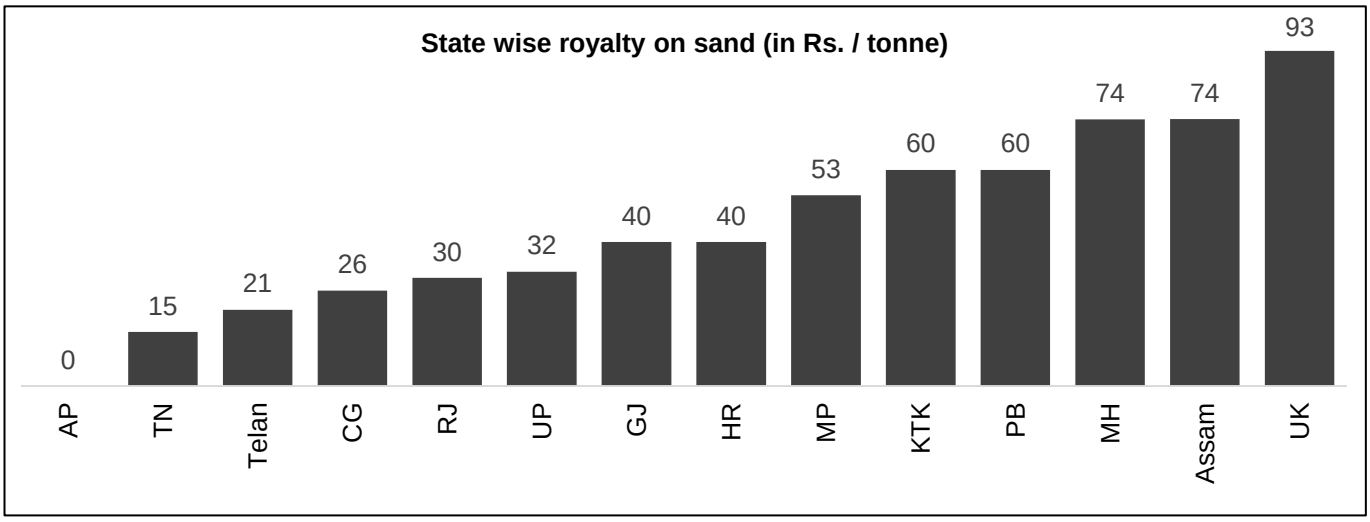
Table 18 Royalty applicable in different States

State	Royalty applicable	Unit applicable in the State	Royalty in Rs. per tonne[1]
Andhra Pradesh	No royalty	Per cubic metre	0
Assam	Rs. 140 per m^3	Per cubic metre	74
Chhattisgarh	Rs. 50 per m^3	Per cubic metre	26.45

[1] *The unit has been changed to per tonne using bulk density of 1.89 gram per cubic metre, Source: MoEFCC's Sustainable Sand Mining and Management Guidelines 2016*

Gujarat	Rs. 40 per tonne	Per tonne	40
Haryana	Rs. 40 per tonne	Per tonne	40
Karnataka	Rs. 60 per tonne	Per tonne	60
Madhya Pradesh	Rs. 100 per m^3	Per cubic metre	52.9
Maharashtra	Rs. 400 per brass (100 ft^3)	Per brass	74
Punjab	Rs. 60 per tonne	Per tonne	60
Rajasthan	Rs. 30 per tonne	Per tonne	30
Tamil Nadu	Rs. 8.5 per 10 ft^3	Per Unit (1Unit=100 $feet^3$)	15.7
Telangana	Rs. 40 per m^3	Per cubic metre	21.2
Uttar Pradesh	Rs. 60 per m^3	Per m^3	31.7
Uttarakhand	Rs. 154/176/187 per m^3	Per m^3	81.5/ 93.1/ 98.9

Figure 4- 2 Royalty comparison across States (Rs per tonne)



The royalty for sand varies from Rs 0 to Rs 93 in different States. There is a significant difference in the royalty structure from one State to other and the bulk density used for conversion of units of royalty is also different in different States. Some States use 1.5 tonnes per cubic metre while others use 1.89 tonnes per cubic metre, as mentioned in the MoEFCC's Sustainable Sand Mining and Management Guidelines 2016. Andhra Pradesh is the only State that does not charge any royalty for sand.

It is suggested that the unit used for royalty calculation should be uniform across the country as it will help in comparison of the royalty collected from sand mining and also in estimating the production and demand of sand in the State. Further, the unit used should be Rs. per tonne as weighing of sand is easier than measuring the volume of sand. By installation of weigh bridges, the quantity of sand in each vehicle can be measured whereas in measuring volume, the capacity of the vehicle is used without considering the over loading factor.

4.1.3 Identification

The process of identification of sand reaches in most of the States is taken up by the relevant department responsible for sand mining in the State. The report prepared during identification of sand reaches also varies from State to State, where most of the States go for joint inspection report or site appraisal report. Gujarat is the only State, which prepares a geological report for blocks. Geo-tagging of the block is also a common practice in many States.

The methodology followed by most of the States for identification of sand mining areas is described as follows:

- Based on information available with the department, the relevant person authorized for the job obtains the map of the area from the revenue officer or the tehsildar and conducts a spot inspection regarding availability of area to check whether the area is reserved for some other purpose or not. If he finds sufficient availability of sand in the area, the area is demarcated and put up for either auction or allotment on nomination basis, as deemed fit by the State.
- Many States have taken up geo-tagging of the demarcated area, which can be useful while conducting physical inspection, as the boundary of the demarcated area can be checked using the coordinates recorded in GPS device, and the monitoring team can be sure of any illegal mining activity outside the permitted area.
- In Uttar Pradesh, the district mining officer prepares the valuation report to assess the quantity of sand available in the block during the identification of sand blocks. However, actual quantity to be mined is as per environment clearance.
- In Karnataka, Taluk Level Sand Committee is formed which is responsible for site inspection and identifying sand blocks for the purpose of tender cum auction or for reservation. The committee estimates approximate extractable sand available in each

identified block by restricting quarrying to three meters depth or water level whichever is less, with the assistance of the Officers of the Revenue, Public Works, ports and Inland Water Transport Department, Water Resources, Mines and Geology and Forest, and the identified blocks are incorporated using the co-ordinates in the certified sketch. The committee also submits joint inspection report and documents with a clear recommendation report to the district committee for the purpose of notification of sand blocks and their extent, which may be either individual blocks or cluster of blocks, for tender- cum- auction or for reservation for Government works or for extraction of sand by Central Government or State Government or body corporation owned or controlled by the Central Government or State Government.

- In Gujarat, a geological report of each sand reach is prepared by the respective district's Assistant Geologist before putting it for auction. The potential areas of the quarry lease are identified and demarcated using DGPS and topographic and geological maps are prepared using total station. With reference to the rules, evidence of mineral resources are established using geological report. The geological report contains estimated resources in the blocks along with other information e.g.: details of the area, DGPS survey, details of infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

The responsible party for identification of the reaches along with the reports being generated by the responsible authorities are mentioned in the table below:

Table 19 Identification details for each State

State	Identification responsibility	Reports prepared	Geo-Tagging or co-ordinates mapping	Standard Template Available as per Rules/ Regulations/ GOs
Andhra Pradesh	District Level Committee	Site Appraisal Report	Yes	No
Assam	District Forest Officer	Initial valuation report	Yes	No
Chhattisgarh	Mining Inspector & Revenue Officer	Joint Inspection Report	Yes	No
Gujarat	Assistant Geologist	Geological Report	Yes	No
Haryana	Department of Mines & Geology	Initial Survey Report, Joint Inspection report	Yes	No

Karnataka	Taluk Sand Monitoring committee	Joint Inspection Report	Yes	No
Madhya Pradesh	District Office	NA	Yes	No
Maharashtra	NA	NA	Yes	No
Punjab	District Level Committee	Site Appraisal Report	Yes	No
Rajasthan	District Committee	Joint inspection Report/ Mauka Report (for private land)	Yes	No
Tamil Nadu	Department of Mines & Geology/ PWD	NA	Yes	No
Telangana	District Level Sand Committee	Joint Inspection Report	Yes	No
Uttar Pradesh	District Mining Officer & Surveyor	Valuation Report	Yes	No
Uttarakhand	District Committee	Site Appraisal Report	Yes	No

However, there are multiple issues with the existing models of identification. One of the major issue with the existing model is that in none of the States, the officer responsible for spot inspection has standard template available in compliance with the Rules and MoEFCC Guidelines, so as to check across all parameters.

Preparation of geological report in Gujarat for each block and putting the blocks for auction based on that geological report is by far the best practice followed in identification process. Geological Report is prepared by the District Assistant Geologist of the concerned district. And the quantity of mineral resources are established using geological assessment. The report contains details of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

4.1.4 Clearances and approvals

Clearances and approvals required in most of the States are more or less similar with little variations from one State to another. First of all, no-objection certificate is required from the Revenue Department that the land is not reserved for other purpose or does not come under forest land or is under any litigation. Mining plan and environment clearance report is required to be submitted in all the States before commencing the mining operations. And the granting authority for environmental clearances is based on the size of the block, as mentioned in the table below:

Table 20 Environment clearance approving authority for mining lease

Size of the block	Category	Approving authority
0-5 Ha	B2	DEIAA/ DEAC
>5 and <25 Ha	B2	DEIAA/ DEAC (In case of cluster)/ SEIAA/ SEAC (Individual)
>=25 and <50 Ha	B1	SEIAA/ SEAC
>= 50 Ha	A	MoEFCC

Other clearances required in many States are Consent to operate (CTO) and consent for approval (CFA), from the State Pollution Control Board and it is the responsibility of the Lessee to get the clearance for the same. Apart from these, Maharashtra seeks approval from the Gram Sabha and the opinion of the Ground Water Survey and Development Agency, and in case of Creek Mining, approval from the Maharashtra Maritime Board. The details of the types of clearances required and the responsibility of taking the clearances are mentioned in the table below:

Table 21 Clearances and responsibility

State	Types of Clearances	Responsibility
Andhra Pradesh	MP, EC	Department of Mines and Geology
Assam	MP, EC, CFE, CTO	Lessee
Chhattisgarh	MP, EC, approval of Gram Sabha	Department does it on behalf of Gram Panchayat
Gujarat	MP, EC, CTO	Lessee
Haryana	MP, EC	Lessee
Karnataka	MP, EC	Lessee
Madhya Pradesh	MP, EC	Department does it on behalf of Gram Panchayat

Maharashtra	EC, Approvals from Maharashtra Maritime Board, Opinion of Ground Water Table and Development Agency	Department of Revenue & Forest
Punjab	MP, EC, CTO	Lessee
Rajasthan	MP, EC, CTO	Lessee
Tamil Nadu	MP, EC	PWD
Telangana	MP, EC, CFE/CFO	TSMDC
Uttar Pradesh	MP, EC	Lessee
Uttarakhand	MP, EC, CTO	Lessee

The responsibility of preparation of mine plan and obtaining environment clearance is with the lessee in most of the States. However in Andhra Pradesh and Chhattisgarh, it is the responsibility of the mining department. In Punjab, till 2017, the department had the responsibility of obtaining the clearances and in Madhya Pradesh, after notification of the new Sand Mining Policy, the department has the responsibility of getting the clearances.

The Department of Mines and Geology in Andhra Pradesh and Chhattisgarh have the responsibility of preparation of mine plan.

However, there are issues with handing over the responsibility of clearances to the mining department:

- The department will have the responsibility of preparation as well as approval of the mine plan which may not be ideal in case of auction model.
- The mining department which may already have a limited technical workforce will be overloaded with work, which might delay the process.

Therefore, it may augur well for the project proponent to procure the clearances and approvals.

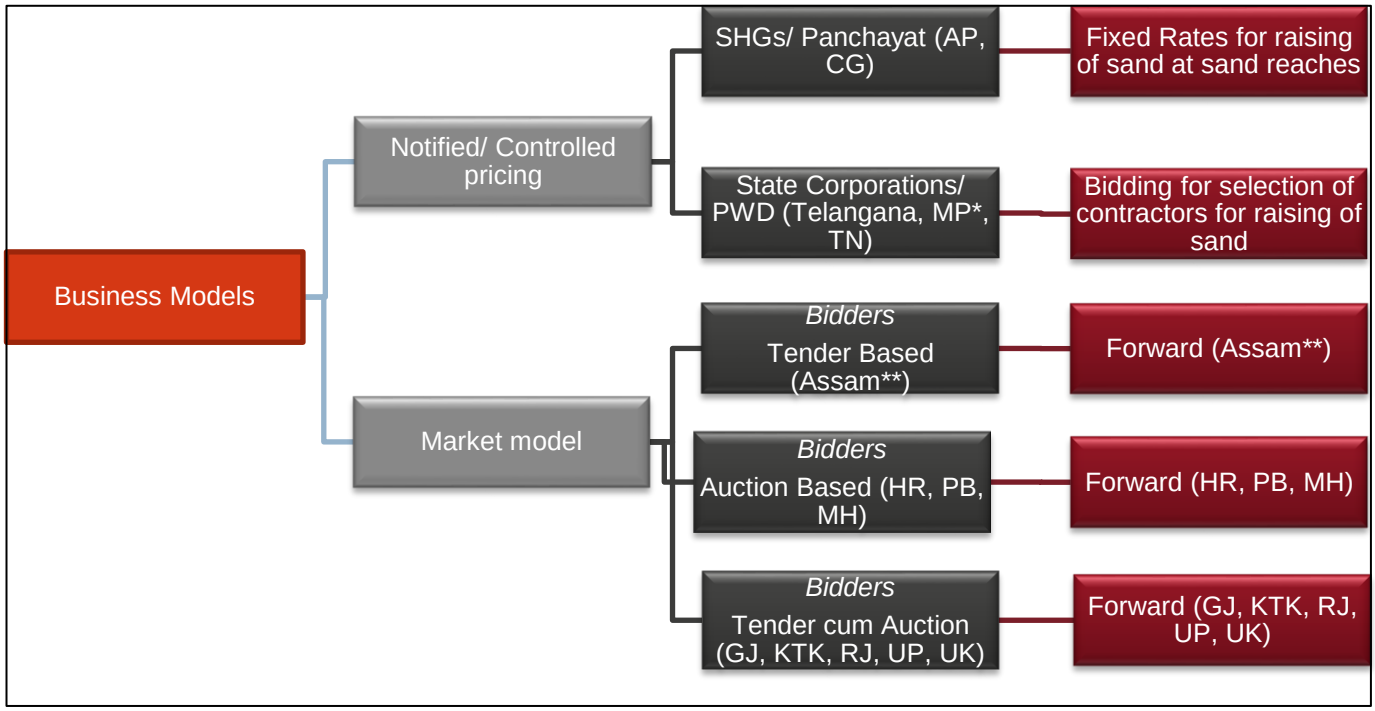
4.2 Business Model

4.2.1 Allocation model and realization to State Government

The mode of allocation of concession for sand varies from State to State. The allocation model adopted depends on the objective of the State Government. States that want to maximize revenue

go for market model (allocation through competitive bidding) i.e. forward auction with no intervention from the State in sale of sand, while others that want to keep prices under control go for a controlled or notified pricing model while keeping the sale right with themselves.

Figure 4- 3 Different models for allocation



**MP followed the market model earlier in which allocation was on nomination basis to MPSMC, which appointed raising contractors (through competitive bidding) who were free to decide the sale prices. However, as per the new Sand Mining Policy 2017, the sale prices in MP are now controlled at the sand reaches and are fixed at Rs.125/m3.*

***Assam is undergoing changes in its Rules*

Table 22 Summary of Pros and Cons of business models followed in different States

Model	Notified Pricing/ Controlled Pricing	Market Model
Key merits	• Uniform and notified Sale Price • Profit with State Govt. • Relatively better operations and monitoring control	• Higher revenues for the Govt. • Minimum Governmental resources • Transparent method of allocation

Key demerits	• Lesser revenue for Govt. in case of lower sale prices • Significant govt. resources required • Sale prices may still be higher in case of deficits in supply	• Prone to Illegal mining/over exploitation • Environmental Concerns • Higher sale prices for consumers • Chances of cartelization during bidding • Chances of cartelization by bidders for supply and prices control

A summary of the models followed by different States and their productions & revenues is tabulated below:

Table 23 Summary of business models followed in different States

State	Business Model	Sub-model	Process followed	Separate accounting for royalty (Yes/ No)	Production FY17 (MTPA)	Revenue FY17 (Rs. Crores)
Andhra Pradesh*	Notified or controlled pricing model	None	Notification of identified reaches for sand extraction is published in Gazette	Not Applicable	NA	Not Applicable
Assam**	Market model	Competitive Bidding	Offline tender	No	5.6	30-35
Chhattisgarh	Notified or controlled pricing model	Nomination	Allocation to Panchayats	Yes	10.0	10.6

Gujarat	Market model	Competitive Bidding	Tender cum forward auction	Yes	49.64	160.34
Haryana* **	Market model	Competitive Bidding	Forward e-auction	Yes	9.8	265.9
Karnataka	Market model	Competitive Bidding	Tender cum forward auction	Yes	4	25.2
Madhya Pradesh** **	Notified or controlled pricing model	Nomination	Allocation to Gram Panchayats	Yes	49.14	240
Maharashtra	Market model	Competitive Bidding	Forward e-auction	No	NA	NA
Punjab	Market model	Competitive Bidding	Forward e-auction	No	NA	43.1
Rajasthan	Market model	Competitive Bidding	Tender cum forward auction	No	56.8	235.9
Tamil Nadu	Notified or controlled pricing model	Nomination	Allocation to PWD	Yes	15.12	86.33
Telangana	Notified or controlled	Nomination	Allocation to TSMDC	Yes	13.23	434

	pricing model					
Uttar Pradesh	Market model	Competitive Bidding	Tender cum forward auction	No	5.9	47.7
Uttarakhand *****	Market model	Competitive Bidding	Tender cum forward auction	No	NA	335.3

**In Andhra Pradesh, the State notifies sand reaches from where sand can be extracted by the consumers without paying any royalty or tax for the extracted sand. There is accordingly no realization to the State Government from sale of sand.*
***For Assam, as per current business model. Assam is undergoing a change in allocation system for sand blocks. As per the new system, sand blocks will be allocated through e-auction method.*
****Haryana production data is for the Calendar year 2017-2018.*
*****MP followed the market model earlier in which allocation was on nomination basis to MPSMC, which appointed raising contractors (through competitive bidding) who were free to decide the sale prices. However, as per the new Sand Mining Policy 2017, the sale prices in MP are now controlled at the sand reaches and are fixed at Rs.125/m^3*
******inclusive of revenue from RBM (River Bed Material) together.*

In Andhra Pradesh, the State notifies sand reaches from where sand can be extracted by the consumers without paying any royalty or tax for the extracted sand. The realization to the State Government from sand in this model is zero. However, the model is considered good in terms of keeping the price of sand under check in the State. Further, the model adopted by Telangana where notified prices of sand and delivery of sand is also available for the consumers, is suitable for both keeping the prices under control as well as revenue for the department which may be used for the development of the resources and area related to resources.

4.2.2 Operations control

The control of operations in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding, the control over operations is with the lessee/contractor who won the reach in the bid. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or by a raising contractor.

In Chhattisgarh, the allocation is on nomination basis to the Gram Panchayat and the Panchayats are to employ local villagers for excavation and loading of sand, in lieu of daily wages. While in Tamil Nadu and Telangana, the allocation of sand reaches is with the State mining corporations/PWD, who in turn hire contractors to do the job on their behalf.

The advantage of giving the control of operations to Government agency is that it does not have much incentive in over-exploitation of resources, and the State can be relatively assured that the regulations laid down by the Government are completely followed. Whereas in the other model

where the control of operations is with the lessee, the main motive for the business is to make as much money as possible. So despite the fact that regulations are laid down by the State Governments, in absence of proper and robust monitoring mechanism, the lessee can escape from complying with the regulations and this has been the primary reason for various bans imposed by the NGT, and courts in different places. It has been observed that in the past, the ban on sand mining has been mainly due to violation of regulations imposed by the Government or the MoEFCC.

Table 24 Operational control of sand mining

State	Operations control
Andhra Pradesh	SHG/ Consumer
Assam	With Lessee
Chhattisgarh	With Gram Panchayat
Gujarat	With Lessee
Haryana	With Mining Contractors
Karnataka	With Lessee
Madhya Pradesh	With Gram Panchayat
Maharashtra	With Lessee
Punjab	With Lessee
Rajasthan	With Lessee
Tamil Nadu	PWD
Telangana	TSMDC
Uttar Pradesh	With Lessee
Uttarakhand	With Lessee

For operations control, the best practice is the one followed in Telangana, where the operations control is given to TSMDC by the DMG, and TSMDC in turn raises a contractor by competitive bidding to extract sand on its behalf. The advantage of this practice is that a Government agency

has control over operations which relatively ensures that the regulations laid are properly followed under monitoring by TSMDC.

4.2.3 Sales rights

The next step in the process chain of sand mining is sale of sand. This is one of the most important steps in the process chain of sand mining as the price of sand in a State, is one of the crucial factors. There are various models followed by the States and the model followed determines the control of sales right. In States such as Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana, where sand reaches are allocated on nomination basis to the State mining corporations, the State Government has complete control over the sale of sand. Also, to an extent, transporters do not have monopoly, thus the price of sand for consumers is under check. Similarly in Chhattisgarh, sand reaches are allocated on nomination basis to Gram Panchayats, the sale right is with the relevant Panchayat. And consequently, the price of sand cannot be increased artificially through cartel formation.

In States that follow competitive bidding for allocation of sand reaches, the sales right is with the successful bidder with no or limited control/ regulation of the State Government over the sale of sand. In such a situation, the participating bidders may try to quote more and more to win the sand blocks, with the intention to increase the market price of sand artificially so as to recover the money that they pay to the State for the allocation of blocks. Besides increase in sale price of sand, this also leads to over exploitation of sand reaches to extract more quantity over the notified quantity.

State-wise details of sales rights, regulation on prices, landed sand price and status of supply (deficit or surplus) are mentioned in the table below.

Table 25 State-wise details of sales rights

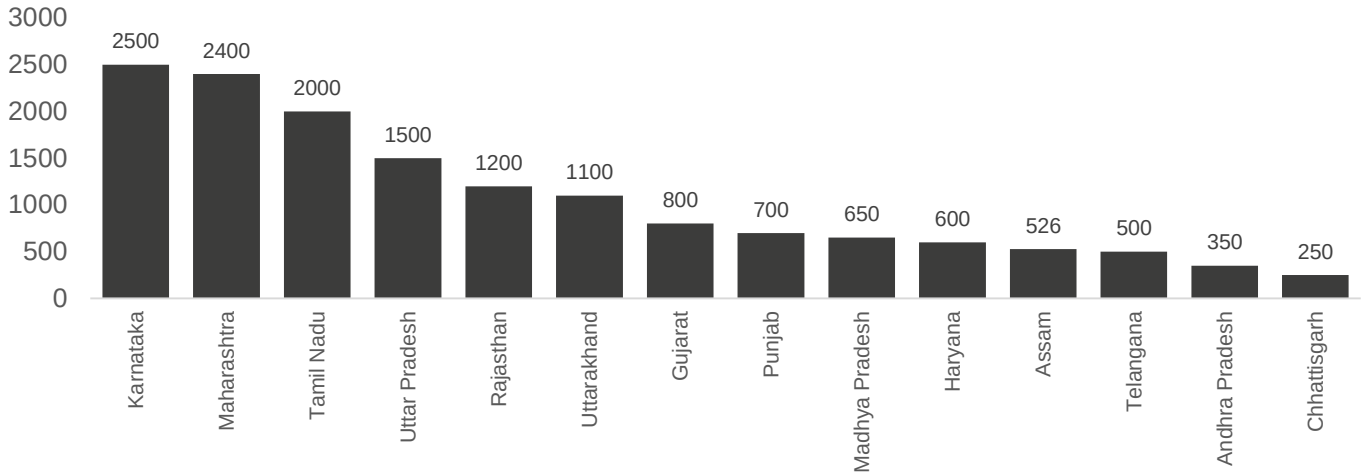
State	Sales Right	Sand Prices (Market determined / Regulated)	Business Model followed	Landed price of sand (Converted to Per tonne Basis) in normal season	Landed price of sand (Converted to Per tonne Basis) during monsoon	Sand Deficit*
Andhra Pradesh	With Department	Free of cost (only	Notified or controlled pricing	Government notified price in all districts	Government notified price in all districts	Yes

		extraction cost)		Varies from Rs 200 to 350		
Assam	With Lessee	Market determined	Market model	Rs 500 to 600 per tonne in Guwahati	Rs 635 to Rs 795 per tonne in Guwahati	Yes
Chhattisgarh	Panchayat	Regulated	Notified or controlled pricing	Rs 132 to 370 per tonne, depending on the district	Rs 175 to 550 per tonne, depending on the district	Yes
Gujarat	With Lessee	Market determined	Market model	Rs 80 to 800 per tonne, depending on the district	NA	Yes
Haryana	With Lessee	Market determined	Market model	Rs 500 to 600 per tonne	NA	Yes
Karnataka	With Lessee	Market determined	Market model	Rs 2400-2500 per tonne in Bengaluru	Rs 2500 per tonne in Bengaluru	Yes
Madhya Pradesh	with Raising Contractor	Regulated	Notified or controlled pricing	600 -700 per tonne in Bhopal	Rs 1500+ after ban on sand mining on Narmada rivers	No
Maharashtra	With Lessee	Market determined	Market model	2000-2200 per tonne in Mumbai	Rs 2400 per tonne in Mumbai	Yes

Punjab	With Lessee	Market determined	Market model	Rs 600-700 per tonne (Mansa)	Rs 850 per tonne (Mansa/ Bhatinda)	Yes
Rajasthan	With Lessee	Market determined	Market model	Rs 400 to 500 per tonne (Udaipur)	Rs 1000 to 1200 per tonne after the SC ban	No
Tamil Nadu	With PWD	Regulated	Notified or controlled pricing	Rs 1500+ per tonne (Chennai)	Rs 2000+ per tonne (Chennai)	Yes
Telangana	TSMDC	Regulated	Notified or controlled pricing	Rs 400-500 per tonne	NA	No
Uttar Pradesh	With Lessee	Market determined	Market model	Rs 1300-1500 per tonne	NA	Yes
Uttarakhand	With Lessee	Market determined	Market model	Rs 1000-1100 per tonne	Rs 1500+ per tonne	No

***Sand deficit analysis has been considered as per demand estimation using RBI methodology and production data available with the State Departments/concerned Department.**

Figure 4- 4 Average Sale price comparison across States in Rs/ tonne*



**based on the consumers feedback*

*** The prices were collected from consumers during Oct - Nov 2017 during field visits. The price of sand varies during different periods of the year and at different places in the same State.*

It can be seen from the chart that the sale price of sand is maximum in the State where competitive bidding for allocation of sand reaches is followed with limited intervention by the State Government in operations or sale of sand, for instance in Karnataka and Maharashtra. Further, it should be noted that the prices cannot be compared directly across the sates, but the fact that whether the State is sand deficit or not has to be taken into account. For instance, in Haryana or Uttarakhand which are not sand deficit States, the price of sand is more than that in Andhra Pradesh and Telangana, where both the States are sand deficit.

It can interpreted that the model in which the sales right is with the Government or the price is regulated by the Government is better in terms of keeping the price of sand under check as the prices cannot be raised artificially through cartelization by the contractors. However, to keep the prices under check, price regulation is not sufficient. A robust monitoring mechanism is also required along with sufficient sand supply.

The best practice in sale of sand is the one followed by Andhra Pradesh where the committee notifies the price for sand in the districts of the State including the transportation, loading/unloading and ramp maintenance fee. There is 24 hours operational call center which gives a call to the consumer to enquire whether the amount that is charged for sand is within the Government's notified limit.

4.2.4 Types of Sand Concessions

The types of concessions offered for sand is each in different States and so are the restrictions on area and the time period. While in some of the States, there is no restriction on the size of the block that can be allotted, in others there are restrictions on the minimum as well the maximum area that can be given. The same is true for the time period of the concession in different States.

The details of the types of concession, restriction on area and time period of concession for all the States are mentioned in the table below:

Table 26 State-wise details of the types of concessions

State	Types of sand concession	Minimum Area	Maximum Area	Limit for holding maximum area in the State	Time period
Andhra Pradesh	Notified Sand Reach	No restriction	No restriction	No restriction	Till exhaustion of sand or one year period, whichever is earlier
Assam	Mining Lease, Mining Contracts and Mining Permits	1 Ha	No restriction	No restriction	Mining Lease: 10-20 years Mining contract 7-10 Years Mining Permit: 2 Years
Chhattisgarh	Notified Sand Reach	No restriction	No restriction	No restriction	As long as EC permits
Gujarat	Quarry Lease, Quarry Permit and Quarry Parwana	1 Ha	No restriction	50 Ha	5 Years

Haryana	Mining Lease, Mining Contracts, Quarrying Mineral disposal permit	1 Ha	No restriction	1000 Ha	7-10 Years
Karnataka	Quarry Lease and Temporary Permit (for local communities)	5 acre (2Ha.)	50 Acre (20 Ha/ 10 Acre (4 Ha)	20 Ha (Mineral Based Industries)/ 4 Ha for others	5 Years
Madhya Pradesh	Quarry Lease, Trade Quarry	1 Ha	No restriction	No restriction	5 Years
Maharashtra	Quarry Lease	NA	NA	NA	1 year, ending on 30th September
Punjab	Mining Lease, Grant of Contracts, Short term Permit	No restriction	For short term contracts – 4 Ha	5 Sq km	2-5 Years
Rajasthan	Mining Lease, Quarry License, Short Term Permit	5 Ha	No restriction	No restriction	5 Years
Tamil Nadu	Sand Quarry	NA	NA	NA	
Telangana	Mining Lease	NA	NA	NA	1 Year

Uttar Pradesh	Mining Lease, Temporary Permit	5 Ha	NA	400 Ha	5 Years
Uttarakhand	Mining Lease, Short term picking contracts	5 Ha	50 Ha	400 acres or 5 Nos. ML	5 Years

Area of concession:

It is observed that providing concessions of very large size is not suitable as the related clearances may take a lot of time (more than a year). It also can create a concentrated market in the hands of a few suppliers. Similarly, providing concessions of very small size is also not suitable as it affects the efficiency and impacts the economies of scale. The other drawback of allotting very small sizes of sand blocks is that there may be chances that bidders in the district get the blocks on the edges, which have access to pathways, and create impediment for auction of other blocks. Such a situation may result in the excavation of sand in the non-notified area by the leaseholders of the outer blocks, including those blocks which could not be auctioned.

The size of blocks should preferably be more than 5 Ha so that clearances can be received at a faster pace. Notwithstanding, States are free to decide minimum and maximum area limits as per their local conditions in the districts. The maximum area limit for allocation should allow for sufficient number of blocks in a district to enable sufficient competition e.g.: minimum three contractors in a district.

Duration of concession:

It has been observed that smaller time periods of concessions is not suitable as getting clearances takes significant amount of time and also no sand can be extracted during the monsoon season i.e. approximately for 3-4 months. So, overall the leaseholder loses a period of around 6-7 months from the period of concession. So in the months left, the lessee may do rampant sand mining with no regard for the norms leading to a situation of environmental damage.

Therefore, it is suggested that the duration of concession should be five to ten years wherein the lessee gets sufficient time for sand extraction and at the same time, there should be a gap of sufficient period between two consecutive allotments of a sand block so that the block can be provided sufficient time to replenish itself. Further, the States may provide short term permits for a period of around one year for specific needs of the Government projects/ Government department/contractors or for any other infrastructure project as the State may deem fit. The

duration of concession mentioned is recommendatory only and the States are free to decide the time period of concession based on their local conditions.

4.3 IT System Analysis

Technology always plays an important role in process improvement, process monitoring and control and in any course of action that aims to increase transparency. In the process chain of sand mining, technology can be leveraged in each of the steps to make the system more transparent and to eradicate corruption. Hence, the objective of this section is to study the technical aspects in the existing sand mining process in different States to find out the best possible use of IT in different processes and find out areas for improvement for the States. Detailed study of the existing IT systems was carried out for major areas as mentioned below:

- Allocation of sand reaches
- Ordering of sand (by customers)
- Monitoring of sand extraction (monitoring agency), and
- Delivery process (customers/monitoring agency).

Different types of technology instruments are being used in different States to make the process more efficient and to monitor the whole operation. Starting from the allocation of sand bearing areas, monitoring of the extraction process, ordering of sand, generation of online transport permits, tracking of order, transportation of sand at the designated address, monitoring of sand stockyards, monitoring of transportation to tracking the delivery and capturing the customer feedback; each step in the process chain incorporates information technology. Use of technology is a very common practice in allocation of sand reaches in the country after introduction of auction system of allotment. However, the use of IT in ordering, monitoring and delivery is limited only in a few States. The southern States are doing relatively well in use of technology in sand mining. Utilization of IT systems in different processes are mentioned subsequently.

4.3.1 Use of IT in Allocation

Most of the States allot reaches through the process of e-auction through competitive bidding through online portal. Out of the fourteen States, Andhra Pradesh is the only State which does not allot its sand reaches to any department or contractor but simply notifies the sand reaches for sand extraction by the common public/SHGs without charging any royalty. Four States namely, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana, allot their sand bearing areas to the Panchayats, the State Mining Corporations or Public Works Department on nomination basis. The State Mining Corporation in Telangana and the PWD in Tamil Nadu, in turn raise the contractor for sand extraction through competitive bidding by offline means. However, the State Mining Corporation in Madhya Pradesh raise the contractor for extraction and sale of sand through online tender.

Nine states viz. Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand allot sand bearing areas through competitive bidding/ auctions. Out of these, only Assam allots the sand bearing areas through offline tender route while the remaining eight States allot through online mode. However, Assam is in the process of shifting to an online system for allocation of sand reaches once amendments of its rules are notified. Five States namely Gujarat, Karnataka, Rajasthan, Uttar Pradesh and Uttarakhand allot sand bearing areas through two stage forward online auction method while the remaining three namely Haryana, Maharashtra and Punjab follow single stage forward auction/ tender route for allotment.

An online tender/auction offers complete transparency and ensures participation from the widest possible range of prospective bidders reducing the scope for unfair practices such as bid rigging and other unfair means. It also ensures fair market price for the natural resource. The table below shows the use of technology in allotment of sand bearing areas in different States.

Table 27 Use of technology in allocation of sand concession across the States

State	Business Model	Use of Information Technology
AP	Notification of identified reaches for sand extraction	Not applicable
Assam*	Offline tender	Limited use of IT
CG	Allocation to Panchayats	Not applicable
GJ	Tender cum forward auction	Good use of IT
HR	Forward e-auction	Good use of IT
KTK	Tender cum forward auction	Good use of IT
MP**	Allocation to Gram Panchayats (earlier to MPSMC)	Good use of IT
MH	Forward e-auction	Good use of IT
PB	Forward e-auction	Good use of IT
RJ	Tender cum forward auction	Good use of IT
TN	Allocation to PWD	Limited use of IT

Telangana	Allocation to TSMDC	Limited use of IT
UP	Tender cum forward auction	Good use of IT
UK	Tender cum forward auction	Good use of IT

**As per the current process*

4.3.2 Use of IT in Ordering

Use of technology in ordering is gaining acceptance in recent times. Few of the States namely Andhra Pradesh, Tamil Nadu, Madhya Pradesh and Telangana have developed an online portal for booking sand. Andhra Pradesh has taken a leap ahead and besides developing an online portal as well as app for sand booking, the State also captures the feedback of all consumers in the State through the People First Grievance Redressal centre.

Before going into the benefits of use of technology in ordering, let us look at the system of ordering using Information Technology. For ordering, a website is created for booking of sand. Anyone who needs to purchase sand, needs to register on the website. After registration, a user has to login using his/her credentials and select the district from the dropdown menu from which he/she is willing to order. Once the district window opens, the list of active reaches with sand is displayed along with the sand prices at those reaches. After selecting the reach, the user has to enter the customer information, vehicle information along with the delivery address. Subsequently, the system redirects the user to payment gateway for online payment of amount. After successful transaction an online receipt is generated. Further, an online waybill is generated at the stockyard after submitting the receipt.

The benefit of the system is that it ensures transparency in the process of sand booking without any artificial inflation in sand prices for the consumers. The system also ensures that the Government gets the actual royalty and taxes for the sand consumed in the State. The amount of sand available at the beginning and end of each day at each reach can be viewed on the system, which will help in analyzing the sand consumption pattern in the State and at the same time keeping a note of the demand of sand in the State.

Table 28 Use of technology in sand ordering across the States

State	Ordering mechanism	website
Andhra Pradesh	Online (Web/App) (Few districts only)	www.apsand.com
Assam	Offline	NA

Chhattisgarh	Offline	NA
Gujarat	Offline	NA
Haryana	Offline	NA
Karnataka	Offline	NA
Madhya Pradesh	Online	https://ekhanij.mp.gov.in/AppPrevious/Sandmp.aspx
Maharashtra	Offline	NA
Punjab	Offline	NA
Rajasthan	Offline	NA
Tamil Nadu	Online (Web/APP)	www.tnsand.in
Telangana	Online (Web/APP)	www.sand.telangana.gov.in
Uttar Pradesh	Offline	NA
Uttarakhand	Offline	NA

4.3.3 Use of IT in Monitoring

Monitoring is a critical part of the sand mining process and use of technology is utmost important here. However, unfortunately use of technology is limited for monitoring in most of the States.

Most of the States are using technology in generation of online transit passes on payment, which can be checked by the monitoring team in the State. However, this alone cannot serve the purpose because it is not possible to check all the sand carrying vehicles physically. Hence, some of the States have taken a step further and have installed CCTV cameras at both the sand reaches as well on the check posts. The installation of CCTV cameras ensures that all the active reaches are monitored. This installation in the way is useful in tracking the vehicles carrying sand from a reach which has not been notified.

Andhra Pradesh, Karnataka, Gujarat and Telanagana are doing relatively better in the process of monitoring by the use of technology.

In Andhra Pradesh, the State Government has a strict vigilance on sand reaches and transportation:

- Task force is constituted by the collectors with line departments for periodic inspection to comply with EC and mine plan.
- Border check posts established with multi-disciplinary departmental Task Force, to prevent transportation of sand to other States.
- The superintendent of Police/Commissioner of Police ensures that no transportation takes place to other State.

Apart from this, the State has:

- appointed Reach Level Officers in order to monitor sand quarrying and transportation; District Collectors have nominated VROs/Panchayat Secretaries as reach level officers for each sand reach. Wide publicity has been given about names and mobile numbers of reach level officers through newspaper advertisement.
- deployed technical assistants to support the reach level officers and monitor sand activities on real time basis. A total of 139 technical assistants are present in the reaches as on 25th Sep 2017.
- developed sand mobile app with the help of Real Time Governance Group (RTG) for monitoring of the sand activities on real time basis. The State does real time monitoring of sand activities with the help of technical assistants. The technical assistants are provided with tabs to upload details of the sand excavation, loading and transportation vehicle details on real-time basis from the reaches in the sand app developed by RTG.
- Apart from this, a 24 hour call centre (People First Grievance Redressal Center) working in 3 shifts with over 2000 employees, makes call to all the sand purchasers in the State to know about the price for which they purchased the sand and/or any problem faced by them during the purchase of sand. At present, the satisfaction level of sand consumers in the State is over 90%. And the few cases that arise are also not related to prices or availability but related to delay in delivery or other minor issues.

Table 29 Use of technology in monitoring across the States

State	In Monitoring			
	Electronic Monitoring of Extraction/ CCTV	Electronic weighing /measurement of extracted sand	GPS tracking in transit	Registering reach/ stockyard level sand availability data on portal

Andhra Pradesh	Yes	No	In some of the districts	Yes
Assam	No	No	No	No
Chhattisgarh	No	No	No	No
Gujarat	No	Yes	No	No
Haryana	In some of the districts	No	No	No
Karnataka	No	Yes	Yes	No
Madhya Pradesh	No	No	No	No
Maharashtra	In some of the districts	No	In some of the districts	No
Punjab	No	No	No	No
Rajasthan	No	No	No	No
Tamil Nadu	No	No	No	Yes
Telangana	Yes	Yes	No	Yes
Uttar Pradesh	No	No	No	No
Uttarakhand	No	No	No	No

4.3.4 Use of IT in delivering

Monitoring of delivery is crucial in sand mining in terms of ensuring that illegal transportation of sand in the State does not take place and the sand reaches the customer within the prescribed time frame and at affordable rates. The best use of technology to monitor the delivery process is to ensure that only transit passes for transport of sand should be used in the State and the delivery of sand is allowed only through GPS enabled vehicles. In the combined system of use of e-permit as well as GPS enabled vehicle, as per the address mentioned in the e-permit, route map and estimated time for delivery gets loaded in the system for tracking purpose. Logic related to alerts

are embedded in the system for monitoring purpose. In case of any deviation (mentioned below), the alarm gets activated and information is passed to the local police/district committee for quick action.

Only six of the fourteen States namely, Gujarat, Karnataka, Madhya Pradesh, Punjab, Tamil Nadu and Telangana have the provision of online transport permits in their States, and Andhra Pradesh does not issue permit for transportation for sand. The remaining seven States still follow the manual passes for transportation of sand in their States. However, even in most of the States where sand is transported using online permit, the online transit pass alone is not sufficient for full proof monitoring as the transporters get photocopies of the pass and transport sand multiple time on a single pass. The State should ensure that online permits issued for transportation of sand are printed on a secure paper and the permit should have QR code/ bar code along with a hologram.

Karnataka has mandated to install GPS and online permits in all sand carrying vehicles in the State through the amendment of the KMMCR amended in August 2016. Andhra Pradesh is in the process of installing GPS in all sand carrying vehicles and as per the G.O. issued, by February all the vehicles will be GPS enabled. Telangana is planning to install GPS in all the sand carrying vehicles in the State. In these four States, all the sand carrying vehicles are registered with the department. Further, the Telangana Government recently introduced 'Sand Taxi Service' - an online mechanism for booking sand with delivery at the consumer doorstep. Initially, as pilot project, the District Administration started the sand taxi service in Peddapalli, Mahabubnagar, Gadwal districts and the same is being extended to all the (30) districts in the State with due linkage to the sand sources. The concept will be further extended at the State level to have consumer feedback as part of further improving the system.

Table 30 Use of technology in sand delivery across the States

State	In Delivery		
	Permit type	Vehicles registered with department	GPS installed vehicles
Andhra Pradesh	Not Applicable	Yes	Currently installed in some districts (G.O. released for installation in all districts)
Assam	Offline	No	No
Chhattisgarh	Offline	No	No

Gujarat	e-permit	No	No
Haryana	Offline	No	No
Karnataka	e-permit	Yes	Yes
Madhya Pradesh	e-permit	Yes	No
Maharashtra	Offline	No	No
Punjab	Online	No	No
Rajasthan	Offline	No	No
Tamil Nadu	e-permit	Yes	No
Telangana	e-permit	Yes	No
Uttar Pradesh	Offline	No	No
Uttarakhand	Offline	No	No

Apart from the processes discussed above, there are still some areas in terms of identification of reaches, resource estimation and operations where technological interventions can make the process more robust. Below is the table where the use of technology has been mapped in the entire process chain of sand mining in different States.

Table 31 Use of technology across the process chain of sand mining

State	Mapping the use of technology in sand mining			
	Allocation	**Ordering**	**Monitoring**	**Delivery**
Andhra Pradesh	Not applicable	Online (Web/App) (Few districts only)	High	Medium
Assam	Limited use of IT	Offline	Low	Low
Chhattisgarh	Not applicable	Offline	Low	Low

Gujarat	Good use of IT	Offline	Medium	Medium
Haryana	Good use of IT	Offline	Low	Low
Karnataka	Good use of IT	Offline	Medium	Medium
Madhya Pradesh	Good use of IT	Online	Low	Low
Maharashtra	Good use of IT	Offline	Low	Low
Punjab	Good use of IT	Offline (Web)	Low	Medium
Rajasthan	Good use of IT	Offline	Low	Low
Tamil Nadu	Limited use of IT	Online (Web/APP)	Medium	Medium
Telangana	Limited use of IT	Online (Web/APP)	High	Medium
Uttar Pradesh	Good use of IT	Offline	Low	Low
Uttarakhand	Good use of IT	Offline	Low	Low

It can be seen from the above chart that the process in which the use of technology is most common is allocation of sand reaches. Further, Andhra Pradesh, Telangana and Tamil Nadu are making good use of IT in ordering, monitoring and transportation of sand in their States. Andhra Pradesh, Tamil Nadu and Telangana have developed web portals for ordering of sand in their States. All the sand carrying vehicles are registered with the State mining department. However, overall, Andhra Pradesh and Telangana have used IT relatively more intensely as compared to other States.

4.4 District Survey Report

Most of the States are lacking in terms of preparation of the District Survey Report which has been mandated by the MoEFCC through its 2016 notification. District Survey Report is a document that needs to provide the estimates of total sand available in a district based on the annual deposition rate.

If DSR is properly prepared, it could give the total sand resources available in a district. Further, with the help of a scientific replenishment study the data on the amount of sand resource that can

be extracted in the district without harming the balance of sand deposition in rivers can be derived. Further, if the DSRs of all the districts clubbed together can give us total resource estimation of sand in a State. And based on the resource and the estimated demand of sand, the State Governments can take a call on the number of sand bearing areas to be allotted for sand mining to meet the demand in the State.

Assam, Andhra Pradesh and Telangana have not prepared DSRs at all, however Andhra Pradesh and Telangana have evolved a system for identification and assessment of sand resources as per the existing WALT Act 2002 and WALT Rules, 2004. Chhattisgarh, Maharashtra and Tamil Nadu prepare the DSR but do not conduct resource assessment in the DSR. However, some of the States such Gujarat, Karnataka, Madhya Pradesh, Rajasthan and Uttarakhand prepare the DSR and conduct resource estimation as well. But none of the States has anything related to replenishment study in their DSRs. Below is the table, depicting the DSR status in the States.

Table 32 Status of District Survey Reports

State	Total No. of Districts	No of Sand Related Districts	DSR Status	Resource Estimation in DSR	Replenishment Study in DSR
Andhra Pradesh	13	12	0/13	No DSR	NA
Assam	33	33	0/33	No DSR	Not Applicable
Chhattisgarh	27	27	27/27	NO	No
Gujarat	33	32	32/33	Yes	No
Haryana	23	16	16/23	NA	NA
Karnataka	30	10	30/30	Yes	No
Madhya Pradesh	51	51	51/51	Yes	No
Maharashtra	36	34	36/36	NO	No
Punjab	22	16	22/22	Yes	No
Rajasthan	33	28	23/33	Yes	No

Tamil Nadu	32	30	30/32	NO	NA
Telangana	31	27	0/31	No DSR	NA
Uttar Pradesh	75	68	68/75	NA	NA
Uttarakhand**	13	13	13/13	Yes	No

**No DSR means DSR is not prepared by the State*

***Uttarakhand's Forest Development corporation (UAFDC) has done replenishment study for some mines through Forest Research Institute (FRI), Dehradun.*

Replenishment study should done across the States in all districts as per the method prescribed in the *Sustainable Sand Mining Guidelines 2016* of MoEFCC**. Some of the points that should be taken care of while conducting replenishment study are:**

- *The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction.*
- *The sediment sampling should include the bed material and bed material load before, during and after extraction period.*
- *Development of sediment rating curve at the upstream end of the potential reach using the surveyed cross- section.*
- *Using the historical or gauged flow rating curve, determination of suitable period of high flow that can replenish the extracted volume.*
- *Calculation of the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.*

The Apex Court has mandated the replenishment study to be conducted by all the States, however the States which are sand deficit should put more thrust on it as chances of environmental damage are more in those States.

One of the reasons for absence of replenishment study from the District Survey Reports in all the States is the lack of manpower to conduct the study.

4.5 Illegal Mining

India's sand mining issues tend to revolve around efforts to curb illegal mining. A number of steps have been taken by different State Governments to control illegal mining in sand.

Illegal mining in sand is basically of two types:

- Illegal extraction from the un-notified areas

- Illegal extraction over the permissible limits

Majority of the registered cases of illegal mining are related to illegal transportation where the transportation of sand is without a valid transport permit. Another way of illegal mining is through illegal transportation of sand from one State to other in cases where the inter-state transportation of sand is banned.

Table 33 Status of inter-state transport by State Governments

State	Inter-State transport permissibility (from State to outside)	Inter-State transport permissibility (from Outside to State)
Andhra Pradesh	No	Yes
Assam	Yes	Yes
Chhattisgarh	Yes	Yes
Gujarat	No	No
Haryana	Yes	Yes
Karnataka	No	Yes
Madhya Pradesh	Yes	Yes
Maharashtra	Yes	Yes
Punjab	Yes	Yes
Rajasthan	Yes	Yes
Tamil Nadu	No	Yes
Telangana	No	Yes
Uttar Pradesh	Yes	Yes
Uttarakhand	No*	Yes

**Uttarakhand allows transportation after processing of RBM material*

The key reason for not allowing transport of sand from one State to other is to avoid shortages of supply in the home State and thereby avoid spiraling prices of sand. However, the State

Governments may view the situation of sand scarcity in totality across the country and consider inter-state movement of sand.

The concern of States regarding sand demand of host State not being met can be taken care of by mandating the sale of sand through online portal only. Once the sale of sand is through online portal only, anyone who has to purchase sand will pay the exact same amount to the lessee on the portal, either the consumer being a resident of host State or neighboring State. Also the States should ensure that lessee does not have any incentive to supply sand to consumers in other States over consumers in host State.

4.6 Production and Revenue comparison

The production and revenue data as provided by the States has been shown in the following chart.

Table 34 Production and Revenue from Sale of Sand

State	Production from river sand (in MMT*)			Revenue (Rs Crore)		
	2014-15	**2015-16**	**2016-17**	**2014-15**	**2015-16**	**2016-17**
Andhra Pradesh	NA	NA	NA	NA	NA	NA
Assam	NA	NA	5.6	NA	NA	32.5
Chhattisgarh	11.7	8.3	10.0	12.34	8.8	10.6
Gujarat**	NA	59.71	49.64	NA	98.4	160.3
Haryana***	NA	4.8	19.2	NA	104.5	266
Karnataka	5.5	6.6	4	32.5	39.4	25.2
Madhya Pradesh	26.36	23.73	49.14	238.6	211.5	240
Maharashtra	NA	NA	NA	NA	NA	NA
Punjab	NA	NA	NA	86.5	46.5	43.0
Rajasthan	62.8	48.4	56.8	206.3	231.7	236
Tamil Nadu	8.5	6.14	15.1	125.2	91.03	86.33

Telangana	NA	NA	13.23	10	375	434
Uttar Pradesh	40	22.8	5.9	165.7	115.2	47.7
Uttarakhand****	NA	NA	NA	173.5	272.5	335.3

**For conversion of production from volume to weight, bulk density of 1.89 has been used.*

***Only royalty data captured for Gujarat. Also production data is for calendar year.*

****Production and revenue of sand and BGS*

***** Revenue and production data includes river bed material (RBM)*

#NA: Data not available.

States need to follow practices similar to major minerals for data capturing related to revenue and production at each reach level for better planning and demand-supply analysis of the State. This will also enable better monitoring by the States in case of illegal mining and transportation.

4.7 Reservations offered in States

Reservations in sand mining are a way to help some of the communities to earn their livelihoods. Most of the States offer some form of reservation in their States. While some of States such as Chhattisgarh notify sand blocks to be operated only by the Panchayat, others such as Karnataka, Gujarat and Rajasthan offer reservation in allocation of sand blocks in scheduled areas to SC/ST/ Specific communities. Some States such as Assam, Chhattisgarh, Haryana and Punjab offer reservations in terms of waiving the royalty on sand extraction to hereditary artisans manufacturing artefacts in traditional way, and some States such as Telangana waive off the royalty on sand extracted from III or below order streams if consumed within the district. Below is a table, depicting the reservation offered in sand mining in different States.

Table 35 Reservations in Sand Mining in different States

State	Reservations available	Details
Andhra Pradesh	Yes	District Collector can allot a sand reach for any project if it is time-bound and prestigious and for the State
Assam	No	Some relaxations in terms of : No royalty applicable for hereditary artisans for manufacturing of earthen pots/ artifacts in traditional way.
Chhattisgarh	No	Some relaxations in terms of :

		No royalty applicable for: • Hereditary Kumhars working in traditional way. • Farmers, village artisans and labours living in the village where the sand mine • Sand used by Gram panchayat, Janpad Panchayat, Jila Panchayat or Nagariya Nikay
Gujarat	Yes	Quarry Parwana - Allocated to Khaniyas/Oad community Quarry Lease - Government may identify sand blocks in schedule areas to be allotted to ST only.
Haryana	No	Some relaxations in terms of : No royalty applicable for: • extraction by hereditary potter, for use in manufacturing of earthen pots/ artefacts on a cottage industry basis, and whose turnover < Rs 1 LPA • mining, transportation or storage by hereditary Kumhars for making tiles, pots or bricks by traditional means • levelling of any agricultural fields by a landowner within his own land
Karnataka	Yes	District Committee may reserve sand blocks for low income housing and/ or for Government works or for sand extraction by Government agencies or Boards or Corporations owned by the Central Government or State Government. District Committee reserves the sand blocks identified for grant through tender cum auction, by way of lottery to the following categories as per percentage mentioned against each category: • SC/ST – 24% • PH – 2% • Others – 74%
Madhya Pradesh	No	Not Applicable

Maharashtra	Yes	Creek mining by hatpati and dubi means to be done only by societies involved in the business traditionally
Punjab	No	Some relaxations in terms of : No royalty applicable for: • extraction by hereditary 'Ghumiars', who prepare earthen pots on a cottage industry basis, whose turnover < Rs 2 lakhs per annum
Rajasthan	Yes	Land owners are given preference who have their own land during auction by rights of first refusal in the auction. In notified scheduled areas, priority is given to the registered society of domicile schedule tribe in allocation of sand blocks
Tamil Nadu	No	Not Applicable
Telangana	No	Some relaxations in terms of : No royalty applicable on sand extracted from I, II and III order streams if consumed within the district. If I, II and III order streams are not available, the Government may demarcate 5 or above Ha area from IV and above order streams. Sand used in the weaker section housing programme exempted from payment of seigniorage fee and sale price for IV to VI and above orders and sand extracted from de-siltation by the construction authorities; and cost of loading and transportation shall be borne by the concerned construction authorities.
Uttar Pradesh	No	Not Applicable
Uttarakhand	No	Not Applicable

In lower order streams where commercial mining is not possible, royalty on extraction has been waived off if the extracted sand is consumed within the district by local village communities/traditional communities, etc. The process of sand extraction and transportation should be by tractor or bullock carts. Further, proper monitoring mechanism should be put in place to ensure that sale of sand through carts does not occur.

The States may reserve certain sand blocks for reserved categories, local or traditional communities and the allocation of sand blocks to these categories may be without auction by following a simplified process. The States shall be free to decide the percentage of sand blocks to be reserved based on the local conditions prevalent in the State.

4.8 Type of Mining (Manual/ Mechanized) across the States

The practices followed for type of mining i.e. manual or mechanized is shown below in the table.

Table 36 Types of Mining (Manual/ Mechanized)

State	Type of Mining (Manual/ Mechanized)
AP	As per Mining Plan/ Environment Clearance
Assam	As per Mining Plan/ Environment Clearance
CG	As per Mining Plan/ Environmental Clearance
GJ	As per Mining Plan/ Environmental Clearance
HR	As per Mining Plan/ Environmental Clearance
KTK	As per Mining Plan/ Environment Clearance
MP	As per Mining Plan/ Environmental Clearance
MH	As per Environmental Clearance
PB	As per Mining Plan/ Environmental Clearance
RJ	As per Mining Plan/ Environmental Clearance
TN	As per Mining Plan/ Environmental Clearance
Telan.	As per Mining Plan/ Environmental Clearance
UP	Mechanized mining allowed with the permission of District Magistrate
UK	Manual Mining

In most of the States, use of machinery/ mechanical excavators in sand mining is permitted based on the approved mining and environmental plans. However, for further clarity on manual v/s

mechanical mining, a clarification seeking the permission to semi-mechanised mining has been sent to MoEFCC.

4.9 Best practices across the process chain

4.9.1 Best practices in the notified or controlled pricing model

4.9.1.1 Demand Supply assessment

Of the 14 States surveyed for this study, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Tamil Nadu and Telangana follow controlled pricing model. Further, only Telangana and Tamil Nadu have undertaken demand estimation. The estimation by Telangana is within the range of estimation done using RBI data based method.

4.9.1.2 Alternates to natural sand

Out of the five States following notified pricing model, Andhra Pradesh and Telangana have separate M-sand policy. Tamil Nadu is in the process of drafting the M-sand policy.

4.9.1.3 Rules & Regulations

Andhra Pradesh and Telangana have well defined rules and regulations for sand mining and alternative materials such as M-sand. These States have separate policies for sand, distinct from other minor minerals. Further, the mining departments/ State agencies in these States handle the regulations and overall administration of sand mining operations. Lastly, these States have been regularly updating their policies for sand and other minor minerals taking into account the developments in the sector.

4.9.1.4 Identification

In States like Andhra Pradesh and Telangana identification process is detailed and joint inspection report is prepared and followed for identification of the concessions.

4.9.1.5 Clearances and approvals

Prior clearances and approvals before auctioning or allocating the blocks helps minimize risks for the bidders and reduces the lead time for development. In States such as Andhra Pradesh and Telangana, the mining department/ Corporation procures the environment clearance and mining plan approvals. Only well administered States may follow the model of obtaining clearances/approvals themselves.

4.9.1.6 Business model

If the objective is to keep prices affordable and accordingly regulated, then notified or controlled pricing model can be adopted as is the case with Telangana and Andhra Pradesh. States however miss out on revenue generation even where consumers have the capacity to pay.

4.9.1.7 Operations & Monitoring

Telangana is doing better in terms of control over sand mining operations, as TSMDC appoints raising contractors through competitive bidding to extract sand on its behalf, and it can mandate stricter compliance with environmental norms as part of its contracting.

The monitoring mechanism should not only be limited to physical checking by identified personnel but should include the use of technology in checking the transport permit, keeping the record of sand consumers for verification and monitoring the excavation sites. In view of this, Andhra Pradesh follows a 360° monitoring starting from the reach level to delivery of sand to the end consumers.

4.9.1.8 Transportation

In Andhra Pradesh, all sand carrying vehicles are registered with the State mining department and are GPS enabled. Further, all the vehicles carrying sand have a valid transport permit generated online along with a scan code or a hologram mark to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team has a scanning device to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., are displayed on the scanning device. The transit pass generated at the reach/stockyard also contains the route of delivery from the origin to the destination, and the same can be cross checked with the GPS device at the check points if there is any deviation in the route designated and the actual route followed. Further, through the GPS device, any unauthorized entry of a transportation vehicle near the reach/ stockyard can also be checked.

4.9.1.9 Sale of sand

Andhra Pradesh has constituted a five member district committee in all the districts which includes the Superintendent of Police, District Transport Commissioner, Executive Engineer of Irrigation department and ADMG under the chairmanship of District Collector. The committee notifies the price of sand for the district including transportation, loading/unloading and ramp maintenance fee. There is a 24 hours operational call centre, which gives a call to all the consumers to enquire whether the amount that is charged for sand is within the Government's notified limit. Consequently, the landed price of sand in the entire State has been under control.

Apart from Andhra Pradesh, Telangana is also relatively well placed in terms of sale of sand in the State, where only TSMDC can sell the sand. Further, the sale can only be through the online

portal developed by the mining corporation. Anyone who wishes to purchase sand in the State has to register on the online portal and subsequently login to place its order. After logging in, the portal displays the entire list of reaches/ stockyards along with the sand available in those reaches/ stockyards and the corresponding quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on location, quality and price and book based on the most suitable lease/ stockyard.

4.9.1.10 Consumer satisfaction and quality

Getting quality sand at reasonable prices is a major concern for consumers. Out of the States following nomination model, the consumer satisfaction is measured only in Andhra Pradesh by calling consumers through the call center for the delivery of sand at notified prices. However, regarding the quality aspect the consumers are not aware and infrastructure for testing facilities are not adequate.

4.9.2 Best practices in the market model

4.9.2.1 Demand Supply assessment

States following market model are Assam, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand. Out of these States Gujarat, Haryana, Karnataka, Punjab, Rajasthan and Uttar Pradesh have done demand estimation. The estimation of the Gujarat and Punjab is within range of estimation done using the RBI data based method.

4.9.2.2 Alternates to natural sand

Out of the nine States following market model Gujarat and Karnataka have M-sand units established. Karnataka has separate M-sand policy chapter in their minor mineral concession rules.

4.9.2.3 Rules & Regulations

Karnataka has well defined rules and regulations for sand mining and alternative materials such as M-sand. The State has separate policy for sand distinct from other minor minerals. Further, the mining department in the State handles the regulations and overall administration of sand mining operations. Lastly, the State has been regularly updating its policy for sand and other minor minerals taking into account the developments in the sector.

4.9.2.4 Identification

Gujarat prepares a detailed geological report through a technically qualified person for each identified sand block and puts the sand blocks for auctions based on the quantity of resource established by the report. Apart from establishing the resource quantity, the report contains details

of the area, DGPS Survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status, geological mapping, laboratory studies of the samples etc.

4.9.2.5 Clearances and approvals

The clearances and approvals need to be processed at a faster pace and in order to achieve that objective the applications for getting the clearances/ approvals should be made online.

4.9.2.6 Business model

If the objective of the State Government is revenue maximization, then simple forward tender cum auction model as is being followed in Gujarat can be adopted where the sand bearing areas are notified for auction after preparation of detailed geological report containing the estimated quantity of sand reserves in the block. Haryana received maximum revenues amongst the States following market model.

4.9.2.7 Operations & Monitoring

Operations in the market model is in the control of lessee/ contractors and the State Government has minimum control over it. Further the States following the market model are in the process of developing monitoring mechanism which is IT based. Few States have started issuing e-pass for transportation of sand and others are still under developing this system. Gujarat has developed applications for checking and has grievance cell for consumers from monitoring aspect.

4.9.2.8 Transportation

Transportation of sand in the market model is controlled by contractors and department/State Government has no control over it. The transport of sand may be integrated with the online sale mechanism.

4.9.2.9 Sale of sand

Sale of sand in the States following market model is direct by lessee/contractors and by offline means only. State Government has no control over the sale of sand or the prices of sand. The States should endeavor for the online sale of sand for doorstep delivery service.

4.9.2.10 Consumer satisfaction

Getting quality sand at reasonable prices is major concern for consumers. In the market model, market dynamics decide the sale prices of sand. In Haryana and Gujarat, prices are comparatively lower due to more supply.

5. Framework

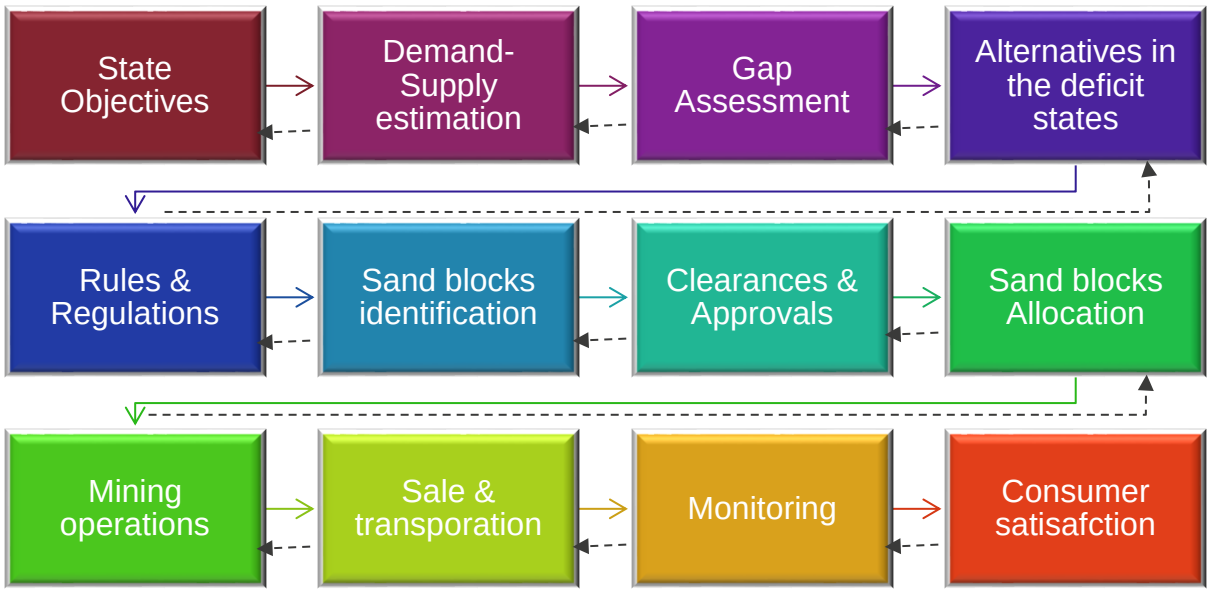
This chapter presents the suggestions for the States on the analysis and best practices identified in the preceding chapters.

The suggestions are divided into four major heads:

1. Defining the objectives of the State
2. Demand supply estimation and assessment of gap
3. Formulation of Alternative options in sand deficit States
4. Process chain wise suggestions

The suggestions are structured as follows:

Figure 5- 1 Key elements in the process chain of sand mining



5.1 State objective

The policies of the State, rules and regulations thereof, shall be dependent upon the objectives, demand-supply assessment and alternatives available for natural sand. Objectives of the States drive the policy formulation for sand mining. States should define their own objectives for the policy related to sand mining depending upon the various factors such as demand supply situation in the State, resources available with the State in terms of manpower and related infrastructure, revenue targets of the State, etc.

While some of the States aim to maximize revenues from sand resources e.g.: Haryana, Gujarat, Karnataka, Punjab, Uttar Pradesh, Uttarakhand, Assam, Maharashtra, Rajasthan; others aim to

keep the sand prices controlled for the public and they are ready to forego the potential revenues from sand e.g.: Andhra Pradesh, Madhya Pradesh, Chhattisgarh and Tamil Nadu. There are a few States that are earning reasonable amount of revenues from sand and at the same time keeping the pricing controlled for the public e.g.: Telangana.

5.1.1 Demand – Supply estimation

5.1.1.1 Demand Assessment

Different States follow different methodologies for sand demand estimation. From the 14 States surveyed for this study only few States such as Haryana, Gujarat, Karnataka, Punjab, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh have carried out demand assessment. However, even where States estimate demand, the methodology adopted does not appear to be robust and estimates vary except in case of four States. Also there are huge variations in estimations undertaken by majority of these States, as compared to estimation using scientific methods.

5.1.1.2 Demand estimation methodologies

Scientific demand-supply assessment and the resultant gap can help the State Government to frame policy for allocation of sand reaches and to adopt business models along with framing policy for alternatives of sand. Further, the following two methods are suggested for estimation of sand demand:

5.1.1.3 RBI Index based methodology

The State-wise demand of sand in India for FY17 has been estimated based on the following factors:

- India's construction GVA [RBI's Handbook of Statistics on Indian Economy]
- India's State-wise construction GVA [RBI's Handbook of Statistics on Indian Economy]
- Conversion factor- Normative cement to sand mixture ratio of 1:2.5

In this method, based on the data released by RBI *(Handbook of Statistics on Indian Economy)*, ratio of construction GVA of State with construction GVA of India is calculated. Further, that number is multiplied by the cement sales in India. Once cement consumption of the State is known, the same is multiplied by the factor of 2.5 to derive the sand consumption. Further, normalization has been done based on the population of the States.

Accordingly, the following process can be used for estimating the demand of sand in the State:

1. India's construction GVA from RBI's *Handbook of Statistics on Indian Economy.*
2. States construction GVA from RBI's *Handbook of Statistics on Indian Economy*
3. Calculate ratio of 1 and 2 above
4. Actual consumption of cement in India is 292 million tonnes in FY17.
5. Cement consumption of the State considering the ratio arrived in step# 3 above

6. Using the normative cement to sand mixture ratio of 1:2.5, the total sand consumption in the State can be computed.
7. Normalization factor has been considered based on population of the State.

Conversion factor

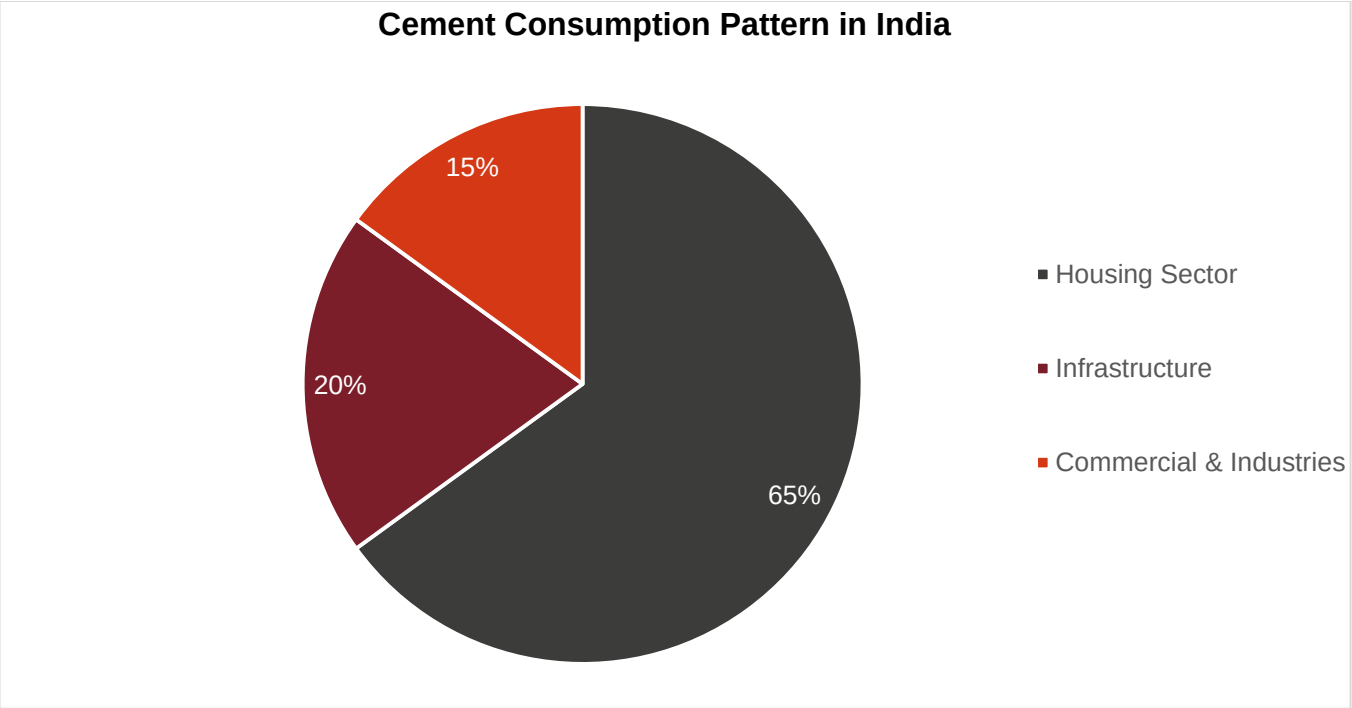
A rough estimate shows that sand consumption factor is around 2.5 for each unit of cement consumed, i.e. if cement consumption in the district is 1 Million Tonnes, then the sand consumption shall be around 2.5 million tonnes.

To arrive at the conversion factor for sand consumption from cement data, we need to have the following two data:

i. The list of sectors in which cement is used and the proportion of cement used in those sectors
ii. The ratio in which cement is mixed with sand in different sectors

Housing sector is a major consumer of sand in India followed by infrastructure and commercial sector. Majority of the consumers of sand are retail consumers and medium enterprises. The sectoral mix for cement consumption in Indian is shown in the following graph:

Figure 5- 2 Sectoral Mix of cement consumption in India



In housing sector, the proportion of cement used out of the total cement consumed across the country is 65%, and in infrastructure and commercial & industries, sectors, it is 20% and 15%, respectively.

The following assumptions have been considered for cement to sand ratio in each sector:

Sector	Ratio of Cement: Sand being used
Housing Sector	1:2
Infrastructure Sector	1:4
Commercial and Industries	1:8
Weighted Average	1: 2.5

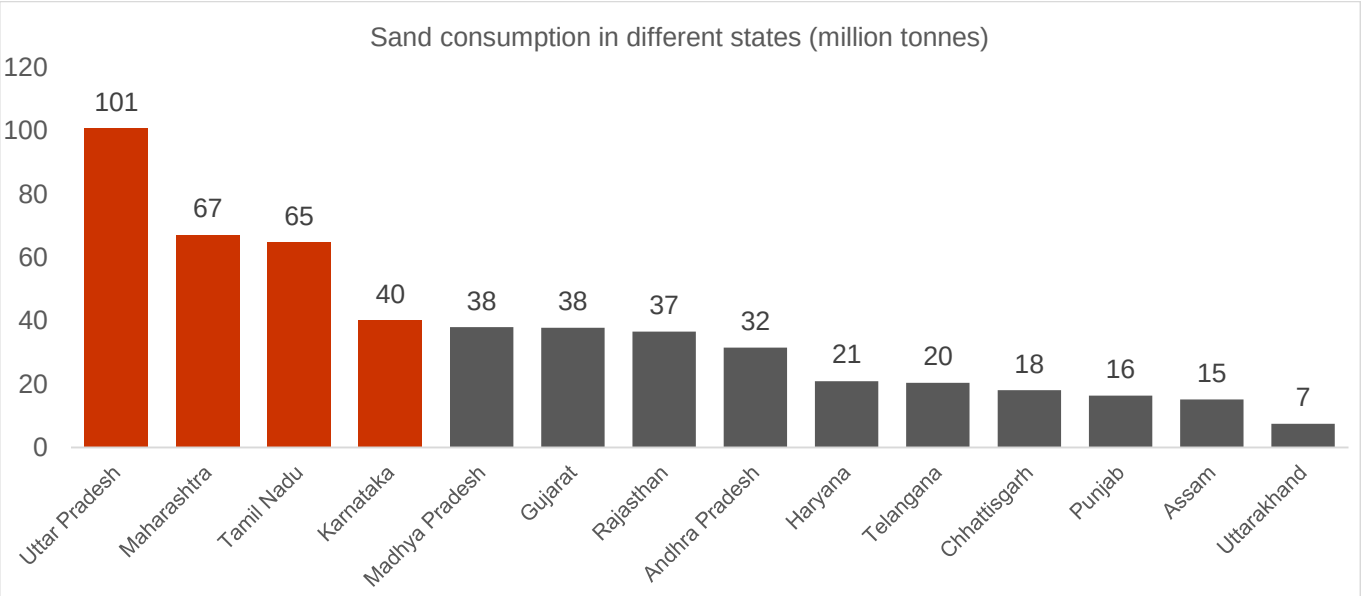
The ratio of sand and cement is different in different sectors depending on strength of concrete required to meet the standards. In housing sector, the average ratio in which cement and sand are mixed is 1:2, in infrastructure sector it is 1:4 and it is 1:8 in commercial & industries sector. Using the two data points provided above and taking the weighted average of the two, the overall cement to sand mixture can be arrived at and it comes out to be 1:2.5.

Normalization Factor

Normalization factor has been considered as per population of the State i.e. per capita Cement consumption has been calculated based on the percentage of population of the State as compared to the total population of the country. Sand consumption has been calculated based on per capita cement consumption multiplied by 2.5. The sand consumption derived, has been apportioned a weightage of 50% and the remaining 50% weightage has been apportioned to sand consumption derived using GVA based methodology. Eg: State A has population proportion of 4% and per capita cement consumption of the State is 4%X292 million tonnes = 12.2 million tonnes. Hence sand consumption of State A is 30 million tonnes (12.2 X 2.5). Also, sand consumption using GVA methodology as explained above is 33 million tonnes. Hence net sand consumption calculated using weightage of 50% for both shall be 30x50%+33X50% = 31.5 million tonnes.

Based on the RBI methodology explained above, sand demand of each State has been calculated.

Figure 5- 3 Estimation of State-wise sand consumption in FY17



Source: RBI, Analysis

Rest of the States viz. J&K, Himachal Pradesh, Arunachal Pradesh, Goa, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Andaman & Nicobar, Chandigarh have demand of less than 8 million tonnes. Data for West Bengal and Tripura is not available. Further to refine the estimate, another methodology can be adopted, as described below, which can be used for calculating district wise demand as well.

5.1.1.4 Cement consumption based methodology

In this method, the demand of sand in a State or district is based on cement consumption in that State/ district multiplied by a conversion factor in terms of assuming a normative cement to sand consumption ratio. Following inputs are required for estimation.

Inputs:

1. Cement consumption in the State/ district
2. Conversion factor - cement to sand consumption ratio

Cement consumption in the State can be obtained from cement sales considering any of the following sources:

1. Sales data from sales tax officials/ GST officials (State Revenue department/ Tax Department)
2. Cement companies for the sales data of the districts and the State
3. Sales data from cement dealers present in the State

Conversion factor has been considered, as 2.5, as explained in detail in the previous methodology using RBI data. Based on this, a district-wise demand of sand can be derived.

E.g.: Cement consumed in a State is 10 million tonnes, which is based on cement sales by the companies, and hence the sand consumption shall be 25 million tonnes multiplying cement by the conversion factor of 2.5.

5.1.1.5 Supply Assessment

Data related to supply of sand is being maintained by all the States surveyed as part of this study. Some of the States consolidate the data captured by the district officers based on returns filed by the lessees, while some States use IT tools to capture the supply data. Other States calculate the supply data based on the royalty collected. Also few States estimate the resources available in the district/ State based on District Survey Reports (DSRs) prepared.

5.1.1.6 Supply estimation methodology

Estimation of accurate supply in the State is necessary for better planning by the State. States need to develop process flow for data collection from different sources of sand supply using IT tools e.g. every sand lessee in the State shall upload online return every month in the portal which needs to be developed by the State Government. This will enable States to analyse the production trend in the State, lease wise, month wise, district wise, etc. Further, for estimation of resources available in the State and production potential for each year, DSR data of districts need to be consolidated.

5.2 Gap Assessment

Based on analysis of demand supply situation in the State, a gap assessment should be done and accordingly policy and rules/regulations need to be framed. Based on the gap assessment, a State can be classified as follows:

a. Sand surplus State
b. Sand sufficient State
c. Sand deficit State

It is crucial for the State to conduct gap assessment since sand sufficient States shall soon turn into deficit states as the natural availability of sand shall not increase. Therefore, these States need to plan activities for future years to enable sufficient supply either through natural sand or alternatives and should frame policies accordingly.

5.3 Alternate Options

After estimation of gap derived from demand supply assessment, States need to analyse the alternate options for sand, available with them. Considering the large deficits in demand and supply of sand, alternate options need to be promoted. Even globally, major consumers of sand have moved towards alternatives of river sand to meet the requirement in construction activities. In China, crushed stone and offshore marine sand deposits present the most viable substitutes for fine aggregate.

Environment impacts of river sand

Some of the environmental effects of excessive sand mining without regard for the natural resource are:

- Change of morphology of the river destroys the riparian vegetative cover. Riparian habitat helps in controlling erosion, providing nutrient inputs into the stream and prevents intrusion of pollutants in the stream through runoff.
- Bed degradation due to sand mining is also responsible for channel shifting, causing loss of properties and degradation of landscape.
- Undermining of bridge supports, pipe lines or other structures.
- The in-stream habitat is highly affected by the increase in river gradient, suspended load, sediment transport and sediment deposition.
- Excessive sediment deposition increases turbidity which lowers light required for photosynthesis and reduces food availability of aquatic fauna.
- Change in morphology of the river bed which is an important part of aquatic habitat.
- Excessive mining can deplete the gravelly bed material thereby causing harm to the aquatic habitat.
- Ground Water table could be lowered.
- Depletion of ground water for the purpose of irrigation and drinking.
- Increase in channel bank scouring and erosion.
- Bank collapse and erosion due to rapid bed degradation.
- Pollution of ground water by reducing the thickness of the filter material.
- Increased concentration of suspended sediment in the river which in turn causes siltation of water resources projects.
- Increase in health hazards such as degradation of air quality and dust fog.
- The biodiversity and pest risks also increases due to excessive mining.
- Excessive in-stream sand mining results in destruction of aquatic and riparian habitat through changes in channel morphology.

Consequently, to conserve the natural eco-system, use of alternates of river sand such as M-sand and sand produced from coal overburden should be encouraged. Further, there are multiple benefits of promotion of alternates of river sand such as:

- Uninterrupted supply of sand can be ensured throughout the year without any seasonal effect
- Employment can be generated through the processing plant
- Revenue can be generated from an otherwise waste product (over burden)
- Over exploitation of river sand can be minimized
- Price of river sand/ ordinary sand can be kept under check

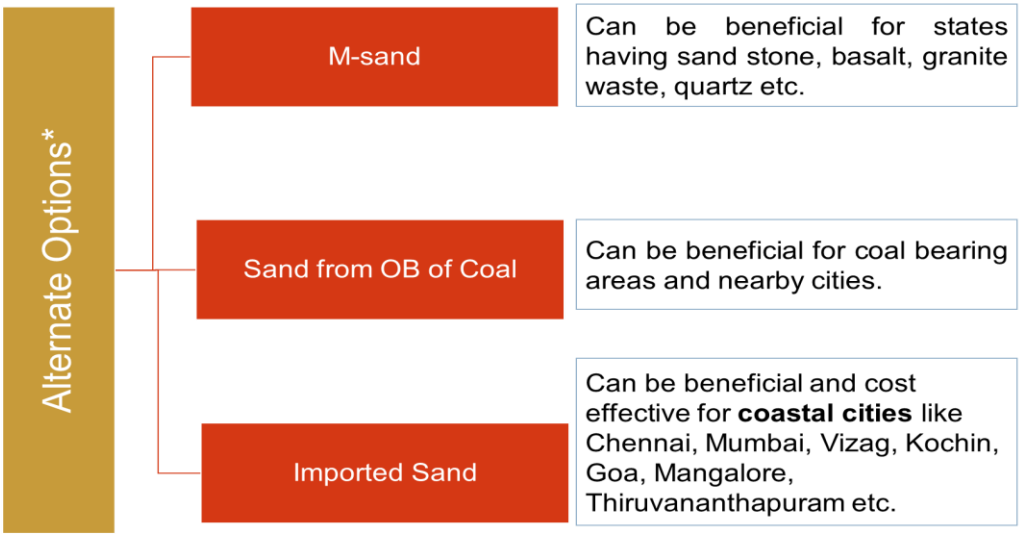
After estimation of gap derived from demand-supply assessment, States need to analyse the alternatives options of natural sand available with them. Considering large demand-supply deficit, alternate options need to be promoted for below reasons:

- ✓ Alternate supply option will reduce pressure on river sand
- ✓ Supply of alternatives may reduce prices of river sand
- ✓ Alternate options can cater to the needs of monsoon season/ peak season

Each of the alternatives of river sand are discussed subsequently.

- ➢ M-sand
- ➢ Sand from Overburden of coal mines
- ➢ Import of sand

Figure 5- 4 Alternate options for river sand

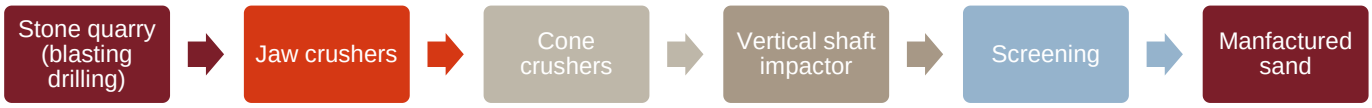


** Another option can be construction & demolished (C&D) waste.*

5.3.1 M-Sand

M-sand is the most common alternate of river sand which has already gained prominence in some of the southern States. It is produced by crushing of rocks, quarry stones to a stipulated size of 150 microns. To arrive at the required grain size, existing coarser hard rock deposits are crushed in a series of crushers and the crushed material is segregated in different fractions as suited to various construction activities. The sand obtained through this process is further refined by removing fine particles and impurities through sieving and washing. In the final stage, the sand is tested for various quality aspects, which is considered better for construction. As per IS-383, the chemical characteristics are similar to the river sand with similar strength and same type of applications. **M-sand concrete has a marginally higher bond strength, and mortar made of M-sand shows higher compressive strength and modulus for masonry, over those of river sand. M-sand is economically feasible, cheaper and is superior as compared to river sand in many of the urban centers in India e.g. Bangalore.**

Figure 5- 5 Process flow for an M-sand manufacturing unit



NCCB conducted Rapid Chloride permeability test to test the durability of M-sand mixes, Water permeability test to test the dense structure of concrete, and Drying Shrinkage test to check the shrinkage in M-sand, and all the tests indicate that the parameters of concrete mix with M-sand are satisfactory, and it can be accepted as a better ingredient as fine aggregate in place of natural sand.

Further, technical analysis conducted by the Department of Civil Engineering, Indian Institute of Science, Bangalore, shows that the properties of M-sand are suitable for application in mixtures such as mortar and concrete, and performs better than riverbed sand.

It has been observed that the use of M-sand has increased significantly especially in the cities. Since it can be crushed from hard granite rocks, it can be readily available at the nearby place, reducing the cost of transportation from far-off river sand bed. Another significant advantage that M-sand provides is that it can be dust free as the sizes/grades of M-sand can be controlled easily as per the requirement of the type of construction.

Although the use of M-sand has increased over the years, it is being used only in some States as:

- River sand is easily available in those States; and

- M-sand has not gained the acceptance among the citizens.

However, there is a significant potential of usage of M-sand in the future. The details of M-sand policy in the State, number of M-sand manufacturing units and the production of M-sand in the State is mentioned in the table below.

Table 37 State-wise details for M-Sand

State	M-Sand Policy available in State	No. of M-sand manufacturing units	Production of M-sand (MMT)
Andhra Pradesh	Yes	6	<1
Assam	No	--	--
Chhattisgarh	No	--	--
Gujarat	No	2	<1
Haryana	No	--	--
Karnataka	Yes	164	20
Madhya Pradesh	No	--	--
Maharashtra	No	--	--
Punjab	No	--	--
Rajasthan	No	--	--
Tamil Nadu	Under development	--	3.24
Telangana	Yes	44	7.2
Uttar Pradesh	No	--	--
Uttarakhand	No	--	--

The detailed analysis of M-sand as an alternative to river sand along with the benefits extended to M-sand manufacturers in different States are annexed in Annexure VII onwards.

It is observed that Karnataka, Telangana and Tamil Nadu are the only States which are producing considerable amount of M-sand in India. The main reason for acceptance of M-sand in Karnataka is due to extremely high price of river sand in Bangalore. The price of river sand in Bangalore is around Rs 70,000 to Rs 1,00,000 for a 30 tonne lorry. It was therefore important to promote M-sand by giving incentives to M-sand manufacturing units and also create awareness among the

consumers about the benefit of M-sand. Karnataka has also done relatively well in creating awareness among the consumers regarding the benefits of M-sand. The State has prepared jingles for the same and has advertised the benefits of M-sand to the citizens of the State through print and digital media. The guidelines and incentives for M-sand production in the State of Karnataka as mentioned in the Karnataka Minor Mineral Concession Rules, has been annexed in Annexure IX.

Some other States are also trying to promote M-sand manufacturing like Andhra Pradesh, Tamil Nadu and Gujarat. Andhra Pradesh has released a GO highlighting the incentives that will be offered for establishment of M-Sand Units in the State, subject to the sale within the State and the incentives shall be apportioned in the ratio of M-sand produced to the total unit production. All M-sand units will be accorded industry status. The list of incentives offered in the State are enclosed as Annexure X.

Telangana has taken up the promotion of M-sand and is working towards the same. The State has accorded industry status to M-sand manufacturing units as long as the unit manufactures 100% sand. The incentives for promotion of M-sand in the State are enclosed as Annexure XI and Annexure XII.

There is a need to promote M-sand units on pan-India basis and create awareness for M-sand usage given the overall environmental and illegal mining concerns associated with river sand mining. Any further reduction in cost and prices of M-sand will make it a more attractive alternative. Accordingly, there is a need to ensure that M-sand units are less capital intensive to further reduce the production cost, create awareness towards usages of M-sand and to attract investments in the sector. The grant of “Industry” status to M-sand units has the following benefits:

- M-sand units can avail facilities and benefits at par with other industries
- M-sand units can avail commercial sources of finance for longer terms
- M-sand/alternates units can be recognized as priority sector, especially by RBI, banks and other financial institutions
- M-sand can be cheaper for end consumers assuming lower rates of interest by the lenders/ bankers
- Industry status will open the sector for FDI, which can expand production and can also enable latest technology adoption
- Industry status can enable faster and easier approvals process
- Industry status will overall reinforce the awareness of M-sand as an alternate option
- Government projects/ CPWD/ State PWDs should be mandated to use M-sand with specific percentage e.g.: 25% in starting years and gradually increasing to 50% of total consumption.
- Soft loans should be granted to M-sand production units, where M-sand producers need to pay only a certain portion of the interest on loan availed, the remaining will be borne by the State Government.

- Royalty should not be charged for the stone but for the sand (It would be beneficial in States where royalty for sand is very low)
- Power subsidy should be provided to M-sand producing units.
- Public awareness campaigns with the assistance of industry bodies like CMA (as they have greater reach up to ground level user) should be designed to inform citizens about the benefits of M-sand to increase its penetration and acceptability.

At present in Udyog Aadhar Memorandum, which is a simple and entrepreneur-friendly online system introduced by MSME Ministry, an entrepreneur can file for MSME status of “M-sand Units” under the NIC 5 digit activity code 08106. Which is defined as operation of sand or gravel pits, basalt porphyry, clay (ordinary), crushing and breaking of stone for use as a flux or raw material in lime or cement, manufacture or as building material, road metal or ballast and other material for construction.

5.3.2 Sand from Overburden of coal mines

The overburden spread over in situ coal seam needs to be removed for extraction of coal to an external dump till sufficient space is created for internal back filling by acquisition of land nearby coal bearing area. Further, this overburden dump needs to be re-handled at the time of closure of mine for land reclamation. As per mine closure plan 80% of the extracted overburden will be used for backfilling the excavated area up to ground level and remaining 20% overburden can be used for producing sand.

Studies conducted by Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles. The theoretical tradeoff between sand recovery and its quality should be quantified through laboratory tests. Western Coalfields Limited has already taken the initiative to segregate sand from the overburden. WCL has committed to supply sand at one fourth of the market price to NIT Nagpur, which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY). Further, WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur.

WCL removes 200 million cubic metres of overburden every year. Out of which, 20% (40 million cubic metres) can be made available for segregation of sand, and based on the recovery factor of 60%, 24 million cubic metres of sand can be produced by WCL alone in a year. If the entire overburden removed in the country is used for sand segregation, a substantial portion of sand demand can be met through an otherwise waste material.

The following estimations have been carried out to understand the possibility of sand production by segregation of overburden of coal mines.

Approx. OB removal every year	**200 MM^3**
Approximate OB available for processing every year	20% of total quantity = 40 MM^3
Likely quantity of Sand production every year	60% of available quantity = 24 MM^3
Revenue generation every year by sale of sand @ Rs. 410.69 / m^3	Rs 985.6 Crores

The quantity of sand that can be produced by processing the overburden left from Western Coalfields Limited alone is 24 million cubic metres. If all the seven subsidiaries of Coal India Limited are instructed by the Government to process and segregate sand from the overburden left out, around 150 million cubic metres (283 million tonnes) of sand can be processed, which is around 35% of the total sand consumed in the country at present. And besides meeting the requirement of sand, this would also ensure that a productive use of otherwise waste material is done.

Initiatives therefore need to be taken to commercialize the same in sync with the State's policy related to sand. A separate policy is required for formulation of sand from OB. Along with this, an awareness campaign is required for consumer to shift some demand to this alternative.

5.3.3 Import of sand for coastal cities

Another way to meet the demand of sand in the country could be to import sand from other countries. This method can especially be beneficial in States which do not have deposit rocks from which M-sand can be manufactured or the coal deposits, from the overburden of which sand could be processed. But this will be only economical for the States near coastal regions.

Some of the south-east Asian countries such as Malaysia and Indonesia have ample sand available in their country, which if not removed could lead to floods. The sand could be sourced from those countries and imported to Indian ports to meet the deficit.

It need to be considered while importing sand from other countries that the sand should qualify for the IS 383 quality standard as well be free from any phyto-sanitary issues. To ensure this, the imported sand should have quality checks at two points.

a. In the country from where the sand is sourced. The supplier should provide this certificate for the ISO standard and phyto sanitary certificate. The supplier should also provide a certificate that the imported sand is free of any metal.
b. At the port where the sand comes, before packing the sand in sealed packets. A third party hired by the State should conduct this test to ensure that there is no conflict of interest.

Karnataka has already formed rules to allow for sale of imported sand in the State through which anyone in the State can import sand from other countries. Right now, Mysore Sales International Limited is importing sand from Malaysia under a tripartite agreement with a supplier in Malaysia and Carry & forwarding agent in Karnataka. Under the agreement, the C&F agent has to pay the entire amount in advance for the quantity of sand required by him to MSIL, which in turn releases the money to the supplier in Malaysia after deducting a commission of Rs 150 per tonne. The sand comes at the Krishnapatnam port from where it is transported in railway wagons after sealing it in bags of 50 and 100 kgs to Bangalore. From the railway siding, the sealed sand is transported in trucks to the stockyards which is near Bangalore city. The C&F agent is issued permit for the quantity of sand imported by it and it in turn sells it at the stockyard and issues the transport permit along with the GST bill to whoever purchases sand from the stockyard. In Bangalore, cement dealers have been hired as booking agents who are paid Rs 100 per tonne for the booked sand. Relevant department in Maharashtra is also interested to import sand from Philippines which gives incentives to remove sand from their country. However, the sand available in Philippines is volcanic sand and is greyish is color, so acceptance by the citizens could be a big challenge in case of import from Philippines.

Tamil Nadu is preparing to import sand. Kerala also has permitted imports of sand from Malaysia and the imported sand is sold in loose at the port at a price of Rs. 2300 per tonne. Imported sand, however, tends to be costly and is therefore suitable only for high deficit areas.

5.4 Rules & Regulations

Rules and regulations and policies related to sand form a very important part of the process chain of sand mining. In some of the States there are separate policies and rules specifically for sand or M-sand e.g. Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Telangana, Uttarakhand have separate sand policy or special rules related to sand mining. Further, Andhra Pradesh, Telangana and Karnataka have separate M-sand policy or rules.

5.4.1 Administrative control of sand mining

The mining department in most of the states except in a few states regulates the sand mining. The advantage of having the control with the mining department is that the staff in the technical department are well versed with mining and consequently there is no operational gap between the regulating body and those taking care of operations. A department has technical capabilities to do its primary job in the best possible way and the primary job of Forest, Revenue or Public Works Departments that have been handling sand mining in some states is not mining. Thus, it is suggested that the only the mining departments can be entrusted for regulating sand mining in the State.

5.4.2 Separate Policy

Despite being a minor mineral, the processes involved in sand mining are very different from those in other minor minerals. Also sand is different from other minor minerals in its direct usage by the general public. A separate policy for sand mining is extremely crucial considering the volume of sand consumed every year and its socio-economic significance. States that have separate Sand Mining Policy and Rules are better able to manage this sector. It is suggested to the State to have separate Sand Mining Policy. It is further suggested that only the State Mining Department should be entrusted for regulating sand mining in the State.

5.4.3 Area and timelines

States should define the area limits in their rules and policies. Mining methods shall be as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. Also, the minimum area can be fixed at 5 Ha for better supply and better control from State Government's point of view. States should take care of the factor that minimum three lease holders/ contractors to be there in each districts for a healthy competition. Notwithstanding, States are free to set their own limits for the minimum and maximum area depending upon the local conditions. Sand deficit States offering large areas may result in delay the process of clearances and approvals and hence may offer smaller areas as per limits of DEIAA and SEIAA.

Table 38 Suggested threshold area for sand mining in a State*

S. No.	Parameter	Minimum area	Time period of allotment
1	For Individual	5 Ha.	5-10 Years
2	For Co-operative society	5 Ha.	5-10 Years

**In case State Government need to allot smaller or larger areas depending upon the river, States are free to do so as per their minor mineral concession rules.*

5.5 Identification of Resources

5.5.1 Classification of the rivers

Before identification, States need to classify the rivers based on the Stream Orders i.e. Stream Orders I, II, III, IV and above. Stream order is a measure of the relative size of streams. The smallest tributaries are referred to as first-order streams. When two first order streams come together, they form a second order stream and with each successive downstream junction, stream order increases. Telangana and Andhra Pradesh do the classification of the rivers based on the

streams i.e. I, II, III, IV etc. order streams. Other States are also suggested to follow the below process for classification for different stream and sand extraction:

5.5.1.1 I, II and III order streams

If the order of the stream is I, II and III, sand may be allowed to extract by manual means for local use in villages or towns bordering the Streams for bonafide purposes other than commercial operations/public trading/stocking etc. States need to frame the operational rules or guidelines for stream I to III. The State Government may notify over exploited areas from where no sand can be extracted even for local use. The extracted sand can be transported only through a bullock cart or a tractor within the jurisdiction, and the block/ district shall be treated as a unit for free movement of sand within the jurisdiction. The sand extraction for local use may adopt the following payment structure:

a. Free of cost (without royalty)
    i. For weaker section housing schemes on a certificate issued by the District Collector or any authorized officer
    ii. For own use basing on the actual requirement to be certified by Panchayat Secretary concerned
    iii. Not to be used for commercial purpose, for selling, trading etc.
b. By payment of royalty/fees
    i. In Government works only.

The District Collector may put in place proper administrative mechanism for enforcement of extraction and transportation of sand in I, II and III order Streams comprising of:

i. Revenue Divisional Officer concerned
ii. Tahsildar concerned
iii. Representative of Deputy Director, Ground water Department
iv. Executive Engineer (concerned), RWS/Irrigation Department
v. Sub-Divisional Police Officer
vi. Motor Vehicle Inspector (concerned) from Transport Dept.

For IV and V order rivers, mechanized means of extraction is appropriate, though one is aware that there is certain lack of clarity of mechanized mining.

5.5.2 Identification of river sand sites/ blocks

Identification is one of the important activities in sand mining. The department should estimate the demand of the particular district and State and hence come out with the requirement of further allotment. Based on the requirement, the process of identification of sand reaches should be taken up by the relevant department responsible for sand mining in the State. The relevant department/ person needs to obtain the Khasra map of the area and conduct a spot inspection

and confirm from other departments regarding availability of area to check if the area is not reserved for some other purpose and can be allotted for sand mining. Further, if the inspector finds that the block is not lying in the restricted zone based on the above parameters and that the area is available for sand extraction, the area should be geo-referenced and pillars should be erected at the corners.

Figure 5- 6 Process to be followed during identification of sand bearing areas

5.5.2.1 District Survey Report

The District Survey Report (DSR) shall be prepared by the State Government as per the MoEFCC Sustainable Sand Mining Management Guidelines 2016. As per the guidelines, States need to undertake replenishment study which shall give the following outputs:

- Annual Deposition rates of sand from a river
- Deposition stretch of the rivers
- Total Resources available in the State for sand

The above outputs shall be the inputs for deciding the annual available quantity in a particular district.

- The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction.
- The sediment sampling should include the bed material and bed material load before, during and after extraction period.
- Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross- section.
- Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume.
- Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.
- Flood discharge capacity of the rivers based on cross section history

While the need for undertaking the replenishment study is well understood, such assessments are presently not being undertaken in a comprehensive manner at the State level. It is envisaged that there is a need to inter-alia build capacity at the State level that trains the relevant staff in undertaking replenishment studies. As a short term measure, States need to identify colleges/ institutions with expertise related to Geology/ Environment/ Hydrology, and these colleges/ institutions could be handed over the responsibility of capacity building for replenishment study as well as conducting the first few rounds of replenishment studies.

For the long term, a preliminary suggestion in that regard is depicted below:

Design of Team	Design of course	Implementation
Technical Capabilities required for Replenishment Study	Skill Development Options for State Departments as per course design	Conduct of Study
Team of following • Geology specialist • Hydrology specialist • Environment specialist • Surveyor	Option 1 • Training of replenishment study by IITs/ NITs/ colleges (Special training)	State Departments/ District Dept. to conduct study for all the state rivers in Phases and priority for at least 2 monsoon seasons
Degree course required in related fields for conducting the study	Option 2 • Training of replenishment study by skill development centers through subject specialist (Special Course)	Study to be completed within 18 months from the start date and report to be approved by the Inter-departmental committee (DMG, Irrigation, Environment)

5.5.2.2 Joint Inspection Report

A Joint Inspection Report (JIR) (Annexure IV) should be prepared by the officers based on the need of the identification by the following departments/concerned officials:

- District Collector (Chairperson)
- Revenue department
- Public Works department
- Water Resources department
- Mines and Geology department

- Geologist
- Environment & Forest department
- any other relevant departments as per State's requirement

The purpose of JIR is to give comprehensive assessment of the sand available in each identified block and decision for go-no go area by assessment of pre-defined parameters.

The JIR team responsible for identification should fill the format containing the various parameters of sand mining as prescribed in the State rules and MoEFCC guidelines. During the identification itself, the details should be noted down and based on the details and internal considerations of the State, it should be decided whether the block should be allocated for mining or not. The responsible officers should submit the joint inspection report with clear recommendations to the concerned authority in charge of sand mining in the State.

5.5.2.3 Technical Report/ Geological Report

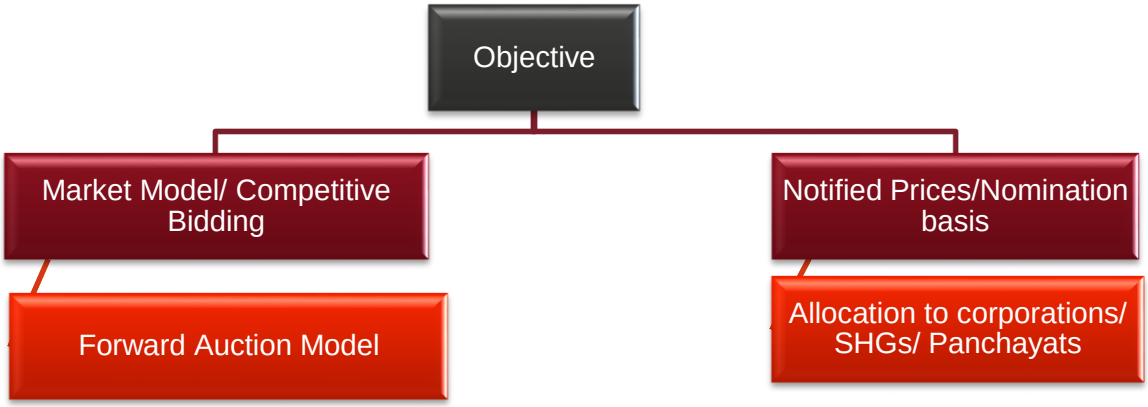
A detailed technical report/ geological report containing details of the area, DGPS survey, infrastructure and environment, geology of the area, drainage and geomorphology, exploration status (if any), geological mapping, laboratory studies of the samples etc. of each sand block should be prepared by the Assistant Geologist/ Geologist, before putting it for auctions/ allotment. The potential areas of the quarry lease should be identified and demarcated using DGPS, topographic and geological maps prepared using Total Station. The area thus identified should be physically demarcated preferably by erecting boundary pillars.

5.6 Allocation

The allocation model that should be adopted by the States depends on the objective of the respective State. If State's objective is revenue maximization then the State needs to follow Market Model/ competitive bidding model. However, if the State's objective is to keep the prices under control then the notified prices model needs to be followed.

States are free to choose the model as per their demand-supply situation. In case of abundant supply, the auction model is best suitable. Following are the details of each model:

Figure 5- 7 Recommended Allocation Model based on the objectives of the State



5.6.1.1 Market Model

5.6.1.1.1 Forward Auction Model adoption

States may adopt simple forward auction model, subject to technical and financial eligibility of the bidders. Bidding parameter can be any of the two a) revenue share or b) production linked payments. There should be a strict monitoring mechanism to compute the exact quantity of sand extracted and dispatched from the sand blocks.

In the forward auction model most of the states generally have a mix of technical and financial qualifications as eligibility criteria. Further the interested bidders have to submit an Earnest Money Deposit (EMD) and Bid Security money to participate in the bidding process, which is refunded or converted to performance security (as the case may be) on completion on completion of auction process. The NIT shall also contain at least the following:

1. Information Memorandum (IM) having details of the mines
2. Eligibility criteria (technical and financial eligibility criteria)
3. Reserve price against the bidding parameter above which all eligible bidders have to quote. The calculation of reserve price needs to be based on the % of royalty payable by the bidder
4. Bid Security/ EMD to be submitted along with the tender
5. Other affidavits/ annexures/supporting documents to be submitted

Allocation of sand reaches can be completed within the month of March and September of each year so that the operations can begin from April and October of each year. The practice should be followed across the year, which will streamline the process of allocation efficiently.

Royalty collection and other funds: The royalty calculation in this model should be on ad-valorem basis and not to be collected as a lump sum amount on annual basis. Further, there should be a strict monitoring mechanism to compute the exact quantity of sand extracted from sand blocks.

5.6.1.2 Notified Sand Pricing Model

If the objective of the Government is to make sand affordable or make available at controlled rates, the States can adopt this model.

5.6.1.2.1 Nomination Basis

Sand reaches should be notified by the State after getting the mine plan approval and environment clearance, and should be given to either State corporations or Co-operative societies of the village for purpose of excavation and loading work. The main control to be with department/ corporation only. The fixation of selling price and selling rights shall be with the department only. State corporation/SHGs/co-operative societies will only facilitate the department in operations. In case of allocation of sand reaches to the State department on nomination basis, the nominated State department may further award the excavation and loading work to private companies through transparent reverse auction method. For this model also to be successful, strict monitoring is required. Further, the Government should also specify the rates of transportation and increase the supply as per demand so that the prices are not increased artificially by the transporters. Further, there should be a robust disclosure mechanism devised by the department/ State Government for better monitoring and control over supply.

Table 39 Summary of the business models followed by the States

Model ->	Notified Pricing/ Controlled Pricing	Market Model
Selection Method	**Nomination Basis**	**Competitive Basis**
Sale Pricing Methodology of Sand	**Fixed Rates**	**Market Rates**
Operations control	SHGs/ Panchayats/ State Corp./PWD	Lease holder/ Private Contractor
Selling rights	State Govt./ Department	Lease holder/ Private Contractor
Profit from sale of sand	State Govt./ Department	Lease holder/ Private Contractor
Profit basis	Sale Price *minus* Mining related exp.	Sale Price *minus* Premium *minus* *m*ining related exp.
Mining expenses to be borne by	State Govt.	Lease holder/ Private Contractor

Revenue sources for Govt.	From sale of sand	From auction premium, royalty

Depending upon the State's objectives, States are free to adopt any of the above model along with a robust monitoring mechanism.

5.7 Clearances and approvals and suggestions for MoEFCC

Clearances and approvals are procured by the State mining department/State Govt. Agency in Andhra Pradesh, Maharashtra and Telangana while in most of the other States it is left to the project proponents. Only well administrated State may follow this model.

It is suggested that the responsibility seeking the clearances and approvals should be given to the lessee/contractors only and department should play the role of facilitator/ regulator only. A fixed time line should be attached for all the clearances required, and the responsible person should get it done within the specified timeline. Further, the applications for getting the clearances/ approvals should be online. In some States specifically where there are State departments/PSUs carrying out mining, obtaining clearances may continue as per the existing process.

Below is the suggested list of clearances, their approving authority and their timelines

Table 40 Proposed clearances and their approving authority & timelines

Clearance	Preparation by	Approving authority	Time period for approval	Mode of process
Mining Plan & Reclamation Plan	To be prepared by a technically qualified person and shall have validity of five years. However the bidder/ lease holder may revise the mining plan subject to approval by approving authority.	Mining Department	45 days + 1 month extension	online filing and approval
Environment Clearance (EIA, EMP, Mining Plan)*	As per existing guidelines and notification of MoEFCC	As per existing guidelines and notification of MoEFCC	As per existing guidelines and notification of MoEFCC	

CTO/ CFE	By Lease Holder/ Permit Holder/ Contractor	State Pollution Control Board	1 month	online filing and approval
Reclamation Plan (Implementation)	By Lease Holder/ Permit Holder/ Contractor	Competent Authority	As per Plan	

** Exemptions shall be applicable for the environment clearances as per MoEFCC's notification dated 15.01.2016; MoEFCC's Sustainable Sand Mining Management Guidelines 2016, other circulars/notification issued.*

Modification of the mining plan during the operations stage shall also need approval of the competent authority. In the case of sand concessions for riverbed sand mining, specific river stretches should be identified and mining permits/lease should be granted stretch wise so that the requisite safeguard measures are duly implemented and are effectively monitored by the respective regulatory authorities.

5.7.1 Suggestions for faster clearances – delegations of power to DEIAA/SEIAA

As an administrative mechanism, projects for environment clearance are divided into sub-categories (B1, B2, A etc.) by MoEFCC based on the area of the lease. For minor minerals including sand and gravel, mining lease (in case of individual) for B2 categories (0-5 Ha.) the grant of EC will be done by the DEIAA headed by the District Magistrate or District Collector and for B2 (5-25 Ha.) and B1 (25-50 Ha.) (in case of individuals) categories the grant of EC will be done by SEIAA. Further the projects of A category (>=50Ha.) the EC is granted by MOEFCC. It is suggested to the MoEFCC that area limits for taking projects by committee e.g. DEIAA/SEIAA/MoEFCC should be increased to double from the current i.e. 0-10Ha for DEIAA, 10-100 Ha for SEIAA and >=100 for MoEFCC. This will enable faster clearances for the mining projects. Further, considering the large number of projects related to all minerals, a single SEIAA is not sufficient to cater the current needs and MoEFCC may consider forming multiple regional branches of SEIAA in each State for faster clearances without impacting the protection of environment, as the guidelines are now available to guide the bodies/ authorities entrusted for grant of clearances. Criteria suggested below

- **Urban centers**: Urban centers having population of more than 10 Lakhs as per 2011 Census of India should be having one SEIAA regional branch to cater the needs of urban population and hence enabling faster clearances. E.g. Uttar Pradesh have large urban centers and only one SEIAA at State level may not be sufficient. Considering the same 5-6 SEIAA regional branches may be constituted in Uttar Pradesh based on the population of Urban Centers, which are major consumption centers and would have institutions and expertise to discharge the responsibilities of a branch of SEIAA.

- **Distance**: Few States where population concentration is low and distance between the capital where SEIAA headquarter is present are far away from the districts due to large distance. A regional branch of SEIAA may be proposed for easy access for these States. E.g. States like Arunachal Pradesh/ Rajasthan/ Uttar Pradesh having large size and access to the capital city for many of the districts take multiple days to reach due to connectivity and economic issues. It is suggested that wherever the distance between the urban center and current SEIAA is more than 400 kms for plain areas and more than 250 kms for hilly States, a regional branch may be constituted in an appropriate place. .

5.8 Operations

The control of operation in sand reaches depends on the model adopted for allocation of sand reaches. In competitive bidding model the control over operations is with the lessee/contractor who is the successful bidder. While in nomination model for allocation, the control of the operations depends on whether the nominated body excavates sand by itself or through a raising contractor.

It is suggested that irrespective of the allocation model and whoever has the control over operations, sand mining should take place only in accordance with the terms and conditions of the environmental clearance, conditions of the lease deed or license, and methods approved in the mining/ quarrying plan. Mechanized mining may be allowed in stream IV order and higher order rivers as per the approved environment clearance/ Mining Plan and as per notifications of the MoEFCC. MoEFCC guidelines should be reconsidered. Till then mining should be undertaken, as per the guidelines laid down in the *Sustainable Sand Mining Management Guidelines 2016* by the MoEFCC, and circular issued thereof.

5.9 Sale

The State mining department should create a website and/ or app for sand ordering in each of the States. The sale of sand in the State should be only through that portal and direct booking of sand through offline means should be discouraged. The exceptions for online sale should be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity etc. These low demand centers should have the provision to be supplied by local licensed traders through offline means.

We propose two mechanisms for online sale of sand depending on whether there is a free market for sand in the State or the prices are regulated by the Government.

Market Model

In case of market model, all the lessees/ certified dealers in the State should register themselves on the online portal/ mobile app. For registering, lessee/ certified dealer will have to enter the details of its concession/ stockyard, location, quantity of sand expected on a weekly basis, as per the approved mining plan. Once registered, the online portal/ app will display the name of the reach/ stockyard and sand could be booked by the consumer from those leases/ stockyards and prices up to the delivery level. Further, the lessee/ certified dealer needs to regularly update the sand available in the reach/ stockyard, and they can decide the price at which they want to sell their sand. Anyone who wishes to purchase sand in the State will have the following options for buying:

1. Mobile app
2. Online portal
3. Customer care/ telephone call
4. Licensed traders

The consumer needs to register on the portal and login using his/her credentials (Aadhar card based only). After logging in, the portal will display the entire list of reaches/ stockyards along with the quantity of sand available in those reaches/ stockyards and the quality and price of sand. The consumer can filter/ sort the reaches/ stockyards based on such parameters as location, quality and price, and book from the lease/ stockyard he/she wishes to. The consumer should also have the option to purchase the sand by ordering at customer care. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

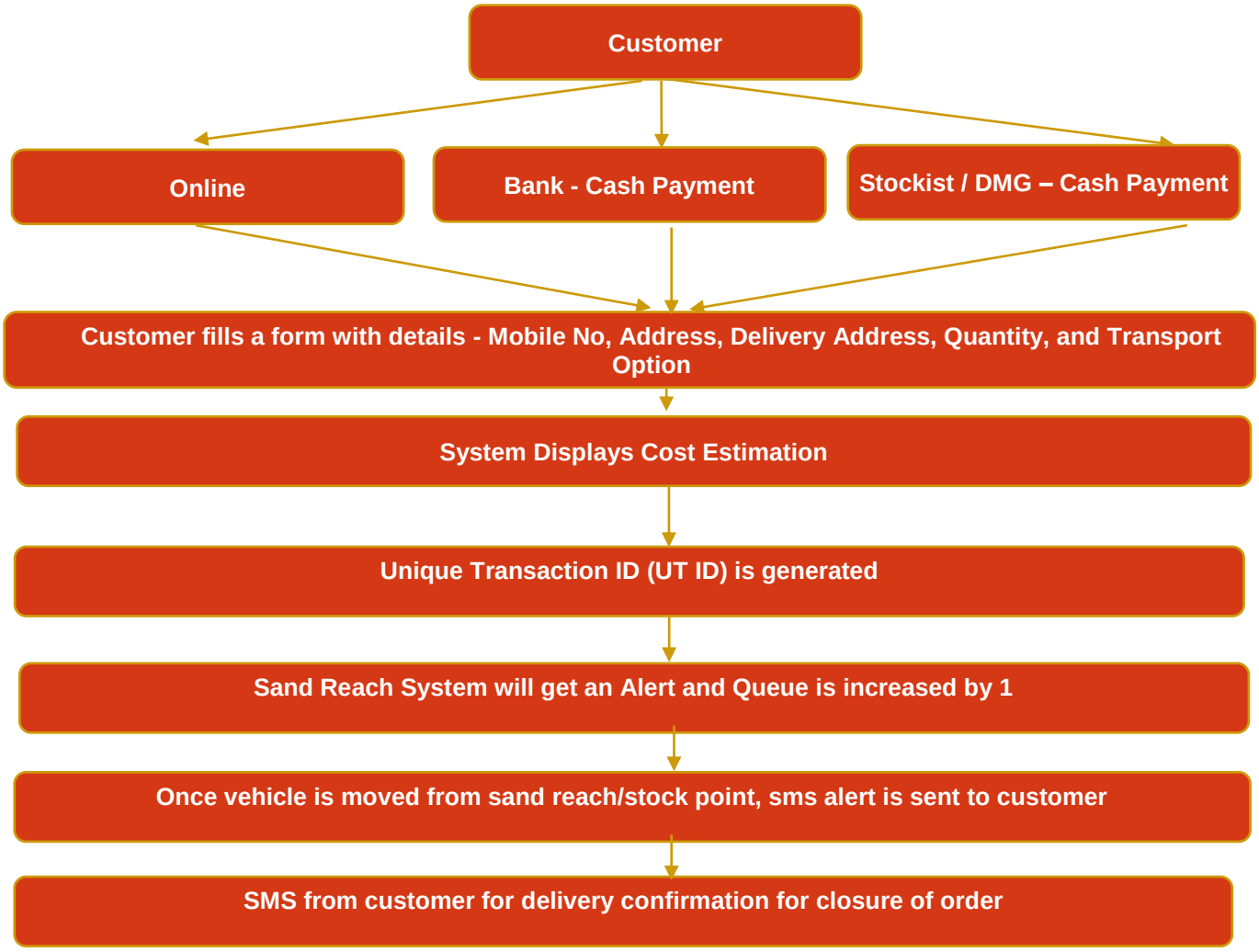
Controlled Market Prices

In case the prices are regulated by the State Government, the only difference from the previous model is that the price of sand at the river reach/ stockyard shall be uniform across the State based on the quality. A consumer after logging in, may choose the reach/ stockyard from which he/she wishes to purchase the sand. The payment for booking the sand in both the cases should be made on the portal/ app so that proper accounting of the sale of sand can be maintained by the Government. A payment receipt should be generated online after payment on the portal/ app and the transit pass should be generated at the reach/ stockyard after showing the online payment receipt. Also, stockyards should be made around all the major consumption hubs in the State based on their estimated demand.

Note: The payment while ordering of sand (including transportation cost) can be made online or on delivery of sand to his doorsteps. In case the consumer chooses the option of payment of cash on delivery, the stockyard owner has to ensure that the sand gets delivered to the consumer who has booked sand on the portal through any of the transporters registered on the portal.

Below is a pictorial representation of the step by step process that should be followed for online sand ordering.

Figure 5- 8 Suggested online sand ordering procedure



Stockyards should be made around all the major consumption hubs in the State based on the demand estimated based the procedure mentioned in the next section. Further, the State can get the supply potential across those major consumption hubs from the District Survey Report prepared by the mining department. And if any gap exists in the demand and supply of sand across those hubs, leading to increased sand prices, the State can allocate more sand reaches around the hubs or try to promote alternates of river sand.

Provision for online sale of sand should be made in case of municipality limits/cities/towns etc. as per definition of Urban Ministry/ Census. The States should adopt online ordering of sand within next one year. For village level consumers, offline sales should be allowed for easy access.

The States may put a cap on the pit head sale price to keep the price of sand in check. Further to ensure sufficient competition, there should be at least 2-3 different sand mineral concessionaires areas in each district.

Note: The exceptions for online sale should be given to the consumption centers in villages/ smaller towns or low demand centers, for which States are free to decide based on either census (population density) or connectivity etc. These low demand centers should have the provision to be supplied by local licensed traders through offline means.

Quality Aspects of the sand

Getting quality sand at reasonable prices is a major concern for consumers. There has been instances when low quality sand is supplied to the consumers and consumers due to lack of awareness of sand quality are cheated. Low quality sand which is not suitable for construction poses risk to the buildings/houses and could be dangerous for human life. States need to promote the quality aspects of sand by creating awareness and help in developing the required testing facilities for sampling and testing of sand even at smaller towns at reasonable prices.

5.10 Transportation & Stockyard

Transportation is the last step in the process chain of sand mining, and it needs to be regulated to ensure supply of sand to consumers at reasonable prices. It is more important in States that are sand deficit and need to transport sand over long distances to reach the consumption hubs.

The supply of sand to consumers should be through stockyards that should be maintained by all individual leaseholders/ raising contractor/ State corporations etc. as the case may be. The stockyard should be established in the vicinity of the reach within a distance of 500 meters from the motor-able road/pucca road. In case of small size leases or cluster of leases, a single stockyard for a group of sand reaches may be established. The size of the stockyard should be such that it has the capacity to store the stock of 3 months of extraction, which would ensure supply during monsoons as well. The leaseholder/ raising contractor should be responsible for transportation of sand from excavation site/ reach to the stockyard through a limited number of GPS/ RFID enabled vehicles and those vehicles should be used only for transportation of sand from the reach to the stockyard.

The limited number of vehicles entering the reach is extremely important from the point of view of sustainability and environment as the riparian habitat is greatly affected by too many vehicles entering the sand reaches. The use of GPS/ RFID enabled dedicated vehicles for the purpose, will also help in evaluating the exact quantity of sand extracted from the reach. Further mandating

the maintenance of stockyards by all individual leaseholders/ raising contractor will ensure continuous supply of sand to consumers even during monsoons and prevent price escalation during non-mining period.

For transportation of sand from stockyards to end consumer:

The stockyards should be delineated by fixing the geo-coordinates or by geo-fencing, to trigger an alarm in case of entry of any unauthorized vehicle in its premises. There should be provision of weigh bridges at the stockyard and all the vehicles transporting sand to the consumers should pass through it to keep a track of exact quantity of sand in the vehicle as per the loading capacity of the vehicle prescribed by the transport department.

All sand carrying vehicles should have a valid transport permit. The transport permit for transportation of sand should be generated at the stockyard after verification of the payment. The transport permit should have a scan code to ensure that the single transport pass is not photocopied and used more than once. Further, the transport monitoring team should have a scanning device/mobile based app to scan the transport permits, and once scanned the entire detail, such as volume, origin point (reach/ stockyard), destination, previous scan detail, etc., should be available.

The responsibility of transportation of sand from the stockyard to end consumer should be handled to the stockyard owner. The States may fix up a time frame for delivery from the ordering period and the State departments need to establish grievance's portal and mechanism also for resolving complaints related to ordering and transportation of sand.

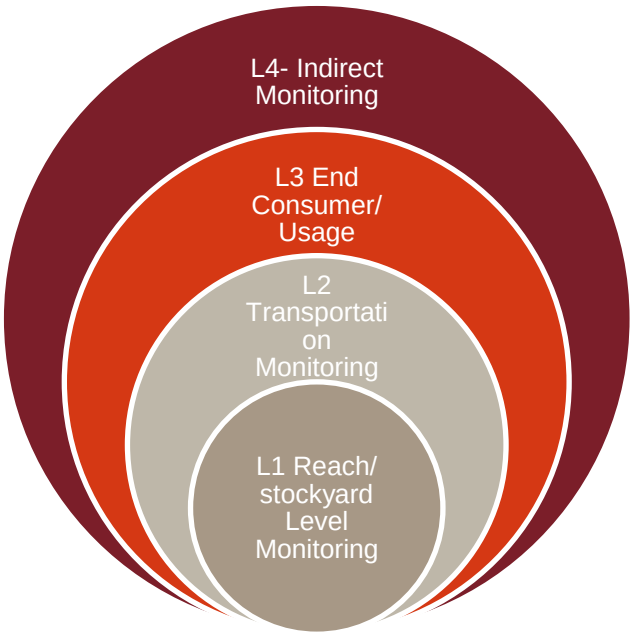
5.11 Monitoring

Monitoring is the most crucial in the entire process chain of sand mining. Any of the business models to be successful, a robust monitoring plan should be in place. The Environment Clearance indicates the quantity of material which can be mined in a year. If this quantity is not measured, and much more mineral than envisaged in the EC is mined out then the entire process of EC is rendered futile. Keeping the above objective in mind, it is required of the State / State Agencies to create and establish a robust system to monitor and measure the mined out mineral at each lease location and its transportation in State. In that regard, a 360 degree monitoring mechanism should be put in place, as follows.

Four Level monitoring mechanism

A four-level monitoring mechanism related to extraction, transportation, selling and usage of sand is suggested as follows:

Figure 5- 9 Four-level monitoring mechanism



Level 1- Reach/ Stockyard level monitoring

For monitoring of the active reaches:

a. Quantity of sand to be extracted from the reach should be based on the quantity assessed by the Joint Inspection Report.
b. The lease boundary should be demarcated with geo-coordinates or geo-fenced to ensure that sand extraction is going on only within the permitted area.
c. De-casting from river beds should be monitored on a regular basis to keep a track of excavated quantity.
d. After every two year mandatory audit of the quantity extracted and quantity permitted along with the replenishment rate.
e. Mandatory e-pass/ e-permit should be made at reach level for transportation of any sand by any GPS enabled vehicle with provision of entering the vehicle number of the sand carrying vehicle and expected delivery address and customer name/ Mobile number. Also provision should be made available for stockyards/ stockiest of sand in each business model. However in case of nomination based (controlled pricing) business model, the margin of private stockist should be capped over a fixed percentage of notified prices.
f. At the stockyard, the stock supervisor should verify the authenticity of online payment receipt before issuing the transit pass. The loading of sand should be monitored electronically and all transporting vehicles should pass through an electronically monitored weigh bridge.
g. Real time data capture for transportation

The security feature of online generated transport permit should be either of the following options:

- Printed on Indian Banks' Association (IBA) approved Magnetic Ink Character Recognition (MICR) Code paper.
- Unique Barcode.
- Unique Quick Response (QR) code.
- Fugitive Ink Background.
- Invisible Ink Mark
- Void Pantograph
- Watermark.

Level 2 - Transportation monitoring

To make transportation monitoring effective and useful, all the sand carrying vehicle (Tractors/ Trucks) should be registered with the department and GPS equipment should be installed in all the sand carrying vehicles. Online weigh Bridges with CCTV should be installed at all the stockyards, active reaches to ascertain the exact quantity of sand being transported in the vehicle. Check posts with CCTV cameras should be established at all major consumption centers to check if all the transporting vehicles are carrying a valid transport permit. The transport permit generated should contain any of the security feature mentioned above so that one permit cannot be re-used by generating photocopies of the permit. This mandatory e-pass will help monitoring in the following ways:

- GPS/ RFID tagging can track location discrepancies in the delivery address of customer vs mentioned in the e-pass
- System can generate alarm in case of delivery of sand or particular quantity for same client/ same address as registered on online portal and relevant officers can accordingly physical check
- Mobile App enabled devices can check the e-pass during physical checking at check posts or surprises checks. After scanning the e-pass, invoice should be generated to show the starting point and destination of the vehicle along with the validity date & time of the e-pass.
- Trucks carrying sand without any e-pass/ e-permit may be confiscated as per the State rules and laws.

In case of inter-State transportation of sand, the transit pass shall be printed in two languages; in the languages which is widely understood/ spoken in both the States.

Level 3 - End consumer monitoring/ bulk consumer

A call center should be established to give a call to all the consumer of sand in the State to enquire about the amount that is charged for sand which will keep the State Government updated about the price of sand in the State and further it will help to check if there is any discrepancy in the sale price of sand within the same district. The mobile number of the consumers can be obtained from

the e-pass/e-permits generated. The number of the call center should be advertised so that it reaches the general public through which anyone in the State can register his/her complain related to the sand, be it in terms of price or any other grievance. Profile of consumers should be analyzed such as delivery of sand at same address, more than the estimated usage as mentioned in purpose, etc. Further surprise checking should be conducted by District Level Sand Committee staff as per instructions of monitoring agency.

- Grievance system for checking prices & supply
- Call center for checking landed prices of sand
- Mobile Vans and Surprise checks by DMG/ Monitoring Committee.

Level 4 - Indirect monitoring:

Indirect monitoring can be done by determining sand consumption through quantum of cement sales in the State, as sale of cement is quite organized and data is easily available at State and district levels for the same. From district-wise cement consumption, further trend of sand consumption can be derived. Any anomalies in the sand consumption/demand can be easily analyzed.

Note: The above monitoring mechanism is recommendatory only. The States may visit Andhra Pradesh to study the mechanism in greater detail.

6. Annexures

6.1 Annexure I: Formation of Sand Mining Committee

(12

No.16/23/2017-M.VI
Government of India
Ministry of Mines

New Delhi, Shastri Bhawan
Dated, the 18th May 2017

ORDER

In pursuance of the deliberations of the State Mining Ministers' Conference held on 4th May, 2017 at New Delhi it has been decided to constitute a committee chaired by the Secretary, Ministry of Mines, Government of India alongwith officials drawn from State Governments, to study the existing system of sand mining in various States and prepare sand mining guidelines which addresses concerns in this sector. The committee shall also look into the way forward in implementation of MSS & Star Rating of mines. The committee will comprise of the following officials:-

1	Shri Arun Kumar	Secretary, Union Ministry of Mines	Chairman
2	Shri R P Singh	Additional Chief Secretary (Geology and Mining), Govt. of Uttar Pradesh	Member
3	Shri Ravi Kapoor	Principal Secretary, Commerce and Industry, Govt. of Assam	Member
4	Shri R K Kataria	Secretary, Commerce & Industries (Mines & MSME), Govt. of Karnataka	Member
5	Shri Subodh Kumar Singh	Secretary, Commerce & Industries and Mining Department, Govt. of Chhattisgarh	Member
6	Shri B R V Susheel Kumar	DGM, Govt. of Telangana	Member
7	Shri Ranjan Sahai	Controller General, Indian Bureau of Mines	Member
8	Shri Prithul Kumar	Director, Union Ministry of Mines	Member Secretary

2. The terms of reference of the Committee shall be to suggest –

   i. Sand mining guidelines, with a view towards a transparent and sustainable system for extraction of sand for ensuring supply of adequate sand at reasonable rates in the states; and

   ii. The way forward for effective implementation of the Mining Surveillance System (MSS) and the Star Rating of Mines for major and minor minerals.

...

3. For the purposes of its deliberations the Committee may invite such officers/persons as it deems fit.

4. The Committee shall submit its report to the Union Ministry of Mines within a period of three months.

(P. Vinay Kumar)
Under Secretary to the Govt. of India
Telephone No: 011-23384070
pv.kumar70@nic.in

To

1. Chief Secretaries of States concerned with reference to the letter dated 5.5.2017*.
2. All the members of the Committee*
3. Secretaries in-charge of mining departments of all States/UTs (36) Letters

*With enclosure of the Ministry of Mines' letter No.16/23/2016-M.VI dated 5.5.52017

Copy for information to:

DSD to Hon'ble Minister of Mines/Sr. PPS to Secretary (Mines)/PS to JS(SC)/PS to JS(NKS) /PS to Dir (P)

6.2 Annexure II: Extension notice for Sand Mining Committee

F. No. 16/23/2017-M.VI
Government of India
Ministry of Mines

New Delhi, Shastri Bhawan
Dated, the 1st March, 2018

NOTIFICATION

In Pursuance of the deliberations of the State Mining Minister's Conference held on 4th May, 2017 at New Delhi, a committee chaired by the Secretary, Ministry of Mines, Government of India along with official drawn from State Governments, was constituted on 18.5.2017 (copy enclosed) to study the existing system of sand mining in various States and prepare sand mining guidelines. During the course of discussion in various meetings, the scope of work of the committee has been extended more than what was envisaged earlier. Initially, the committee was constituted for the period of 3 Months. Now, it has been decided to extend the period of the committee up to 31.3.2018 for submission of its final report to Ministry of Mines.

(A.K Mallik)
Under Secretary to the Government of India
Phone-011-23384743
Email-ak.mallik@nic.in

To

(i) Chief Secretaries of States concerned with reference to the letter dated 18.5.2017.
(ii) All the members of the committee.
(iii) Secretaries in-charge of Mining Departments of all States/UTs.

Copy for information to:

OSD to Hon'ble Minister of Mines/Sr. PPS to Secretary (Mines)/PA to JS (NKS)/ PA to Dir (PK)

6.3 Annexure-III: States visit plan

6.3.1 Meeting Schedule

Date	State
8th - 9th November 2017	Maharashtra (Team 1)
8 – 10th November 2017	Uttarakhand (Team 2)
13th – 15th November 2017	Punjab (Team 2)
13th – 15th November 2017	Haryana (Team 2)
13th – 15th November 2017	Chhattisgarh (Team 1)
19th - 21st November 2017	Rajasthan (Team 2)
20th – 22nd November 2017	Andhra Pradesh (Team 1)
27th – 29th November 2017	Madhya Pradesh (Team 1)
13th -15th cember 2017	Assam (Team 2)
22nd -23th November 2017	Gujarat (Team 2)
11th – 12th December 2017	Karnataka (Team 1)
6th – 7th December 2017	Uttar Pradesh (Team 2)

13th – 14th December 2017	Tamil Nadu (Team 1)
15th – 16th December 2017	Telangana (Team 1)

6.3.2 List of documents required from the States

Sl. No	Name of the document	Status
1.	Minor Mineral Rules applicable in the State (Latest). Please attach if not available in public domain.	
2.	Applicable Sand Mining Policy (if any separate policy) & other related regulations/Government Orders (GOs) in the State. Please attach if not available in public domain.	
3.	Any M-sand or alternate sand policy in the State available. Please attach if not available in public domain.	
4.	DSR followed in the State as per MoEFCC 2016 guidelines. Please attach sample DSR report if any.	
5.	What are the reports initially prepared before allotment of sand e.g.: Joint Inspection report/ etc. Please attach a sample report/format.	

6.3.3 List of data required from the States

Sl. No.	Data Required	Status
1.	No. of leases granted till Sep' 2017 in the State (type wise). i. Total leases granted by this policy ii. No. of leases operationalized iii. No. of leases pendency for operationalization. Reasons for pendency if any.	
2.	Production of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017) (in MT/m3/ft3 etc.) Also mentioned avg. density of the material in the State.	

3.	Revenue of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017)
4.	Royalty collection of sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2016-17, 2017-18 (till Sep 2017)
5.	Premium collection from sand (if auctioned) in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 (till Sep 2017)
6.	Estimated production of M-sand or alternate sand in last 5 years in the State: 2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 (till Sep 2017)
7.	DSR preparation Status. i. No. of Districts in which sand mining is done ii. No. of DSRs prepared iii. Total sand resources in the State as per the DSRs iv. Estimated demand of Sand v. Demand deficit vi. How is the deficit being met with? vii. Action Plans for meeting the deficit
8.	Are there any CCTVs camera available in sand reaches? How many camera total in States and sand reaches?
9.	Are delivery vehicles GPS enabled? How many GPS enables trucks/tractors registered with the concerned department in the State.

6.3.4 List of questions for discussion with the States

Sr. No.	Description	Response
1.	Method of grant of ML/ lease/license for sand mines/ reaches (Auction/first come first served/ Application/ Reservation/ Tender etc.). Please attached Model Tender Document for the same, as applicable.	

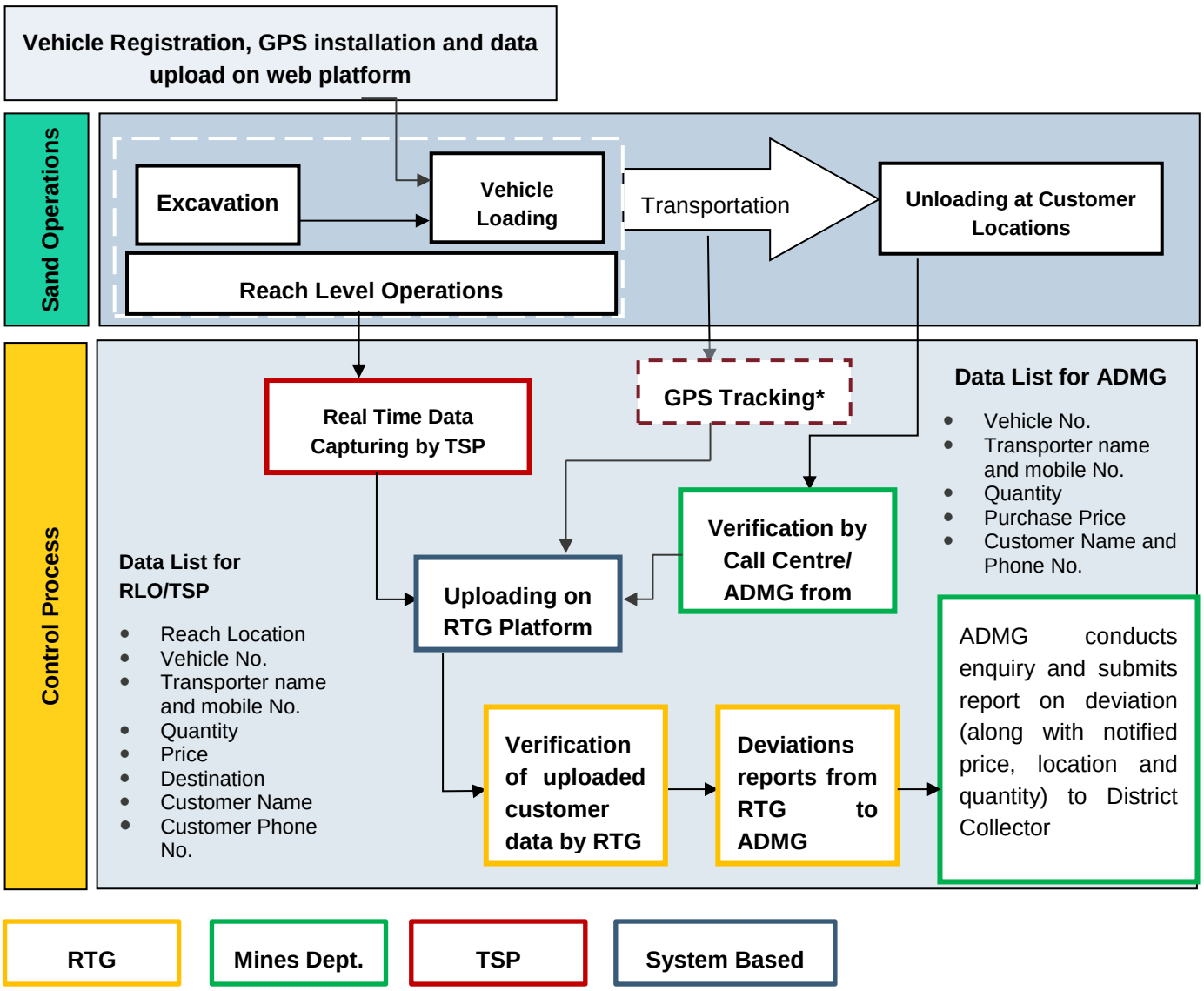
2.	Types of concession for sand mining and minimum and maximum size of the concession (area wise) in the State
3.	Are mines allocated using e-tenders/e-auction etc. or used offline method.
4.	Estimated time for identification up to starting of the mine.
5.	Estimated time taken for clearances and approvals in the State.
6.	What are the environment clearance/clearance/CFE etc. to be taken in the State for starting of sand mine and from which authority (DEIA/SEIA/MoEFCC-etc.)
7.	What is the time period for which Quarry Lease/Quarry license is granted in the State
8.	What is the % of reservation available in the State for sand mining concessions to SC/ST/Local community/Patta land holders etc.
9.	Are there any separate provisions for patta land/ local community for sand mining? Please elaborate.
10.	What is the method of mining allowed as per regulations e.g.: Manual/ Semi Mechanized/ Mechanized etc.
11.	What is the estimated production cost of sand by Lessee / Department / Raising contractor etc. (Rough estimate only as per local rates)
12.	What is the Sale Price of sand sold by Lessee or by State's own department (if any notified rates available)? Also mention units of sand.
13.	What is the monitoring method used currently by the States.
14.	Is sand availability and/or prices (Sale price or transportation etc.) an issue in the State from consumers perspective?
15.	During monsoon period is there any shortage of sand.
16.	Is Import of sand allowed from other State/countries? If allowed, is this beneficial for the State
17.	Is inter State transport of sand allowed?
18.	Are there sand depots in the States?
19.	Any demand-supply assessment done by States for sand.
20.	What is method being used by States for demand-supply assessment.
21.	Is there any online/App based method of ordering of sand in the State. If no, how normal public orders sand (Agents/ Lessee etc.)
22.	Are there separate provisions of sand ordering for Bulk consumers e.g.: Builders etc.
23.	Any other alternatives of river sand e.g. M-sand or any other sand.

24.	Average Cost of production of M-Sand per tonne. a) Incentives for production of M-Sand b) Action plan for substitution through M-Sand
25.	What are the different mechanisms used for curbing illegal mining of sand : c) Use of IT d) Task force deputation e) MSS type application
26.	What are the provisions of sand mining in the Coastal Regulation Zone (CRZ) area?
27.	Provisions for quality assurance of M-sand and River Sand in the State.

6.4 Annexure IV Joint Inspection Format

Sl. No	Description	Detail	In Compliance with State Rules (Yes/No)	In Compliance with MoEFCC Guidelines. (Yes/No)
1	Sand Concession File No.			
2	Area of the concession for inspection (in Ha/ Acre)			
3	Type of area (River bed/ Agricultural land/ others/ Patta Land/ Dam desiltation area)			
4	District, Tehsil, Village			
5	Geo-Co-ordinates of the concession (closed polygon)			
6	Type of Land (Revenue/ Forest) & Area under each			
7	Type of minor minerals (Sand/ Others)			
8	Distance from River Bank (in Meters) as per GPS			
9	Distance from National Highway & Number			
10	Distance from State Highway & Number			
11	Distance from Any other major road			
12	Distance from nearest railway line			
13	Nearest Road distance, name and Type of road			
14	Distance from nearest Bridge,			
15	Distance from nearest drinking water bodies, wells, hydraulic structure, reservoir			
16	Distance from nearest canal or other public works			
17	Distance from nearest public structures			
18	Extractable sand available (rough estimate as per DSR			

6.5 Annexure V Monitoring Mechanism of Andhra Pradesh



* - Currently implemented in Nellore.

RTG – Real Time Governance
RLO – Reach Level Officer
TSP – Technical Staff Personnel
ADMG – Assistant Director Mines & Geology

6.6 Annexure VI: State Introduction

Sr. No.	State	Capital	No of Districts	% of total area of India	Population density (per sq km)	Population as per census 2011	GSDP (2014-15) at factor cost (Base 2011-12) (in billion)	Major Minerals (examples)	Minor Minerals (examples)
1	Andhra Pradesh	Vijayawada	13	4.95	308	4.94 crore	4417.41	Iron ore, Copper, Lead, Limestone, Manganese, Sepentine	Ball Clay, Baryte, Calcite, China Clay, Dolomite, Feldspar, Fire Clay, Gravel, Granite, Laterite, Limekankar, Marble, Mica, Natural Clay, Ordinary Sand, Pyrophillite, Quartz, Quartzite, Road Metal, Steatite, Slate, Slate Stone, etc.
2	Arunachal Pradesh	Itanagar	23	2.5	17	0.13 crore	135.40	Limestone, Coal, Iron Ore	Dolomite
3	Assam	Guwahati	33	2.5	397	3.1 crore	1667.08	Limestone and Coal	Building stones, Gravel, Ordinary clay, Ordinary sand other than sand used for prescribed purposes, Boulder, Shingle, Chalcedony or impure quartz pebbles, Limeshell, Kankar, Limestone, Murram, Brick-earth, Fuller's earth, Bentonite, Road metal, Reh-

									matti, Slate and Shale, marble, Stones, Quartzite and sandstone, Salt – petre
4	Bihar	Patna	38	2.8	1102	10.38 crore	3047.66	Limestone, Asbestos, Softstone	Brick, Clay, Murram, Sand, Stone/ Crusher, Silica sand
5	Chhattisgarh	Raipur	27	4.1		2.8 crore	1960.23	Iron ore, Limestone, Dolomite, Bauxite, Tin	Agate, Ball clay, Baryte, Calcite, China Clay, Chalk, Dolerite, Felspar, Fire Clay, Granite, Marble, Gypsem, Jasper, Kaolin, Limekankar, Mica, Ochre, Pyrophyllite, Quartz, Quartzite, Sand, Shale, Silica Sand, Slate, Talc, etc
6	Goa	Panaji	2	0.11	490	0.18 crore	346.10	Iron ore	Lime stone, Lime kankar, Lime shells, Boulder, shingle, gravel, Ordinary sand, Ordinary clay, Murram, Mitti, Brick-earth, Ordinary earth.
7	Gujarat	Gandhinagar	33	6	308	6 crore	7915.69	Limestone, Bauxite, Manganese Ore, Marl, Fluorspar, Base metal ore	Quartzite, Sandstone, Granite, Other building Stone, Gravel Quartzite pebbles, Dolerite, Murrum, Brick Earth, Red Clay, Ordinary Clay, Ordinary Sand, Hard Phylite, Carbonaceious Shale, Brick Clay, Naliya, Brick,

									Black Stone, Agate, Ochre, Natural Clay, White Clay, Quartz, Calcite, Calcarious Sand, China Clay, Chalk, Gypsum, Dolomite, Pipe Clay, Fire Clay, feldspar, Ball Clay, Molding Sand, Silica Sand, Diatomaceous Earth, Soap Stone, Laterite, Talc
8	Haryana	Chandigarh	22	1.5	573	2.54 crore	3666.35	Limestone, Kynite	Sand, Boulders, Stones, Silica Sand, China clay, Quartz Stone, School Slate, Slate Stone
9	Himachal Pradesh	Shimla	12	1.67	123	0.68 crore	890.31	Limestone	Marble, bajri, Ordinary sand, Building stone, Masonry Stone, Boulders, Shingles, Brick earth, Kankar, Road Metal, Marble, Ordinary Stone, Shale, Brick Earth, Rock salt, Gypsum, Silica-sand and Baryte
10	Jammu & Kashmir	Srinagar/ Jammu	22	6.67	56	1.25 crore	852.67	Bauxite, Limestone, Magnesite, Sapphire	Limestone, Gypsum, Marble, Slate, Dolomite, Quartz, China Clay

11	Jharkhand	Ranchi	24	2.39	414	3.29 crore	1864.91	Iron ore, Bauxite, Chromite, Manganese ore, Gold,	Ochre, Statite, Silica sand, Mica, Talc/ Stealite/ Soapstone, Vermiculate (t), Felspar
12	Karnataka	Bangalore	30	5.8	320	6.1 crore	7602.82	Gold, Silver, Copper, Iron ore, Bauxite, Lime Stone, Manganese, Magnasite, Chromite	Agate, Ball clay, Barytes, Brick and Tile clay, Calcareous Sand, Calcite, chalk, Chalcedony, Clay (others), Diaspore, Fire clay, Fuller's Earth, Gypsum, Lime Kankar, Corrundum, Dolomite, Dunite or Pyroxenite, Felsite, Feldspar, Fuchsite Quartzite, Jasper, Marble or crystalline Limestone, Mica, Building stone, Sandstone, Steatite, Silica Sand, Kaolin, China Clay, etc
13	Kerala	Thiruvananthapuram	14	1.2	860	3.33 crore	4322.36	Gold, Iron ore, Basalt, Graphite, Limestone	Kankar, Limestone, Ordinary Clay, Ordinary Sand, Ordinary Earth, Laterite, Fireclay
14	Madhya Pradesh	Bhopal	51	9.38	236	7.3 crore	3839.93	Diamond, Limestone, Manganese, Copper, Bauxite, etc.	China Clay, Dolomite, Felspar, Fire Clay, Granite, Marble, Ochre, Pyrophillite, Quartz, Quartzite, Sand, Sand Stone, Steatite, Talc, etc
15	Maharashtra	Mumbai	36	9.34	370	11.2 crore	15248.45	Limestone, Manganese, Iron	Clay, Baryte, Illmenite, Fluorite, Dolomite, Feldspar, Quartz,

								Ore, Kyanite – Sillimanite, Bauxite, Tungsten	Soapstone, Agate (Semiprecious Stones), Granite, Pyrophillite
16	Manipur	Imphal	16	0.67	130	0.22 crore	150.30	Chromite	-
17	Meghalaya	Shillong	11	0.67	140	0.32 crore	211.51	Limestone, Iron ore	Granite, Quartzite, Felsper, Clay
18	Mizoram	Aizwal	8	0.63	52	0.10 crore	96.33	Limestone	
19	Nagaland	Kohima	11	0.50	119	0.19 crore	141.15	Limestone	Slate, Marble
20	Odisha	Bhubaneshwar	30	4.67	270	4.19 crore	2747.20	Iron ore, Bauxite, Nickel, Graphite, Copper, Lime stone	Agate, Ball Clay, Barytes, Calcareous Sand, Calcite, Chalk, China clay, Clay, Corundum, Diaspore, Dolomite, Dunite or Pyroxenite, Felsite, Feldspar, Fireclay, Fuschite, Quartzite, Gypsum, Jasper, Kaolin, Laterite, Lime Kankar, Mica, Ochre, Pyrophyllite, Quartz, Quartzite, Sand, Shale, Silica Sand, Slate, Steatite, bajri, Road Material, Boulders, metals, chips, ballast, sandstone, laterite, slab,

									Limestone, lime shell, lime, bentonite, fuller's earth,
21	Punjab	Chandigarh	22	1.53	550	2.7 crore	3132.75	None	Building Stones, Lime Kankar, Marble, Gravel, Kankar, Road Metal, Brick Earth, Quartz, Quartzite, Silica Sand, etc.
22	Rajasthan	Jaipur	33	10.4	200	6.8 crore	5120.9	Gold, Iron Ore, Limestone, Manganese, Silver, Tungsten, etc.	Bajri, Brick Earth, Chert, Diorite, Dolerite, Gneisses, Granite, Kankar, Lime Kankar, Lime Stone, Marble, Masonry Stone, Murram, Ordinary Clay, Phyllites, Sandstone, Shale, Slate Stone, etc.
23	Sikkim	Gangtok	4	0.21	86	0.06 crore	128.82	Lead, Copper	Dolomite, Quartzite, Talc
24	Tamil Nadu	Chennai	32		550	7.2 crore	9006.2	Iron ore, Bauxite, Copper, Lead, Zinc, Silver, Gold, Magnesite, Titanium, etc.	Felspar, Firclay, garnet, Granite, Quartz, Silica Sand, Talc, China Clay, Ordinary sand, etc.
25	Telangana	Hyderabad	31	3.4	307	3.52 crore	4239.71	Chromite, Copper, Gold, Iron ore, Manganese, Molybdenite, etc.	Asbestos, Building Stone, Clay, Mica, Baryte, Felspar, Fuller;s Earth, Mica, Quartz, Quatrzite, Steatite, Talc, etc.
26	Tripura	Agartala	8	0.29	350	0.36 crore	250.86	Iron Ore,	Kaolin, Limestone

								Limestone	
27	Uttar Pradesh	Lucknow	75	7.3	820	20 crore	8538.72	Limestone, Rockphosphate, Potash, Andalusite, Calcite, Bauxite, Copper, Gold, Iron, Platinum, Sillimanite etc	Silica Sand, Dolomite, Granite, Dolostone, Sand stone, Granite dimensional stone, river sand, river bed material, China Clay, Quartzite, Marble, Ordinary Sand etc.
28	Uttarakhand	Dehradun	13	1.6	189	1 crore	1407.90	Copper, Lead, Zinc, Silver, Magnesite, Limestone, etc	Dolomite, Talc, Ordinary Sand, Bajri, Gravel, Mica, Gypsum, Phyllites, Slate, Quartzite, etc.
29	West Bengal	Kolkata	23	2.66	1029	9.13 crore		Iron ore, Lead, Silver, Limestone, Copper, Manganese,	Fire clay, Dolomite, Quartz, Kaolin, Barytes, Moulding Sand, Glass Sand,

6.7 Annexure VII: Note on M-sand

An Alternate Solution to River Sand

Rivers, Forests, Minerals and such other resources constitute Nation's natural wealth. These resources are not to be frittered away and exhausted by any one generation. Every generation owes a duty to succeeding generations to develop and conserve the natural resources of the Nation in the best possible way in the larger public interest. The Principle of Intergenerational Equity is recognized world over, as one generation of human kind has an obligation to conserve and pass on the natural resources to the succeeding generation.

River systems in the State shall not be treated as the sole source of Sand, as conservation of Water-bodies is paramount obligation of the State which is an essential resource for survival of the mankind. There is no alternate for Water but there is alternate for River Sand in the form of Manufactured Sand (M-sand) which is fine aggregate produced by crushing hard Rock to a required size of 150 microns by using crushing, shaping, screening and classifying methods. Manufactured sand is produced by crushing rocks, quarry stones or larger aggregates pieces into sand sized particles. Rocks or quarry stones are blasted and subjected to a series of crushing cycles to reduce the particles to the size of naturally occurring sand. The produced sand is then sieved and washed to remove fine particles and impurities, and tested for various quality aspects before it is deemed fit as a construction aggregate. Manufactured Sand is produced from crushing of the rock to required size and gradation suitable for construction industry. Such Manufactured Sand obtained must confer to IS Code- 383:2016, and should be suitable for construction activity. Fine particles of less than 150 Microns size shall not be present in excess quantity than the percentage specified in the IS code 383:2016. Stone dust obtained in conventional crushing units shall not be treated as Manufactured Sand as it is detrimental for use in construction and is not eligible for claiming incentives.

The use of Manufactured Sand is steadily growing due to the scarcity for natural sand and the environmental issues related therewith. Injudicious sand mining and continuous depletion of natural aggregate sources have led to the implementation of new environmental/land use legislations which has made the procurement of natural sand difficult and expensive. In addition, presence of silt and clay in natural sand is another reason for increased use of Manufactured sand. Natural sand is inherently high in silt and clay. It can be damaging for screed and concrete, if the sand is not sufficiently processed to bring down clay and other impurity content to acceptable levels. Manufactured sand also reduces the wastage of low-value by-products in the quarries. The low value aggregates formed as a by-product of rock crushing can be utilized efficiently to create a high value product.

M-Sand also offers higher flexural strength, better abrasion resistance, higher unit weight and lower permeability. Due to these advantages, manufactured sand is being used on a large scale

by the Southern States of India mainly in construction sector. However, its acceptability and use in the Northern part of country is yet to rise.

General Terminology

As per the **IS Code 383:2016,** for the "Course and fine aggregates for concrete" the definition of Fines and Coarse aggregates as defined under item 3 of the code (Terminology), is furnished below,

- **Fine Aggregate** – Aggregates most of which passes 4.75mm IS Sieve and contains so much coarser material as permitted in 6.3.
  - **Natural Sand** – Fine aggregates resulting from the natural disintegration of rock and which has been deposited by streams or glacial agencies. This may also be called as **Uncrushed Sand.**
  - **Crushed Sand**
  - ✓ Crushed Stone Sand: Fine aggregates produced by crushing hard stones.
  - ✓ Crushed Gravel Sand: Fine aggregates produced by crushing natural gravel.
  - **Mixed Sand**–Fine aggregates produced by blending natural sand and crushed stone sand or crushed gravel sand in suitable proportions.
  - **Manufactured Fine Aggregate (Manufactured Sand)**: Fine aggregate manufactured from other than natural sources, by processing materials, using thermal or other processes such as separation, washing, crushing and scrubbing. Manufactured fine aggregate may also be Recycled Concrete Aggregates. Examples of manufactured sand are; Iron slag aggregate, steel slag aggregate, copper slag aggregate, Construction and Demolition (C&D) waste etc. Fine aggregates produced by blending natural sand and crushed stone sand or crushed gravel sand in suitable proportions is called Mixed sand.

- **Coarse Aggregate** – Aggregate most of which is retained on 4.75mm IS sieve and containing only on much finer material as is permitted for the various types described in this standard. Coarse aggregate may be,
  - Uncrushed gravel or stone which results from natural disintegration of rock.
  - Crushed gravel or stone when it results from crushing of gravel or hard stone: and
  - Partially crushed gravel or stone when it is a product of the blending of (a) and (b).
  - Manufactured from other than natural sources, by processing materials, using thermal or other processes such as separation, washing, crushing and scrubbing. Manufactured coarse aggregate may be Recycled Concrete Aggregate (RAC) or Recycled Aggregate (RA).

For the purpose of this paper the Crushed Stone Sand (as defined in the IS code) is refereed as M-Sand, as it is the most popular and commercially accepted name in the market.

General Requirements of M-Sand

1. All the sand particles should have higher crushing strength.
2. The surface texture of the particles should be smooth.
3. The edges of the particles should be grounded.
4. The ratio of fines below 600 microns in coarse sand (zone I) should be between 15% and 34% as per IS:383.
5. There should not be any organic impurities
6. Silt in sand should not be more than 2%, for crushed sand.
7. In manufactured sand the permissible limit of fines below 75 microns shall not exceed 15%.

Technical specifications for M-Sand

Sand is mainly used for the preparation of mortar and concrete. It is also required to manufacture the building blocks. The standard terminology used for sand is ***fine aggregate***. We all know that Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand is silica (silicon dioxide, or SiO_2), usually in the form of quartz. Fine Aggregate (Sand and/or crushed stone) are those which are less than 4.75 mm in size.

Quality of aggregates: Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, gravel and sand or combination thereof. They shall be hard, strong, dense, durable, clear and free from veins and adherent coating; and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible, flaky, scoriaceous and elongated pieces should be avoided.

Deleterious Materials -Aggregates shall not contain any harmful material such as pyrites, coal, lignite, mica, shale or similar laminated material, clay, alkali, soft fragments, sea shells and organic impurities in such quantity as to affect the strength or durability of the concrete.

Aggregates to be used for reinforced concrete shall not contain any material liable to attack the steel reinforcement. Aggregates which are chemically reactive with alkalies of cement are harmful as cracking of concrete may take place.

Table 1 and 2 as furnished below depicts the different gradation zones based on the fineness of the aggregate and the significance of grading.

TABLE 1 : TECHNICAL SPECIFICATION FOR FINE AGGREGATES IS:383-1970 (Reaffirmed 2016 Clause 6.3)	
IS SIEVE DESIGNATION	**PERCENTAGE PASSING FOR**

	Grading Zone 1	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

Significance of grading

Table 2 of IS 383:2016

IS Sieve Designation	Percentage passing by weight Grading			
	Zone-I (Coarse Sand)	Zone-II Most Suitable/Desirable	Zone-III	Zone-IV (Fine Sand)
10mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600µm	15-34	35-59	60-79	80-100
300µm	5-20	8-30	12-40	15-50
150µm	0-10	0-10	0-10	0-15
Fineness Modulus	4.0-2.71	3.37-2.10	2.78-1.71	2.25-1.35

The percentage passing through 600µm sieve will decide the zone of the sand,

• Zone-I: Coarse Sand, (Suitable for concreting)

• Zone-II; III and Zone-IV : Fine Sand. (Suitable for plastering)

Fineness Modulus (FM): The result of aggregate sieve analysis is expressed by a number called Fineness Modulus. It is obtained by adding the sum of the cumulative percentages by mass of a sample aggregate retained on each of a specified series of sieves and dividing the sum by 100.

The specified sieves are: 150 µm (No. 100), 300 µm (No. 50), 600 µm (No. 30), 1.18 mm (No. 16), 2.36 mm (No. 8), 4.75 mm (No. 4), 9.5 mm , 19.0 mm , 37.5 mm , 75 m , and 150 mm.

The latest Indian Standard IS: 383- 2016 “Coarse and Fine Aggregates for Concrete-Specification (Third Revision)” covers the requirements for aggregates, crushed or uncrushed, derived from natural sources, such as river terraces and riverbeds, glacial deposits, rocks, boulders and gravels, and manufactured aggregates produced from other than natural sources, for use in the production of concrete for normal structural purposes including mass concrete works.

M- Sand Quality

Aggregates strongly influence concrete's freshly mixed and hardened properties, mixture proportions, and economy. Consequently, selection of aggregates is an important process. Although some variation in aggregate properties is expected, characteristics that are considered include:

- Grading
- Durability
- Particle shape and surface texture
- Abrasion and skid resistance
- Unit weights and voids
- Absorption and surface moisture

Crushed Sand should adhere to the highest standards and must undergo the following quality tests:

- Test for silt and clay
- Sieve analysis
- Optical Microscopic Study to check the particle shape
- Workability (slump test by slump cone method)
- Cube test for compressive Strength

Tests for Silt and clay

Aggregates shall consist of naturally occurring (crushed or uncrushed) stones, gravel and sand or combination thereof. They shall be hard, strong, dense, durable, clear and free from veins and adherent coating; and free from injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. As far as possible, flaky, scoriaceous and elongated pieces should be avoided.

Size and Grading of Aggregates

Grading refers to the determination of the particle-size distribution for aggregate. Grading limits and maximum aggregate size are specified because these properties affect the amount of aggregate used as well as cement and water requirements, workability, pumpability, and durability of concrete. In general, if the water-cement ratio is chosen correctly, a wide range in grading can be used without a major effect on strength. For a good

Concrete mix, aggregates need to be clean, hard, strong particles free of absorbed chemicals or coatings of clay and other fine materials that could cause the deterioration of concrete. Where the grading falls outside the limits of any particular grading zone of sieves other than 600-micron IS Sieve by a total amount not exceeding 5 percent for a particular sieve size,(subject to a cumulative amount of 10 percent), it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600-micron IS Sieve or to percentage passing any other sieve size on the coarse limit of Grading Zone.

Deleterious Materials

Aggregates shall not contain any harmful material such as pyrites, coal, lignite, mica, shale or similar laminated material, clay, alkali, soft fragments, sea shells and organic impurities in such quantity as to affect the strength or durability of the concrete. Aggregates to be used for reinforced concrete shall not contain any material liable to attack the steel reinforcement. Aggregates which are chemically reactive with alkalies of cement are harmful as cracking of concrete may take place.

Limits of Deleterious Materials

The maximum quantity of deleterious materials shall not exceed the limits specified in Table 2 of IS 383:2016. However, the engineer-in charge at his discretion may result of some further tests and evidence of satisfactory performance of the aggregates.

Aggregate Crushing Value

The aggregate crushing value, when determined in accordance with IS: 2386 (Part IV)-1963 shall not exceed 30 percent for concrete for wearing surfaces, such as runways, roads and pavements. 30 percent for aggregate used for concrete other than for wearing surfaces. Other parameters to be checked for quality are:

- Aggregates Impact Value,
- Aggregate Abrasion Value and
- Soundness of Aggregate.

Benefits of M-Sand

Sustainable Supply

There is growing shortage of natural sand in many cities. The severity varies from market to market, and in some cases this may not appear to be a priority topic. Eventually, pressure from environmentalists and sand conservationists worldwide will continue to encourage both legislators

and construction engineers to look for viable alternatives to natural sand. Cubical sand manufactured from crushed rock is the most desirable fine material for concrete production. It is generally accepted that particle shape depends on the rock type, breakage energy and the type of crusher used.

The rocks are crushed using crushers to manufacture coarse aggregates and the fines which are produced are usually flaky and has been used in filling, asphalt etc. Manufactured sand is defined as purpose made crushed fine aggregate produced from a suitable source material.

In many places within the country, the problem of non-availability of natural sand is increasing with each passing day. It is further aggravated by the seasonality, inconsistency and volatility that are associated with extraction and supply of natural sand. In the market, the need for good quality manufactured sand is evident and the market has started to move towards the same. The Government has banned sand dredging in many parts of the country.

Optimum Shape

The optimum shape of manufactured sand is spherical, next best being cubical. Similarly, an even gradation of the total coarse aggregate fraction is desirable so that the smaller particles can fit between the larger particles, thereby minimizing the voids. Well-shaped aggregates also minimize the incidence and degree of segregation. It has been proven that more than 20kg of cement can be saved for every cubic meter of concrete that is made by replacing a poorly shaped aggregate with a cubical aggregate. In addition, both compressive strength and flexural strength are improved by using cubical aggregates, which also increases workability and reduces bleeding and shrinkage. The impact of the physical characteristics of the sand used in concrete mix is even greater than that of the coarse aggregate fractions, both in the concrete's plastic and hardened States.

Minimum void concent

The principles of total internal friction and void content apply equally to the fine fraction, but because of the vastly smaller particle size and therefore the greatly increased surface-area-to-volume ratio, any detrimental or undesirable shape or texture properties will be greatly amplified. Similarly, manufactured sand presents an opportunity to control the mineral content in the particles. Natural sand often contains undesirable minerals and clays, and the effect of these materials on both the fresh and the hardened States of concrete can be extremely harmful. For example, the effect of clay particles in fresh concrete is not obvious, as the particles absorb disproportionate volumes of water and hence swell to many times their original size. This swelling occupies a volume in the cement paste in its fresh State. When it hardens, however, the clay particles contract and leave minute voids, which in turn increase the shrinkage and permeability and hence reduces the concrete's chemical resistance and compressive strength. Other undesirable materials, ranging from basic chlorides to harmful chemicals, can exist in this fine material fraction. The use of manufactured sand, however, reduces the risk of impurities.

Comparison between Natural Sand and M-Sand

It is understandable that sand from river, due to natural process of attrition, tends to possess smoother surface texture and better shape. It also carries moisture that is trapped in between the particles. These characters make concrete's workability better.

However, silt and clay carried by river sand can be harmful to the concrete. Another issue associated with river sand is that of obtaining required grading with a Fineness Modulus of 2.4 to 3.1. It has been verified and found, at various locations across South India, that it has become increasingly difficult to get river sand of consistent quality in terms of grading requirements and limited silt /clay content. It is because we do not have any control over the natural process.

In case of Manufactured Sand, the process of attrition through VSI and washing makes the Crushed- Stone- Sand particles good enough to be compared with shape and surface texture of natural sand.

Well-designed screening system the required grading (Zone II) and Fineness Modulus (2.4 to 3.1) can also be achieved consistently in the case of Manufactured Sand.

When there is a need to control micro fines as in the case of the not-so-hard rocks, Manufactured Sand facilities can be equipped with Filter System and/or Washing System that can remove the micro fines.

It must be noted that properly processed Manufactured Sand can improve both compressive strength and flexural strength through better bond when compared to river sand.

Usage of good quality river sand with consistency to manufacture concrete has become increasingly difficult in India. Depletion of resources has not only made good quality river sand a scarce material but also directs Technocrats decisively, to look for better alternative in order to prevent ecological damage.

The technology to manufacture sand through VSI crushers has evolved through series of research and development works abroad. Though this technology found acceptance in developed countries like European Union, Australia, New Zealand and Japan quite a sometime ago, other Asian countries like China, India, Singapore, Malaysia and Vietnam have started adopting this Technology for the past 5 to 6 years.

Hundreds of thousands of cubic metre of concrete from normal grade to high grade is being produced worldwide, with good consistency with Manufactured Sand as an important ingredient. It is found out through various studies, including this one that Concrete Manufacturing, with optimal Cement and Admixture content and consistency in quality, is becoming cost effective when these processed or Manufactured Coarse and Fine Aggregates are used. The cost paid to the Technology in comparison with savings obtained is lesser. Most importantly savings of cement by enhancing the properties of aggregates through a manufacturing process is a big contributing factor to ecology. The Technology of Manufactured Sand and Coarse Aggregates could well be the solution for the Indian Concrete Industry.

Manufacturing Process of M-Sand

Crushed stone sand (M-Sand) is produced by crushing hard stone or natural gravel. It is produced by rock-on-rock or rock-on-metal impact in the Vertical Shaft Impactor (VSI). Proper particle size reduction and achieving equi-dimensional shape is critical to get desired properties. If rock is crushed in compression lot of inherent properties exhibited by natural river sand are lost. If proper technique of manufacturing is not adopted aggregates are bound to become flaky and elongated. Improvements to sand by way of washing, grading and blending may have to be done before use at the consumer end.

In case of Crushed Stone Sand all the processes mentioned above can be done at manufacturing plant itself and controls are much better in producing quality fine aggregates. Fine aggregates (Crushed Sand) proposed to be used shall be produced from a Vertical Shaft Impact (VSI) crushers and shall conform to the requirements of Zone- II (in most of the cases) as per IS 383-2016. Special efforts on the part of Crushed Sand manufacturers (such as washing of sand by water or dry washing by air) are required to restrict particles finer than 75 µm. Crushed Sand can also be used for making masonry mortar and shall conform to the requirements of IS 2116-1980 (Reaffirmed 1998) - “Specification of sand for Masonry mortars”.

The various processes involved in manufacturing of M-Sand, is given below,

❖ **QUARRYING**

Like in any other Mining industry, Quarry serves as the raw material source to boulders – which are fed to the plant for further processing. Quarrying activity is superset to the following activities:

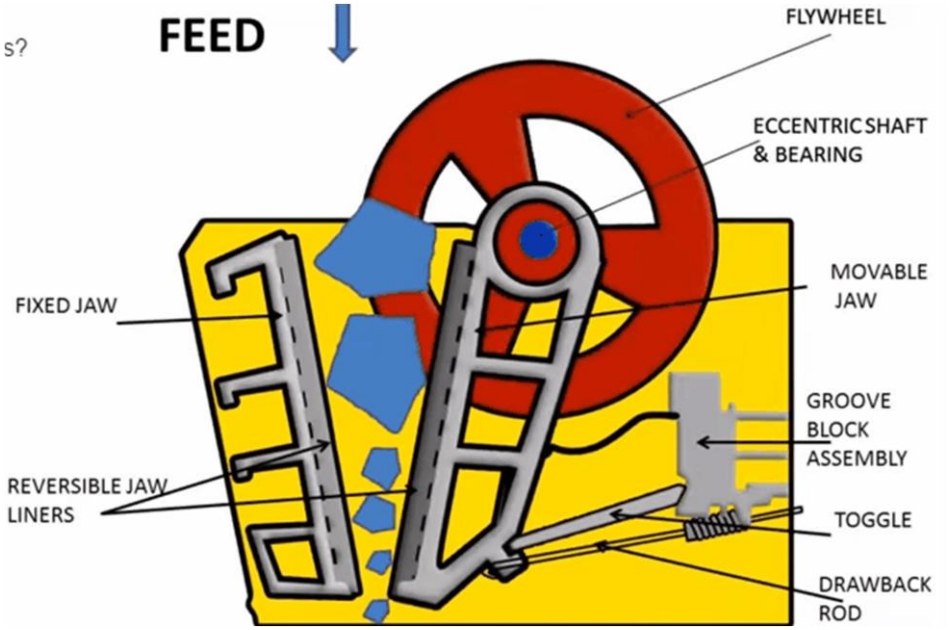
1. **Drilling & Blasting**- The foremost activity in quarrying is the Drilling. It consists of Drill machine with drill a bit powered with compressor with range of 6 – 12 bars of pressure. Diameter of the drill bit is typically varies between 105 mm – 115mm. Holes are drilled perpendicular to the ground surface in pre-conceived geometric pattern which generally varies from rock to rock and feed size of the crusher. And Second activity that follows Drilling is the Blasting. Holes drilled are loaded with explosives of sufficient energy which can dislodge the in-situ rock and produce desired fragmentation of the rock.

2. **Loading & Transportation**: - Post blasting, the blasted rock is loaded with Back hoe(Excavators) of suitable bucket capacity. Generally 0.9 cum to 1.1 cum of bucket capacity is used. These Back hoes are crawler mounted and diesel operated machines. Number of Excavators deployed is dependent on the installed crushing capacity of the Plant and Transportation: Usually tippers ranging from 6 tyre to 10 tyre are deployed for rock transportation from quarry to crushing plant. Excavators load the tippers with boulders of desired size and are transported to the crushing plant.

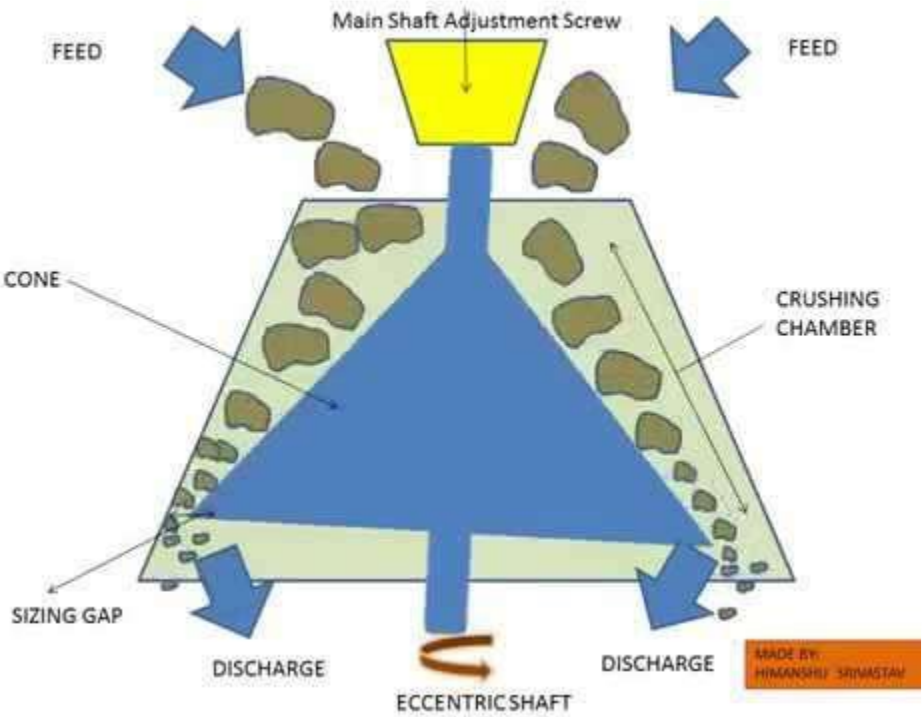
❖ **Crushing**

The Blasted rock from quarry transported through tippers are finally unloaded in the crushing unit and Crushing is primarily divided into three stages:

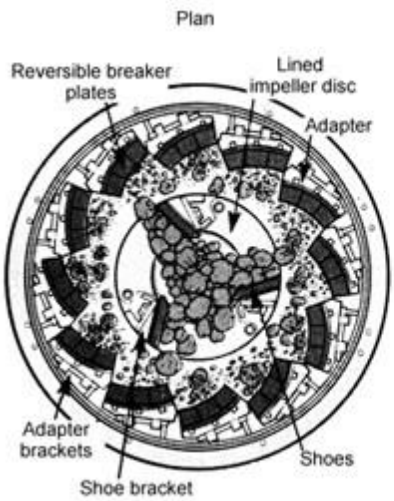
Primary Crusher – Jaw Crusher

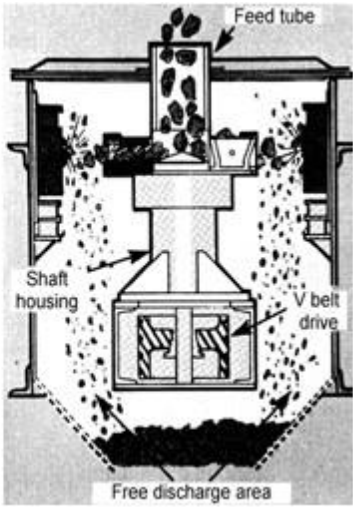


Secondary Crusher – Cone Crusher



Tertiary Crusher – Vertical Shaft Impactor(VSI)





Primary Crusher: This is the portal for Quarry and Plant and primary crusher is Jaw Crusher. Feed size generally varies from -400mm to -550mm. Boulders from quarry transported via tippers are unloaded into jaw crusher hopper (receiving bin for raw material from quarry) and from there is fed in to the mouth of Jaw crusher.

Secondary Crusher: The output of Jaw crusher is fed to Secondary crusher i.e a Cone Crusher via a set of belt conveyors and screens. The feed size -150mm rock is crushed to -40mm size. Cone crusher consists of two truncated cones with different diameters. These two truncated cones are called as Concave and Mantle which is made of Manganese alloy. Rocks are crushed in between the chamber of Concave and Mantle.

Tertiary Crusher: This is the final stage crushing where the output of Cone Crusher is fed to Vertical Shaft Impactor (VSI) through a series of belt conveyors and screens. M-sand is produced from the output of VSI as end products. Natural inheritance of River sand formation is replicated inside the chamber of VSI where rock on rock hitting and attrition takes place thus leading to well graded particle shape. The VSI crusher by means of its unique design and action produces well shaped fine aggregate particles. The process of attrition also enables the removal of surface roughness of the fine aggregate particles to a good extent. The cubicle structure of particles is imparted in the sizing chamber of VSI thus making the product most amenable for construction. Usually the rock of -40mm size is reduced to varied sizes ranging from -20mm to -2mm.

When the stones are processed through Vertical Shaft Impact (VSI) Crusher, not only fine aggregates, but the coarse aggregates, another end product, also acquire improved particle shape and reduced surface roughness.

Manufactured Sand plants ensure better grading of fine aggregates for better particle size distribution. Also some of the plants possess Air Filter System and/or washing facility through which the percentage of micro fines (passing 75 micron) is controlled below 3% by weight.

The washing facility provides another benefit of keeping the Manufactured Sand in wet or partially wet condition. This will help to reduce the absorption rate of Manufactured Sand during concrete manufacturing and in turn will contribute to the better workability and workability retention. Test results in South India has shown that if the Manufactured Sand is produced by processing through VSI crusher and washing system, it exhibits much reduced water absorption character in comparison with Crusher Dust (CRF).

Raw Material for M-Sand

Deposits of Granite, Sand stone, Basalt, Quartzites, Pegmatites, Charnokite, and Khondalites etc. are the suitable source rocks for manufacturing of M-Sand. Accordingly each State can identify and reserve the source rocks exclusively for the production of M-sand, and leases of these deposits canthen be granted on preferential basis to the M-Sand manufacturers.

The growing demand for sand, provides the potential for encouraging the M-Sand plants in various States.

Economics of M-Sand

The landed cost of M-sand is comparable with the landed cost of the river sand under normal circumstances. For this analysis detailed study of one such M-sand unit located in Chikkballapura district of Karnataka, was carried out. The plant is located about 80kms from Bengaluru. The plant has a capacity to produce 360 tonnes per hour. Assuming the plant operates for 20 hours a day and 300 days a year, the following are the production details:

Total Plant capacity = 360 tph x 20 hrs a day= 7200 tpd

Operational capacity = 2500 tpd x 300 days a year = 10,50,000 or ~1 mtpa

The M-sand cost would typically have five cost components: Basic price, Royalty, DMF, Transportation cost and GST

Cost comparison of types of sand

S. No.	Component	Description
1	Key assumptions (M-sand)	a) Manufacture 30 tonne of sand b) Manufacturing cost of 1 ton of M- sand is Rs. 500 c) Royalty charged on a ton of M-sand = Rs.60 /ton d) DMF charged = 30% of royalty = 30% x 60 = Rs.18/ ton

		e) Transportation cost per kilometre is Rs 3- 3.5 per km per ton f) Bangalore city is 80 kms from the plant location g) GST is 5% on all the other components i.e. Basic price, Royalty,DMF, Transportation cost
2	**Computation (M-sand)**	a) Manufacturing cost (Including margins): = 500 x 30 = Rs. 15000 b) Royalty : = 60 x 30 = Rs. 1800 c) DMF : = 18 x 30 = Rs. 540 d) Transportation cost : = 80 x 3.3 x 30= Rs. 7920 e) GST = 5% x (15000+1800+540+7920) = Rs. 1263 f) Total landed cost of 30 tonne of M-sand at Bengaluru = a + b +c + d +e = Rs. 26,523 g) Per ton sale price of sand=Rs 883/ton h) Actual sale price of sand= Rs 900-950/ton
	Computation (River sand at Bengaluru)	a) Actual Sales Price of river sand at Bengaluru (35 ton) = Rs.70, 000 to 1,00,000 ~ Rs. 2000 – 2850 per ton
3	Result (M-sand)	Per ton sale price of M-Sand at Bengaluru = Rs. 900-950/ton (under ideal conditions)
4	Result (river sand)	Per ton sale price of river sand at Bengaluru = Rs. 2000-2850/ton (as per market demand)

The manufacturing cost of Rs 500 per ton, which is around 55-60% of total landed cost (Rs 883/ton) is high for M-sand. There is a potential to reduce the M-sand cost further by looking into the capital cost towards plant and machinery and the financing expenses related thereof.

Demand and Supply Scenario of Sand (River and M-sand)

The estimated annual demand and supply of sand on Pan India basis, based on the collection of data from various State Governments, during the study of sand mining is furnished below.

Annual demand (estimated by the States) and supply of Sand in the country

Name of the State	Total demand (estimated by the States) of sand in 2016-17 (in MMT) (Bulk density = 1.89 t/cbm)	Total supply of sand in 2016-17 (in MMT, B.D.= 1.89 t/cbm)		Sand deficit/surplus based on State data (- / +)	Sand situation based on our analysis
		River sand	**M-Sand**		
AP	NA	NA	NA	NA	NA
Assam	NA	5.6	0	NA	NA
CG	NA	10.0	0	NA	NA
GJ	70	49.64	-	-12	+
HR	8.5	9.8*	0	+	+
KTK	30	4	20	-4	-
MP	NA	49.14	0	NA	NA
MH	NA	NA	NA	NA	-
PB	16	NA	0	NA	NA
RJ	56.8	56.8	0	0	+
TN	53.7	15.12	3.24	-35.34	-
Telangana	22.5	13.23	7.56	-2.83	-
UP	45.0	5.9	0	-39.4	-
UK*	71.2*	NA	0	-	NA

NA: information not available

**Haryana demand and production data are for the calendar year 2017-2018*

Source: Data as collected from various State Governments, during the study.

Availability of M-Sand units and production

State	M-Sand Policy available in State	No. of M-sand manufacturing units	Production of M-sand (MMT)
Andhra Pradesh	Yes	6	<1
Assam	No	--	--
Chhattisgarh	No	--	--
Gujarat	Yes	2	<1
Haryana	No	--	--
Karnataka	Yes	164	20
Madhya Pradesh	No	--	--
Maharashtra	No	--	--
Punjab	No	--	--
Rajasthan	No	--	--
Tamil Nadu	Under development	--	3.24
Telangana	Yes	44	7.56
Uttar Pradesh	No	--	--
Uttarakhand	No	--	--

From the above tables it is clear that most of the States have not assessed the annual demand of sand as at present there are no direct methods for assessing the demand for sand. The demand mostly depends upon the development activities going on in the State, which is dynamic in nature. However, it can be inferred that there is a vide gap in demand and supply of sand, which can be bridged by increasing the production of M-Sand. Thus there is an urgent need to mull upon the various possibilities for incentivizing the production of M-Sand.

Basic Objectives for Promoting M-Sand

The main objectives for promoting the M-Sand, are:

i. To prevent damage to eco system by rationalizing the use of river sand in a conserved manner without causing damage to environment.
ii. To promote the use of M-Sand as an alternative to River Sand, given the increasing demand of sand for domestic consumption as well as the scarcity of river sand.

iii. To meet out the deficit in demand and supply scenario of sand in the States.
iv. To encourage the MSME sector in setting up of Manufactured Sand units across all districts, generate employment and effective utilization of resources.

Proposed Steps for Promoting M-Sand

For promoting the use of M-sand, the need of the hour is to provide the **Industry Status** to all such M-Sand manufacturing Units and to provide suitable provisions in the Minor Mineral Concession Rules of each of the State for facilitating the availability of requisite type of stone/boulder quarries for M-Sand units as a backward linkage, and for giving preference in allocation of such quarries to the interested M-Sand manufacturers.

By giving them Industry Status each of such units will be facilitated by the incentives and the concessions to be given to the Industry, in each of the States, as per their Industrial Policy or Micro Small & Medium Enterprises Policy (MSME Policy).

To study the advantages of giving the Industry Status to such M-Sand Units the Industrial Policy and the Government orders of the States of **Andhra Pradesh, Telangana, Karnataka** were studied in details, as the M-sand production and utilization is most popular in these southern States. Following are the findings in each of such State,

(A) ANDHRA PRADESH

Estimated annual demand for sand in Andhra Pradesh is about 200 Lakh Cbmt and is projected to go upto 250 Lakh cum. Estimated annual production of River Sand is about 100 Lakh Cbmt. Hence, quantity required to meet the present surplus annual demand is 100-150 Lakh Cbmt.

Government of Andhra Pradesh has its Micro Small and Medium Enterprises (MSME) Policy, 2015-20, for according top priority to development of Micro, Small and Medium Enterprises for catalyzing growth. This policy proposes a holistic package of interventions encompassing fiscal incentives, capital and interest subsidies, incentives on land and power, financial aid for skill development and quality improvement and marketing assistance. As per this policy the definition of Micro, Small and Medium Enterprises in manufacturing sector in terms of investment in Plant and Machinery is as,

- Micro : Investment does not exceed Rs. 25 lakhs
- Small : Investment is more than Rs.25 lakhs but does not exceed Rs. 5 crore
- Medium: Investment is more than Rs. 5 Crore but does not exceed Rs. 10 cr.
- Large Industry: means an industry in which the investment on plant and machinery is less than Rs 500 crores except Micro, Small and Medium Enterprises.

Facilitation of Industries

- Strengthening of existing Single Window Clearance System by the Telangana State Industrial Project Approval and Self Certification System (TS-iPASS).
- Creation of “Investment Promotion Cell”

- A Cell would be created in the Commissionerate of Industries to facilitate the investors in effective manner with adequate infrastructure and outsourcing the support services to facilitate investors by providing pre-investment services and also to facilitate them to get requisite clearances under the TS-iPASS till the project is commissioned.

(B) KARNATAKA

The Government of Karnataka has announced the New Industrial Policy 2014-19, vide **Government Order No. CI 58 SPI 2013 Bengaluru Dated: 1-10-2014.**

The **objectives** of the Karnataka Industrial Policy 2014 -19 are as follows:

(i) To maintain an industrial growth rate of 12 % per annum

(ii) To enhance the contribution of manufacturing sector to the State GDP from present level of 16.87 to 20% by the end of the policy period

(iii) To attract investment of Rs. 5 lakh crore

(iv) To create employment opportunities for 15 lakh persons

(v) To create an environment to enhance ease of doing business in the State.

Government desires to achieve these objectives through various policy measures and one of these is providing attractive package of incentives and concessions to various categories of MSMEs, Large, Mega, Ultra Mega and Super Mega enterprises. The above industrial policy and package of incentives and concessions shall come into effect from 01.10.2014 and will have a span of five years i.e. up to 30.9.2019.

As per the Industrial policy of Karnataka State, the classification of various Manufacturing Enterprises (defined under item 1.0 of the policy) based on the investment in plant and machinery and as per the MSMED Act, 2006, is furnished below,

- **Micro Enterprises** : Investment is up to Rs. 25 lakhs
- **Small Enterprises** : Investment above Rs.25 lakhs and up to Rs.500 lakhs (5 Crores)
- **Medium Enterprises**: Investment above Rs. 500 lakhs (5 Crore) and up to Rs. 1000 lakh (10 Crores)
- **Large Project/Industry/Enterprises** :An Industrial Enterprise which is not classified as Micro, Small and Medium Enterprise and with investments uptoRs. 250 Crores is classified as Large Enterprise.

Investment / capital investment:

For the purpose of package of incentives and concessions, investment/capital investment shall mean investment made in fixed assets of the Enterprise.

In order to create a strong industrial base and for the overall development of the State, the taluks are grouped as different zones in order to provide different incentives and concessions. The zones are as follows,

- The Hyderabad Karnataka area is grouped into two zones viz, HK-1, HK-2
- Area other than Hyderabad Karnataka area is grouped into three zones viz, OHKZ-1, OHKZ-2, OHKZ-3
- The projects under implementation at the time of announcement of this policy in the above specified zones shall be required to commence commercial production before 31st August, 2

A) <u>Investment Promotion Subsidy</u>

Investment promotion subsidy shall be available to Micro, Small Enterprises and Medium Manufacturing and eligible service sector Enterprises as per Annexure-X as detailed below. However the study has been confined only to the General category Entrepreneurs.

A	Micro Enterprises	***i) Other than Hyderabad Karnataka Area***
		Zone 1: 25% Value of Fixed Assets (VFA) (max. Rs. 15.00 lakh)
		Zone 2: 20% Value of Fixed Assets (VFA) (max. Rs. 12.00 lakh)
		Zone 3: 15% Value of Fixed Assets (VFA) (max. Rs. 9.00 lakh)
		Zone 4: Nil
		ii) Hyderabad Karnataka Area
		HK Zone 1: 30% Value of Fixed Assets (VFA) (max. Rs. 18.00 lakh)
		HK Zone 2: 25% Value of Fixed Assets (VFA) (max. Rs. 15.00 lakh)
B	Small Enterprises	***i) Other than Hyderabad Karnataka Area***
		Zone 1: 20% Value of Fixed Assets (VFA) (max. Rs. 40.00 lakh)
		Zone 2: 15% Value of Fixed Assets (VFA) (max. Rs. 30.00 lakh)
		Zone 3: 10% Value of Fixed Assets (VFA) (max. Rs. 20.00 lakh)
		Zone 4: Nil
		ii) Hyderabad Karnataka Area
		HK Zone 1: 25% Value of Fixed Assets (VFA) (max. Rs. 45.00 lakh)
		HK Zone 2: 20% Value of Fixed Assets (VFA) (max. Rs. 40.00 lakh)
C	Medium	***i) Other than Hyderabad Karnataka Area***

[manufacturing Enterprises (as defined in MSMED ACT and those who provide minimum 25 direct employment)]	Zone 1 : Rs. 50.00 lakh Zone 2 : Rs. 40.00 lakh Zone 3 : Rs. 30.00 lakh Zone 4 : Nil ***ii) Hyderabad Karnataka Area*** HK Zone 1 : Rs. 55.00 lakh HK Zone 2 : Rs. 50.00 lakh

B) Exemption from Payment of Stamp Duty & Concessional Registration Charges

Stamp duty to be paid in respect of (i) loan agreements, credit deeds, mortgage and hypothecation deeds executed for availing loans from State Government Including VAT loan from C&I Department and/or State Financial Corporation, National Level Financial Institutions, Commercial Banks, RRBs, Co-operative Banks, KVIB/KVIC, Karnataka State SC/ST Development Corporation, Karnataka State Minority Development Corporation and other institutions which may be notified by the Government from time to time for the initial period of five years only, and

(ii) for lease deeds, lease-cum-sale and absolute sale deeds executed by industrial enterprises in respect of industrial plots, sheds, industrial tenements by KIADB,KSSIDC, KEONICS, Industrial Co-operatives and approved private industrial eStates shall be exempted as below:

I. <u>MSME</u>

CATEGORY OF ENTREPRENEUR	AREA AND ZONE	RATE OF STAMP DUTY EXEMPTION	CONCESSIONAL REGISTRATION CHARGES
General	Other than Hyderabad Karnataka Area-Zone 1,2	100%	Re. 1 per Rs. 1000
	Zone 3	**75%**	Re. 1 per Rs. 1000
	Zone 4	**Nil**	**Nil**

Hyderabad Karnataka Area-Zone 1,2	**100%**	Re. 1 per Rs. 1000

II. <u>Large, Mega, Ultra Mega, Super Mega Enterprises</u>

AREA AND ZONE	RATE OFSTAMP DUTYEXEMPTION	CONCESSIONAL REGISTRATION CHARGES
Other than Hyderabad Karnataka Area-Zone 1 & 2	100%	Re. 1 per Rs. 1000
Zone 3	**75%**	Re. 1 per Rs. 1000
Zone 4	**Nil**	**Nil**
Hyderabad Karnataka Area-Zone 1 & 2	**100%**	Re. 1 per Rs. 1000

The exemption of stamp duty and concessional registration charges are also applicable to lands purchased under Section 109 of the KLR Act 1961, and also for direct purchase of industrially converted lands for the projects approved by SHLCC/SLSWCC/DLSWCC. This incentive will also be applicable for the land transferred by KIADB to land owners as compensation for the land acquired.

The exemption of stamp duty and concessional registration charges are also available for registration of final sale deed in respect of lands, sheds, plots, industrial tenements after the expiry of lease period at the rate as specified in the Industrial Policy which was in vogue at the time of execution of lease-cum-sale deed.

C) Reimbursement of Land Conversion Fine

The payment of land conversion fee for converting the land from agriculture use to industrial use will be reimbursed as detailed below:

<u>I. MICRO, SMALL AND MEDIUM ENTERPRISES</u>

CATEGORY OF ENTREPRENEUR	AREA AND ZONE	RATE OF REIMBURSEMENT
General	Other than Hyderabad Karnataka Area-Zone 1,2	100%
	Zone 3	**75%**

Zone 4	**Nil**
Hyderabad Karnataka Area-Zone 1,2	**100%**

II. LARGE, MEGA, ULTRAMEGA AND SUPER MEGA ENTERPRISES

AREA AND ZONE	RATE OF REIMBURSEMENT
Other than Hyderabad Karnataka Area-Zone 1,2	100%
Zone 3	**75%**
Zone 4	**Nil**
Hyderabad Karnataka Area-Zone 1,2	**100%**

Reimbursement of Land Conversion fine is available only to Manufacturing MSMEs and Large, Mega, Ultra Mega and Super Mega and Selected Service Enterprises. The waiver of conversion fine will be reimbursed to the eligible enterprises after implementation of projects i.e. after commencement of the commercial production by the enterprises.

D) Exemption from Payment of Entry Tax

I. MICRO, SMALL AND MEDIUM ENTERPRISES

Category of entrepreneur	Area and zone	During implementation	During operational phase
General	Other than Hyderabad Karnataka Area Zone 1, 2 & 3 and HK Zone 1 & 2	100% Exemption from payment of Entry Tax on ***'Plant &Machinery and capital goods'*** for an initial period of three(3) years from the date of commencement of	On raw materials, inputs, component parts & consumables (excluding petroleum products) [wherever applicable] for a period of Five (5)

		project implementation. For this purpose, the term Plant & Machinery and Capital Goods also includes Plant & Machinery and Equipments procured for captive generation of electricity.	years from the date of commencement of commercial production.
	Zone 4	NIL	NIL

II. LARGE, MEGA, ULTRA MEGA AND SUPER MEGA ENTERPRISES

In other than HK Zone 1, 2 & 3 and HK Zone 1 & 2 these units are eligible for 100% exemption from payment of Entry Tax on ***'Plant & Machinery and Capital Goods'*** for an initial period of three years for Large and Mega and five years for Ultra Mega and Super Mega enterprises from the date of commencement of project implementation. For this purposes, the Plant and

Machinery and Capital Goods also includes Plant & Machinery and Equipment procured for captive generation of electricity / power.

On raw materials, inputs, component parts & consumables (excluding petroleum products) [wherever applicable] for a period of five years from the date of commencement of commercial production. In respect of Mega, Ultra Mega and Super Mega Enterprises, additional One, Two and Three years will be allowed respectively for operational period.

E) Interest Subsidy for Micro Enterprise

Interest subsidy at 5% to General category entrepreneurs and 6% to SC/ST, Women, Minority, Backward Class (category 1 & 2A only), Physically challenged & Ex-servicemen entrepreneurs on term loans shall be provided to micro manufacturing enterprises who avail term loan from bank/financial institutions subject to prompt repayment of the loan installments. The interest subsidy is payable only on the interest actually paid to financial institutions and not defaulted in payment of principle or interest installments. The amount of interest subsidy will be effective rate of interest (after deducting interest subsidy receivable by any institutions/ under any Government of India scheme) or 5% / 6% per annum whichever is less.

The period of interest subsidy is 6 years, 5 years and 4 years in other than HK Zone-1, Zone-2and Zone-3 and 7 years and 6 years in HK Zone 1 and 2, respectively. Interest subsidy shall be applicable/ eligible from the date of 1st loan released by Bank/Financial institution. However the enterprises has to claim the benefit only after commencement of commercial production.

F) Exemption from Tax on Electricity Tariff

I. MSME for General Category Entrepreneurs

100% exemption of tax on electricity tariff for the initial period of six years, five years, four years in Zone 1, Zone 2 and Zone 3 other than HK area and seven and six years in HK Zone 1 and HK Zone 2 area respectively.

G) Incentives to Micro and Small Enterprises for obtaining ISO Certification

In order to enhance the competitive strength of the Micro and Small Enterprises, the Government introduced an incentive scheme for their quality improvement and environment management. The scheme provides incentive to those micro and small enterprises that have acquired ISO 9000/ISO 14001/HACCP certifications/Other Nationally and Internationally recognised Certifications. The scheme for reimbursement of ISO series Certification Charges in operation since 1998 has now been enlarged so as to include reimbursement of expenses for acquiring ISO 14001 certification also.

H) Incentives to Micro and Small Enterprises obtained BIS Product Certification:

Based on Karnataka Industrial Policy 2014-19, KARNATAKA COUNCIL FOR TECHNOLOGICAL UPGRADATION (KCTU) is providing incentives to MSEs obtained BIS Product Certification. The monitory benefit will be as under.

Schemes envisages reimbursement of fees payable to BIS and reimbursement of testing equipment as per the above table.

The incentive is extended to The New or the existing Micro and Small Manufacturing Enterprises which undertakes Expansion/ Modernisation/ Diversification programme (Both own and financed enterprises) in all the zones in the State.

I) Interest free loan to Large, Mega, Ultra Mega and Super Mega Enterprises onNet VAT and CST

All Large, Mega, Ultra Mega & Super Mega Enterprises established in Zones 1, 2, 3 and HK Zone 1 & 2 will be eligible for an interest free loan on Net VAT and CST, subject to industries providing minimum number of direct employment as specified.

Investment range on fixed assets	Interest free loan in other than Hyderabad Karnataka area	Interest free loan in Hyderabad Karnataka area

<table>
<tr>
<td>

Large Enterprises:

(i.e. investment on fixed assets above Rs. 10 crore to Rs. 250 crore)

Minimum direct Employment 20Number for first Rs.10 crore& additional35 employment for every additional investment of Rs.50crore proportionately.

</td>
<td>

100% of Net VAT + CST will be sanctioned as interest free loan from the date of commencement of commercial production as follows,

<table>
<tr><td>Zone</td><td>Max. period</td><td>Investment limit</td></tr>
<tr><td>1</td><td>9</td><td>65% of VFA</td></tr>
<tr><td>2</td><td>8</td><td>50% of VFA</td></tr>
<tr><td>3</td><td>7</td><td>40% of VFA</td></tr>
</table>

The loan shall be repaid as follows :

The loan availed in the first year shall be repaid in the 11th year and the second year in the 12th year & so on.

This incentive is limited to either the period or loan limits whichever is reached earlier and no carry forward is permitted.

</td>
<td>

100% of Net VAT + CST will be sanctioned as interest free loan from the date of commencement of commercial production as follows

<table>
<tr><td>Zone</td><td>Max. period</td><td>Investment limit</td></tr>
<tr><td>1</td><td>10</td><td>75% of VFA</td></tr>
<tr><td>2</td><td>9</td><td>60% of VFA</td></tr>
</table>

The loan shall be repaid as follows:

The loan availed in the first year shall be repaid in the 11th year and the second year in the 12th year & soon.

This incentive is limited to either the period or loan limits whichever is reached earlier and no carry forward is permitted.

</td>
</tr>
</table>

Provision in the Central Act and Rules

As per Section 3(e) of the **Micro, Small and Medium Enterprises Development Act, 2006**,

"enterprise" *means an industrial undertaking or a business concern or any other establishment, by whatever name called, engaged in the manufacture or production of goods, in any manner, pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951 (55 of 1951) or engaged in providing or rendering of any service or services;*

Further, the Section 7 of the Act prescribers the classification of enterprises which is reproduced below,

Classification of enterprises*.—(1) Notwithstanding anything contained in section 11B of the Industries (Development and Regulation) Act, 1951 (65 of 1951), the Central Government may, for the purposes of this Act, by notification and having regard to the provisions of sub-sections (4) and (5), classify any class or classes of enterprises, whether proprietorship, Hindu undivided*

family, association of persons, co-operative society, partnership firm, company or undertaking, by whatever name called,—

(a) *in the case of the enterprises engaged in the manufacture or production of goods pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951 (65 of 1951), as—*

*(i) a **micro enterprise**, where the investment in plant and machinery does not exceed twenty five (25) lakh rupees;*

*(ii) a **small enterprise**, where the investment in plant and machinery is more than twenty-five lakh rupees but does not exceed five crore rupees; or*

*(iii) a **medium enterprise**, where the investment in plant and machinery is more than five crore rupees but does not exceed ten crore rupees;*

(b) *in the case of the enterprises engaged in providing or rendering of services, as—*

(i) a micro enterprise, where the investment in equipment does not exceed ten lakh rupees;

(ii) a small enterprise, where the investment in equipment is more than ten lakh rupees but does not exceed two crore rupees; or

(iii) a medium enterprise, where the investment in equipment is more than two crore rupees but does not exceed five crore rupees.

A closure look of the First Schedule reveals that the Sand as manufactured from artificial crushing and processing of stones/boulders is not considered as a product or article which in turn does not give a recognition of Sand manufacturing unit as an INDUSTRY.

Conclusion

The artificial sand produced by proper machines can be a better substitute to river sand. The sand must be of proper gradation (it should have particles from 150 microns to 4.75 mm in proper proportion). When fine particles are in proper proportion, the sand will have fewer voids. The cement quantity required will be less. Such sand will be more economical. Demand for manufactured fine aggregates for making concrete is increasing day by day as river sand cannot meet the rising demand of construction sector. The particle shape of the aggregates is very important for making concretes. The grains should be of durable material and the size of the grains must be such that it should give minimum voids. The presence of clay and slit is avoided since it retards the setting of the cement and making mortar. It is not possible in river sand that all particles should be of higher strength.

This can be achieved only by making sand with the help of machines. In machine-made sand, we can use the raw material of higher strength. The manufactured sand produced by proper machines can be better substitute to river sand. M-Sand is ready-to-use-sand with no wastage since it do not have organic impurities. The superior shape and gradation of M-Sand ensures high strength concrete with significant savings in cement. Looking into all the above qualities of M-

Sand it is the high time to promote its use. This in turn will preserve our water bodies and ecological system for survival of the mankind and for ensuring the intergenerational equity.

6.8 Annexure VIII Assessment of M-Sand as an alternate to river Sand

Parameter	Assessment
Technically Acceptable	• As per IS-383, the chemical characteristics of M-sand are similar to that of river sand having similar strength. • The product is moisture free, as it is made of crushed Granite stone (or other raw materials) • The silt content in river sand is around 0.45% whereas in M-sand it is about 0.2%. • There is no shrinkage or reduction in the quantity due to the absence of moisture. • Grading curve of river sand as well as M-sand falls within the IS 383 zone II limits. • Bulk density and specific gravity of M-sand are comparable to those of river sand. • Bond strength of M-sand concrete is marginally higher than that of river sand concrete. • The mortar made of M-sand shows higher compressive strength and modulus for masonry when compared with the values for masonry using river sand. • Water absorption in M-sand is higher, 1.6% as compared to 1.15% in river sand. • About 7.8 % of particles of natural sand pass through 150 micron sieve, whereas 18 % of M-sand particles pass through the same. As per IS 383:1970 limit is 0-20% for crushed stone sand **Tests Carried on M-sand** • Rapid Chloride Permeability Test (RCPT) conducted to test the durability of M-sand mixes indicate the RCPT values for concrete with M-sand are less than 1000 coulombs , which indicate a very low Chloride permeability and good quality dense concrete. • Water permeability test with M-sand are 14 mm and 11 mm depth of penetration for M25 and M40 grade respectively which indicate very good dense structure of concrete. • Drying Shrinkage of M25 and M40 grades concrete samples with M-sand are 0.043% & 0.048% respectively, which indicate shrinkage are within values estimated from Drying Shrinkage estimation curve.

Economically Feasible	It is economically feasible
Implementable option in States	As of now, only around 180 plants are operational in States like Karnataka, Andhra Pradesh, Gujarat and Telangana.
Scalable Option	Yes, in States such as Andhra Pradesh, Telangana, Maharashtra, Gujarat, Odisha, Karnataka

6.9 Annexure IX - M-sand policy of Karnataka as mentioned in the KMMCR

Rule 31-ZC: SPECIAL PROVISIONS FOR M-SAND

1. Notwithstanding anything contained anywhere in these Rules, Manufactured Sand (herein after called as M-sand) units commissioned or operational as on the date of commencement of these rules producing M-sand of the quality that meet the standards for being used in building construction for use in masonry and concrete shall be granted quarry lease, following the procedure prescribed hereunder, to enable them to produce M-sand for the next twenty years at a capacity that may go up to two times their present average annual production in the last three years or up to two times the capacity shown in the environmental clearance of the quarry lease that they may have.

2. M-sand units commissioned or operational as on the date of commencement of these rules shall, if they are in requirement of quarry blocks apply to the Commissioner or Director, Department of Mines and Geology for their requirement with exact area, sketch and DGPS readings of the boundary points of quarry blocks identified by these units within a distance of ten kilometres of the present location of the M-sand unit.
   Provided that in case of the M-sand unit is owned by a company or firm then the application shall be made by the said company or firm that owns the M-sand unit, and in case the M-sand Unit is owned by an individual then the application shall be made by the concerned individual who owns the M-sand unit.
   Provided further that an application under Form AQL shall be made within a period of six months of the commencement of these rules.

3. The Commissioner or Director, Department of Mines and Geology shall satisfy himself through getting necessary tests done in laboratories or institutes notified by Government that the concerned unit is producing M-sand of quality that meets the standards for being used in building constructions for masonry and concrete.

4. The Commissioner or Director, Department of Mines and Geology shall assess the requirements of quarry blocks size to be allotted to the applicant to enable him to produce M-sand for the next twenty years at a rate up to two times the annual average production done in the past three years or up to two times the capacity shown in the environmental clearance in case the applicant undertakes to enhance the production of M-sand within a period of six months from the date of grant of quarry lease.

5. The Commissioner or Director as the case may be shall then issue a letter of intent for grant of quarry lease for the M-sand unit clearly specifying the area to be allotted with DGPS readings of the boundary points.

6. Based on the letter of intent, the applicant of the M-sand unit shall proceed to procure the necessary No Objection Certificates from the Revenue Department and the Forest Department, environmental as well as pollution board clearances and any other necessary statutory clearances that may be needed as under existing applicable law.

7. On submission of the No Objection Certificates and other necessary clearances the Commissioner or Director of Mines and Geology, as the case may be, shall grant quarry lease to the applicant for a period of twenty years, clearly specifying the extent of grant with the DGPS readings of the boundary points of the lease, the period of the grant and the minimum annual production of M-sand that the lessee shall produce.

   Provided that the M-sand unit granted quarry lease under these rules shall pay in addition to Royalty, and additional sum which shall be equal to fifty per cent of the Average Additional Periodic Payment by the holders of quarry lease or license through auction within the Taluk if such average is available for the Taluk, or within the District, if such average is not available for the Taluk, or within the neighboring Districts if such average is not available for the District, and if such average is not available, within the neighboring Districts, such Average Addition Periodic Payment shall be deemed to be fifty per cent of Royalty. This deemed percentage shall be reset after three years based on average obtained in auction by 31-3-2019, and if no auctions have taken place by 31-3-2019 for deriving the average from Taluk , district or neighboring districts, as the case may be, then the deemed rate will become the final rate for the Average Additional Periodic Payment.
   Provided further that when such Royalty and additional Periodic Payment is paid as provided above, the payment to District Mineral Foundation by the lessee shall be as payable by holders of lease in an auction.

8. In case the grantee fails to enhance the production as indicated in the lease within six months of the signing of quarry lease deed, the grant made under these rules shall be liable to be cancelled.
   Provided that in case the grantee is able to show genuine reasons for not being able to enhance production within the above prescribed period of six months the Commissioner shall have the power to extend the period up to another six months.

9. In case market conditions are such that demand for M-sand has come down substantially, then the minimum annual production that has been indicated in the quarry lease conditions can be suspended by the Commissioner for a period that would be indicated in an order issued by the Commissioner in this regard and during such period the M-sand units shall produce as per the quantity shown in the said order.

10. M-sand units shall produce M-sand of the quality that meets the specified standards for being used in building construction for use in masonry and concrete and failure to do so will make the lease liable for cancellation:

    Provided that M-sand units shall keep a stock register of M-sand as well as by-products in a format prescribed by the Commissioner and update the stock register on a daily basis. Such stock register shall be kept in the premises of the concerned M-sand unit.
    Provided further that M-sand units shall declare to the Authorised Officer every month the quantity of M-sand and by products in opening balance, produced during the month, sold or disposed-off during the month and in closing balance at the end of the month.
    Provided also that the M-sand unit shall keep the M-sand and the by-products always physically separate in stock.

11. Any officer authorized by the Commissioner or Director of Mines and Geology or by the Deputy Commissioner of the District in this regard, by a general or special order, or a member or the District or Taluk Committee shall be competent to draw samples of M-sand produced by the lessee and get it tested in laboratories or institutes notified by the Government and if the sample fails to meet the standards for M-sand to be used in building construction for use in masonry and concrete, the Competent Authority shall issue a notice to the M-sand unit to stop production forthwith and suspend supply of M-sand and on receipt of such notice the M-sand unit shall comply with the order forthwith.

12. The Competent Authority shall give a period of sixty days to the M-sand unit to comply with the standards for M-sand to be used in building construction for use in masonry and concrete standards and if the unit fails to comply with these standards, the Quarrying Lease shall be cancelled.

13. The stock of M-sand in the M-sand unit that does not meet the standards for M-sand to be used in building construction for use in masonry and concrete shall be seized and confiscated by the Competent Authority and disposed-off in a manner that it cannot be used for building construction for use in masonry and concrete.

14. The quarry lease shall be liable to be cancelled if the M-sand unit is found to be producing for the third consecutive time M-sand of quality that does not meet standards for M-sand to be used in building construction for use in masonry and concrete.

15. Whoever produces and or supplies, for construction purpose, M-sand that does not meet the specified standards for M-sand to be used in building construction for use in masonry and concrete shall be punished and imprisonment of up to two years or fine that may extend up to rupees five lakh or both.

6.10 Annexure X- G.O. of Andhra Pradesh for promotion of M-sand

GOVERNMENT OF ANDHRA PRADESH
ABSTRACT

MINES & QUARRIES – Promotion of Manufactured Sand in place of River Sand in construction activity - Manufactured Sand Policy-2016 – Orders – Issued.

---------- INDUSTRIES AND COMMERCE (MINES-II) DEPARTMENT

G.O.Ms.No.38 Date: 17-03-2016.

Read the following:

1) DM&G Letter No. 3337/P/2014, dt: 27.10.2015.
2) G.O.Ms.No. 19, Ind. & Com. (M.II) Dept., dt: 15.01.16.
3) G.O.Ms.No. 20, Ind. & Com. (M.II) Dept., dt: 15.01.16.
4) G.O.Ms.No.53, Ind. & Com. (Prog-I) Dept., Dt: 23-07-2015.

Order:-

*****In the reference 1st read above, the Director of Mines & Geology, Hyderabad submitted the proposal for issuance of a Policy to promote the development of Manufactured Sand industries since the Manufactured Sand (M-Sand) is an alternative to the River Sand in construction activity in view of the increase in demand of sand for domestic consumption as well as the scarcity of River Sand.

2. In the G.O 2nd and 3rd read above, the Government committed to encourage Manufactured Sand as an alternative to River Sand in order to conserve River Sand in the State.

3. Hence, the present policy for promoting Manufactured Sand industries in the State to utilize Manufactured Sand in place of River Sand in construction activity is issued.

A) PREAMBLEMANUFACTURED SAND POLICY – 2016a) Rivers, Forests, Minerals and such other resources constitute a Nation's natural wealth. These resources are not to be frittered away and exhausted by any one generation. Every generation owes a duty to succeeding generations to develop and conserve the natural resources of the Nation in the best possible way in the larger public interest. The Principle of Intergenerational Equity is recognized world over, as one generation of human kind has an obligation to conserve and pass on the natural resources to the succeeding generation.

River systems in the State shall not be treated as a source of Sand as conservation of Water-bodies is paramount obligation of the State which is an essential resource for survival of the mankind. There is no alternate for Water but there is alternate for River Sand in the form of M-sand, which is produced from crushing of the Rock to a required size of 150 microns. Manufactured sand is produced by crushing rocks, quarry stones or larger aggregates pieces into sand- sized particles. Rocks or quarry stones are blasted and subjected to a series of crushing cycles to reduce the particles to the size of naturally occurring sand. The produced sand is then sieved and washed to remove fine particles and impurities, and tested for various quality aspects before it is deemed fit as a construction aggregate. Manufactured Sand is produced from crushing of the rock to required size and gradation suitable for construction industry.

The use of Manufactured Sand is steadily growing due to various reasons. Global scarcity for natural sand exists. Injudicious sand mining and continuous depletion of natural aggregate sources have led to the implementation of new environmental/land use legislations which has made the procurement of natural sand difficult and expensive. In addition, presence of silt and clay in natural sand is another reason for increased use of Manufactured sand. Natural sand is inherently high in silt and clay. It can be damaging for screed and concrete, if the sand is not sufficiently processed to bring down clay and other impurity content to acceptable levels. Manufactured sand also reduces the wastage of low-value by-products in the quarries. The low value aggregates formed as a by-product of rock crushing can be utilized efficiently to create a high value product.

M-Sand also offers higher flexural strength, better abrasion resistance, higher unit weight and lower permeability. Due to these advantages, manufactured sand is being used on a large scale by the construction sector.

a) **Environmental concerns regarding River Sand Quarrying:**

i) Sand quarrying is desirable only up to permissible limits as it prevents channel shifting, progress of flood plain and erosion effects on opposite banks of river bed.

ii) However, indiscriminate sand quarrying ultimately results in lowering of fresh water table and draught conditions.

B) Objectives of M-Sand Policy:

The main objectives are:

i) To prevent damage to eco system by rationalizing the use of river sand in a conserved manner without causing damage to environment.

ii) To promote the development of the Manufactured Sand industry as an alternative to River Sand, given the increasing demand of sand for domestic consumption as well as the scarcity of river sand.

iii) To encourage the MSME sector in setting up of Manufactured Sand units across all districts, generate employment and effective utilization of resources within Andhra Pradesh.

C) Demand and Supply of Sand:

Estimated annual demand for sand in Andhra Pradesh is about

200 Lakh Cbmt and is projected to go up to 250 Lakh cum. Estimated annual production of River Sand is about 100 Lakh Cbmt. Hence, quantity required to meet the present surplus annual demand is 100-150 Lakh Cbmt.

D) Future demand for sand:

i) Visakhapatnam, Guntur, Nellore, Tirupathi, Vijayawada& Kurnool are major centers of urbanization, and consume about 50-

60% of the sand produced in the State. These cities would continue to be major drivers for sand consumption in the State.

ii) The proposed capital of the State at Vijayawada would also be a major demand driver for sand consumption and in fact other building materials also, due to the construction boom and other major civil works expected in the city.

iii) There are plans for upgrading the domestic airports of Visakhapatnam, Rajahmundry, Gannavaram, Kadapa & Tirupathi to international airports – this will also entail major construction works which will in turn drive demand for sand.

iv) The road connectivity within the State and with adjacent States is expected to improve along with the widening of roads – this will also drive demand for sand.

E) Manufactured Sand and Potential for establishment of Manufacturing Units:

1) (a) **Manufactured Sand (M-Sand)** is fine aggregate produced by crushing hard rock by using crushing, shaping, screening and classifying methods. Such Manufactured Sand obtained must confer to IS Code and should be suitable for construction activity. Fine particles of less than 150 Microns size shall not be present in excess quantity than the percentage specified in the IS code. Stone dust obtained in conventional crushing units shall not be treated as Manufactured Sand as it is detrimental for use in construction and is **not eligible for claiming incentives**.

(b) M-Sand unit for the purpose of availing incentives is defined as a unit which produces atleast 50% of its total produce as Manufactured Sand.

2) Availability of Raw Material for Manufactured Sand in the State:

(i) Vast deposits of Charnokite suite of rocks and Khondalites, which are suitable to establish Manufactured sand units in Visakhapatnam, Srikakulam, and Vizianagaram Districts.

(ii) Vast tracts of Quartzites, Pegmatites in addition to Granite Rock deposits are source rocks to setup Manufactured sand units in Chittoor, Kadapa and Anantapuramu Districts.

3) Presently there are about six Manufacturing Sand units in the State.

It is estimated that 30 or more such units of 1000 Cbm per day are needed just to meet the current unmet demand of 100 Lakh Cbm. The growing demand for sand provides the potential for further units to be established based on the vast Raw material source available in the State.

F) <u>Incentives to be provided for the Manufactured Sand Industry in A.P:</u>

1) For establishment of Manufactured Sand Units, the following incentives will be provided, subject to the sale happens within the State and the incentives **shall be apportioned in the ratio of Manufactured sand produced to the total unit production**.

All manufacturing sand units will be accorded industry status.

In addition to the above, the following incentives will be extended to different category of industries as per MSME Policy 2015-20.

1. Micro and Small Enterprises

i) <u>Stamp Duty:</u>

100% of stamp duty and transfer duty paid by the industry on purchase or lease of land meant for industrial use shall be reimbursed.

100% of stamp duty for lease of land/ shed/ buildings, mortgages and hypothecations shall be reimbursed.

ii) <u>VAT/CST/ SGST:</u>

100% of net VAT/CST/SGST shall be reimbursed for a period of 5 years from the date of commencement of commercial production.

iii) <u>Power</u>:

Fixed power cost reimbursement is proposed to be provided @ Rs.1/- per unit for 5 years from the date of commencement of commercial production. This will apply to open access units as well.

Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

The units generating power from captive power plant will not be eligible for the subsidy.

iv) Interest Subsidy:

Interest subsidy on the term loan taken for fixed capital investment by new Micro and Small enterprises in excess of 3% per annum subject to a maximum of 9% per annum for 5 years from the date of commencement of commercial production.

v) All other incentives as per the MSME Policy 2015-20.

1. Medium Enterprises

i) Stamp Duty:

100% of stamp duty and transfer duty paid by the industry on purchase or lease of land meant for industrial use shall be reimbursed.

100% of stamp duty for lease of land/ shed/ buildings, mortgages and hypothecations shall be reimbursed.

ii) VAT/CST/SGST:

75% of net VAT/CST/ SGST shall be reimbursed for a period of 7 years from the date of commencement of commercial production or up to realization of 100% fixed capital investment, whichever is earlier.

iii) Power:

Fixed power cost reimbursement is proposed to be provided @ Rs.1/- per unit for 5 years from the date of commencement of commercial production. This will apply to open access units as well.

Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

The units generating power from captive power plant will not be eligible for the subsidy.

iv) Interest Subsidy:

Interest subsidy on the term loan taken for fixed capital investment by new Medium M-Sand units enterprises @5% per annum for 5 years from the date of commencement of commercial production.

v) All other incentives as per the MSME Policy 2015-20.

1. Large Enterprises

All the Large Enterprises will be provided incentives as per the Industrial Development Policy 2015-20.

Special incentives:

a. Interest subsidy for Micro and small sand Manufactured units shall be applicable as per MSME Policy-2015 and for medium units, 5% subsidy on interest shall be provided.

b. 10% reduction of VAT on purchase of machinery/ equipment used in Manufactured Sand units.

c. 50% concession on seigniorage fee on raw materials used in the process of Manufacturing Sand shall be extended both for the new and existing industries.

2) **For all existing M-Sand units**, Special teams will be constituted to study each unit on scientific lines in terms of the Technology adopted, investments made, the production and sales details and P&L accounts of the units since inception, etc., and suggest a customized package of measures both financial and non-financial, for units competitive, as a one off measure delinked from the incentive policy. The said process shall be completed within 60 days from the date of representation made by the existing M-Sand unit holder.

3) All M-Sand units availing incentives from Government shall supply at least 1/3rd of their production to Govt., works at a rate decided by the District Collector.

4) All existing M-Sand units are eligible for Seigniorage fee concession, power cost reimbursement and VAT/CST/SGST reimbursement as mentioned above based on the category of the industry.

5) Concessions for Conversion of existing stone crushers into M-Sand Units:

1. 10 % Concession on VAT for purchase of machinery to convert existing crushers into M-Sand units or a Green field M-Sand unit will be claimed only on the machinery required for Manufacture of M-Sand.

2. 5% interest subsidy for conversion of crusher units into M- Sand units in case of Medium units and 9% interest subsidy in case of Micro and Small units as stipulated in MSME policy on the Term loan taken for fixed capital investment on M-Sand manufacturing activity.

3. Reimbursement of power incentive will be provided subject to condition of installation of separate electric meter for measuring power consumed by M-Sand manufacturing unit, excluding coarse aggregate producing machinery.

G) Assurance from Govt., to purchase 50% of M-Sand production by the Units:

All Government Engineering Departments consuming sand in their civil works shall insist on the following:

i) Imposition of a condition in their contracts that at least 50% of the total quantity of sand required in such works shall be met by Manufactured sand produced from the Units located within 50 Km radius of the works.

ii) This condition will be extended in phased manner depending on the increase of establishment of Manufactured sand units.

H) <u>Proposed implementation approach:</u>

i) 88 potential mineral areas have been provisionally identified for allotment to Manufactured Sand units. Director of Mines & Geology is directed to indentify new mineral bearing areas for manufacturing Sand.

ii) The Director of Mines & Geology is directed to take action for issuance of RFP for the provisionally identified mineral bearing areas and also for the new mineral bearing areas for allotment to M-Sand units.

iii) The Director of Mines & Geology is also directed to issue RFP in

30 days with the suitable technical and financial parameters for selection of entrepreneurs duly obtaining prior approval of the Government.

4. This orders issues with the concurrence of the Finance Department vide this Department e-file No.15471/M.II(1)/2015, dt.11.01.2016.

5. The Director of Mines & Geology, Hyderabad shall take necessary action in the matter.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

M. GIRIJA SHANKAR,

SECRETARY TO GOVERNMENT (MINES & FP) (FAC)

To

The Director of Mines & Geology, Hyderabad. All District Collectors in the State.

All Joint Directors of Mines & Geology. }

All Deputy Directors of Mines & Geology } through Director of

All Assistant Directors of Mines & Geology } Mines & Geology

All Departments of Secretariat, Hyderabad.

The Commissioner of Panchayat Raj, Hyderabad

The Commissioner and Director of Municipal Administration, Hyderabad. The Panchayat Raj & Rural Development (Pts.III) Department.

The Engineer-in-Chief, Water Resource Department, The Engineer-in-Chief, TR&B Departmnet,

The Engineer-in-Chief, Panchayath Raj Dept.,

The Managing Director, A.P.Housing Corporation.

The Managing Director, A.P.Police Housing Corporation.

Copy to:

The Secretary to Government of India, Ministry of Mines, New Delhi. The Law (H) Department.

The Industries and Commerce (M.I/M.III) Department. The P.S. to Hon'ble Chief Minister.

The P.S. to Hon'ble Minister for Mines and Geology. The P.S. to C.S.

The P.S.to Secretary to Government, Industries & Commerce Department. Sf/Sc

//FORWARDED :: BY ORDER//

SECTION OFFICER

6.11 Annexure XI – Section 9 of G.O. 3 of Telangana dated 08.01.2015

Section 9: Crushed Stone Sand as alternative to natural sand:

Alternate to River sand in the form of Crushed Stone Sand (Manufactured Sand) shall be encouraged from the conservation point of view to River bed/in-Stream sand quarrying operations at affordable cost be made available to meet the requirement of bulk consumers by following:

I. By according industry status as long as the unit manufactures 100% sand for availment of VAT and power subsidy prospectively.
II. Regular incentives will be extended for new units.
III. Preference in quarry lease allotment
IV. Existing Stone Crushers will be accorded ancillary status subject to crushed stone sand certified by ISO/NAC/NCCBM
V. The Government Departments shall be mandated to use at least 50% of manufactured sand in Government constructions.

6.12 Annexure XII – M-Sand related bullet points in G.O. 38 of Telangana dated 12.12.2014

3 (xvi) Rock sand manufactured can be accorded industry status as long as the unit manufactures 100% rock sand. Right now only 20% of the capacity is being used for manufacture of Rock Sand. VAT and power subsidy can be extended prospectively. Regular incentives can be given for new units.

(xvii) In addition, preference in quarry lease allotment will be given for units manufacturing Rock Sand. Existing Stone Crushers can be accorded ancillary status provided the crusher rock sand is certified by ISO/NAC/NCCMB.

(xvii) Government Departments shall be mandated to use at least 50% of Rock Sand in Government constructions.

6.13 Annexure XIII Assessment of Sand obtained by segregation of Coal Overburden as an alternate to river sand

Parameter	Assessment
Technical Acceptable	Studies conducted by Central Institute of Mine and Fuel Research show that processing of overburden yield 60 to 65% sand, 30 to 35% clay and 5% pebbles
Feasibility	WCL has committed to supply sand at one fourth of the market price to NIT Nagpur, which has entered a memorandum of understanding to supply sand for the low cost housing projects under Pradhan Mantri Awas Yojna (PMAY). Telangana State is also trying to check feasibility of suppling OB from The Singareni Collieries Company Limited (SCCL)
Implementable option in States	All Coal bearing States e.g. Jharkhand, Bihar, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Maharashtra, Gujarat etc.
Scalable Option	WCL has proposed to set up a sand segregation plant of 200 cubic metre per day capacity near Nagpur. Approx. OB removal every year is 200 million m3 and Can supply 20% of total quantity = 40 MM3 for processing. Further recovery factor is 60% and hence 24 MM3 (60%X40) can be prepared.

सत्यमेव जयते

भारत सरकार

खान मंत्रालय

शास्त्री भवन, डॉ. राजेन्द्र प्रसाद रोड, नई दिल्ली–110001

वेबसाइटः https://mines.gov.in

https://mines.gov.in

@MinesMinIndia