

Ref:- MSEDCL/MERC/Ag/ **No 01781**

Date:- **16/01/2020**

To,  
The Secretary,  
Maharashtra Electricity Regulatory Commission  
World Trade Centre, Centre No.1,  
13<sup>th</sup> Floor Cuffe Parade, Mumbai

**Subject:** MSEDCL's comments on Agriculture Sales Estimation Draft Analysis by Working Group

**Reference:** 1) MERC order dated 02.11.2018 for constitution of working group.  
2) Working group meeting dtd 02.01.2020

Sir,

MERC vide its order under reference (1), constituted the Working Group for Agricultural Consumption Study and subsequently held four meetings of Working Group. Further the Survey of feeders is started in Sept 19. Till date 70% survey is completed. Meanwhile Prayas Energy Group has presented draft analysis on Ag sales Estimation in Working Group meeting dated 02.01.2020.

Observations regarding following points has been presented by Prayas Energy Group,

- Analysis of survey data
- Metering status
- Pump usage
- Pump operational status
- Analysis of feeder load profile
- Estimation of AG sales for FY 18-19

After using some of the data Prayas Energy group has developed a methodology for estimation of Ag Sale.

**Prayas Energy Group methodology:**

- Feeder meter(FM) input as primary parameter
- FM - Technical Loss - non AG sales = Ag consumption (MU)
- Ag consumption / Ag connected load = feeder consumption norm (kWh / HP / yr and Hrs./ yr)
- Develop norm for each quartile, based on Ag load weightage/ratio of each sample feeder in that quartile to total Ag load of all sample feeders in that quartile
- Technical Loss range between - 6 % to 28 % , Wt. average - 18 %

Quartile	Number of Feeders	Wt. average Loss %
1st	21	19
2nd	8	19
3rd	11	16
4th	4	11

Below graph estimating AG sale with feeder loss range and Annual hours of pumping.  
Range – 21,000 MU to 23,800 MUs



Ag Sale Estimated using above methodology: 22,500MUs

#### Comments of MSEDCL on Estimation of AG sales for FY 18-19:

1. While estimating total MSEDCL Ag sale, Prayas has not considered 3,23,587 number of Ag consumers having 19,76,971 HP Load connected on mixed feeders.

#### 2. Technical Loss of Feeder:

The detail calculation of Technical loss arrived by Prayas is not available with MSEDCL, but from presentation shared it seems that technical loss is calculated on the basis of few assumption. Also, while capturing I<sup>2</sup>R loss, the current considered is not specified.

In order to determine requirement of new sub-stations, Augmentation of Power Transformer, New feeder erection, MSEDCL has updated the feeder level data like length of feeder, Conductor type, DTC capacity and load on DTC etc. in IT system of nearly 75% feeders. %Voltage regulation of these feeders is calculated through IT System. MSEDCL is taking all out efforts for updation of balance feeder information. On the basis of this data planning for HVDS is also being done. Further MSEDCL is doing GIS survey of all HT feeders. The SLDs are plotted as per the survey data on the GIS map. For calculation of technical loss, actual details of feeders are considered and technical loss for 37 numbers of feeders having AMR/MRI data is calculated. The detail calculation is explained below and calculation sheet of 37 feeders is enclosed. Also SLDs plotted on GIS map for 12 feeders out of these 37 is attached herewith.

#### HT Line Loss Calculation:

MSEDCL has worked out HT line loss on actual details of feeder and AMR/MRI data of feeder for sample 37 nos. of feeders.

- The Technical loss calculation is based on factors like length of feeder, Sp. resistance of conductor, loading of feeder and duration.
- The loss is calculated considering various loading condition (interval are divided into time slots of 5% of Maximum loading on the feeder) and usage hours.
- The actual distance of DTCs from sub-station and feeder is taken.
- The current consumed by DTC is calculated considering the individual DTC capacity and Total Capacity of DTCs on the Feeder.
- The resistance of line calculated by considering conductor specific resistance /KM and length of the feeder.
- The  $I^2R$  (Copper losses) of HT feeder is calculated similarly, considering average current of different time slots (based on loading condition).

#### **LT Line Loss Calculation:**

Also while calculating LT loss Prayas group has considered 50% loading at middle point of LT feeder which is not realistic and is based on assumption. However MSEDCL has calculated LT line losses based on following actual data.

- DTC wise consumers connected load, distance of installation from DTC.
- The HT side current of DTC considering individual DTC capacity and total DTCS with average feeder current loading for the duration.
- LT current is derived from corresponding HT current & transformation ratio.
- The average current loading of individual consumer connection is determined by taking in consideration of connected load of consumer in proportion to total load on that DTC.
- The copper loss ( $I^2R$ ) is calculated for every consumers, considering distance of load from DTC.
- The copper losses of all consumers aggregated to arrive copper loss (LT Line loss) at DTC Level.

#### **DTC Loss Calculation:**

Further while calculating DTC loss the Prayas has taken DTC input as Feeder input less Feeder line loss. However they have not considered the variation in the capacity and distance of the DTC from substation while calculating the DTC input and losses.

MSEDCL has worked out the DTC loss considering actual site conditions,

- In the distribution transformer losses are occurred due to magnetic field and resistance of transformer windings.
- The losses are Iron loss (Fixed Loss) & Variable loss ( $I^2R$ ) loss.
- The standard values (as per MSEDCL transformer specification) of Cu loss and Iron losses are taken for calculation of Transformer losses.
- The % loading of each transformer is calculated and corresponding Cu losses in units (kwh) are determined for different hours based on loading conditions.
- The Total transformer loss is summation of Cu loss units and Iron Loss units.

3% losses are accounted for deteriorated lines due to aging, joints on HT/LT lines, repaired DTCs and non-ideal field conditions.

The Total Technical Loss of feeder is = HT Line Loss+ DTC Loss + LT Line Loss+3%

From detail calculation of 37 feeders, the Technical Loss is in the range of 1.55% to 5.02%. With addition of 3% losses accounted for deteriorated lines due to aging, joints on HT/LT lines, repaired DTCs and non-ideal field conditions, the technical loss of feeder can be considered as 8%.

The weighted average loss calculated by Prayas is 18%, which is very high. However considering the actual field data Technical losses calculated by MSEDCL is only 8%. So there is 10% difference in losses and correspondingly the rise in Ag sale need to be considered.

### 3. Ag Sale Estimation:

MSEDCL has already submitted 8737 nos. Ag feeder meter input data to Hon'ble Commission and estimated Ag sale can be calculated by deducting technical loss and Non Ag sale as shown below,

Feeder Type	No Of Feeders	Input (MUs)	Sale (MUs)	Consumers (Nos)	Connected Load (HP)
			NON AG	Ag	Ag
Pure AG	2158	7457	259	776148	4118908
AG SDT	3131	14204	402	1465327	7764338
SPP	3438	12003	1664	1400073	7083789
<b>Total</b>	<b>8727</b>	<b>33664</b>	<b>2325</b>	<b>3641548</b>	<b>18967035</b>

Considering 8% Technical losses, the Ag sale computed is as below,

Description	Estimated AG Sale (Feeder Input - 8% Tech Loss - Non AG Sale)
Pure AG (MUs) -(A)	6602
AG SDT (MUs) -(B)	12665
SPP (Mus) - (C)	9379
<b>Total (Mus) (D=A+B+C)</b>	<b>28645</b>
Connected Load of AG Feeders As per MSEDCL system(HP) - (E)	18967035
Index of AG Feeders (kWh/HP) (F=D/E)	1510
Ag Load on Other Feeders (HP) (G)	2331980
Applying Index of AG Feeder to AG Load connected on Other feeders (MUs) (H=F x G)	3522
<b>Final AG Sale (MUs) (I= D+H)</b>	<b>32167</b>

After deducting (8% technical loss + Non Ag sale) MSEDCL arrived at Ag sale on Ag Feeders (Pure Ag, Ag with SDT & Single Phasing) and Index. After applying this Index to the Ag Connected load of other mixed feeders final Ag sale is estimated as 31411MUs. Further it is also to be noted that there may be upto 5% variation in the estimated figure and hence the Ag sale submitted by MSEDCL is correct and factual.

**4. Consumption of EHV feeders feeding to Ag dominated MSEDCL Sub-Stations (feeding to 502 MSEDCL feeders) :**

In order to establish year on year variation in Ag sale against EHV input, analysis of 234 EHV feeders feeding to 502 feeders selected by Prayas is as below..

H1	234 EHV feeders		Total MSEDCL		
	EHV input	AG Sale	Total MSEDCL I/p	MSEDCL Ag sales	Total MSEDCL Sales
16-17	3,105	2,123	55291	10720	48328
17-18	4,046	2,739	60927	12813	52124
18-19	4,661	3,227	65804	15316	57697
Year- on -Year trend (%)					
FY 17-18/16-17	30.29	29.03	10.19	19.52	7.85
FY 18-19/17-18	15.19	17.82	8.01	19.53	10.69

H2	234 EHV feeders		Total MSEDCL		
	EHV input	AG Sale	Total MSEDCL I/p	MSEDCL Ag sales	Total MSEDCL Sales
16-17	5,099	3,463	61503	16687	51319
17-18	4,990	3,465	62945	16992	54529
18-19	5,200	3,592	66637	17240	56688
Year- on -Year trend (%)					
FY 17-18/16-17	-2.14	0.08	2.35	1.83	6.26
FY 18-19/17-18	4.20	3.66	5.86	1.46	3.96

FY	234 EHV feeders		Total MSEDCL		
	EHV input	AG Sale	Total MSEDCL I/p	MSEDCL Ag sales	Total MSEDCL Sales
16-17	8,204	5,586	1,16,794	27,407	99,647
17-18	9,036	6,204	1,23,872	29,805	1,06,653
18-19	9,860	6,819	1,32,441	32,556	1,14,385
Year- on -Year trend (%)					
FY 17-18/16-17	10.14	11.08	6.06	8.75	7.03
FY 18-19/17-18	9.12	9.91	6.92	9.23	7.25


From above Table, it is seen that MSEDCL's Ag sale rise for FY18-19 (9.23%) is in line with the input rise of EHV feeders (9.12%).

**5. Comparison with Other states:** Further during Ag working Group meeting dtd. 02.01.2020, the Ag consumption and index of other states was discussed. For Punjab and Gujrat the index is 1700 Kwh/HP/Annum, whereas in Rajasthan it is in the range of 1325 - 2314 kWh/HP/Annum. Index arrived by MSEDCL is 1510kWh/HP/Annum, which is well below the other states index.

**6. Circle wise losses:** Further it is submitted that MSEDCL is calculating Circlewise Losses by taking Input & sale energy of that particular Circle & for FY 18-19 the losses of Non Ag circles such as Washi Circle - 6.70%, Ganeshkhind Circle - 8.10%, Nagpur Urban - 4.10% etc. Also the Towns from Ag dominated circles has non AG Consumption these towns losses are on higher side upto 64.21%, the details of such Towns is attached as Annexure 3, which is also available MSEDCL website and also submitted to Ministry of Power, GoI. **Hence the presumption that non Ag sale is being booked in Ag sale is not correct considering the losses of non Ag Circles, Losses of Towns of Ag dominated Circles also by correlating with EHV feeder input of Ag dominated feeders.**

From all above analysis and points mentioned in above para's Ag sale submitted by MSEDCL in it's MYT petition is correct and factual. It is further to submit that any correction or revision in MSEDCL's Ag sales based on assumption and sampling methodology will severally affect MSEDCL's financial position.

Yours Faithfully



(Satish Chavan)

Director (Commercial), MSEDCL

- Encl:**
- 1. Annexure 1 - Technical Loss of 37 Feeders**
  - 2. Annexure 2 - GIS SLDs of 12 Feeders**
  - 3. Annexure 3 - Town Losses of Ag dominated circles.**

## Technical Losses of 37 Nos. Sample Feeders

SR NO	SUBSTATION NAME	SUBSTATION CODE	FEEDER NAME	FEEDER CODE	INPUT KWH	NO OF DTC	HT LINE LOSS KWH	DTC LOSS KWH	LT LINE LOSS KWH	TOTAL LOSS KWH	% LOSS
1	33/11 KV NIMON SUB STATION	014096	11 K V Palaskhade	203	2569894	14	336	69402	1850	71588	2.79
2	33 / 11 KV Aradgaon	014140	11 KV GANPATWADI	203	5898800	33	9024	147845	39127	195996	3.32
3	WADWALI	044089	11KV MAIGAON AG	209	3005560	28	3229	53124	31366	87719	2.92
4	33/11 KV DEOLA S/Stn	054142	11 KV KHADKI DEWLA AG	202	2255664	56	762	37229	12871	50862	2.25
5	33/11 KV PIMPALNER	094007	11 KV DEGAON	201	7697360	60	7175	209398	30919	247492	3.22
6	33/11 KV GHODASGAON	124028	11 KV GHODASGAON AG FEEDER	204	2210560	36	2003	39597	17138	58738	2.66
7	33/11 KV NHAVI	124048	11 KV JTM FEEDER	203	4018920	22	5069	114234	72111	191413	4.76
8	33/11 KV ADGAON	124078	11 KV UMBERKHEDE	203	663140	18	390	21252	2186	23827	3.59
9	33/11 KV KURWEL S/STN	124093	11 KV KURWEL AG	202	4700880	51	2289	95253	21350	118892	2.53
10	33/11 KV KURWEL S/STN	124093	11 KV Dhanwadi AGR feeder	205	3108487	30	4258	64853	20689	89799	2.89
11	33 KV GIRAD	124120	11 KV BHATKHANDE	203	6180559	30	2830	161491	7110	171431	2.77
12	33/11 KV BHALOD	124169	11 KV MANUDEVI AG	202	3475040	40	3244	43299	15324	61867	1.78
13	33/11 KV YEROL	154024	11 KV YEROL SPP	202	4295640	6	1780	76081	108593	186455	4.34
14	33/11 KV KAWA	154052	11KV RAIJ NAGAR	203	1563135	15	630	43606	9744	53980	3.45
15	33KV Bhatta S/S	154065	11 KV BETA FEEDER	202	3337197	31	3055	116241	40365	159661	4.78
16	33 KV S/S NIVALI	154086	11 KV KARKHANA	201	4585400	60	3287	138114	17905	159306	3.47
17	BHOKAR	174011	11 KV BATALA	203	2969092	57	2804	117871	4159	124834	4.20
18	HADGAON	174013	11 KV AMBALA	201	3902040	46	2914	137022	5907	145842	3.74
19	33 KV S/S DAPKA	174110	11 KV HATRAL	203	939492.4	24	145	36245	4120	40509	4.31
20	PALASPUR	174123	11 KV DOLHARI	203	1604040	14	1090	40755	3401	45246	2.82
21	DEOLA	184004	11 KV RAMESHWAR	206	6232560	48	3569	165036	49237	217842	3.50
22	VADNER BH	184051	11KV DHONDGAVAN	202	5269840	47	2700	80376	9237	92313	1.75
23	33/11 KV UMARANE	184064	11 KV GIRNARE-AG SDT	202	4984560	56	3418	152907	19166	175491	3.52
24	JORAN	184071	11 KV JORAN	201	4022400	34	1230	115501	13616	130348	3.24
25	TANDULWADI	184090	11 KV ANTARVELLI	204	2945640	42	3850	83596	12137	99583	3.38
26	33/11 KV AHURI S/S	184151	11 KV MHASURI	201	4427840	43	882	63586	7127	71596	1.62
27	GAVANDGAON SUB STATION	184207	11 KV KHAMGAON	201	1655680	29	2237	67863	10139	80238	4.85
28	33/11 KV KARANJAD	184216	11 KV PARNER	203	3594378	47	1528	97754	8039	107321	2.99
29	HIRAPUR	184222	11 KV URDUL AG	202	2705920	40	1950	60117	4521	66589	2.46
30	33/11 KV MALGAON	184244	11 KV MALGAON	201	4951520	35	3479	126136	30637	160252	3.24
31	33/11 KV TALEGAON	184249	11KV DHAKAMBE 1	202	4220760	39	2097	115300	8782	126179	2.99
32	BHARAM SUB STATION	184254	11 KV BHARAM FEEDER	201	1400080	25	1300	54733	8255	64289	4.59
33	33/11 KV TINGRI	184264	11 KV DAHIDI	201	4962800	71	4565	144715	16157	165437	3.33
34	33/11 KV SUB-STATION DHOKI	194010	11 KV TADWALA (KOMBADWADI)	201	1996120	28	2544	43535	15449	61528	3.08
35	JEWALI	194048	11 KV HIPPARAGA S SPP feeder	201	2653400	28	5954	90431	36821	133205	5.02
36	33 KV BORJA	324079	11 KV YEHELGAON AG	201	1820040	28	301	50308	2171	52780	2.90
37	KHONDAMALI	334004	11 KV LIS - II	202	4270480	56	2837	84004	24143	110984	2.60

7951e

**Annexure 2**

**GIS SLDs of 12 Feeders**



791/c

gisdermoapp Logout

GIS View User Details Recruitment Report Downloads Approval User tracking

Zone: All

Jalgaon

Circle: All

Jalgaon

Division: All

Savada

Subdivision: All

Yawal II

Scope: Both

both

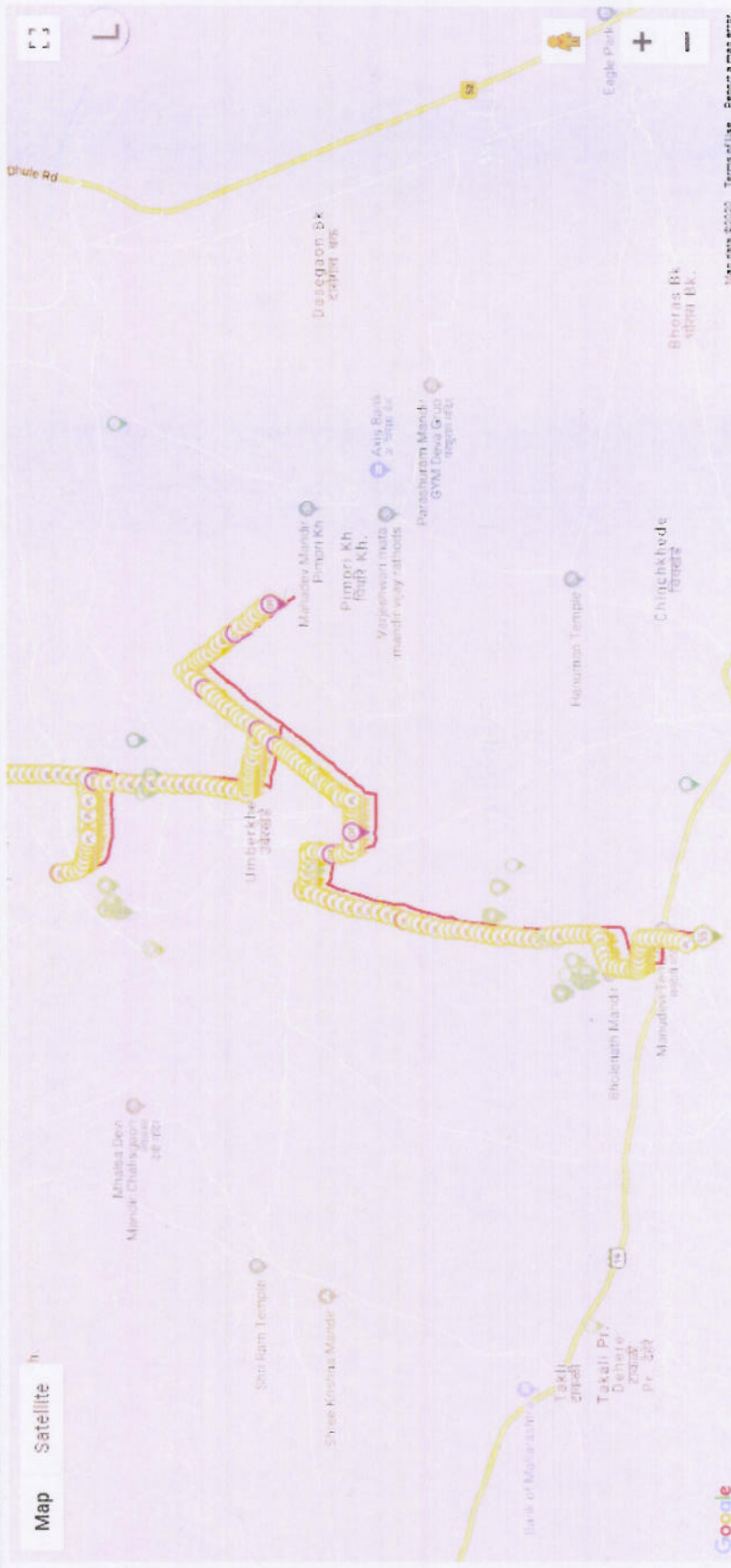
Substation: 124052

Feeder Code: Please Seect

201

Map Satellite

© Copyright 2018 mapquest.com



Map Satellite

Zone: All

Jalgaon Circle: All

Jalgaon Division: All

Chalisgaon Subdivision: All

Chalisgaon-Rural I Scope: Both

both Substation: 124078

Feeder Code: Please Select

203

789/c



7881c

GIS View    User Details    Recruitment    Report    Download's    Approval    User tracking    Logout

gisdemoapp

Map    Satellite

Zone: All

Nasik Circle: All

Malgaon Division: All

Kalwan Subdivision: All

Deola Scope: Both

both Substation: Both

184027 Feeder Code: Please Select

202

Search: Kandoli

Map data ©2018    Terms of Use    Report a map error

© Copyright 2018 mangosent.com

7831e

Map Satellite

Zone	All
Masik Circle	All
Masik Urban Division	All
Chandwad Subdivision	All
Chandwad Scope	Both
both Substation	both
184051 Feeder Code	Please Seect
202	

7811C

Vendor: **Surveyor**

Zone: **All**

Naalik Circle: **All**

Malegaon Division: **All**

Malegaon Urban Subdivision: **All**

Malegaon Scope: **Both**

Both Substation: **184864**

Feeder Code: **Please Select**

202

7791c

Zone:

Nasik Circle:

Malegaon Division:

Manmad Rural Subdivision:

Yeola Rural Scope:

both Substation:

1030000 Feeder Code:

204

Map Satellite

© Copyright 2015 mapbox.com

777/C

Logout

gisdemoapp

User tracking

Approval

Report

Downloads

Recruitment

User Details

GIS View



Zone	▼
Naalik	▼
Circle	▼
Malegaon	▼
Division	▼
Ali	▼
Manmad Rural	▼
Subdivision	▼
Ali	▼
Yeola Urban	▼
Scape	▼
Both	▼
both	▼
Subdivision	▼
104207	▼
Feeder Code	▼
Please Select	▼
201	▼

© Copyright 2018 mangosent.com

Map data ©2020 Terms of Use Report a map error



7781c

Zone:

Nasik:

Circle:

Malgaon:

Division:

Satania:

Subdivision:

Nampur:

Scope:

both:

104216:

Please Select:

203

Map

Satellite

Way
+
-

778/c

Zone:   
 Naask:   
 Circle:   
 Naask Urban:   
 Division:   
 Chandwad Subdivision:   
 Scope:   
 both:   
 Substation:   
 184222 Feeder Code:   
 202



7711C

Zone	All
Nasik Circle	All
Nasik Urban Division	All
Nasik Rural Subdivision	All
Dindori Rural	All
Scope	Both
both Substation	both
184249 Feeder Code	Please Select
202	



789/C

**Zone**

**Masik**

**Circle**

**Malegaon**

**Division**

**Subdivision**

**Yeola Urban**

**Scope**

**Feeder Code**

**Please Select**

**Town names of Ag Dominated Circles****Annexure 3**

<b>Sr. No.</b>	<b>Name of Circle</b>	<b>Name of town</b>	<b>Dist Loss %</b>
1	LATUR CIRCLE	AHMADPUR	53.78
2	AMARAVATI CIRCLE	ANJANGAON	31.66
3	HINGOLI CIRCLE	BASMATH	64.21
4	BEED CIRCLE	BEED	50.83
5	JALGAON CIRCLE	BHUSAWAL	38.95
6	JALGAON CIRCLE	CHALISGAON	54.17
7	JALGAON CIRCLE	CHOPDA	26.21
8	JALGAON CIRCLE	DHARANGAON	43.15
9	YAVATMAL CIRCLE	DIGRAS	33.06
10	HINGOLI CIRCLE	HINGOLI	30.94
11	AURANGABAD CIRCLE	KANNAD	41.41
12	BEED CIRCLE	MAJALGAON	42.7
13	MALEGAON CIRCLE	MANMAD	37.26
14	NANDED CIRCLE	NANDED	41.92
15	LATUR CIRCLE	NILANGA	43.79
16	PARBHANI CIRCLE	PARBHANI	47.55
17	BEED CIRCLE	PARLI	44.12
18	PARBHANI CIRCLE	PATHRI	64.12
19	PARBHANI CIRCLE	PURNA	52.83
20	PARBHANI CIRCLE	SAILU	46.19
21	AURANGABAD CIRCLE	SILLOD	42.01
22	YAVATMAL CIRCLE	UMARKHED	63.39
23	SANGLI CIRCLE	URAN-ISLAMPUR	53.78
24	WASHIM CIRCLE	WASHIM	29.01