

# Six-monthly Progress Report in compliance to NGT Orders 12<sup>th</sup> September 2019 in a matter of O.A. no. 606 of 2018 –State of Goa

*(compiled based on inputs received through e-mail from Department of Environment / Directorate of Fisheries / Directorate of Health Services / District Collector (North) / Directorate of Municipal Administration / Directorate of Panchayats / Department of Mines and Geology / Goa Industrial Development Corporation / Goa Waste Management Corporation / Water Resources Department)*

| Sr. No | Clause in the Order dated 10 <sup>th</sup> April 2019   | Action required / mandated   | Follow-up action / Status as on 11 <sup>th</sup> October 2019   |
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| 1      | A. <b>Clause – 29 / 39 (i)</b> - Compliance under Rule 22 of Solid Waste Management (SWM) Rules 2016. | <p>a. Identification of suitable sites for setting up solid waste processing facilities.</p> <p>b. Identification of suitable sites for setting up common regional sanitary landfill facilities for suitable clusters of local authorities and for setting up common regional sanitary landfill facilities or stand alone sanitary landfill facilities by all local authorities.</p> <p>c. Procurement of suitable sites for setting up solid waste processing facility and sanitary landfill facilities.</p> <p>d. Enforcing waste generators to practice segregation of bio-degradable, recyclable, combustible, sanitary waste domestic hazardous and inert solid wastes at source.</p> <p>e. Ensure door to door collection of segregated waste and its transportation in covered vehicles to processing or disposal facilities.</p> <p>f. Ensure separate storage, collection and transportation of construction and demolition wastes.</p> | <p>Presently, all the ULBs' have their suitable sites for treatment of waste except for Cacora Curchorem Municipal Council (CCMC) in South Goa district. The site in respect of CCMC has been handed over to Goa Waste management Corporation (GWMC) for setting up Solid Waste Management Facility at Cacora. .</p> <p>Directions have been issued to all ULBs' in this regard, and directions have been issued with respect to bulk waste generators</p> <p>All 191 village panchayats are undertaking door-to-door collection / street cleaning / conversion of black-spots into green-spots</p> <p>Site has been identified as a temporary measure for dumping of construction &amp; demolition (C &amp; D) waste in respect of North Goa District and will be notified once Government approval is accorded for the same</p> |

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|  |  | <p>g. Setting up solid waste processing facilities by all local bodies.</p> <p>h. Setting up common or stand alone sanitary landfills by or for all local bodies for the disposal of only such residual wastes from the processing facilities as well as untreatable inert wastes as permitted under the Rules.</p> | <p>for which proposal has been moved to Government through Collector, North Goa . In South Goa District, the search for a temporary site is ongoing. The action with respect to the C &amp; D plant is carried out by GWMC.</p> <p>There are 191 village panchayats in the State of Goa.</p> <ul style="list-style-type: none"> <li>• Procedure in process where Land Available for construction of MRF—64 V.P.</li> <li>• Land Identified by Village Panchayats—113 V.P.</li> <li>• No Land Available with VP –14 V.P. (Decided for cluster approach with neighbouring Panchayats.)</li> </ul> <p>Technical sanction (part) for civil works in respect of expansion of <b>Saligao Solid Waste Treatment Facility (SWMF)</b> is accorded by Goa State Infrastructure Development Corporation (GSIDC) and subsequently, GWMC has issued letter of acceptance of proposal to the concessionaire. Concessionaire is required to submit bank guarantee (BG) and detailed working drawings for issue of work order. Further, Goa Industrial Development Corporation (Goa-IDC)'s approval for construction is awaited. Electro-mechanical proposal was scrutinised on 4<sup>th</sup> October 2019 by Goa State Infrastructure Development Corporation (GSIDC) and concessionaire has been directed to submit revised proposal incorporating</p> |
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|  |  |  | <p>corrections recommended.</p> <p><b>Further,</b> Technical sanction (part) for civil works in respect <b>Cacora Solid Waste Treatment Facility</b> is accorded by GSIDC. Further, the concessionaire is required to submit electromechanical proposal for approval.</p> <p>In respect of proposed <b>SWM facility at Bainguinim</b>, Final EIA report is received on 10/09/2019, which was forwarded to Goa State Expert Appraisal Committee (Goa-SEAC) on 13/09/2019. Further NEERI, Nagpur (Consultant) presented before the Goa State Expert Appraisal committee (Goa-SEAC) on <b>01/10/2019</b>, in which the Goa-SEAC has recommended to verify and revalidate studies and has recommended some additional suggestions to be carried in the draft EIA report. Subsequently, NEERI, Nagpur has started to revalidate studies from <b>07/10/2019</b>.</p> <p>In respect of <b>waste treatment facility proposed at Verna Industrial Estate</b>, it is informed that Terms of Reference (TOR) has been obtained from Goa- SEAC for conducting EIA study. Draft DPR has been prepared by M/s Paradigm Strategies Pvt. Ltd., <i>(appointed by the GIZ)</i>.</p> <p>As regard to <b>CSR project at Chicalim by Airport Authority of India (AAI)</b>, presentation of revised proposal to be scheduled in the next board meeting of</p> |
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|  | <p>B. Compliance under Rule 24 of Solid Waste Management (SWM) Rules 2016.</p> | <p>i. Bio-remediation or capping of old and abandoned dump sites (<i>i.e. legacy-dumps</i>).</p> <p>j. Submission of Annual report by local bodies (<i>i.e. CCP / municipal councils / village panchayats</i>).</p> | <p>AAI (<i>tentatively in October, 2019</i>).</p> <p>GWMC has floated tender for remediation of legacy (<i>i.e. old</i>) dumpson 16/08/2019 and pre-bid meeting was held on 27/08/2019. Tender will be opened on 15/10/2019.</p> <p>In addition, survey for mapping and quantification of fourteen sites of ‘legacy-waste’ has been conducted through M/s Owlways Creatives, Goa (<i>refer Enclosure – I</i>)</p> <p>All Municipal Councils / Village Panchayats have submitted annual-reports.</p> <p><b>Local authorities in South Goa district –</b><br/>South Goa Collectorate has informed that in Salcete / Mormugao / Ponda / Quepem / Canacona / Sanguem / Dharbandora talukas out of 89 panchayats - 69 panchayats have identified the sites for garbage management, 36 panchayats have obtained NoC and 22 panchayats have received technical sanction from the Public Works Department (PWD).</p> <p>Margao municipality has achieved 90% door-to-door collection of segregated waste, Vasco / Ponda / Curchorem / Sanguem / Cuncolim / Canacona have achieved 100%. In respect of Mormugao municipality, 10,000 metre square land has been transferred to the Directorate of Municipal Administration for capacity</p> |
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|  |  |  | <p>augmentation for the Urban Local Bodies (ULB), Canacona municipality is in the process of augmenting its waste treatment capacity.</p> <p><b>Local authorities in North Goa district –</b><br/>All local bodies are undertaking door-to-door collection / street cleaning / conversion of black-spots into green-spots.</p> <p>(i) As regards to a proposal to set-up ‘Bio-digester’ at Taleigao, CCP will be floating a expression of interest (EOI) for the same While, at Calangute and Candolim, common area has been identified and proposal to obtain NOC for land is under progress. (ii) As regard to waste-management in industrial areas, Goa-IDC has identified areas within respective Industrial Estates (<i>refer Annexure - A</i>) and GWMC shall carry out feasibility study of these areas for utilizing it for appropriate Waste Treatment facility, (iii) Policy is being framed for relocation of scrap-yards (iv) For plastic-to-fuel plant, shed has been made ready, NOC of fire department is obtained and Goa State Urban Development Agency (GSUDA) and GWMC is awaiting instructions from GSUDA for stocking of plastic waste at the plastic-to-fuel plant facility. (v) In respect of minimizing the usage of single-use plastic, all local authorities have passed a ‘resolution’ in this regard and raids / inspections are being conducted for its implementation. Further, Government has issued circular on ban of single use</p> |
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|  | <p>C. Compliance to Plastic waste Management Rules, 2016.</p> <p>D. Compliance to Bio-medical waste Management Rules, 2018.</p> | <p>k. Ban on single-use plastic items.</p> <p>1. Setting up of Common BMWT facility</p> | <p>plastic in all Government Departments/ Corporations/ PSU / Autonomous bodies (vi) New agency is appointed for the purpose of 'Beach-cleaning'. (vii) All bus-stands are regularly cleaned and garbage segregation shed is available at Panjim and Mapusa (<i>In progress</i>). (viii) Secretariat is making arrangements for handling different types of waste, namely Wet / Dry Waste, E-Waste, Furniture Waste and Paper Waste generated within its complex and revised proposal is sent for Govt. approval. In other North Goa Talukas, Joint Inspections to identify suitable land has been conducted and report is under preparation. Further GWMC is working on proposal to utilise 3000 – 4000 sq. mts. land at Dona Paula belonging to IT Department to set up transfer station for North Goa.</p> <p>The Department of Environment has Notified the Goa Non-Biodegradable Garbage (Control) (Amendment) Act, 2019 in an Official Gazette (Extraordinary), Series I, No. 25 dated 23<sup>rd</sup> September 2019 (<i>pg.26 – 27</i>), wherein vide clause 3(A) use of plastic carry-bags have been prohibited (<i>refer Annexure - B</i>).</p> <p>In respect of setting up of a <b>Common Bio-medical waste treatment facility proposed at Kundaim IE</b>, tender for selection of service provider for Design, Build, Operate and Transfer (DBOT) a CBMWT at Kundaim is floated on 09/08/2019 and pre-bid</p> |
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|  | <p>E. Compliance to Hazardous wastes Management Rules, 2018.</p> <p>F. Compliance to Construction and Demolition wastes Management Rules, 2016.</p> | <p>m. Setting up of Common HWTSD facility</p> <p>n. Setting up of C &amp; D facility</p> | <p>meeting was held on 27/08/2019. Tender will be opened on 17/10/2019. Further, Environmental Clearance (EC) for the CBWTDF has been granted by Goa-SEAC on 27/09/2019, which is uploaded on DST website.</p> <p>Further, as regard to setting up of <b>Common Hazardous Waste Treatment Storage &amp; Disposal Facility (CHWTSDF) at Pissurlem Industrial Estate</b>, agreement for Deed of lease with Goa Industrial Development Corporation (GIDC), Goa Industries Environmental Management Association (GIEMA) and GWMC has been executed on 24/09/2019.</p> <p>Further, with respect to setting up of a <b>Construction and Demolition waste (C &amp; D waste) treatment facility</b>, land acquisition of Colvale site is in process and proposal for transfer of alternate revenue land under survey no. 146/2,3,4,6, and 148/2,6,7 in Curchirem village admeasuring an area of approx 44,478 sq.mt. to GWMC moved to O/o North District Collectorate.</p> <p>Proposal for identifying abandoned quarries/mines for backfilling is issued to <b>Director Municipal Administration on 22/07/2019 to notify the sites</b> under survey no, 146, 148, 129 &amp; 130 in Village Curchirem, 95 &amp; 98 in Mayem Village.</p> |
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| <p><b>Clause 39(ii) –</b><br/>         Identification of three major cities/towns in the State and at least three Panchayats in every District to be notified on the website as “Model cities /towns’.</p> <p>Remaining cities, towns and Village Panchayats of the State to be fully complaint in respect of environmental norms.</p> | <p>Identification of Model Cities /Towns / Villages</p> | <p>With respect to <u>Three identified Model Cities</u>, the status is as given below:-</p> <ol style="list-style-type: none"> <li>1. <b>Corporation of The City of Panaji- Class A:</b> 100% Door to Door collection is being carried out . Steps have been taken to augment processing and disposal capacity. The ULB has sufficient capacity with respect to Dry waste and in respect of wet waste the ULB is floating EOI for setting up Bio methanation plants .The paucity of land and opposition to the proposed projects has slowed progress.</li> <li>2. <b>Cuncolim Municipal Council- Class B</b> : 100% Door-to-Door Collection is being carried out . The ULB is augmenting capacity for waste treatment and has floated tender for the same.</li> <li>3. <b>Valpoi Municipal Council- Class C:</b> 100% Door to Door Collection is being carried out . The ULB is augmenting capacity for waste treatment and work in this regard is in progress.</li> </ol> <p>Capacity augmentation proposals with respect to Solid Waste Treatment have been worked out for each ULB in the state except for Quepem and Sanguem Municipal Councils which have achieved 100% Door to Door Collection and are currently having sufficient waste treatment facilities for wet and dry waste. Additionally, Bicholim Municipal Council also has achieved 100% Door to Door Collection and has sufficient Dry and Wet waste handling capacity. However, capacity augmentation is proposed to handle future increase in waste generation.</p> <p>Further, with respect to six identified model villages, the status is as under -</p> <p><b>South Goa District</b><br/> <u>V.P. Chicalim-</u></p> <ul style="list-style-type: none"> <li>• Land Available in in Sy. No. 7/1, Estimation Prepared and Technical Sanction</li> </ul> |
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|  |  |  | <p>obtained from PWD and also obtained N.O.C from GSPCB, file is sent for the Administrative Approval to Directorate of Panchayats. Once the approvals are received the further tendering process will be completed.</p> <ul style="list-style-type: none"> <li>• The wet waste is disposed by the Contractor in the composting pit at Nofra and setting up of Material recovery facility along with 10TPD bio digester/Composting Unit under CSR through GWMC is in process.</li> <li>• Collect both the Dry and Wet waste from the entire Household. The Village Panchayat has provided 10 ltr. Of 2 Dustbins for each house to keep their waste separately.</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> <li>• V.P has collected all the E-waste and taken initiative for handing over the same to Karo Sambhav for scientific disposal.</li> <li>• V.P. levy fines for littering and burning of Garbage and also user charges are collected from all households.</li> <li>• All Black Spots are converted into Green spots.</li> <li>• Street sweeping is done on daily basis.</li> </ul> <p><u>V.P. Navelim-</u></p> <ul style="list-style-type: none"> <li>• Existing Shed is available for segregation of Garbage. Also, new Site of 300 sq. Mts. of land at Moddi is in process for setting up of Material Recovery Facility.</li> <li>• Wet Waste Composting Machine is installed at Panchayat Premises of 75kg per day capacity. Black Soldier Fly Larvae of 1000 kg capacity (2 Units) are installed in premises of Panchayat. As well as in all 11 wards Bio Digesters are installed.</li> <li>• Collect both the Dry and Wet waste from the entire Household.</li> <li>• E-waste is collected regularly and disposed through Government empanel.</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> <li>• V.P. levy fines for littering and burning of Garbage and also user charges are collected from all households</li> </ul> |
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|  |  |  | <p><u>V.P. Ugum-</u></p> <ul style="list-style-type: none"> <li>• Identified land in Survey No.26/3 of Village Uguem belonging to Govt Dept and NOC awaited.</li> <li>• All households are disposing their wet waste at their own level.</li> <li>• collect only dry waste from all the households</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> <li>• V.P. levy fines for littering and burning of Garbage and also user charges are collected from all households</li> </ul> <p><b>North Goa District</b></p> <p><u>V.P. Old Goa-</u></p> <ul style="list-style-type: none"> <li>• Identified land in Survey No. 154/3 at Ella, Old Goa. ,Sy. No.154 at Ella, Old Goa. ,) Sy. No.20 at Bainguinim, Old Goa. Belonging to Govt Dept and NOC awaited.</li> <li>• Only dry waste is being collected and it is disposed at Goa Solid Waste Management Corporation, Saligao Goa.</li> <li>• Street sweeping is Done twice in the month at Tourist places.</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> </ul> <p><u>V.P. Oxel-</u></p> <ul style="list-style-type: none"> <li>• Shed has been constructed close to the Panchayat admeasjouring of 50-60 Sq mtr in S.Y.No. 104/1(Part)</li> <li>• V.P. is carrying out Door to door both wet and dry waste and is being sent at GWMC Saligao for disposal.</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> </ul> <p><u>V.P. Aldona-</u></p> <ul style="list-style-type: none"> <li>• Land identified in Sy. No. 340/1/(Part A) of village Aldona. But there are objection from the villagers. The V.P. is in process to identify alternate land for setting up MRF facility.</li> </ul> |
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|  |  |  | <ul style="list-style-type: none"> <li>• V.P. is carrying out dry Door to door garbage collection. Wet Waste is collected from Aldona Market on Daily Basis and same is being sent to SWM Plant at Saligao Goa.</li> <li>• V.P. constituted Garbage Management committee and it is functional</li> </ul> <p>In addition to above-referred six villages, following eight villages have been prioritised</p> <ol style="list-style-type: none"> <li>1. Moira</li> <li>2. Pilerne-Marra</li> <li>3. Surla</li> <li>4. Casnem-Ambere-Porsocodem</li> <li>5. Veling -Priol</li> <li>6. Cavelossim</li> <li>7. Chicolna-Bogmalo</li> <li>8. Nuem</li> </ol> |
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| 2 | <b>Clause 39(iv)</b> –<br>Quarterly report be furnished by the Chief Secretary   | Submission of quarterly report ( <i>i.e. every three-months</i> ) by Chief Secretary | First quarterly progress report was submitted to the CPCB / NGT on 15 <sup>th</sup> July 2019.   |
| 3 | Estimate of value of environmental degradation and cost of restoration be prepared and compensation be planned and recovered from polluters for environmental restoration and Restitution on that basis. | <b>Estimation of Loss of damage to environment and loss of livelihood</b>            | The Department of Environment has informed that the proposal has been forwarded to the Government for financial approval.  |
| 4 |  | <b>Threatening health hazard and loss to forest cover</b>                            | <p><u>In respect of extraction of major mineral i.e. Iron ore &amp; Manganese Ore mining in State of Goa,</u> it is informed that vide Order dated 07.02.2019, the Hon’ble Supreme Court of India has quashed the second renewal granted to 88 mining leases &amp; at present there is no extraction activities of Iron ore/Manganese ore being carried out in the State of Goa.</p> <p><u>In respect of scientific closure of illegal laterite/ minor mineral extraction as well as compensation levied for illegal extraction,</u> it is submitted that the Dy. Collector, Pernem has identified the occupant of the land/offending parties responsible for said act &amp; notices has been issued upon them for restoration of land. Show cause notice has been issued to</p> |

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|   |  |  | the violators for recovery of value of mineral from polluters. Flying squads has been reconstituted empowering respective taluka Mamlatdars for monitoring of illegal extraction, Transportation & Storage of minor mineral. Illegal extraction sites identified in Pernem, Bicholim, Sattari and Tiswadi taluka along with officials of respective Mamlatdar, Goa Waste Management Corporation, GSPCB, and DLSR. Extraction sites on Government land to be filled with construction debris. All details of abandoned minor mineral extraction sites are given to Collectorate to facilitate action plan by Goa Waste Management Corporation to fill the same by C & D waste. |
| 5 | <b>Clause – 35:</b> Polluters-Pays-Principle                                     | Implementation of Polluters Pay Principle                              | The GSPCB has levied polluter-pay-penalty on 220 numbers of units. Out of which 57 no. of units have paid the penalties. Further, action is in the process of being initiated.  |
| 6 | <b>Clause (vi)</b> – Monitoring of progress with all District Magistrates.       | Monitoring / progress with District Collectors by Chief Secretary      | The O/o North Goa Collector has convened ten (10 nos.) meetings, last being held on 30 <sup>th</sup> September 2019, while, O/o South Goa Collector has convened three (03 nos.) meetings to monitor the progress the NGT compliance.   |
| 7 | <b>Clause 39(vii)</b> – Monitor the status of compliance of environmental norms. | Monitoring of compliance to environmental norms by District Collector. |   |

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| 7 | <b>Clause 39(ix)</b> – Performance audit of functioning of all regulatory bodies and all local bodies | To be conducted and remedial measures be taken | The CPCB has conducted the ‘Performance Audit’ of the GSPCB on 22 <sup>nd</sup> May 2019 and on its scrutiny, the Goa State Pollution Control Board (GSPCB) has been placed at sixth-position nationwide. | In respect of Solid Waste Management in Urban Local Bodies, the office of the Principal Accountant General (PAG) -Goa has already carried out Performance Audit. The Department of Urban Development will carry out Performance Audit as per requirement from time to time.<br><br>While, in respect of conducting audit of village panchayats, Directorate of Panchayat is in a process of working out on modalities on how to conduct performance audit of the village panchayats |
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In addition to above, the follow-up / status-update in respect of following matters (*as discussed / deliberated during the C.S.'s personal appearance before the NGT on 10<sup>th</sup> April 2019 as well as in compliance to NGT Order dated 12<sup>th</sup> September 2019*) is as under -

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| A | Water Audit of all Casinos  | Work Order has been issued to M/s TUV during 2 <sup>nd</sup> week of September 2019   |  |
| B | Bio diversity index for all rivers  | The study is proposed to be conducted through the National Institute of Oceanography (NIO). Accordingly, financial approval is being processed through the Department of Environment.   |  |
| D | All RRC's plans to be displayed on the website with name of designated official to ensure compliance. | <p>Action Plans prepared by RRC-Goa through a consultant – M/s Unity I.E. (<i>as per NGT Order in a matter of O.A. no. 673 of 2018 dated 20<sup>th</sup> September 2018</i>) for rejuvenation of polluted river-stretches have already been uploaded on GSPCB-website. These plans were also discussed / deliberated during the meeting conducted by the CPCB on 12<sup>th</sup> September 2019 and comments have been suggested. Further, the State Government (<i>through the Department of Environment</i>) has submitted a 'Performance Guarantee' of Rs. 15 crores to the CPCB as per NGT Order dated 8<sup>th</sup> April 2019 in a same matter.</p> <p>Further, as per NGT Order dated 12<sup>th</sup> September 2019, RRC plans is yet be uploaded on State Government website.</p> <p>Further, as a remedial measure, action initiated by Urban Local Bodies (ULBs') in response to non-compliance to 'Notices' issued to various units (residential as well as commercial establishments) for release / discharge of untreated sewage into water-bodies (<i>refer Annexure - C</i>). Further, similar action initiated by Directorate of Panchayats (<i>refer Annexure – D</i>) and Directorate of Health Services (DHS) (<i>refer Annexure - E</i>).</p> |  |
| E | Providing infrastructural facilities / common toilets along Fishing-jetties                           | <p>The Department of Fisheries (DoF) has –</p> <p>(a) initiated upgrading/ reconstructing/ extending the present infrastructure comprising of 20-seater toilet block / waste-water treatment plant at <u>Malim jetty</u> and to be completed by 30<sup>th</sup> September, 2019 by GSIDC,</p> <p>(b) initiated upgrading/reconstructing/ extending the present infrastructure comprising of 02-seator toilet block / waste-water treatment plant at <u>Cortalim jetty</u> and to</p>  | <p><u>Malim jetty:</u></p> <p>a. The work of Construction of 20 seater toilet block and waste water treatment plant is undertaken by Goa State Infrastructure Development Corporation.</p> <p>b. As informed by Goa State Infrastructure Development Corporation vide its e-mail dtd: 11/10/2019, 95% of the work of the toilet block is complete and the remaining is likely to complete by 31/10/2019. The work of waste water treatment plant is in progress and is likely to complete by</p> |

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|   |  | <p>(c) be completed by 30<sup>th</sup> September, 2019 by GSIDC,</p> <p>(d) initiated/upgrading/reconstructing/ extending the present infrastructure comprising of 03-nos. of Bio-toilets at <u>Chapora</u> to be constructed by M/s Go Green Solutions Pvt. Ltd.,</p> <p>(e) proposed 02-seator toilet block at <u>Talpona jetty</u> to be completed by 10<sup>th</sup> October 2019 by PWD,</p> <p>(f)proposed 02-seator toilet block at <u>Nerul-ramp</u> to be completed by 10<sup>th</sup> October 2019 by PWD. In addition, DoF has requested GWMC to provide 04-nos. of Bio-toilets, one each at Chapora / Talpona / Cortalim / fishing ramp at Nerul.</p> | <p>15/11/2019.</p> <p><u>Cortalim jetty:</u></p> <p>a. A toilet block of one seater will be installed by Goa Waste Management Corporation by 15/10/2019.</p> <p>b. The work of Construction of Permanent 2 seater toilet block and waste water treatment plant is undertaken by Goa State Infrastructure Development Corporation.</p> <p>c. As informed by Goa State Infrastructure Development Corporation vide its e-mail dtd: 11/10/2019, 40% of the work of the toilet block is complete and the remaining is likely to complete by 31/11/2019. The work of waste water treatment plant is in progress and is likely to complete by 15/12/2019</p> <p><u>Chapora jetty:</u> A toilet block of one seater will be installed by Goa Waste Management Corporation by 15/10/2019.</p> <p><u>Talpona jetty:</u> Goa Waste Management Corporation has constructed 2 seater toilets at Talpona jetty.</p> <p><u>Nerul ramp:</u> A toilet block will be installed by Goa Waste Management Corporation by 15/10/2019.</p> |
| F | Status of CETPs' / ETPs' including performance | <p>There are no CETP's in the State of Goa.</p> <p>In respect of Effluent Treatment Plant (ETP), out of 209, one ETP is non-complying with the effluent water-quality standards and an action has been against the said industry.</p> <p>In respect of Sewage Treatment Plant (STP), although there are no Municipal STPs'. Other STP's (<i>total nos. 399</i>) are complying with the treated water-quality standards. The Board has inspected / conducted performance evaluation of eight (08 nos.) of STP during the month of August 2019.</p>   |  |

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| G | Groundwater extraction / contamination and recharge | <p><b>Ground Water Extraction and Recharge.</b></p> <ul style="list-style-type: none"> <li>➤ The State has implemented Goa Ground Water Regulation Act 2002 on 29<sup>th</sup> January 2002.</li> <li>➤ The State is actively monitoring the ground water resources for its availability, use and contamination.</li> <li>➤ To monitor and for judicial use the ground water the government has declared entire state of Goa as <b>Scheduled area</b>, where in the registration of the ground water structure is mandatory.</li> <li>➤ <b>Ground water cell</b> is constituted by the govt headed by the Chief Engineer, with Sr Engineer , as members to monitor and regulate the sinking of new wells, and control drawl of water for commercial purpose.</li> <li>➤ Govt has nominated <b>6 nos. Ground Water Officer</b> in the state in the grade of Executive Engineer who are implementing provisions of the act.</li> <li>➤ The commercial exploitation of water is regulated by levying water use tax at rate of Rs2 per Cum during monsoon , from Nov to May is Rs 6/ m3. Domestic purpose Rs 0.1 /m3.</li> <li>➤ 105 ground water monitoring station are installed in the state for monitoring the Pre Mansoon and Post Manson groundwater availability.</li> <li>➤ Though the Central Ground Water Board (CGWB) sate has conducted study on Dynamic Ground water Resources of the State .</li> <li>➤ 44 nos of hydrograph stations are maintained in the State to study the ground water fluctuations spread all over the state. Pre- monsoon and Post- Monsoon levels have been monitored.</li> <li>➤ Ground Water available in the state is estimated to be 14625 Ha –M as against which the utilisation is 5377 ha-m.</li> <li>➤ Considering future Consumption the ground water upto year 2025 for agriculture, domestic and industrial purpose is estimated at 3902 ha-m</li> <li>➤ The ground water harnessed to <b>only 37 % of its availability and hence is categorised as SAFE.</b></li> <li>➤ Dept has registered (851) nos. wells, which have been registered for commercial use, and water used is being charged with water usage charges by fixing water meters.</li> </ul> <p><b>Recharge;-</b></p> <ul style="list-style-type: none"> <li>➤ The department has implemented over <b>350 water harvesting structuring by the way of bandharas /weir on the rivers, which are storing 564.7 MCM</b> of water which charges the ground water and maintains E- flow in the river.</li> </ul> <p><b>Water quality</b></p> |
|---|---|--|

|   |                         |  |
|---|-------------------------|--|
|   |                         | <ul style="list-style-type: none"> <li>➤ Ground water quality is also monitored, except in the low laying swamp areas in the tidal affected regions which are affected by salinity i.e., 2 well out of 48 wells (4.16 %) rest all the wells are having fresh water chlorides are in permissible limits. Entire Goa state is free from fluoride.</li> </ul> <p><b><u>Rejuvenation of Water-Bodies</u></b></p> <ul style="list-style-type: none"> <li>➤ In respect of water-bodies, Water Resources Department (WRD) has classified the same into (a) rivers, (b) Dams / storage schemes, (c) tanks / ponds / lakes and (d) wells</li> <li>➤ State has constructed 2 nos medium dams namely Salauli and Anjuna , 4 nos minor dams namely Chapoli, Amthane, Panchwadi, Gawane dam harvesting 29365 ha-m of water.</li> <li>➤ State has one Inter- State project Tillari Dam which provides 11350 ha- m of water for irrigation , water supply to maintain E- flow in the rivers.</li> <li>➤ State has taken up development of lakes , wells and other water storages structures for rejuvenation of water bodies have implemented over 1500 nos small projects .</li> <li>➤ The department has implemented over <b>350 nos of water harvesting structuring by the way of bandharas /weir on the rivers, which are storing 564.7 MCM</b> of water which charges the ground water and maintains E- flow in the river</li> <li>➤ The State has implemented Goa Ground Water Regulation Act, 2002 . Registrations of wells have been made compulsory.</li> <li>➤ Ground water is monitored by 43 Nos observation / monitoring wells , where in pre and monsoon levels are monitored for quality and quantity.</li> <li>➤ Ground water utilisation is utilisation is only 37%. <b><i>Stage of ground water development is categorised as SAFE by CGWB.</i></b></li> <li>➤ A subsidy scheme – ‘<i>Nital Goem Nital Baim</i>’ has been introduced for rejuvenation of wells where in the well owner is provide financial help upto Rs 50,000/- (max)</li> <li>➤ Department has established full-fledged water quality lab under hydrology project which monitors water quality pre and post mason.</li> </ul> <p>E flow studies have been conducted for the Madei river Basin, and the E-flow recommended is 808.94 MCM.</p> |
| H | 100 Industrial clusters | No industrial cluster / estate in the State has been categorised as ‘critically polluted’.   |

|   |   |  |
|---|---|--|
| I | Air pollution including Noise pollution | <p>No city has been categorised as ‘Non- Attainment City’ in the State. However, the GSPCB has been conducting air-quality monitoring through 18 fixed-locations under National Ambient Air-quality Monitoring Programme (NAMP) of the CPCB. In addition, site-specific air-quality monitoring is being conducted by the Board with the help of mobile Online Continuous Ambient Air Quality Monitoring System (CAAQMS).</p> <p>As regard to Noise pollution, the State <i>through the Department of Environment</i>, has notified the ‘Designated Authorities’ as per the provisions of the Noise Rules, 2000 and the issued about noise have been addressed effectively.</p>   |
| J | Rejuvenation of water-bodies            | <p>In respect of wetlands, the Goa State Biodiversity Board (GSBB) is the Nodal Agency for Goa State Wetland Authority (GSWA) and is in a process of identification of wetlands in the State through the National Institute of Oceanography (NIO) and the same is proposed to be completed by December 2019.</p> <p>In respect of water-bodies, Water Resources Department (WRD) has classified the same into (a) rivers, (b) dams / storage schemes, (c) tanks / ponds / lakes and (d) wells. The State has implemented Goa Ground Water Regulation Act, 2002 though its utilisation is only 37%. Registrations of wells have been made compulsory and a scheme – ‘<i>Nital Goem Nital Baim</i>’ has been introduced for rejuvenation of wells.</p> |

## ANNEXURE – A

**Identification of Open-plots within the Notified Industrial Estates  
for waste-segregation**

No.: GIDC/GM(E)/SWM/2019-20/2999  
Date: 13/08/2019  
09

To,  
The Managing Director,  
Goa Waste Management Corporation,  
Saligao – Goa, 403 515

**Sub: Action taken on the minutes of the 9<sup>th</sup> meeting held on 11/09/2019.**

Sir,

With reference to the minutes of meeting held on 11/09/2019, in the office of the Dy. Collector (DRO-North), North Panaji, it has been directed to furnish the information in regards to the plots earmarked for the segregation center in the various Industrial Estates, along with the name and contact number of the concerned officers to your office, for inspection/feasibility of land for the same. Therefore the list detailed as below.

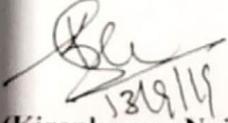
| Sr No. | Name Of Industrial Estate  | Area                | Name of the Officer  | Contact Number             |
|--------|----------------------------|---------------------|----------------------|----------------------------|
| 1.     | Pisurlem Industrial Estate | 1000 m <sup>2</sup> | Dheeraj Satardekar   | 9823577909                 |
| 2.     | Honda Industrial Estate    | 1000 m <sup>2</sup> | Dheeraj Satardekar   | 9823577909                 |
| 3.     | Bicholim Industrial Estate | 1000 m <sup>2</sup> | Dheeraj Satardekar   | 9823577909                 |
| 4.     | Colvale Industrial Estate  | 1000 m <sup>2</sup> | Jitendra Gawandalkar | 9822486746                 |
| 5.     | Pilerne Industrial Estate  | 1000 m <sup>2</sup> | Raghuraj Shetgaonkar | 9423321159                 |
| 6.     | Tuem Industrial Estate     | 1000 m <sup>2</sup> | M. Kaisukar          | 70383231153/<br>9511685119 |
| 7.     | Kundaim Industrial Estate  | 1000 m <sup>2</sup> | Pooja Naik           | 9823390806                 |
| 8.     | Madkaim Industrial Estate  | 870 m <sup>2</sup>  | H. Manjrekar         | 9822487407/<br>8668960495  |
| 9.     | Cancona Industrial Estate  | 600 m <sup>2</sup>  | Mason Dias           | 9822165224                 |
| 10.    | Kakoda Industrial Estate   | 1000 m <sup>2</sup> | Jose Barreto         | 9850791558                 |
| 11.    | Cuncolim Industrial Estate | 1000 m <sup>2</sup> | Stanley Colaco       | 9822128948                 |
| 12.    | Margoa Industrial Estate   | 1000 m <sup>2</sup> | Jose Barreto         | 9850791558                 |
| 13.    | Verna Industrial Estate    | 1000 m <sup>2</sup> | Sanket Faldessai     | 9822142618                 |

C/326

|     |  |                     |                      |                            |
|-----|--|---------------------|----------------------|----------------------------|
| 14. | Sancoale Industrial Estate                           | 1000 m <sup>2</sup> | L.G. Costa           | 9822100800                 |
| 15. | Sanguem Industrial Estate                            | 1000 m <sup>2</sup> | Jose Barreto         | 9850791558                 |
| 16. | Shiroda Industrial Estate                            | 1000 m <sup>2</sup> | Naresh Dessai        | 9823883931                 |
| 17. | Tivim Industrial Estate                              | 800 m <sup>2</sup>  | M. Kaisukar          | 70383231153/<br>9511685119 |
| 18. | Mapusa Industrial Estate                             | Not<br>Available *  | Vinayak Khandeparkar | 9822134737                 |
| 19. | Corlim Industrial Estate                             | Not<br>Available ** | H. Manjrekar         | 9822487407/<br>8668960495  |
| 20. | Bethora Industrial Estate                            | 800 m <sup>2</sup>  | Vibhav Jalmi         | 9545387565                 |
| 21. | Panchawadi Industrial Estate                         | 1000m <sup>2</sup>  | Naresh Dessai        | 9823883931                 |
| *   | Garbage will be treated at Tivim Industrial Estate   |                     |                      |                            |
| **  | Garbage will be treated at Kundaim Industrial Estate |                     |                      |                            |

Please take note of the same. We also enclose copy of earlier letter No.: GIDC/MD/SWM/2019-20/2731 dated 23/08/2019 addressed to The Dy. Collector (DRO-North), Office of the Collectorate building from the Managing Director for reference.

Yours Faithfully,



(Kirankumar Naik)  
Regional Manager (H.O)

Copy to:

1. The Dy. Collector (DRO-North), Office of the District Collector, Collectorate building, Opp. Municipal garden, Panaji Goa. 403 001
2. Addl. District Magistrate, Office of the Collector & District Magistrate, South Goa District, Magisterial Branch, Matanhy Saldanha Admisnistrative Complex., Near KTC Bus Stand , Margao-Goa.
3. PA to MD
4. All FM's/AM's
5. O/c
6. Guard file
7. Outward guard file

## ANNEXURE - B

## Official Gazette Notifying the Ban on single-use plastic in Goa

| SERIES I No. 25  | OFFICIAL GAZETTE — GOVT. OF GOA<br>(EXTRAORDINARY)  | 23RD SEPTEMBER, 2019   |
|--|---|--|
| <p align="center"><b>Notification</b><br/>7/12/2019-LA</p> <p>The Goa Non-Biodegradable Garbage (Control) (Amendment) Act, 2019 (Goa Act 13 of 2019), which has been passed by the Legislative Assembly of Goa on 09-08-2019 and assented to by the Governor of Goa on 17-09-2019, is hereby published for the general information of the public.</p> <p>D. S. Haut Dessai, Joint Secretary (Law).<br/>Porvorim, 23rd September, 2019.</p> | <p>fitness clubs, retail stores, banks, financial institutions, supermarkets, auto and boat dealerships, etc. and other such establishments;"</p>   | <p>(#) after clause (b), the following clause shall be inserted, namely:—</p>  |
| <p align="center">The Goa Non-Biodegradable Garbage (Control) (Amendment) Act, 2019<br/>(Goa Act 13 of 2019) [17-09-2019]<br/>AN<br/>ACT</p>   | <p>(be) "inert waste" means waste which is neither chemically nor biologically reactive and will not decompose;</p>   | <p>(#) after clause (n), the following clauses shall be inserted, namely:—</p>   |
| <p><i>further to amend the Goa Non Biodegradable Garbage (Control) Act, 1996 (Goa Act 5 of 1997).</i></p>  | <p>(o) "plastic" means material which contains as an essential ingredient a high polymer such as polyethylene (PE), polycarbonates (PC), high density polyethylene, vinyl, low density polyethylene, polypropylene, polystyrene (PS Styrofoam/Thermocol) resins, multi-materials like Acrylonitrile Butadiene Styrene (ABS), Polyphenylene Oxide, Polycarbonate, Polyvinyl Chloride, Acetal, Acrylic, Cellulose Acetate, Cellulose Acetate Butyrate, Nylon, Polybutylene terephthalate and shall also include Non Woven Polypropylene, Multilayered co-extruder Polyterephthalate (PT), Polyamides, Polymethylmethacrylate, Plastic microbeads.</p> | <p>(p) "plastic carry bags" means bags made from plastic material with or without handles used for the purpose of carrying or dispensing commodities but do not include bags that constitute or form an integral part of the packaging in which goods are sealed prior to use;</p> |
| <p>Be it enacted by the Legislative Assembly of Goa in the Seventieth Year of the Republic of India as follows:—</p>   | <p>(q) "Styrofoam" is a type of expanded polystyrene used especially for making food containers and packing materials.</p>  | <p>3. <i>Insertion of new section 3A.</i>— After section 3 of the principal Act, the following section shall be inserted, namely:—</p>   |
| <p>1. <i>Short title and commencement.</i>— (1) This Act may be called the Goa Non-Biodegradable Garbage (Control) (Amendment) Act, 2019.</p>  |   |  |
| <p>(2) It shall come into force at once.</p>   |   |  |
| <p>2. <i>Amendment of section 2.</i>— In section 2 of the Goa Non-Biodegradable Garbage (Control) Act, 1996 (Goa Act 5 of 1997) (hereinafter referred to as the "principal Act"),</p>  |   |  |
| <p>(j) after clause (a), the following clause shall be inserted, namely:—</p>  |   |  |
| <p>"(aa) "commercial establishment" means an establishment used for commercial purposes, such as, bars, shacks, restaurants, private offices,</p>  |   |  |

3(A). *Prohibition on use of plastic carry bags, etc.—*

(1) No person shall manufacture, import, store, transport or sell plastic carry bags or items made up of plastic/styrofoam such as, cups, straws, lids, cutlery, cello and poly film, metalised film, plastic cellophane paper and such other items as specified by the Government, by notification in the Official Gazette.

(2) No person including commercial establishment shall use or throw or cause to be thrown plastic carry bags and items specified in sub-section (1), in a public place.

(3) No person shall burn non-biodegradable garbage in public place.

Provided that provisions of this section shall not apply to export oriented units or units in special economic zones, notified by the Central Government, manufacturing their products against an order for exports. Such export oriented units shall not allow their products for sale and usage within the State of Goa."

4. *Insertion of new section 5B.—* After section 5A of the principal Act, the following section shall be inserted, namely:—"5B. *Penalty for contravening provisions of section 3A.—*

(1) whoever contravenes provisions of sub-section (1) of section 3A shall be punishable with a fine of Rs. 50,000/- (Rupees fifty thousand) for the first offence, Rs. 1,00,000/- (Rupees one lakh) for the second offence and Rs. 3,00,000/- (Rupees three lakhs), or with imprisonment which may extend to three months or with both for every subsequent offence.

(2) Whoever contravenes provisions of sub-section (2) of section 3A shall be punishable with,—

(i) a fine of Rs. 2,500/- (Rupees two thousand five hundred) for the first offence, Rs. 3,500 (Rupees three thousand five hundred) for the second offence and Rs. 5,000/- (Rupees five thousand), or with imprisonment which may extend to five days, or with both, for every subsequent offence, when the offence is in relation to an individual;

(ii) a fine of Rs. 10,000/- (Rupees ten thousand) for the first offence, Rs. 20,000/- (Rupees twenty thousand) for the second offence and Rs. 50,000/- (Rupees fifty thousand), or with imprisonment which may extend to one month or with both, for every subsequent offence, when offence is in relation to commercial establishment;

(3) Whoever contravenes provisions of sub-section (3) of section 3A shall be punishable with a fine of Rs. 5,000/- (Rupees five thousand) in case of simple burning, Rs. 25,000 (Rupees twenty five thousand) in case of bulk burning, for the first offence and for subsequent offences Rs. 10,000/- (Rupees ten thousand) for simple burning and Rs. 50,000 (Rupees fifty thousand) for bulk burning or with imprisonment which may extend upto a period of five days or with both.

(5) *Amendment of Schedule.—* In the Schedule to the principal Act, after item at serial No. (11), the following items shall be inserted, namely:—

"(12) Styrofoam;

(13) Inert Waste;"

Secretariat,  
Porvorim, Goa.  
Dated: 23-09-2019.

CHOKHA RAM GARG  
Secretary to the  
Government of Goa,  
Law Department  
(Legal Affairs).

## ANNEXURE - C

### Follow-up action initiated by the Urban Local Bodies for non-compliance to Notices issued for discharge / release of untreated sewage into water-bodies

| Sr. No./Name of ULBs                                    | Total No. of individuals/ establishments found responsible initially | Total No. to whom notices have been issued    | Total No. who have complied   | Total No. still found non complying after notice period   | Total No. against whom action has been taken  | Remarks  |
|---|--|---|---|---|---|--|
| <b>1. CCP</b><br><i>(status as on 13/09/2019)</i>       | 156 Nos. of residents.   | Notices to 156 Nos. of residents were issued. | 84 Nos. of residents have given reply, out of which 2 Nos. of residents have provided septic tank/soak pit. | 72 Nos. of residents had not replied. Now 3 Nos. of residents have replied, out of which 1 No. of resident has given reply that his work is under process. Further, 2 Nos. of residents have replied that it is difficult by them to provide septic tank/soak pit because of getting water level and financial problem. | The list of 84 Nos. of residents who have replied and 72 Nos. of resident who have not replied have been forwarded to Urban Health Centre Panaji to take action under the Health Act against who have not replied. Out of 84 Nos. of residents who have replied, 2 Nos. of residents have complied. 82 Nos. of residents action is under process. | The UHC, Panaji vide letter dated 04/10/2019 has submitted the Action Taken Report.  |
| <b>2. Valpoi MC</b><br><i>(status as on 12/09/2019)</i> | 13   | 13  | 02  | 11  | Nil   | None of the 11 rivers listed in the Order of NGT passes through the jurisdiction of Valpoi Municipal Council, hence the Council do not come under purview of the said Order. However, Final Notice will be issued to the defaulters. |

|  |   |   |  |                                |   |   |
|--|---|---|--|--------------------------------|---|---|
| <b>3. Margao MC</b><br>(status as on 19/09/2019)   | 116   | 116   | Nil  | Notice period is not completed | Not applicable  | -   |
| <b>4. Sankhali MC</b><br>(status as on 13/09/2019) | <p>1. Shri. Madhukar Gawas</p> <p>2. Shri. Nilesh Kanekar</p> <p>3. Shri. Shriram Chandrakant Naik</p> <p>4. Shri. Sameer Karpe</p> | <p>No. SMC/TECH/MS W/River/Notice/2019-20/449 dated 04/06/2019</p> <p>No. SMC/TECH/MS W/River/Notice/2019-20/450 dated 04/06/2019</p> <p>No. SMC/TECH/MS W/River/Notice/2019-20/451 dated 04/06/2019</p> <p>No. SMC/TECH/MS W/River/Notice/2019-20/775 dated 04/06/2019</p> | <p>Complied the instructions.</p> <p>Complied the instructions</p> <p>Complied the instructions</p> <p>Complied the instructions</p> | -                              | -   | All the Four Violators have complied to the directions issued by the CHC, Sankhali & the Council. |
| <b>5. Mormugao MC</b><br>(status as on             | Survey is under progress  | 156   | -  | 156                            | The Council is in process of taking further action in the matter. | Survey is under progress to detect source of discharge of waste water from individual/            |

|  |   |        |        |     |                |  |
|--|---|--------|--------|-----|----------------|--|
| <i>11/09/2019)</i>                                       |   |        |        |     |                | establishments   |
| <b>6. Sanguem MC</b><br><i>(status as on 27/09/2019)</i> | <ol style="list-style-type: none"> <li>1. Altaf G. Shaikh, Muslimwada, Sanguem</li> <li>2. Hidayat Shaikh, Muslimwada, Sanguem</li> <li>3. Mr. Khalil, C/o Smt. Malika Bi Shaikh, Muslimwada, Sanguem</li> <li>4. Shafi Jagindar, C/o Smt. Malika Bi Shaikh, Muslimwada, Sanguem</li> <li>5. Rafiq, C/o Smt. Malika Bi Shaikh, Muslimwada, Sanguem</li> </ol> | 5 Nos. | 5 Nos. | Nil | Not Applicable | The Council has issued notices to all 5 individuals who were found discharging sewerages into the Municipal drains which flows into water bodies. After issuing notices they have stopped to allow sewerage water into drain and same is confirmed by officials of PHC, Sanguem & the Council. |
| <b>7. Pernem MC</b><br><i>(status as on 11/09/2019)</i>  | 1 No. (individual)  | 01 no. | 01 no. | Nil | Nil            |  |
| <b>8. Mapusa MC</b><br><i>(status as on 09/10/2019)</i>  | As replied by Mapusa MC, that none of the Rivers mentioned in the Order Ref. No.DMA/ENGG/GEN(RS)/2018-19/F.26/401 dated 13/05/2019 are flowing within the territorial limit of Mapusa Municipal Council, hence the reply may be treated as “Not Applicable”   |        |        |     |                |  |
| <b>9. CCMC</b><br><i>(status as on 10/10/2019)</i>       | Total 46 Establishments were jointly inspected and notices were issued by Health. Out of 46, 4 are Commercial and 42 are Domestic Households. As per the latest reports 4 Commercial Establishment and 26 Domestic Households have complied with the instructions and remaining 16 Final Notices will be issued by the Health Dept.                           |        |        |     |                |  |
| <b>10. Canacona MC</b>                                   | Portion of Talpona River flows through Canacona Municipal jurisdiction. Notice was issued to 13 households who were discharging into the water body. All 13 households have now complied with the directions and stopped discharge.   |        |        |     |                |  |

|  |  |               |              |              |            |   |
|--|--|---------------|--------------|--------------|------------|---|
| <i>(status as on 10/10/2019)</i>                           |  |               |              |              |            |   |
| <b>11. Quepem MC</b><br><i>(status as on 10/10/2019)</i>   | 12 Nos.  | 12 Nos.       | 12 Nos.      | Nil          | Nil        | As per the Notice all of them have replied that they constructed the soak pit and connected the waste water in the soak pit. Accordingly, the Health as well as the Quepem Mun. Council verified and found satisfactorily.  |
| <b>12. Bicholim MC</b><br><i>(status as on 10/10/2019)</i> | Commercial - 19 Nos.<br><br>Household – 200 Nos.   | 19<br><br>200 | 11<br><br>24 | 8<br><br>176 | 8<br><br>- | Trade License Suspended.<br><br><b>1.</b> Action for disconnection of water & power will be initiated at the Municipal Level.<br><br><b>2.</b> Some households have given undertaking to complete construction of soak pit after rains subside.<br><br><b>3.</b> Some households have identified the sites to construct a sewage treatment plant jointly. |
| <b>13. Ponda MC</b>  | As per information from Ponda Municipal Council none of the 11 identified rivers are flowing through its jurisdiction. Hence, Not Applicable     |               |              |              |            |   |
| <b>14. Cuncolim MC</b>                                     | As per information from Cuncolim Municipal Council none of the 11 identified rivers are flowing through its jurisdiction. Hence, Not Applicable. |               |              |              |            |   |

## ANNEXURE - D

### Follow-up action initiated by the Directorate of Panchayats for non-compliance to Notices issued for discharge / release of untreated sewage into water-bodies

| Sr. No. | Polluted river stretch   | Name of the village / town   | Responsible Officer with Name and Designation   | Number of household discharging direct sewage | Current Status                                  | Timeline proposed          |
|---------|--|--|---|---|---|----------------------------|
| 1       | <b>Sal river – Priority-III</b><br><i>(from Mobor to Khareband),</i> | 1. Nuvem<br>2. Seraulim<br>3. Margao<br>4. Khareband<br>5. Sirvodem<br>6. Sirlim<br>(Telaulim)<br>7. Kankanamoddi<br>(Pazorconi).<br>8. Navelim<br>9. Talaulim<br>10. Cana-Benaulim<br>11. Varca<br>12. Orlim<br>13. Carmona<br>14. Assolna<br>15. Cavelossim<br>16. Velim<br>17. Mobor<br>18. Cutbona | 1. Amitesh A. Shirvoikar (BDO) Salcete.<br>2. Prasad Naik (BDO), Mormugao<br><br><b>V.P. Secretaries</b><br>1.Mohan Goankar V.P Aquem-Biixo<br>2.Joaquim Rodrigues V.P Navelim<br>3.Sunita Dessai V.P Chinchinim Deussa<br>4.Shrisail Pattanshetti V.P Ambelim<br>5.Krishna Dessai V.P Assolna<br>6.Allaudin Maniyar V.P Cavelossim | 78  | Notices issued between 09/08/2019 to 12/08/2019 | Follow-up action initiated |

|    |   |   |  |      |   |                            |
|----|---|---|--|------|---|----------------------------|
| 2. | <b>Talpona river</b> – Priority-IV<br>(from Talpona to Gokarn math) | 1. Canacona<br>2. Talpona<br>3. Poinguinim  | 1. Vaman Gaonkar, BDO, Canacona<br><br><b>V.P. Secretary</b><br>1. Rajiv Naik Gaonkar V.P. Poinguinim  | 11   | Notices issued between 09/08/2019 to 12/08/2019 | Follow-up action initiated |
| 3  | <b>Mandovi river</b> – Priority- IV<br>(from Panjim to Volvoi)      | 1. City Corporation of Panaji (CCP).<br>2. Betqui-Khandola<br>3. Marcem-Tivrem-Orgaon<br>4. Amona<br>5. Navelim<br>6. Candola-Volvoi<br>7. St.Istevam<br>8. Se Old-Goa.<br>9. Salvador-do-Mondo<br>10. Penha-de-France<br>11. Reis-Magos<br>12. Nerul | 1. Anil Dhumaskar, BDO-II, Bardez<br>2. Deepak P. Vaigankar, BDO-II, Bardez<br>3. Shrikant Pednekar, BDO, Bicholim<br>4. Milind G. Velip, BDO, Ponda<br>5.Prajakta D. Goltekar, BDO, Tiswadi<br><br><b>V.P. Secretaries</b><br>1.Pravisha Bhonsle V.P. Aldona<br>2.Rupesh Halarnkar V.P. Penha- De- Franca<br>3.Premanand Mandrekar V.P. Reis Magos<br>4.Avinash Palni Salvador- Do- Mundo<br>5.Avelino V.P. Pomburpa Olaulim<br>6.Satish Gauns V.P. Amona<br>7.Raghunath Naik, Betqui Candola<br>8.Vinod Shetkar V.P. Bhoma Adcolna<br>9.Sushant Naik V.P. Tivrem Orgao<br>10.Prasad Naik V.P. Verem Vaghurme<br>11.Prasad Naik V.P. Volvoi<br>12.Lancy Dias Juliao V.P. Chimbél<br>13.Ramita K. Murgaonkar V.P. Cumbarjua<br>14.Jenu Naik V.P. Sao-Matias<br>15.Ashish Naik V.P. Se Old Goa<br>16.Tukaram Naik V.P. Goltim Navelim<br>17.Rajesh Naik V.P. Santa Cruz | 2145 | Notices issued between 09/08/2019 to 12/08/2019 | Follow-up action initiated |

|    |  |   |  |     |   |                            |
|----|--|---|--|-----|---|----------------------------|
|    |  |   | 18.Shrishkumar G. Tari V.P.St.Estevam<br>19.Orville Valles V.P.Merces  |     |   |                            |
| 4. | <b>Chapora river</b> –<br>Priority V<br>(from Alorna Fort to Morjim) | 1. Alorna<br>2. Casarvernem<br>3. Ozrim<br>4. Dhargalim<br>5. Tuem<br>6. Parcem<br>7. Agarwada<br>8. Chopdem<br>9. Morjim<br>10. Mencurem<br>11. Pirna<br>12. Nandora<br>13. Rivora<br>14. Colvale<br>15. Camurlim<br>16. Oxel<br>17. Siolim<br>18. Assagao<br>19. Anjuna | 1. Ani Dhumaskar, BDO-I, Bardez<br>2. Deepak P. Vaigankar, BDO-II, Bardez<br>3. Manish Hari Kedar, BDO, Pernem<br><br><b>V.P. Secretaries</b><br>1.Dharmendra Govekar V.P. Anjuna Caisua<br>2.Rajesh Assolkar V.P. Assagao<br>3.Chandan Chodankar V.P. Oxel<br>4.Subhash Kambli V.P. Siolim – Marna<br>5.Ramesh Mandrekar V.P. Agarwada-Chopdem<br>6.Vijay Tilve V.P. Morjim<br>7.Amol Sawant V.P. Ozarim<br>8.Viraj Kinalkar V.P. Parcem<br>9.Rajaram Kamat V.P. Tuem | 265 | Notices issued between 09/08/2019 to 12/08/2019 | Follow-up action initiated |
| 5. | <b>Terekhol river</b> –<br>Priority – V<br>(at Terekhol)             | 1. Pernem Municipal Council<br>2. Querim-Tiracol<br>3. Paliem<br>4. Corgaon<br>5. Casnem-Amberem-   | 1. Manish Hari Kedar, BDO, Pernem<br><br><b>V.P. Secretaries</b><br>1. Abhay Sawant Querim Terekhol  | 1   | Notices issued between 09/08/2019 to 12/08/2019 | Follow-up action initiated |

|    |  |  |  |     |  |                                  |
|----|--|--|--|-----|--|----------------------------------|
|    |  | Poroscodem<br>6. Tamboxem-<br>Mopa-Uguem<br>7. Torxem  |  |     |  |                                  |
| 6. | <b>Zuari river -<br/>Priority – V<br/>(from<br/>Curchorem to<br/>Madkai)</b> | 1. Curchorem –<br>Cacora<br>Municipal<br>Council<br>2. Savordem<br>3. Panchwadi<br>4. Shiroda<br>5. Borim<br>6. Wadi-<br>Talaulim<br>7. Durbhat<br>8. Bandora<br>9. Madkai<br>10. Neura<br>11. St. Lawrence<br>(Agassim)<br>12. St. Andre<br>(Goa-Velha)<br>13. Siridao-Pale<br>14. Macasana<br>15. Curtorim-<br>Quelossim<br>16. Sancoale | 1. Amitesh A. Shirvoikar (BDO), Salcete.<br>2. Prasad Naik (BDO), Mormugao<br>3. Milind G. Velip, BDO, Ponda<br>4. Prajakta D. Goltekar, BDO, Tiswadi<br><br><b>V.P. Secretaries</b><br>1.Pradip H. Gaude V.P. Bandora<br>2.Kapil Naik V.P. Borim<br>3.Viraj Naik,Dhavli V.P. Cundaim<br>4.Sarvesh Naik V.P. Durbhat<br>5.Neetin Bandonkar V.P. Marcaim<br>6.Mayur Kudalkar V.P. Panchawadi<br>7.Harichandra Naik V.P. Queula<br>8.Divya Surlekar V.P. Querim<br>9.Namita Hazare V.P. Shiroda<br>10.Jitendra Naik, V.P. Vaze Wadi Talaulim<br>11.Dinkar Kossambe V.P. Veling Priol<br>Cuncolem<br>12.Rajendra Gawas V.P. Curca Bambolim<br>& Talaulim,<br>13.Ramita K. Murgaonkar V.P. Cumbarjua<br>14.Rajesh Naik. V.P. Santa Cruz<br>15.Peter Martins V.P. Taleigao<br>16.Basilo Pires V.P.St. Lawrence (Agassaim)<br>17.Dinesh Amonkar V.P Loutulim<br>18.Nilesh Shirodkar V.P Rachol | 717 | Notices<br>issued<br>between<br>09/08/2019<br>to<br>12/08/2019 | Follow-up<br>action<br>initiated |

|    |   |   |   |    |   |            |
|----|---|---|---|----|---|------------|
|    |   |   | 19.Sachin Naik V.P. Cortalim<br>20.Narayan Ajgaonkar V. P. Quelossim  |    |   |            |
| 7. | <b>Khandepar river</b> – Priority V<br>(from Opa Ponda & Codli- u/s of Opa Water works) | 1. Khandepar<br>2. Usgaon<br>3. Kundaim   | 1. Milind G. Velip, BDO, Ponda<br><br><b>V.P. Secretaries</b><br>1.Sanjay Naik V.P. Betoda Nirancal Conxem Codar<br>2.Gokuldas Kudalkar V.P. Curti- Khandepar<br>3.Prasad Shet V.P.Usgao-Ganjem   | 3  | Notices issued between 09/08/2019 to 12/08/2019 | 26/08/2019 |
| 8  | <b>Assonora river</b> – Priority –V<br>(from Assonora to Sirsaim)                       | 1. Assonora<br>2. Sirsaim-Thivim  | 1. Anil Dhumaskar, BDO-I, Bardez<br>2. Deepak P. Vaigankar, BDO-II, Bardez<br><br><b>V.P. Secretaries</b><br>1.Rajkumar Chodankar V.P. Assonora<br>2. Dinesh Chodankar V.P. Sirsaim   | 36 | Notices issued between 09/08/2019 to 12/08/2019 | 26/08/2019 |
| 9  | <b>Valvanti river</b> – Priority – V<br>(from Poriem to Sanquelim-Bicholim)             | 1. Sanquelim Municipal Council<br>2. Poriem<br>3. Honda<br>4. Karapur – Sarvona | 1. Shrikant Pednekar, BDO, Bicholim<br>2. Suryajirao Rane, BDO, Sattari<br><br><b>V.P. Secretaries</b><br>1.Sachin Dhawaskar V.P. Poriem<br>2.Sujata Morajkar V.P. Morlem<br>3.Laxman Naik V.P. Querim<br>4.Honaji Morajkar V.P.Cudnem<br>5.Mahadev Naik V.P. Karapur- Sarvan | 13 | Notices issued between 09/08/2019 to 12/08/2019 | 26/08/2019 |

|    |  |   |   |   |  |  |
|----|--|---|---|---|--|--|
|    |  |   | 6.Hanumant Borkar V.P.Navelim<br>7.Resha Govekar V.P.Ona –Maulinguem  |   |  |  |
| 10 | <b>Bicholim river - Priority- V</b><br><i>(from Bicholim to Curchirem)</i>             | 1. Bicholim Municipal Council.<br>2. Curchirem<br>3. Ona- Maulingem<br>4. Karapur – Sarvona<br>5. Amona<br>6. Pilgaon | 1. Shrikant Pednekar, BDO, Bicholim   | 0 |  |  |
| 11 | <b>Sinquerim river - Priority- V</b><br><i>(from Candolim to Ganesh Temple, Nerul)</i> | 1. Pilerne –Marra<br>2. Candolim<br>3. Reis-Magos<br>4. Nerul   | 1. Anil Dhumaskar, BDO-I, Bardez<br>2. Deepak P. Vaigankar, BDO-II, Bardez<br><br><b>V.P. Secretaries</b><br>1.Laurence Rebeiro V.P. Candolim<br>2.Peter Martins V.P. Pilerne Marra | 3 |  |  |

## ANNEXURE – E

### Action initiated by the Directorate of Health Services (DHS)

DIRECTORATE OF HEALTH SERVICES  
Updated Riverine Stretches Report

| Sr. No. | Polluted river stretch | Number of household discharging direct |      |             | Current Status of compliance |      |             | Disconnection |      |            |
|---------|------------------------|--|------|-------------|------------------------------|------|-------------|---------------|------|------------|
|         |                        | Com                                    | Dom. | Total       | Com                          | Dom. | Total       | Com           | Dom. | Total      |
| 1       | Sal                    | 183                                    | 150  | <b>333</b>  | 183                          | 141  | <b>324</b>  | 0             | 3    | <b>3</b>   |
| 2       | Talpona                | 0                                      | 25   | <b>25</b>   | 0                            | 24   | <b>24</b>   | 0             | 1    | <b>1</b>   |
| 3       | Mandovi                | 31                                     | 2332 | <b>2363</b> | 15                           | 168  | <b>183</b>  | 16            | 192  | <b>208</b> |
| 4       | Chapora                | 8                                      | 283  | <b>291</b>  | 8                            | 104  | <b>112</b>  | 0             | 28   | <b>28</b>  |
| 5       | Terekhol               | 0                                      | 3    | <b>3</b>    | 0                            | 3    | <b>3</b>    | 0             | 0    | <b>0</b>   |
| 6       | Zuari                  | 21                                     | 861  | <b>882</b>  | 20                           | 554  | <b>574</b>  | 1             | 81   | <b>82</b>  |
| 7       | Khandepar              | 0                                      | 2    | <b>2</b>    | 0                            | 2    | <b>2</b>    | 0             |      | <b>0</b>   |
| 8       | Assonora               | 0                                      | 66   | <b>66</b>   | 0                            | 52   | <b>52</b>   | 0             | 14   | <b>14</b>  |
| 9       | Valvanti               | 6                                      | 12   | <b>18</b>   | 6                            | 12   | <b>18</b>   | 0             |      | <b>0</b>   |
| 10      | Bicholim               | 15                                     | 239  | <b>254</b>  | 15                           | 67   | <b>82</b>   | 0             | 172  | <b>172</b> |
| 11      | Sinquerim              | 0                                      | 3    | <b>3</b>    | 0                            | 3    | <b>3</b>    | 0             |      | <b>0</b>   |
|         | <b>TOTAL</b>           | 264                                    | 3976 | <b>4240</b> | 247                          | 1130 | <b>1377</b> | 17            | 491  | <b>508</b> |

# Drone Survey for Mapping and Quantification of 14 Nos. Legacy Waste Site in Goa

Survey Execution and Documentation by



OFFICE ADDRESS – FiRE, DON BOSCO COLLEGE CAMPUS, FATORDA, GOA

EMAIL – [rahul@owlwayscreative.com](mailto:rahul@owlwayscreative.com)

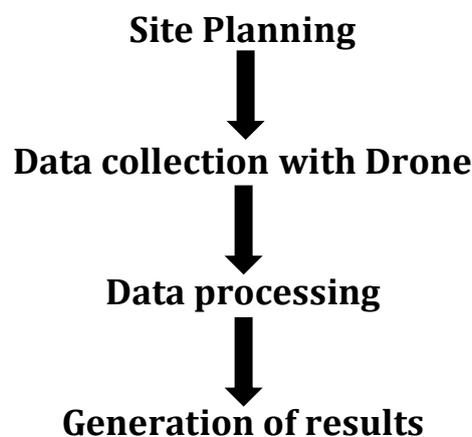
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## **1.1 OBJECTIVE**

To conduct drone survey for Mapping and Quantification of 14 numbers legacy waste sites in Goa.

## **1.2 METHODOLOGY**



Methodology adopted for Survey using Drone

Drone data offers most valued intuitions in terms of evaluation, mapping and site observation giving detailed specification. The use of UAV platforms differs on varying situation.

We work with genuine platforms which gives the desired output with accuracy. For surveys using drones Ground Sampling Distance or resolutions is as high as 1cm per pixel.

Using in aerial surveying tools, we survey the site and produce point cloud referenced volume, producing more data than traditional methods.

## **2. SURVEY OBSERVATION OF 14 NOS LEGACY WASTE SITE**

Each of 14 number of Legacy Waste Site were surveyed using Drone for mapping and quantification.

In following pages are the detailed observations.

### **Note-**

- **All legacy sites are surveyed considering ground level as reference.**
- **All volumetric measurements are calculated considering ground reference and dump above it.**
- **Below ground legacy waste is not possible to calculate.**

## **2.1. SURVEY OF BICHOLIM MUNICIPAL COUNCIL**

- Date of Survey Conducted – 03<sup>rd</sup> January 2019
- Location – **Adjacent to the Garbage Treatment Plant, Lakherem.**
- Mapped Location of Surveyed Area –  
Latitude – 15. 36` 23.02`` N Longitude – 73. 57` 51.43`` E
- Site Top View



Figure 2.1.1 – Top View of Surveyed Area

- Mapping on Google Earth

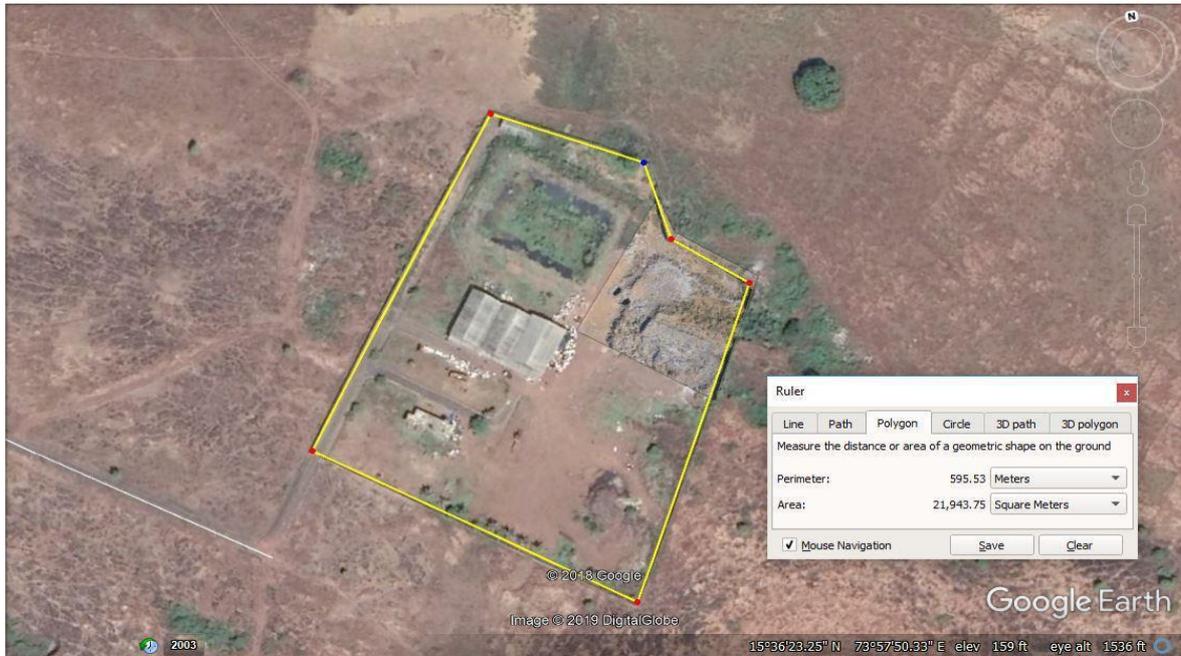


Figure 2.1.2 – Mapped Area

Area of Mapped Surface – 21943.75 m<sup>2</sup>

- Quantification

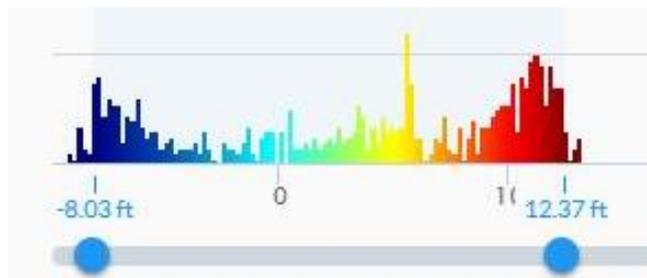
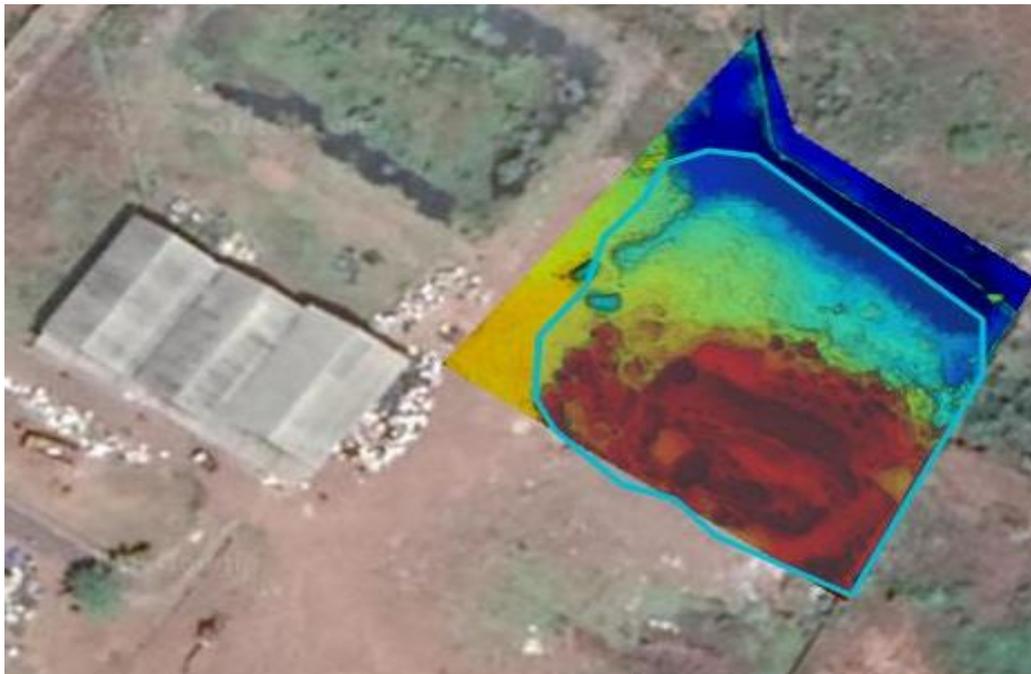
Area of Dump = 2561.66 m<sup>2</sup> (approx.)

Volume of Dump = 3165.257 m<sup>3</sup> (approx.)



Figure 2.1.3 – Ground Control Points of Dump Area

- **Elevation Map**



12.37ft = 3.77m

Figure 2.1.4 – Elevation Map

- 3D Model

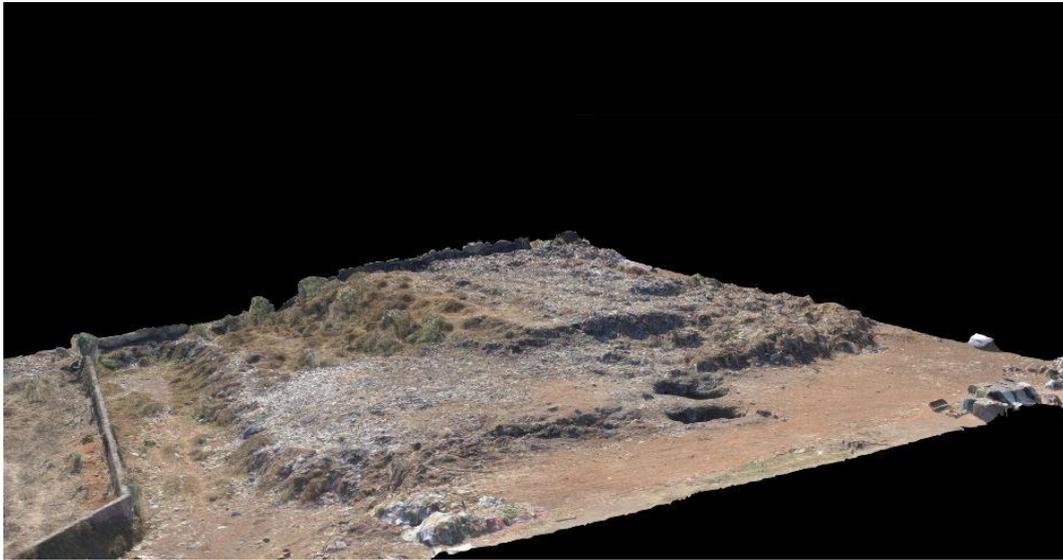


Figure 2.1.5 – 3D Model

- Nearest Land Mark



Figure 2.1.5 Nearest landmark

Nearest landmark - Bicholim Waste Treatment Plant at 50.22 meters (approx.)

## **2.2. SURVEY OF CANCONA MUNICIPAL COUNCIL**

- Date of Survey Conducted – 03<sup>rd</sup> January 201
- Location – Garbage Treatment Plant At Dumane Shristhal
- Mapped Location of Surveyed Area  
Latitude – 15° 01' 48.15" N      Longitude – 74° 01' 18.38" E
- Site Top View



Figure 2.2.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.2.2 – Mapped Area

Area of Mapped Surface – 4917.15 m<sup>2</sup>

- **Quantification**

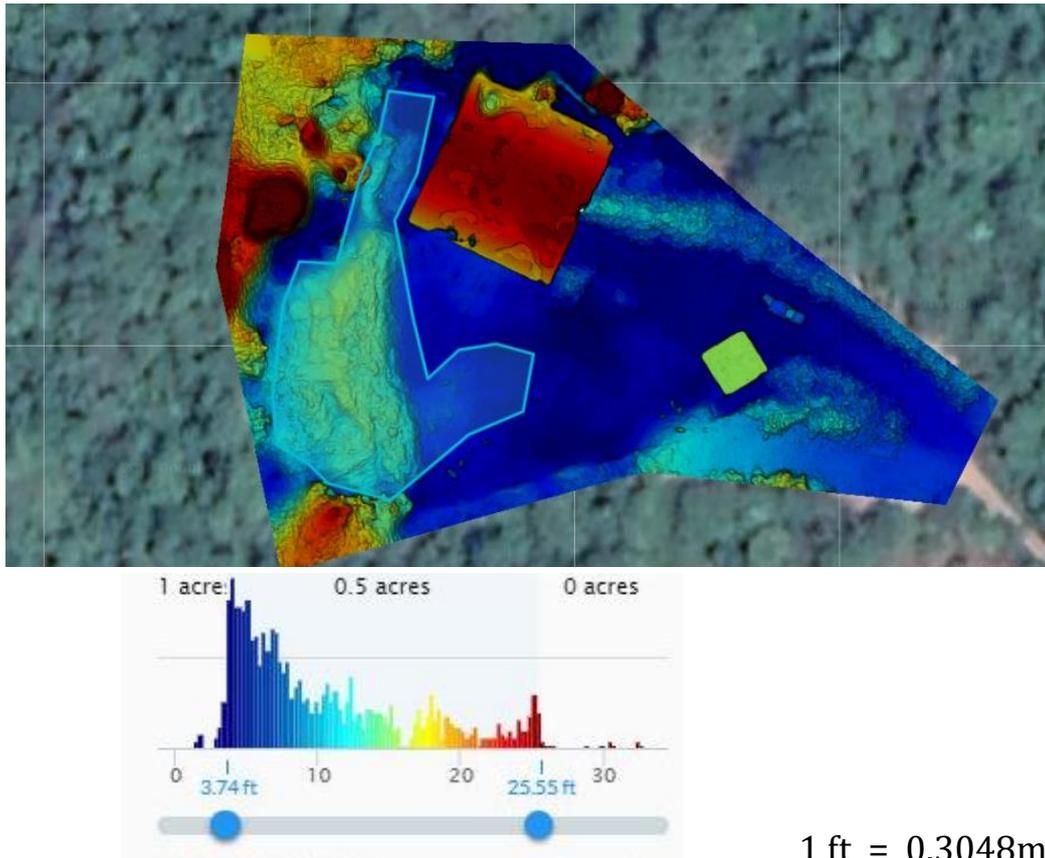
Area of Dump = 929.30911 m<sup>2</sup>

Volume of Dump = 493.21434 m<sup>3</sup>



Figure 2.2.3 – Ground Control Points of Dump Area

- **Elevation Map**



1 ft = 0.3048m  
25.55 ft = 7.75m

Figure 2.2.4 – Elevation Map

- **3D Model**



Figure 2.2.5 – 3D Model

- **Nearest Land Mark**

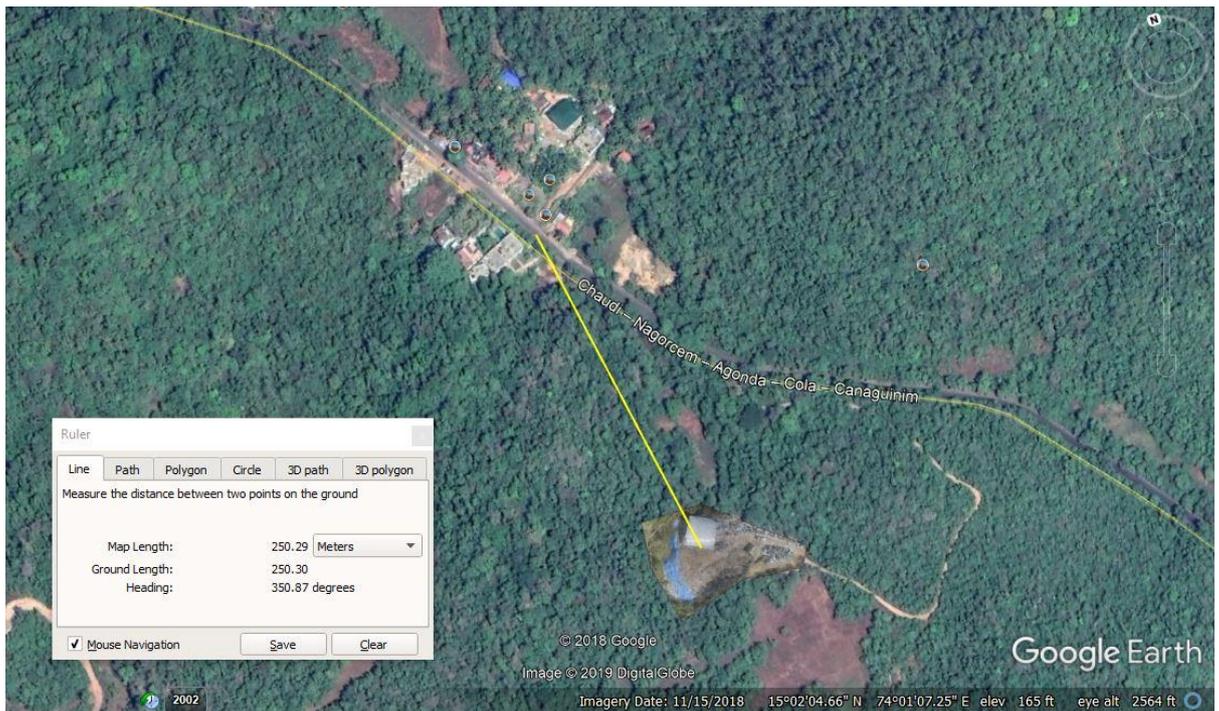


Figure :2.2.6 nearest landmark

Nearest landmark - Milly`s place (Restaurant) at 250.29 meters (approx.)

### **2.3. SURVEY OF CORPORATION OF CITY OF PANJIM (CAMPAL)**

- Date of Survey Conducted – 31<sup>st</sup> December 2018
- Location – Opp. Campal Ground, Campal
- Mapped Location of Surveyed Area  
Latitude – 15° 29' 21.06" N Longitude – 73° 48' 59.26" E

- **Site Top View**



Figure 2.3.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.3.2 – Mapped Area

Area of Mapped Surface = 3123.37m<sup>2</sup>

- **Quantification**

Area of Dump = 3476.24 m<sup>2</sup>

Volume of Dump = 7555.25 m<sup>3</sup>

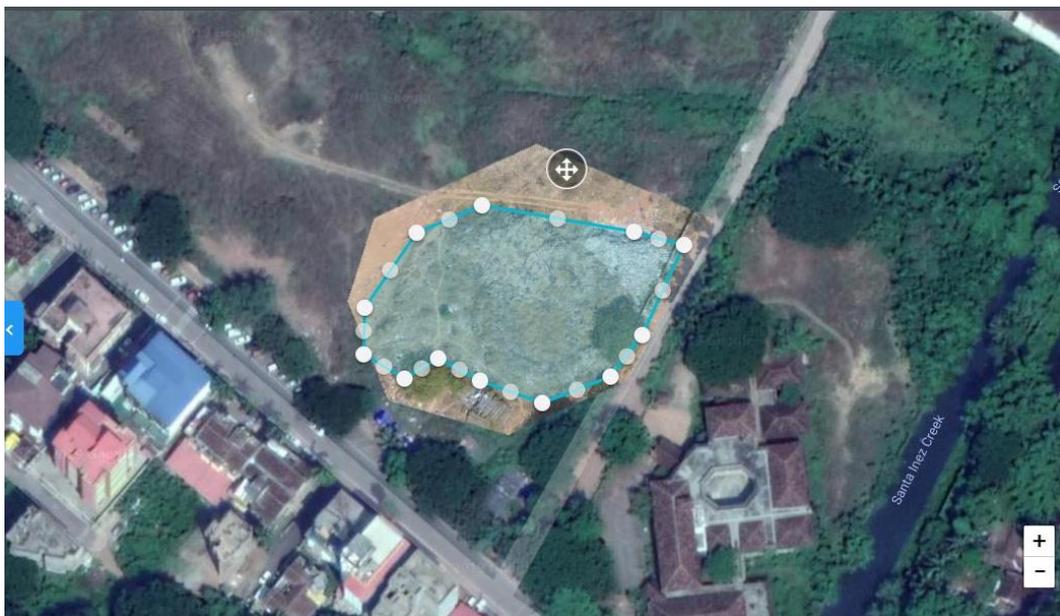


Figure 2.3.3 – Ground Control Points of Dump Area

- **Elevation Map**

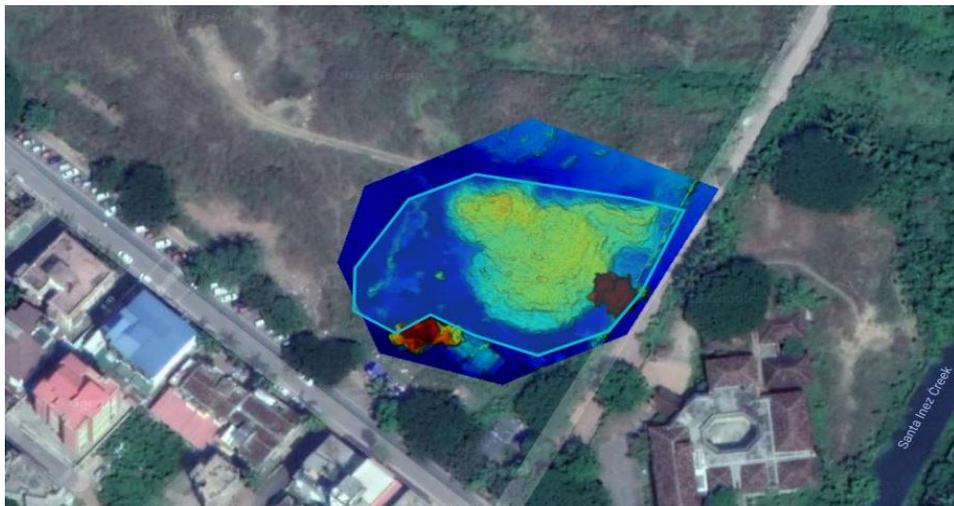
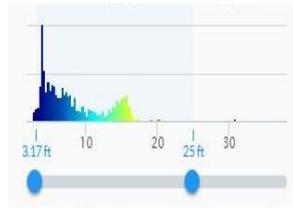


Figure 2.3.4 – Elevation Map



1 ft = 0.3048m    25.55 = 7.75m

- **Nearest Land Mark**

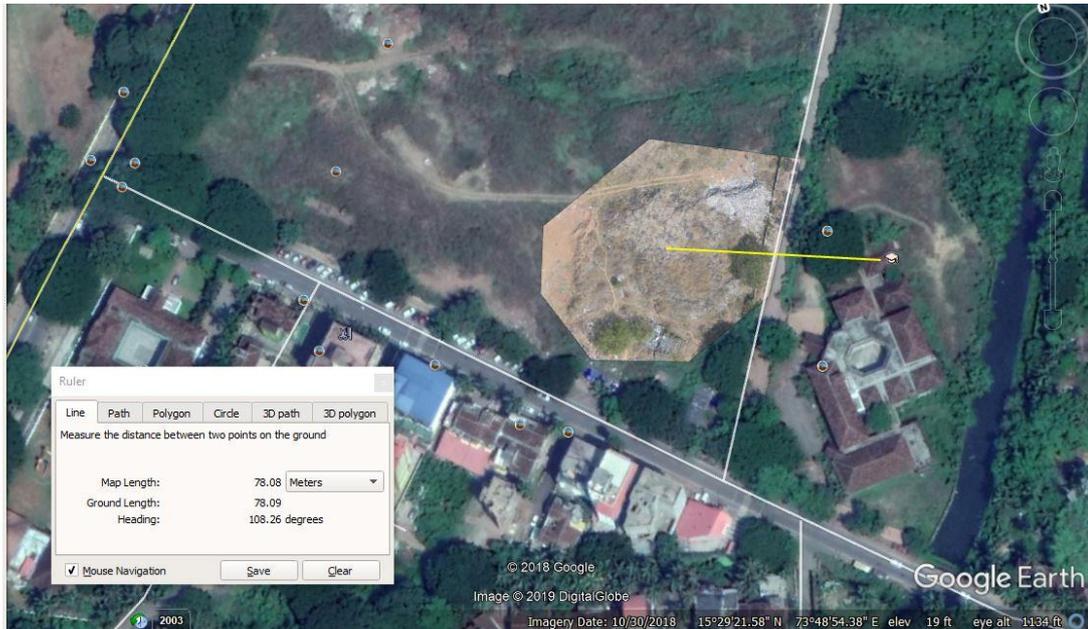


Figure 2.3.5 – Nearest Landmark

Nearest landmark - Goa College of Home Science at about 78.08 meters (approx.)

## **2.4. SURVEY OF CUNCOLIM MUNICIPAL COUNCIL**

- Date of Survey Conducted – 27 December 2018
- Location – Cuncolim Industrial Estate
- Mapped Location of Surveyed Area  
Latitude : 15° 10` 47.94`` N    Longitude : 74° 01` 26.52`` E
- **Site Top View**



Figure 2.4.1 – Top View of Surveyed Area

- Mapping on Google Earth



Figure 2.4.2 – Mapped Area

Area of Mapped Surface – 25385.07 M<sup>2</sup>

- Quantification



Figure 2.4.3 – Ground Control Points of Dump Area

Area of Dump = 6309.04 M<sup>2</sup>

Volume of Dump = 3616.95m<sup>3</sup>

- **Elevation Map**

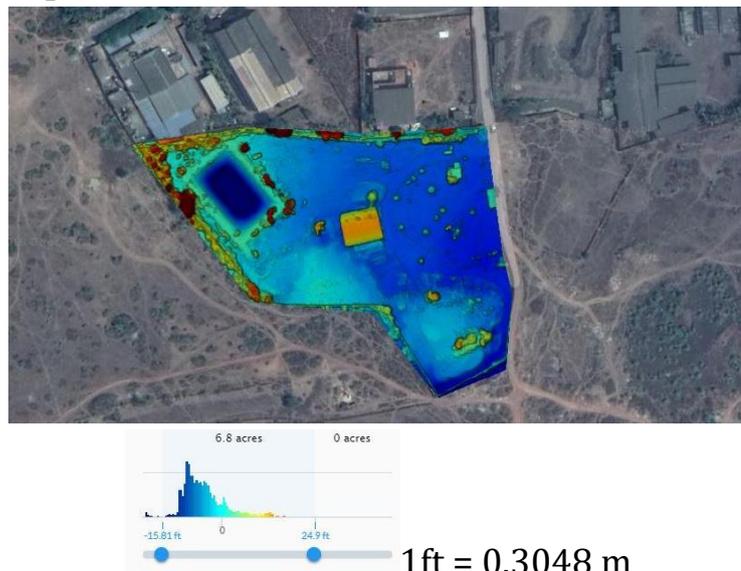


Figure 2.4.4 – Elevation Map

- **3D Model**



Figure 2.4.5 – 3D Model

- **Nearest Land Mark**



Figure 2.4.6 – 3D Model

Nearest landmark – Commercial Industry at about 85.33m.

## 2.5. SURVEY OF CURCHOREM CACORA MUNICIPAL COUNCIL AND SANGUEM MUNCILPAL COUNCIL

- Date of Survey Conducted – 01 January 2019
- Location – Survey No. 164/8, 165/1, 167 & 168
- Mapped Location of Surveyed Area  
Latitude –  $15^{\circ} 13' 53.45''\text{N}$  Longitude –  $74^{\circ} 07' 34.36''\text{E}$
- **Site Top View**



Figure 2.5.1 – Top View of Surveyed Area

- **Mapping on Google Earth**

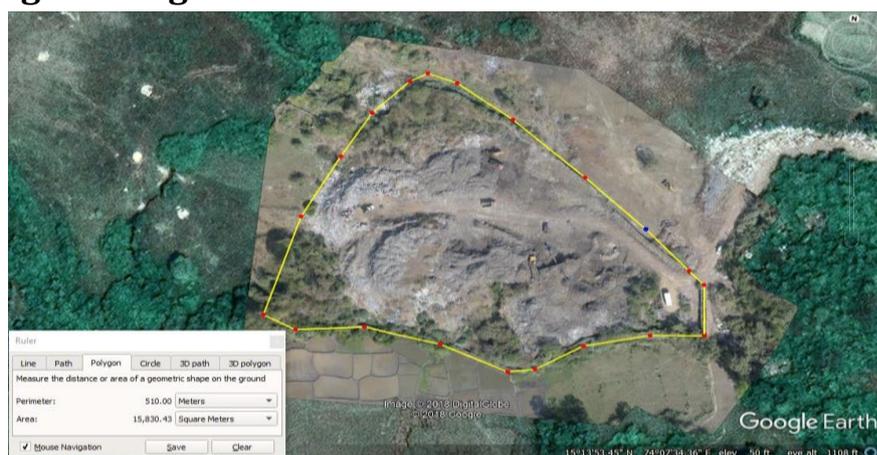


Figure 2.5.2 – Mapped Area

Area of Mapped Surface –  $15830.43 \text{ m}^2$

- **Quantification**

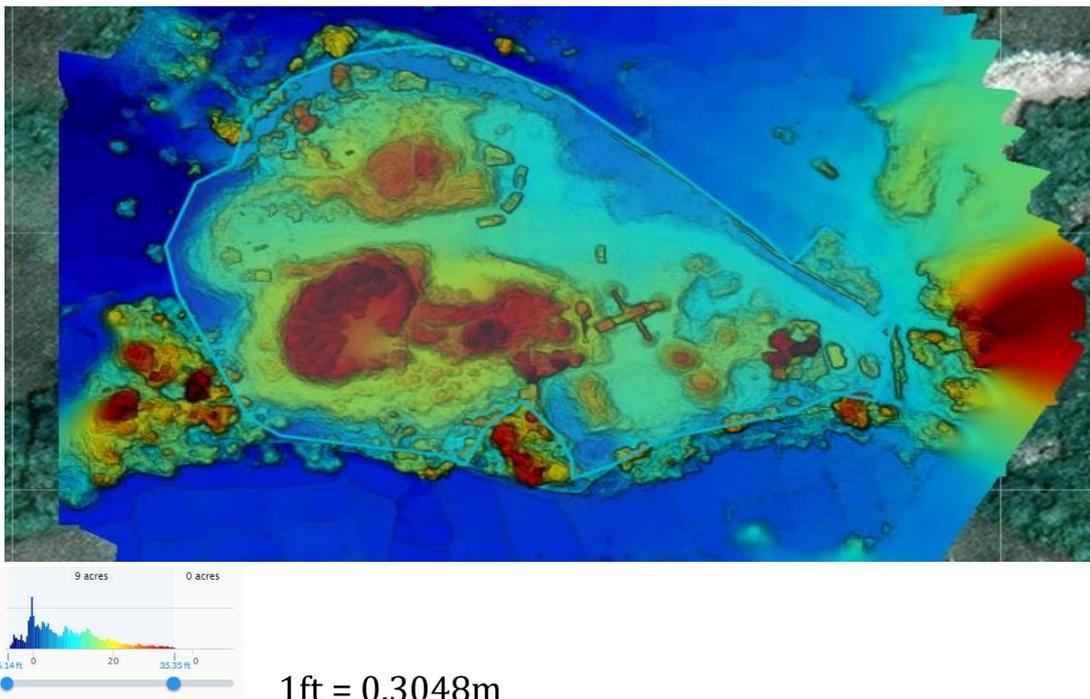


Figure 2.5.3 – Ground Control Points of Dump Area

Area of Dump = 13200.846 m<sup>2</sup>

Volume of Dump = 23775.89m<sup>3</sup>

- **Elevation Map**



1ft = 0.3048m

Figure 2.5.4 – Elevation Map

- **3D Model**

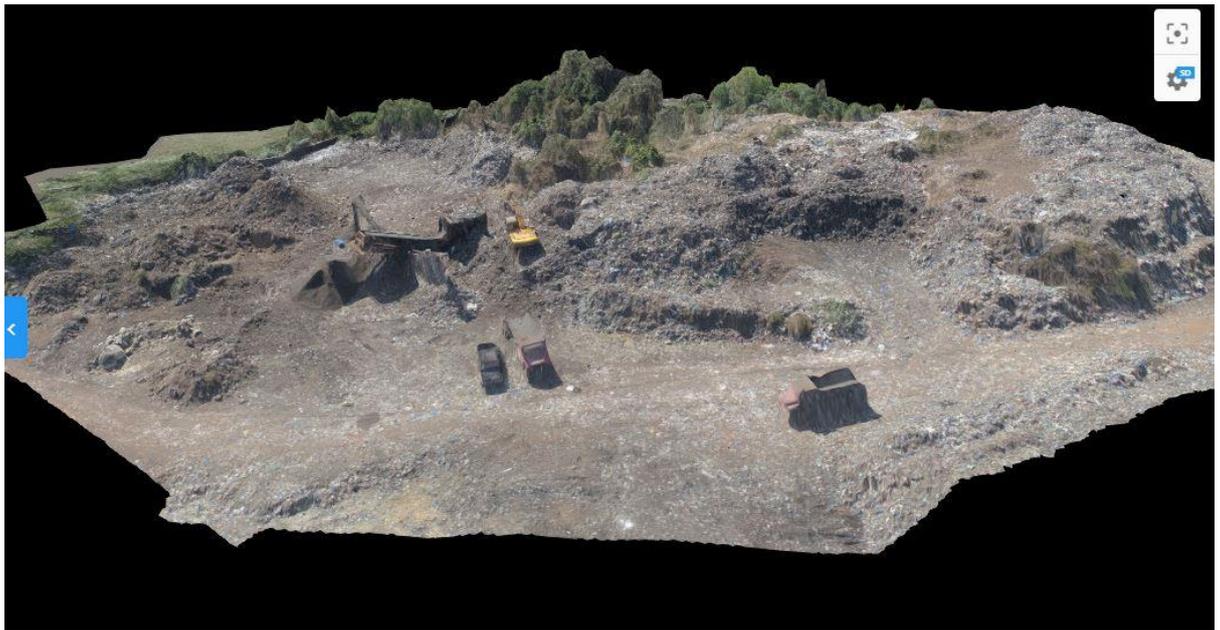


Figure 2.5.5 – 3D Model

- **Nearest Land Mark**

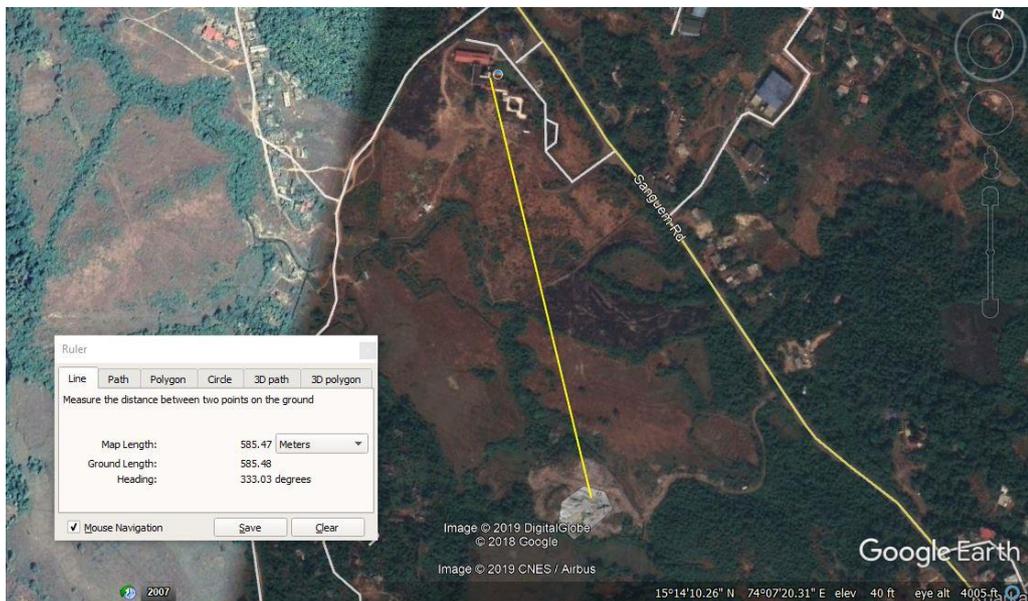


Figure 2.5.6 – Nearest Land Mark

Nearest Landmark - Government Polytechnic College Curchorem at about 585.47m(approx.)

## **2.6. SURVEY OF MAPUSA MUNICIPAL COUNCIL**

- Date of Survey Conducted – 02<sup>nd</sup> January 2019
- Location – Survey No. 145/1, Assagao Plateau Assagao Village
- Mapped Location of Surveyed Area  
Latitude – 15° 36` 31.95`` N      Longitude – 73° 47` 50.01``E
- **Site Top View**



Figure 2.6.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.6.2 – Mapped Area

Area of Mapped Surface –69339.89M<sup>2</sup>

- **Quantification**



Figure 2.6.3 – Ground Control Points of Dump Area

Area of Dump =24742.48 m<sup>2</sup>

Volume of Dump =127684.866m<sup>3</sup>

- **Elevation Map**

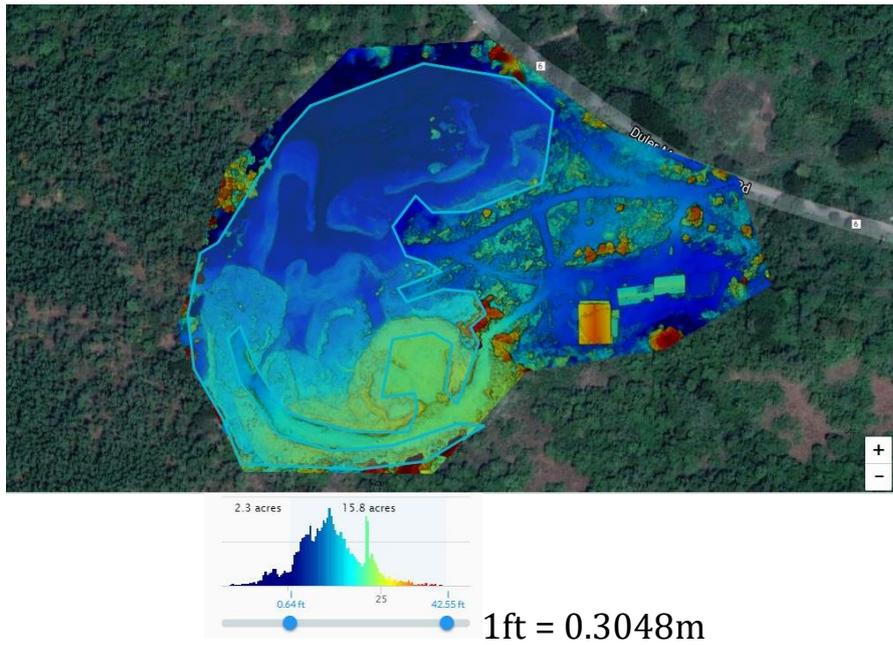


Figure 2.6.4 – Elevation Map

- **3D Model**

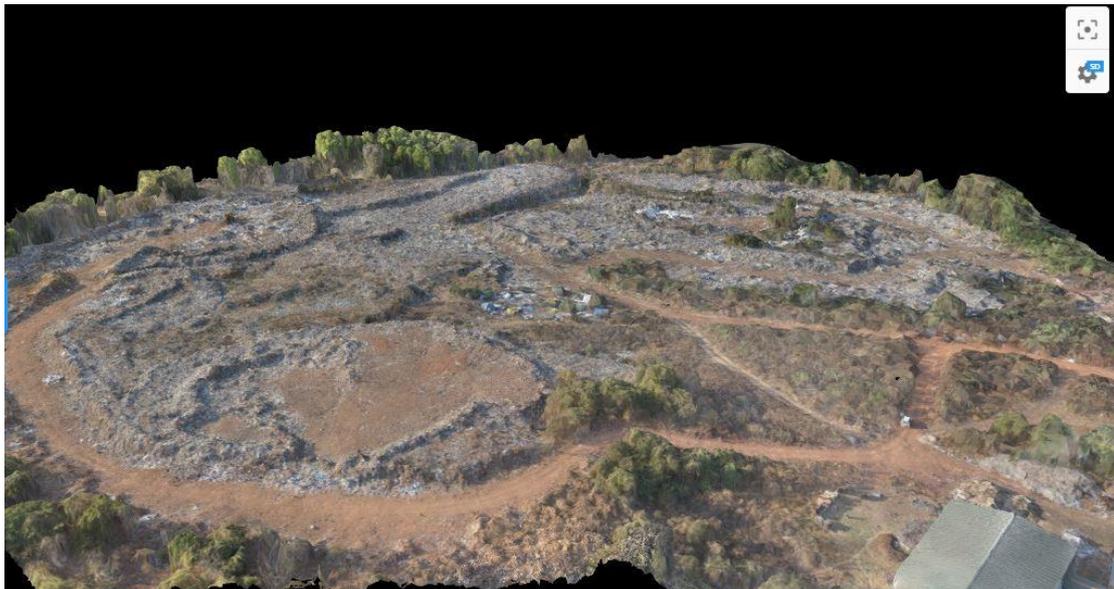
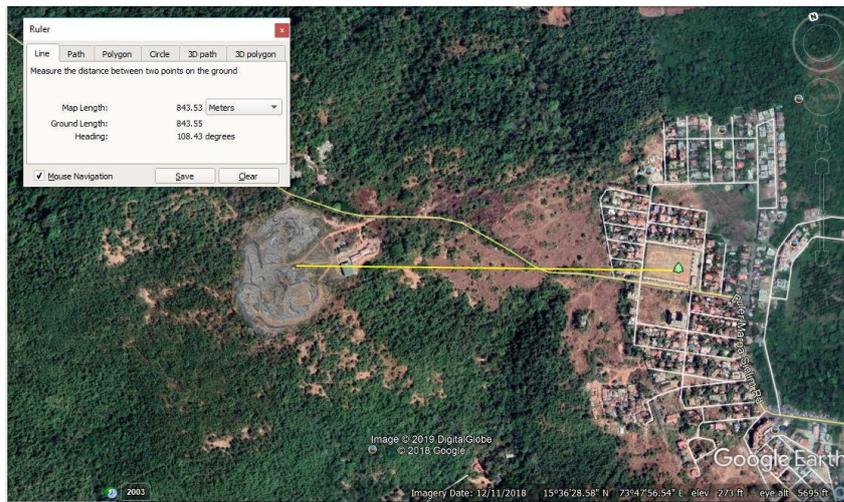


Figure 2.6.5 – 3D Model

- **Nearest Land Mark**



**Figure 2.6.6 – Nearest Land Mark**  
Nearest landmark - Mapusa housing board at about  
843.53m(approx.)

## **2.7. SURVEY OF CORPORATION OF CITY OF PANJIM (DIVJA CIRCLE)**

- Date of Survey Conducted – 02<sup>nd</sup> January 2019
- Location – Near Divja Circle Panjim
- Mapped Location of Surveyed Area –  
Latitude – 15° 29' 54.15" N      Longitude – 53° 50' 16.91" E

- **Site Top View**



Figure 2.7.1 – Top View of Surveyed Area

- **Mapping on Google Earth**

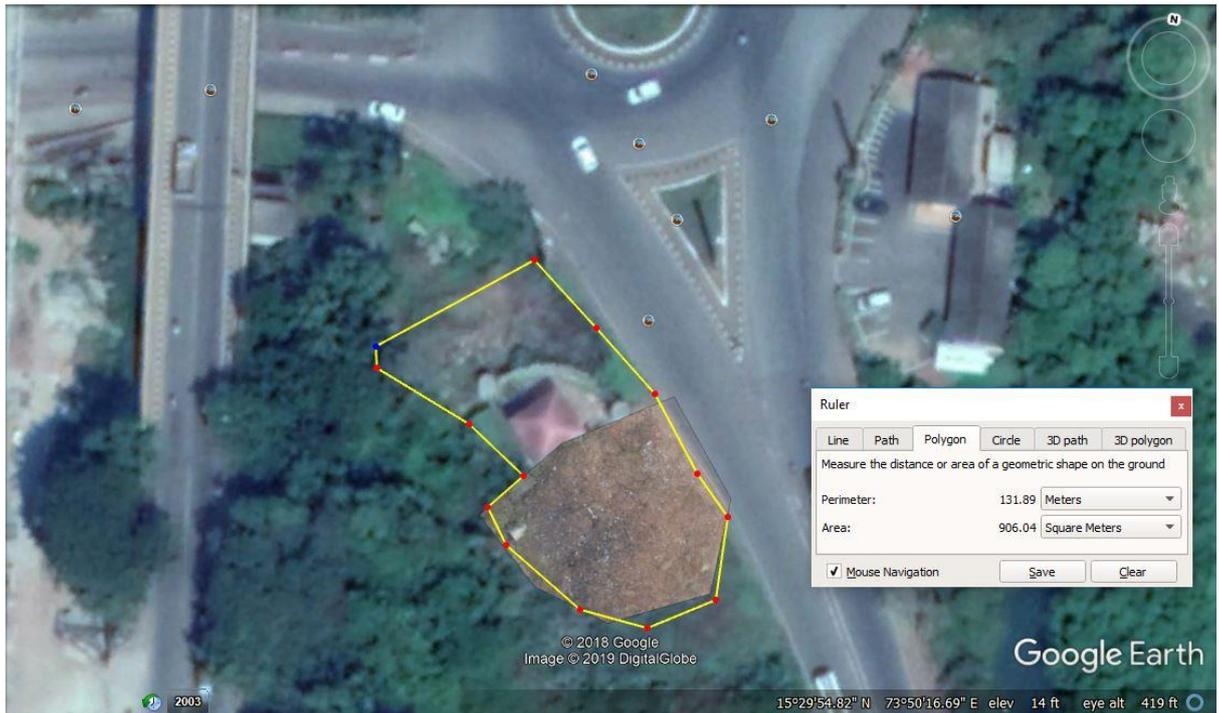


Figure 2.7.2 – Mapped Area

Area of Mapped Surface –**906.04 m<sup>2</sup>**

- **Quantification**



Figure 2.7.3 – Ground Control Points of Dump Area

Area of Dump =850.8989m<sup>2</sup>

Volume of Dump =1018.38m<sup>3</sup>

- **Elevation Map**

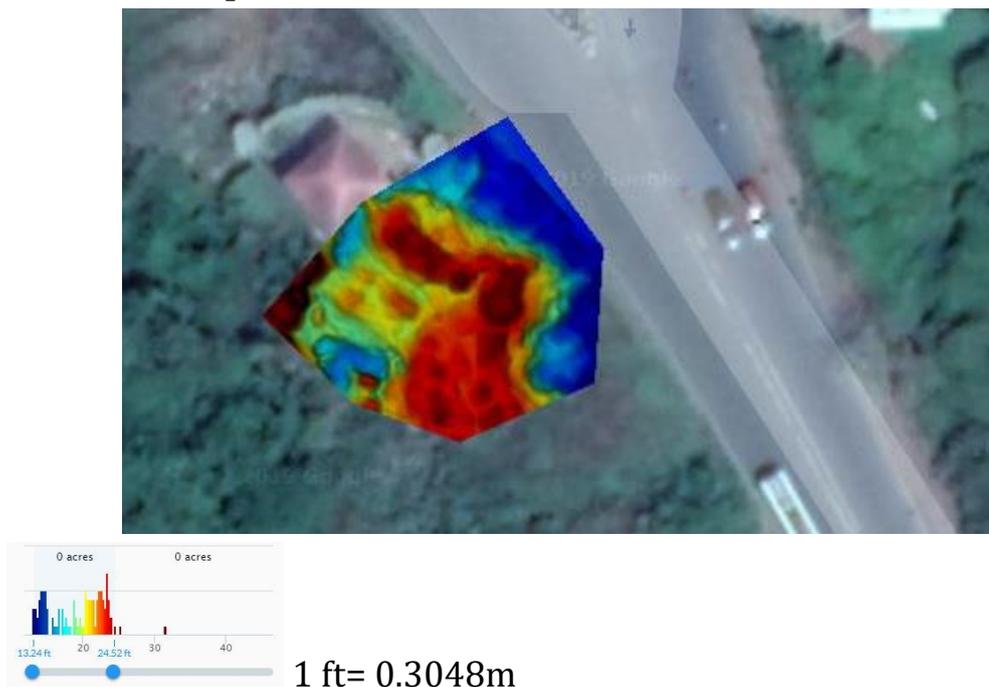


Figure 2.7.4 – Elevation Map

- **Nearest Land Mark**



Figure 2.7.5 – nearest landmark

Nearest landmark - Divja circle at about 40.80 meters.

## **2.8. SURVEY OF CORPORATION OF CITY OF PANJIM (EDC PATTO, BEHIND SBI)**

- Date of Survey Conducted – 31 December 2018
- Location – Behind SBI , EDC Patto Panaji
- Mapped Location of Surveyed Area  
Latitude – 15° 29` 47.40`` N    Longitude – 73° 49` 56.32`` E
- **Site Top View**



Figure 2.8.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.8.2 – Mapped Area

Area of Mapped Surface – 6087.64m<sup>2</sup>

- **Quantification**

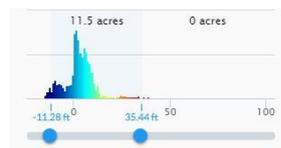
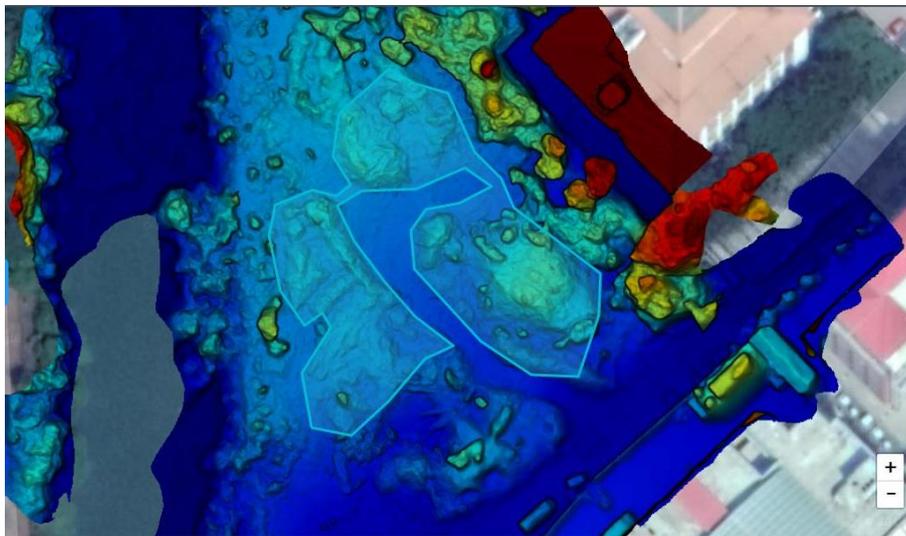


Figure 2.8.3 – Ground Control Points of Dump Area

Area of Dump = 1537.805 m<sup>2</sup>

Volume of Dump = 2542.297 m<sup>3</sup>

- **Elevation Map**



1ft = 0.3048m

Figure 2.8.4 – Elevation Map

- **3D Model**



Figure 2.8.5 – 3D Model

- **Nearest Land Mark**

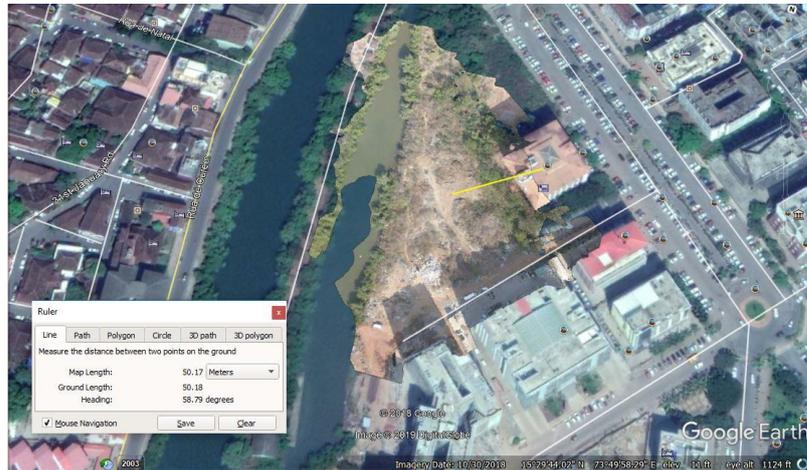


Figure 2.8.6 – 3D Model

Nearest landmark - State Bank of India Panaji branch at about 50.17m (approx.)

## 2.9. SURVEY OF MARGAO MUNICIPAL COUNCIL

- Date of Survey Conducted – 28<sup>th</sup> December 2018
- Location – Municipal Jurisdiction On Eastern Side Of The Road
- Mapped Location of Surveyed Area  
Latitude – 15° 17' 39.98" N      Longitude – 73° 59' 17.16"
- **Site Top View**



Figure 2.9.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.9.2 – Mapped Area

Area of Mapped Surface – 16121.73 m<sup>2</sup>

- **Quantification**



Figure 2.9.3 – Ground Control Points of Dump Area

Area of Dump = 12581.677m<sup>2</sup>(approx.)

Volume of Dump = 231239.76 m<sup>3</sup> (approx.)

- **Elevation Map**

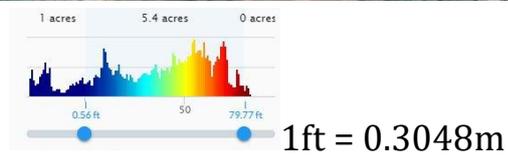
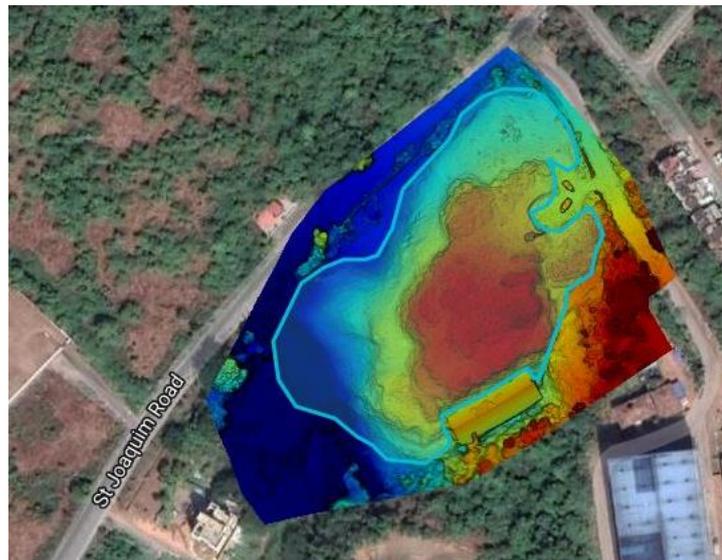


Figure 2.9.4 – Elevation Map

- **3D Model**

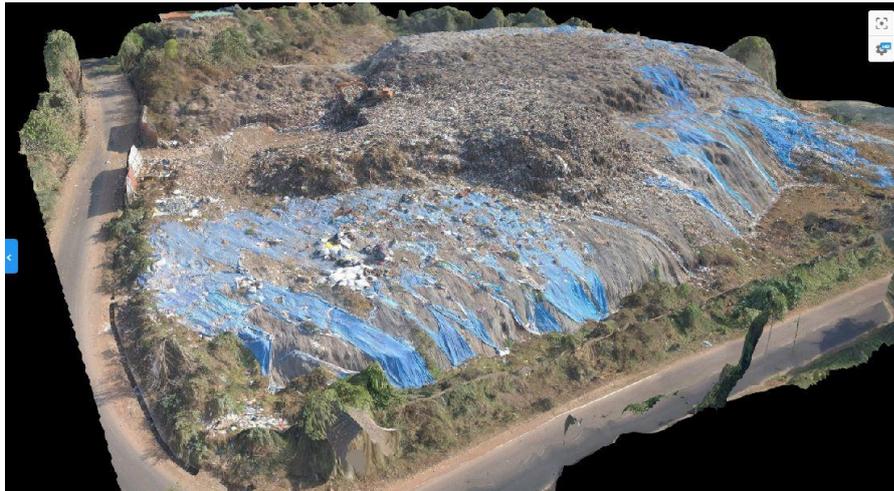


Figure 2.9.5 – 3D Model

- **Nearest Land Mark**



Figure 2.9.6 – Nearest Landmark

Nearest landmark -Manovikas High school at about 250.53m(approx.)

## 2.10. SURVEY OF PERNEM MUNICIPAL COUNCIL

- Date of Survey Conducted – 02<sup>nd</sup> January 2019
- Location – At Garbage Treatment Plant Of Pernem Municipal Council
- Mapped Location of Surveyed Area –  
Latitude – 15° 42' 16.52" N      Longitude – 73° 47' 40.71" E

- **Site Top View**



Figure 2.10.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.10.2 – Mapped Area

Area of Mapped Surface – 6460.12m<sup>2</sup>

- **Quantification**



Figure 2.10.3 – Ground Control Points of Dump Area

Area of Dump = 498.9822m<sup>2</sup>(approx.)

Volume of Dump = 210m<sup>3</sup> (approx.)

- **Elevation Map**

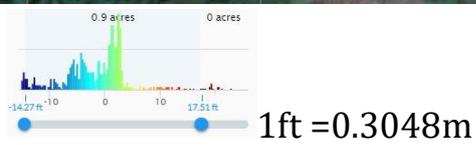
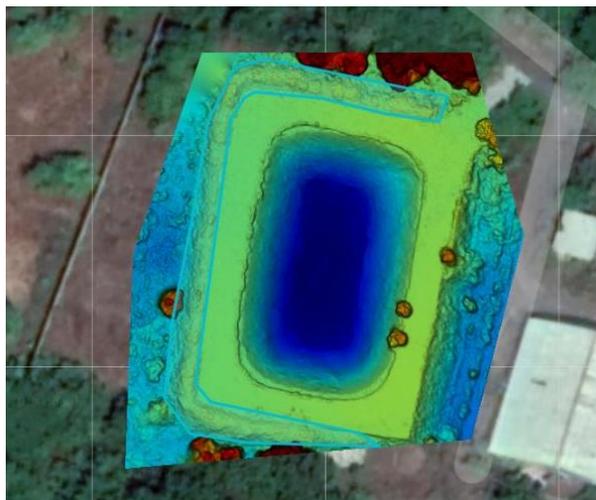


Figure 2.10.4 – Elevation Map

- **3D Model**

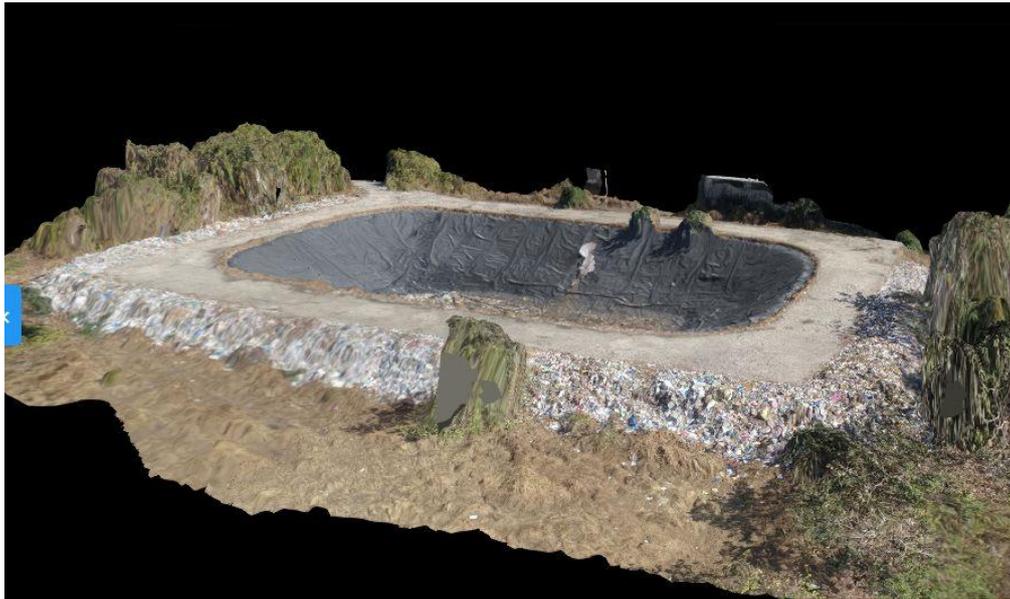


Figure 2.10.5 – 3D Model

- **Nearest Land Mark**



Figure 2.10.6 – 3D Model

Nearest landmark - Tuvem ITI at about 780.80m

## **2.11. SURVEY OF MARMUGAO MUNICIPAL COUNCIL**

- Date of Survey Conducted – 28<sup>th</sup> December 2018
- Location – Opp. MPT Hospital Headland Sada
- Mapped Location of Surveyed Area  
Latitude – 15o 24` 12.67`` N      Longitude – 73o 47` 29.43`` E
- **Site Top View**



Figure 2.11.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.11.2 – Mapped Area

Area of Mapped Surface – 20240.67m<sup>2</sup>

- **Quantification**



Figure 2.11.3.1 – Ground Control Points of Dump Area



Figure 2.11.3.2 – Ground Control Points of Dump Area



Figure 2.11.3.3 – Ground Control Points of Dump Area

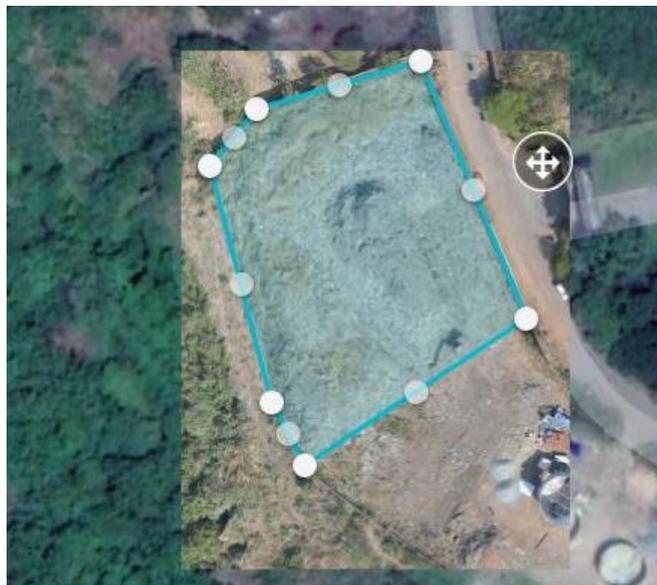


Figure 2.11.3.4 – Ground Control Points of Dump Area

Area of Dump = 14313.731m<sup>2</sup> (approx.)

Volume of Dump = **83661.41**m<sup>3</sup> (approx.)

- **Elevation Map**

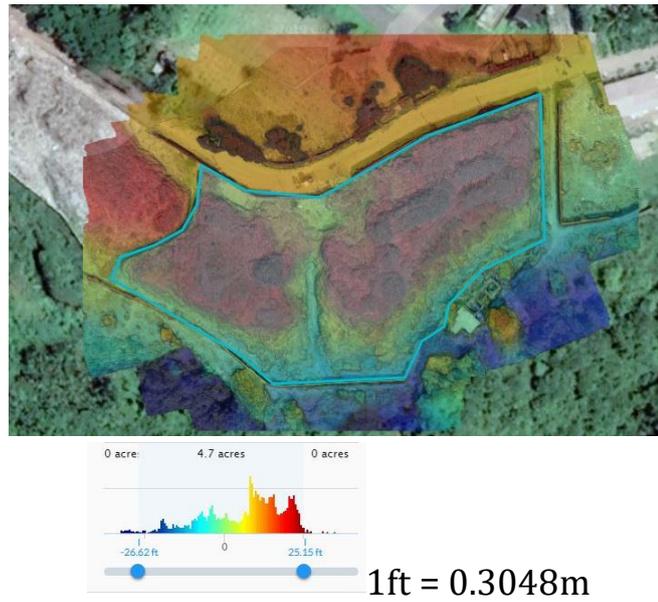


Figure 2.11.4.1 – Elevation Map

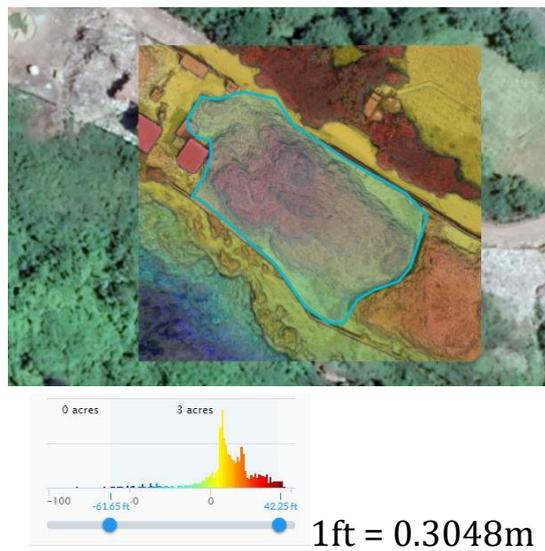


Figure 2.11.4.2 – Elevation Map

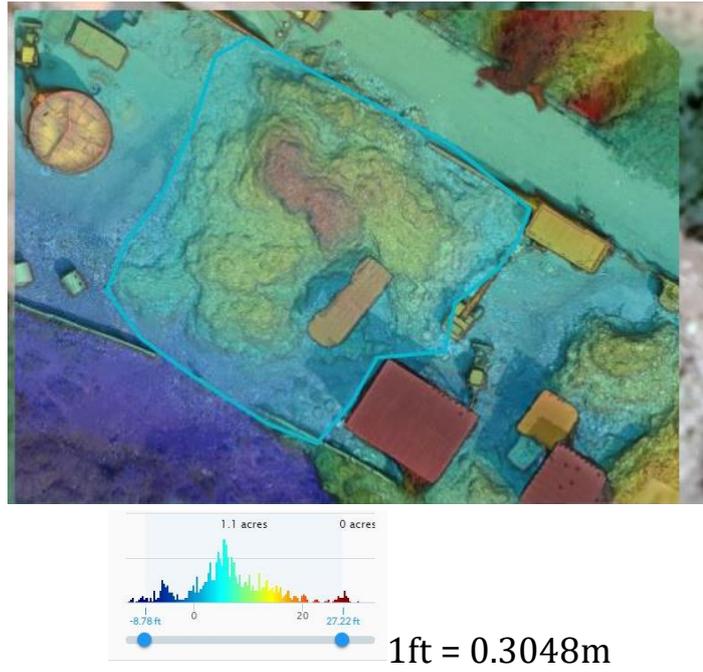


Figure 2.11.4.3 – Elevation Map

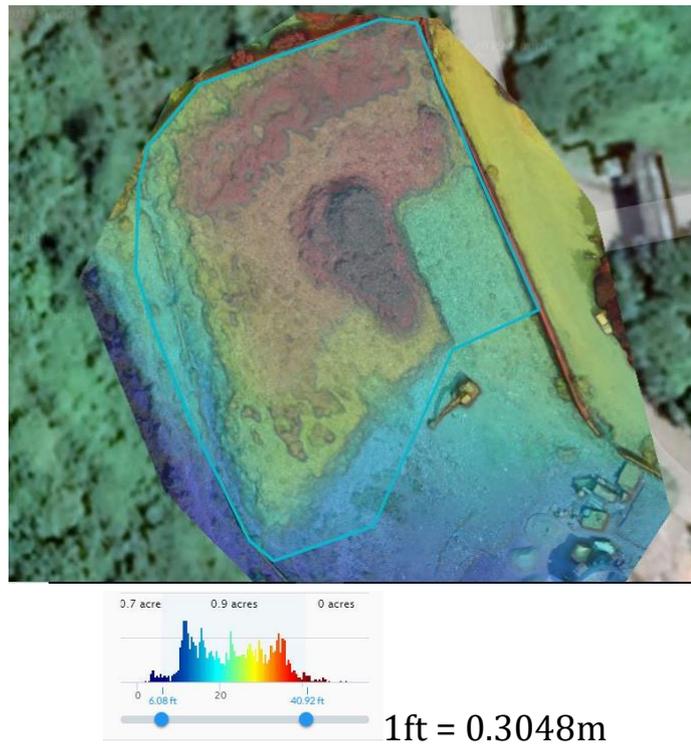


Figure 2.11.4.4 – Elevation Map

- **3D Model**



Figure 2.11.5.1 – 3D Model

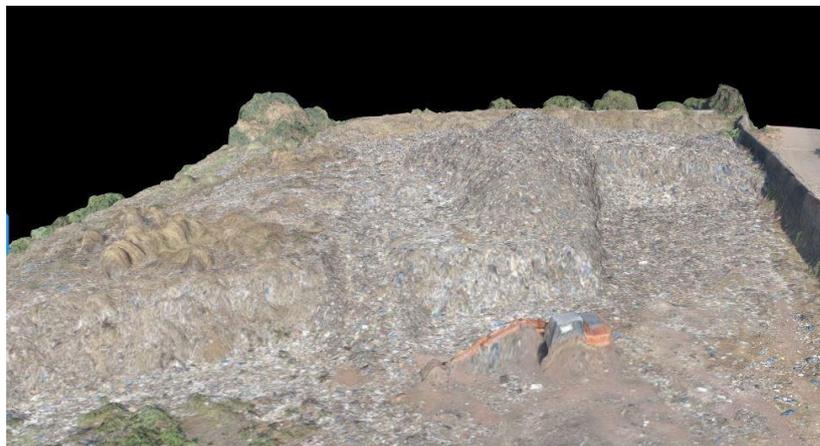


Figure 2.11.5.2 – 3D Model



Figure 2.11.5.3 – 3D Model



Figure 2.11.5.4 – 3D Model

- **Nearest Land Mark**

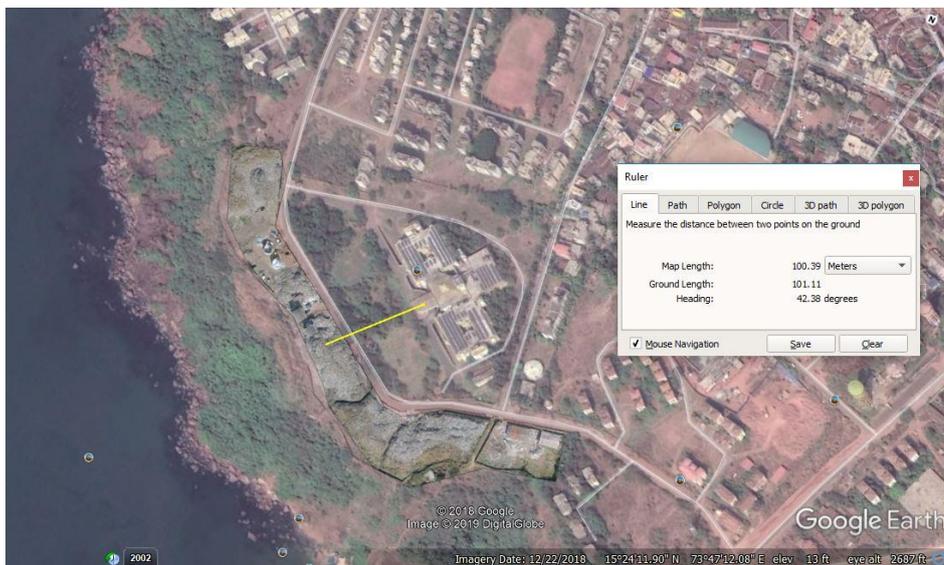


Figure 2.11.6 – Nearest Land Mark

Nearest landmark- MPT hospital at about 100.39m

## 2.12. SURVEY OF CORPORATION OF CITY OF PANJIM (CURCA)

- Date of Survey Conducted – 22 January 2019
- Location – Near Military Camp, Curca
- Mapped Location of Surveyed Area  
Latitude – 15° 28' 16.70" N Longitude – 73° 52' 43.08" E

- **Site Top View**



Figure 2.12.1 – Top View of Surveyed Area

- **Mapping on Google Earth**



Figure 2.12.2 – Mapped Area

Area of Mapped Surface – 9244.38 m<sup>2</sup>

- Quantification



Figure 2.12.3 – Ground Control Points of Dump Area

Area of Dump = 9497.972m<sup>2</sup>(approx.)

Volume of Dump = **7454.94**m<sup>3</sup> (approx.)

- Elevation Map

The Curca Site Elevation Map was not able to be graphed and calculated due to increased number of Foliage at the site.



Figure 2.12.4 – Site View

- Nearest Land Mark

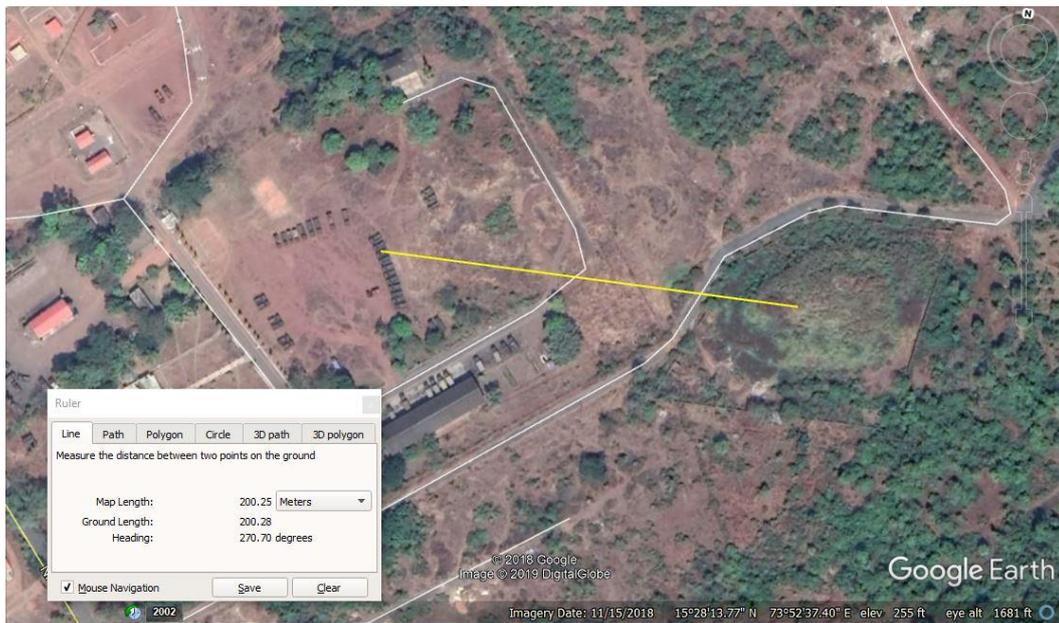


Figure 2.12.3 – Nearest Land Mark

Nearest landmark - Military Camp Curca at about 200.25 m (approx.)

### **2.13. SURVEY OF SALIGAO I**

- Date of Survey Conducted – 24 March 2019
- Location – Goa Waste Management Corporation
- Mapped Location of Surveyed Area  
Latitude – 15° 31` 46.33`` N      Longitude – 73° 47` 01.20`` E
- Site Top View



Figure 2.13.1 – Top View of Surveyed Area

- Mapping on Google Earth



Figure 2.13.2 – Mapped Area

Area of Mapped Surface – 22133.41 m<sup>2</sup>

- **Quantification**

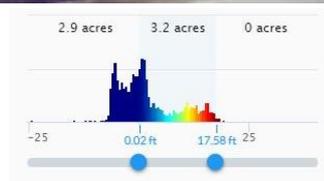
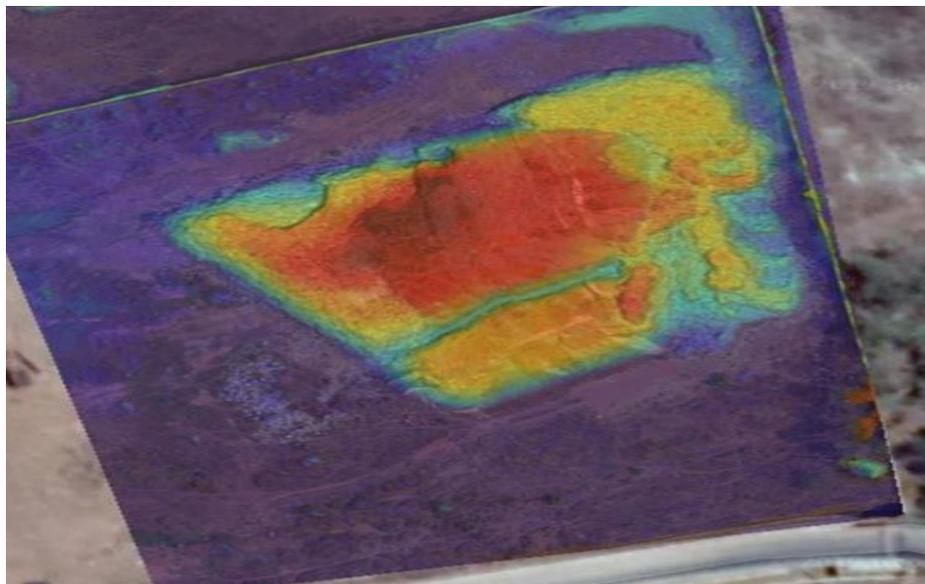


Figure 2.13.3. – Ground Control Points of Dump Area

Area of Dump = 8126.0877 m<sup>2</sup>

Volume of Dump = 21918.259 m<sup>3</sup>

- **Elevation Map**



1ft = 0.3048m

Figure 2.13.4 – Elevation Map

- **3D Model**

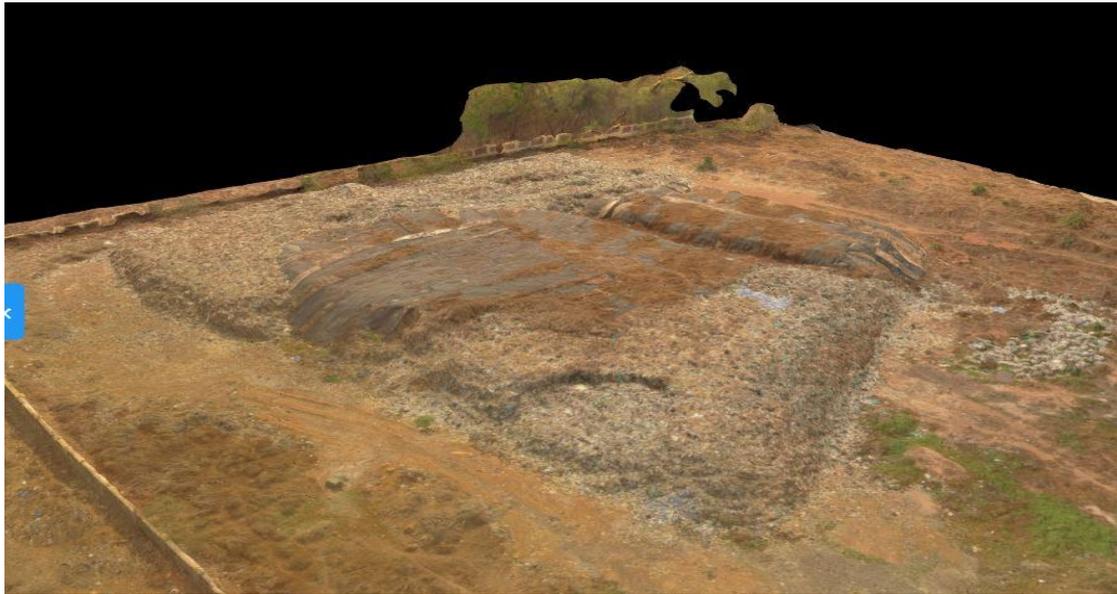


Figure 2.13.5 – 3D Model

- **Nearest Land Mark**

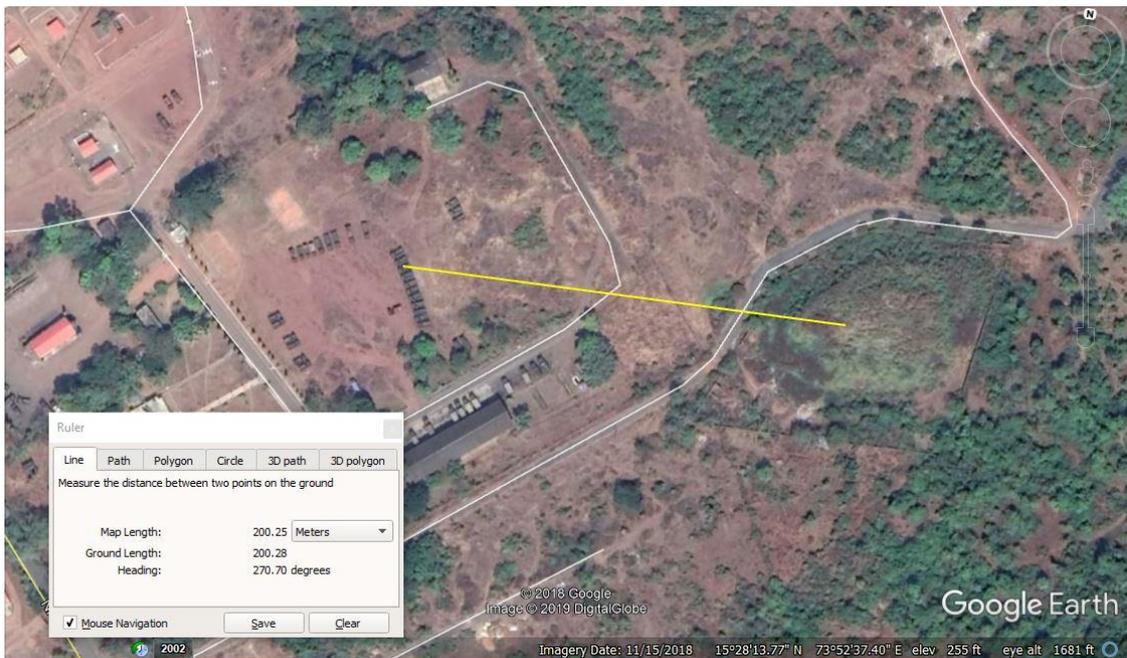


Figure 2.13.6 – Nearest Landmark

Nearest Landmark - Goa waste management corporation at about 200.25m

## **2.14. SURVEY OF SALIGAO II**

- Date of Survey Conducted – 24 March 2019
- Location – Goa Waste Management Corporation
- Mapped Location of Surveyed Area  
Latitude – 15° 31` 46.33`` N      Longitude – 73° 47` 01.20`` E
- Site Top View



Figure 2.14.1 – Top View of Surveyed Area

- Mapping on Google Earth



Figure 2.13.2 – Mapped Area

Area of Mapped Surface – 22133.41 m<sup>2</sup>

- **Quantification**

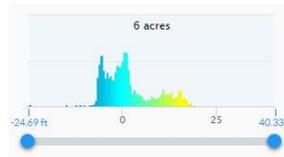
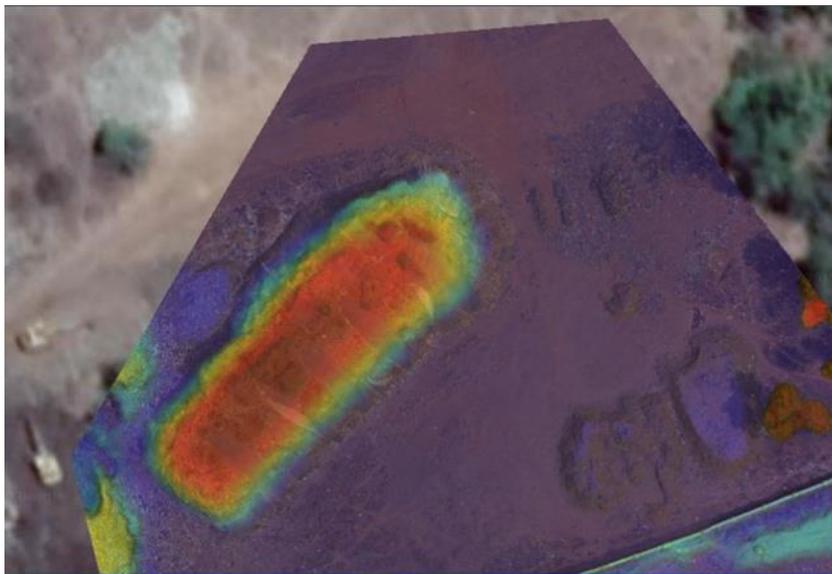


Figure 2.14.3 – Ground Control Points of Dump Area

Area of Dump = 2282.427m<sup>2</sup>

Volume of Dump = 8703.004404m<sup>3</sup>

- **Elevation Map**



1ft = 0.3048m

Figure 2.14.4 – Elevation Map

- **3D Model**

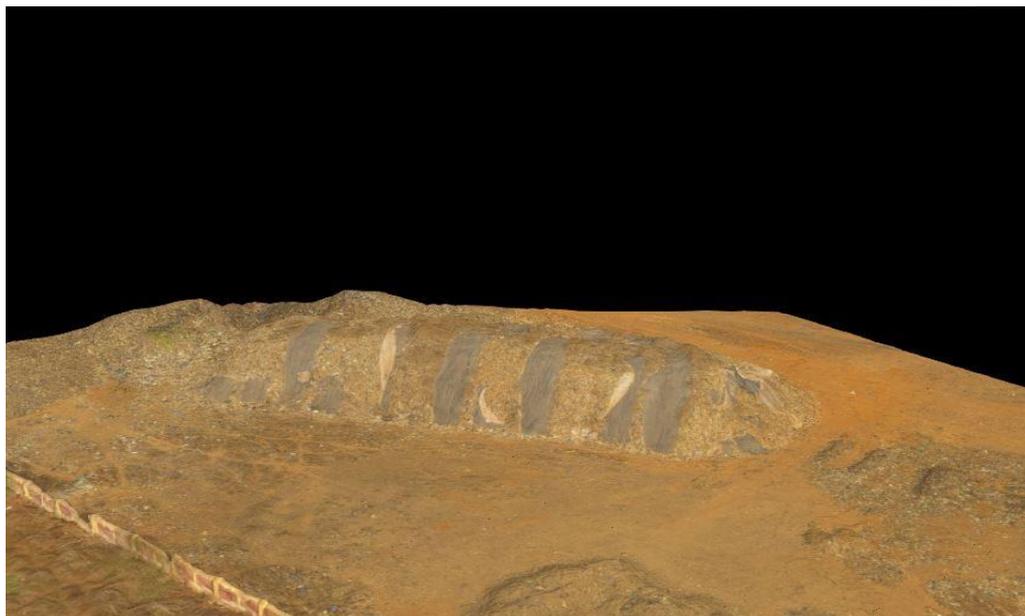


Figure 2.14.5 – 3D Model

- **Nearest Land Mark**

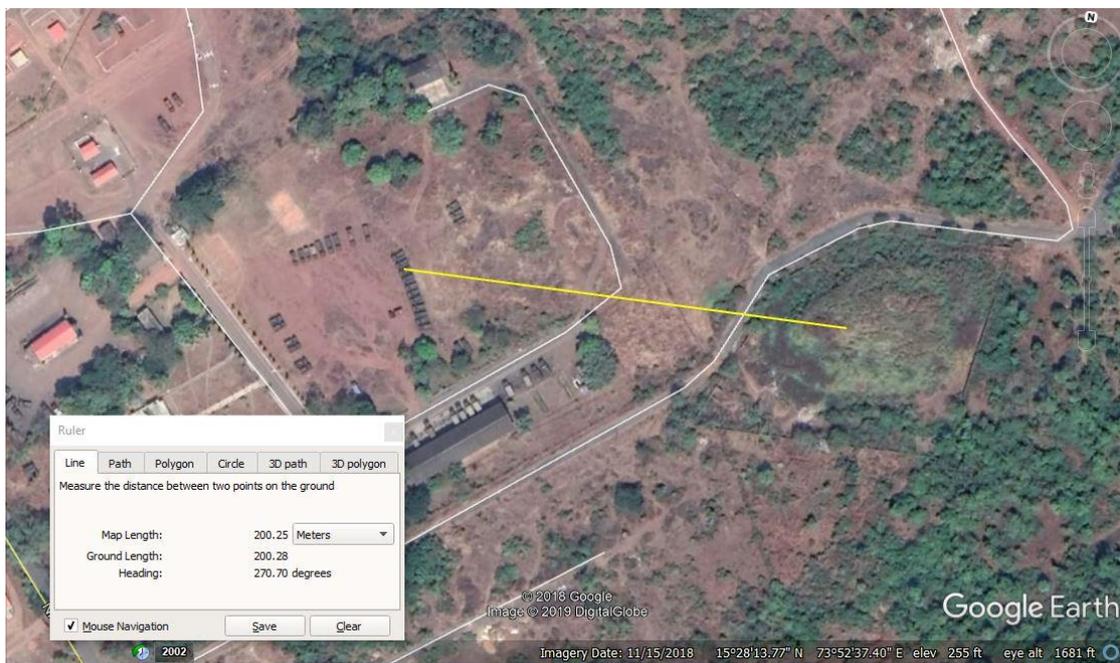


Figure 2.14.6 – 3D Nearest Landmark

Nearest Landmark - Goa waste management corporation at about 200.25m

### **3. CONCLUSION**

The Drone Survey was conducted for measurement and quantification of 14 Nos. Legacy waste site in Goa.

#### **4. WEBLIOGRAPHY**

1. <https://www.dji.com/guides>
2. <https://www.dronedeploy.com/>
3. <http://maps.google.com/>