https://doi.org/10.46335/IJIES.2021.6.9.5 **e-ISSN: 2456-3463**
Vol. 6, No. 9, 2021, PP. 22 -25

International Journal of Innovations in Engineering and Science, www.ijies.net

Geospatial And Drone Technology For M & R To Ratnagiri Water Supply Scheme & Feasibility Study of Harcherikt Weir

Poonam Reure [1], Sanket Pantoji [2], Sanjeevani Mhatre [3], Sayali Avhad [4]

[1,2,3,4]UG Student, Dept. of Civil Engineering,
Datta Meghe College of Engineering, Navi Mumbai, Maharashtra, India.

***Received on**: 10 August,2021* ***Revised on**:05 September, 2021* ***Published on**: 07 September, 2021*

Abstract – *Water is basic human need, despite of the rain there is water scarcity in major urban area as well as the rural areas. Only way to deal with this problem is to preserve the available water as much as possible. To preserve this, we have to build dams, weirs, Bandharas, Barriers on the river stream. The construction of these structures is expensive. There has to be better idea, coming to this we can just increase the height of the existing dams and we can increase the capacity of the water using the drone and GIS technology. To follow this, we worked on the Harcheri KT weir, situated in Ratnagiri district of kokan region where the rainfall is moderate, but still the issue of water is faced. Water demand has increased due to population and the expansion of Industrial area. We used Geospatial and Drone technology to increase the height of the Hacheri KT weir. The feasibility study of Harcheri KT weir using GIS based Integrated mapping and area capacity graphs helped the authority to distribute the water equitably, improve service delivery and achieve standard benchmarks.*

.***Keywords- Geospatial, Drone, Capacity***

I- INTRODUCTION

Harcheri KT weir is situated in Harcheri village of Ratnagiri District. The KT weir is built across Kajali River. This KT weir supplies water to nearby villages such as Bagpatole, Hatis, Tonade, Dugave, Kurtade, Navet, Thikwadi, Nirool, Chandor, Taliwadi, Bhatye, etc and also to the industrial areas in the Ratnagiri District. The length of the KT weir is approximately 70m. The top level of KT weir measures 6m from MSL (Mean Sea Level). Jack well is situated near the KT weir provided with specific capacity of pipes to supply the water to the nearest water treatment plant in Tike village. It is an masonry supported with sheet piles at the sides. It also has a small well to discharge the surplus water to the downstream side. The KT weir is surrounded by forest area, agricultural land, and small communities.

1.1 Need of the project

In recent years villages to which water from Harcheri KT weir was supplied have been facing water scarcity. As the KT weir is old, there has been accumulation of silt at the heel of the dam causing reduction in the capacity of water storage. Also, the industrial areas are affected due to the same. Every passing year, the population is increasing and also there has been a spike in tourism in Ratnagiri District. Due to this there has been increase in demand of water. Due to the problems

https://doi.org/10.46335/IJIES.2021.6.9.5 e-ISSN: 2456-3463
Vol. 6, No. 9, 2021, PP. 22 -25

mentioned above there is an urgency to find an alternative source of water. Constructing a new dam is not possible since many industries are established nearby. The only possible solution is to increase the height of the existing KT weir.

1.2 Objective

1. The objective of the present study is to envisage the DGPS based survey to collect the
2. survey data about the land surrounding the Harcheri KT weir up to a stretch of approximately
3. 4km on u/s side till Nivasar Dam and up to 1 - 1.5km on d/s side.
4. To decide the height of new KT weir
5. To estimate storage capacity of existing reservoir as well as proposed reservoir.

II - LITERATURE REVIEW

Geospatial & Drone technology is one of the advancements in the field of surveying, many researchers had put their views previously. Elena Ridolfi presented a unique study for introducing "Accuracy Analysis of a Dam Model from Drone Surveys" study proves an efficient solution for analysing a dam model which concludes The knowledge a priori of the effect of the GCPs number and location on the model accuracy can increase survey reliability and accuracy and speed up the survey set-up operations. Michael F. Goodchild also presented a baseline for professionalsh working efficiently in GIS introducing "GIS & Basic Research: The National Centre For Geographic Information & Analysis" study gives detailed idea on basic concept of GIS, future of GIS etc. The high growth rate experienced recently in the GIS industry is exciting, but it inevitably led to concern for the future; how long can the GIS phenomenon last, and has GIS been oversold? To some extent, growth has been sustained because new application fields have appeared, or new disciplines have become interested in GIS tools, but this cannot continue forever.

III - METHODOLOGY

3.1Area of Interest

The area of interest taken into consideration on upstream side for the survey was up to the Nivasar dam which is approximately 4 km away from the existing Harcheri KT weir. And on the downstream side it was up to stretch of 1 km. So total area of 225 Ha was considered during the survey. This survey was completed in duration of 15 days.

3.2 Drone Survey

A drone survey refers to the use of a drone, or unmanned aerial vehicle (UAV), to capture aerial data with downward-facing sensors, such as RGB or multispectral cameras, and LIDAR payloads. During a drone survey with an RGB camera, the ground is photographed several times from different angles, and each image is tagged with coordinates. Survey drones generate high-resolution Orth mosaics and detailed 3D models of areas where low-quality, outdated or even no data, are available. They thus enable high-accuracy cadastral maps to be produced quickly and easily, even in complex or difficult to access environments. Surveyors can also extract features from the images, such as signs, curbs, road markers, fire hydrants and drains.

3.3 DGPS Survey with Real Time Kinematics

Real Time Kinematic uses a radio data link to transmit satellite data from the Reference to the Rover. This enables coordinates to be calculated and displayed in real time, as the survey is being carried out. Used for similar applications as Kinematic. A very effective way for measuring detail as results are presented as work is carried out. This technique is however reliant upon a radio link, which is subject to interference from other radio sources and also line of sight blockage. There are several measuring techniques that can be used by most

https://doi.org/10.46335/IJIES.2021.6.9.5 **e-ISSN: 2456-3463**
Vol. 6, No. 9, 2021, PP. 22 -25

International Journal of Innovations in Engineering and Science, www.ijies.net

GPS Survey Receivers. The surveyor should choose the appropriate technique for the application.

3.4 Orthomosaic Map

Once the images have been captured, review your images before processing to confirm the quality and completeness of your data set. Make sure your images are crisp and that no areas were missed, and that there are no stray pictures that don't belong in your map. Remember, bad data in equals bad data out, so it's important that you create your map using a complete set of quality images. Upload the images on the software (Drone2Map). Uploading your images might take a couple of minutes, and then the data needs to be processed. The processing status bar is showed on the website, and the process might take from a few minutes to a couple of hours depending on the scope of your project. The output can be a flat areal image of the mapped area called 'orthomosaic' or a 3D point cloud. It is important to note here that the science of photogrammetry is applied in drone mapping where measurements are made from photographs which result into map, measurement or 3D model of a real-world object or scene.

Fig 1 -Orthomosaic Image

3.5 Geographic Information System

GIS can be defined as - A System which involves collecting/capturing, storing, processing. manipulating, analyzing, managing, retrieving and displaying data (information) which is, essentially, referenced to the real-world or the earth (i.e. geographically referenced). The fundamental components of spatial data in a GIS are points, lines (arcs), and polygons. When topological relationships exist, you can perform analysis, such as modelling the flow through connecting lines in a network, combining adjacent polygons that have similar characteristics and overlaying geographic features. Geographical Information System (GIS) has emerged as powerful tool which has potential to organize complex spatial environment with tabular relationships. The emphasis is on developing digital spatial database, using the data sets derived from precise navigation and imaging satellites, aircrafts, digitization of maps and transactional databases In simple words GIS is defined as Creation of maps with the help of Satellite Images and making them intelligent by attaching attributes to the digitized drawing.

3.6 Contour Mapping

Contours are the imaginary lines joining the points of equal elevation. Mapping of contours is necessary to check the feasibility of the project as it is useful in finding out the capacity of KT weir. Also, it gave an idea about the area of submergence along the periphery of water body. Hence, contours of 6,7 and 8m were traced with the help of DGPS points marked on the ground as well as DTM on the orthomosaic image.

3.7 Excel calculations

As aim of our project is to increase the height of KT weir, new heights of KT weir were proposed viz. 7m and 8m. So, to check the practicality of current as well as proposed height it is important to find out the volume capacity. Thus, area volume calculations were made. To do so, levels of riverbed were taken at an interval of 50m along the length of river and at an interval of 10m along its width on the upstream side of HarcheriKT weir up to Nisar dam. Raster values of the bottom levels were extracted from ArcGIS software using 'Toppo to Raster' feature.

100.00						
Chainage	Top level	Bottom level	Depth	Average Depth	Length	Area
0	6	5.963554	0.036446			
10	6	4.09207	1.90793	0.972188	10	9.72188
20	6	3.286412	2.713588	2.310759	10	23.10759
30	6	3.159995	2.840005	2.7767965	10	27.76797
40	6	3.816823	2.183177	2.511591	10	25.11591
50	6	5.589388	0.410612	1.2968945	10	12.96895
51.597	6	5.855888	0.144112	0.277362	1.597	0.442947
						99.12524

Fig 2- Sample Calculation for C-sectional area at 100m using Excel

3.8 C & L section Graphs

For every 50m chainage along the length of the river, graphs were plotted which showed the visual representation of varying depths along the water body. Also graphs along the centre line of the river body were plotted for every 500m of chainage.

https://doi.org/10.46335/IJIES.2021.6.9.5 **e-ISSN: 2456-3463**
Vol. 6, No. 9, 2021, PP. 22 -25

International Journal of Innovations in Engineering and Science, www.ijies.net

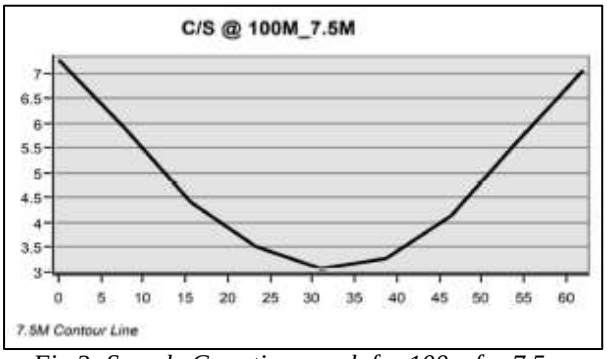

Fig 3 -Sample C-section graph for 100m for 7.5m height

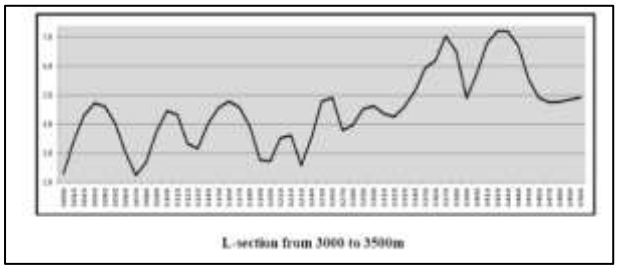

Fig 4- Sample C-section graph from 3000m to 3500m

IV - APPLICATIONS

The main considerations are being safety, economy and the environment. the criteria for increasing height of KT weir are sensitive to the physical, environmental and economical settings, GIS and drone technology can be useful tools for generating, manipulating and handling relevant data, leading eventually to identifying a number of optimum sites for locating reservoir and ultimately providing options and, assisting with the planning process and decision making. The GIS as a decision-making tool, being facilitated combining various information layers as well as implementing the necessary analysis on the data.

V - RESULTS & CONCLUSIONS

The comparison of the area volume calculation of 6 and 7.5m is shown below, Volume capacity at 6m level = 297302.9 co. Volume capacity at 7.5m level = 592282.6 co. (twice of the initial capacity) After observing the results, client found 7.5m height of the KT weir to be economical, with optimum capacity and satisfactory in all other manners. For every 50 m chainage along the length of the river, graphs were plotted which showed the visual representation of varying depths along the water body. Also graphs along the centre line of the river body were plotted for every 500m of chainage.

VI - CONCLUSIONS

A) Height of the KT weir: The height of KT weir was decided such that the top level is at 7.5m level. This height proved to be economical for the project with sufficient capacity for future needs. The comparison of the area volume calculation of 6 and 7.5m is shown below, Volume capacity at 6m level = 297302.9 cu.m Volume capacity at 7.5m level = 592282.6 cu.m (twice of the initial capacity)

B) Land acquisition: The land which might come under submergence area of the KT weir was detected and identified for the client to acquire it for the project. The land to be acquired is within 100 meters along boundary of the water body on both the side.

ACKNOWLEDGEMENTS

We are obligated to Dr. Atulya Patil Sir, Rahul Deshmukh Sir for their guidance and constant supervision as well as for providing necessary information and technology to us.

REFERENCES

[1] *Ngunyi D. N., Makokha G. O 2017., "Web Geographic Information System in Accreditation & Monitoring of Professional Training Institute of Quality Assurance,". Journal of Geography & Regional Planning,*

[2] *Hutchinson, M. F. (1998). Calculation of hydrologically sound digital elevation models," Third International Symposium on Spatial Data Handling at Sydney, Australia,*

[3] *Nehra T (2017). "Carrying DGPS Survey and Preparation of Digital Elevation Model Issn (print): 2393-8374, (online): 2394-0697, volume-4, issue-10.*

[4] *Ridolfi E (2020). "Accuracy Analysis of a Dam Model from Drone Surveys," DICA Department of Civil and Environmental Engineering, University of Perugia, 06125 Perugia*