

**Report on**  
**Topographic and Bathymetric Survey of Reservoirs**  
**for Water Resources Department, Govt. of Gujarat**  
**at Saurashtra and Northern Gujarat Region, Gujarat**

**Bhadar - 2 Reservoir**

**Owner**



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2.	OSaS_P34320_WRD_Bhadar-2_CC_02	Contour Map Scale: 1:15000
3.	OSaS_P34320_WRD_Bhadar-2_03	Bathymetry and Topography Chart Scale: 1:5000; Grid: 25m X 25m
4.	OSaS_P34320_WRD_Bhadar-2_04	Bathymetry and Topography Chart Scale: 1:5000; Grid: 25m X 25m
5.	OSaS_P34320_WRD_Bhadar-2_05	Bathymetry and Topography Chart Scale: 1:5000; Grid: 25m X 25m
6.	OSaS_P34320_WRD_Bhadar-2_LP_06	Longitudinal Profile Along Lowest Line Scale: 1:5000
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9.	OSaS_P34320_WRD_Bhadar-2_CP_09	Cross Section Profiles 69 - 94 Scale: 1:5000
10.	OSaS_P34320_WRD_Bhadar-2_CP_10	Cross Section Profiles 95 - 112 Scale: 1:5000

### ABBREVIATIONS

WRD	Water Resources Department
BM	Benchmark
C.M.	Central Meridian
CD	Chart Datum
cm	Centimetre
ddmm.mmm	Degrees minutes. decimal minutes
DGPS	Differential Global Positioning System
DTM	Digital Terrain Model
DSL	Dead Storage Level
FRL	Full reservoir Level
GPS	Global Positioning System
HSE	Health, Safety & Environment
ID	Identification name/number
IHO	International Hydrographic Organization
kHz	Kilohertz
km	Kilometre
KP	Kilometre Post
Lat	Latitude
LBM	Local Benchmark
Long	Longitude
m	Metre
MCum	Million Cubic Metre
MDDL	Minimum Drawdown Level
MSL	Mean Sea Level
MSqm	Million Square Metre
MV	Motor Vessel
NA	Not Applicable
NU	North Up
OSL	Outlet Sill Level
SOW	Scope of Work
SVP	Sound Velocity Profile
UTM	Universal Transverse Mercator projection
w.d.	Water depth
WGS84	World Geodetic System 1984

## EXECUTIVE SUMMARY

Ocean Science & Surveying Pvt. Ltd. (OSaS) was contracted by Narmada Water Resources, Water Supply & Kalpsar Department (WRD) to carry out topographic and bathymetric surveys of thirteen reservoirs in the Saurashtra region; namely Bhadar-1, Bhadar-2, Brahmani-1, Und-1, Machhu-1, Machhu-2, Khodiyar, Aaji-1, Nara, Tappar, Rudramata, Mitti and Fatehgadh.

This report describes the results of the topographic and bathymetric survey services provided by OSaS to the WRD for topographic and bathymetric mapping of the Bhadar-2 reservoir, Saurashtra region, Gujarat.

The vessel SMB Ocean, owned by OSaS, was used for conducting the survey. The mobilisation of equipment started on 10<sup>th</sup> March 2021. A DGPS consistency check was done on 10<sup>th</sup> March by establishing two reference stations (TBMs) using RTK systems. The topographic survey commenced on 11<sup>th</sup> March and bathymetric survey commenced on 12<sup>th</sup> March at Bhadar-2 reservoir.

Bathymetric survey was completed on 20<sup>th</sup> March and topographic survey was completed on 25<sup>th</sup> March 2021.

The survey data was processed on the site on a daily basis and reporting and charting was completed in the OSaS data processing centre in Navi-Mumbai after the survey.

All the co-ordinates in the report and charts are referenced to WGS 84 datum, UTM projection, CM 69° east, zone 42, northern hemisphere.

All bathymetric and topographic data has been reduced to M.S.L using the observed average water level of each day during the survey period.

The survey was carried out in daylight hours keeping in mind the safety of personnel and survey equipment.

The construction works of Bhadar 2 commenced in 1998 and were completed in 2000. Gated Ogee type spillway and gates were completed in 2003. With an area of 8.5 km<sup>2</sup>, Full Reservoir Level (F.R.L) of the Bhadar 2 reservoir is 53.1m above M.S.L over a catchment area of 612.78 km<sup>2</sup>. The gross storage (at F.R.L:53.1m) and dead storage (at D.S.L:45.44m) as per 2005 survey are 49.0 M.Cu.m and 7.15 M.Cu.m respectively.

Bathymetric and topographic survey was restricted at some places due to the presence of bushes, shallow areas, waterlogged areas, small streams with unsafe and inaccessible marshy ground and exposed rocks in the river.

Capacity survey conducted in 2005 was provided to us for comparison with the current survey.

In the current bathymetric and topographic survey, a minimum elevation of 36.5m was observed in the southwestern portion of the survey area within the bathymetric section. A maximum topographic elevation value of 61.58m is observed in the northwestern portion of the survey area.

The survey was extended till the High Flood Level (H.F.L:53.1m). Within the survey area, the river channel exhibits a change in contours from 50m in the northeast to 37m in the southwest. The extreme northeastern portion is irregular but further towards the central part the river bed becomes slightly irregular with a localised flat riverbed.

Most of the portion of the river bank follows a 50m elevation contour. Further upslope towards the survey boundary the river bank exhibits an irregular topography with moderate to steep slopes, between the 50m and 53m contours.

The comparison between 2005 and 2021 (16 years) data results shows a rate of siltation (Silt Index) at a rate of 7.4 Ha.m/100sq.km./year. Annual percentage loss of gross storage capacity, live storage capacity and dead storage capacity are 0.92%, 0.99% and 0.49% respectively.

The detailed comparison of current capacity data at different levels to the previous capacity data of 2005 survey shows an increase in capacity within the dead storage area particularly below 44.00m, possibly due to further deepening of the river channel or the sediment removal possibly due to a flood.

Above 44.0m, the reservoir exhibits a significant reduction of capacity at different levels up to F.R.L. due to sediment deposit at different levels of the reservoir, occurring in part of the dead storage area and throughout the live storage area.

The capacity at D.S.L (45.44m) reduced from 7.150 M.Cu.m to 6.586 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 7.89 percent. The amount of sediment deposited during this period at D.S.L is 0.564 M.Cu.m.

The capacity at F.R.L (53.10m) reduced from 49.000 M.Cu.m to 41.786 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 14.72 percent. The amount of sediment deposited during this period at F.R.L is 7.214M.Cu.m.

The removal or deposition of the sediment within the reservoir results in a corresponding increase or loss of storage capacity.



## 1 INTRODUCTION

The Water Resources Department, Govt. of Gujarat is engaged in developing water reservoirs within the state of Gujarat, under a World Bank funding programme towards National Hydrology Projects of Govt. of India. Towards this end, the Water Resources Department, Govt. of Gujarat requires services for conducting bathymetric survey of reservoirs of Saurashtra and northern Gujarat regions under its National Hydrology Project.

Ocean Science & Surveying Pvt. Ltd. (OSaS) was contracted by Narmada Water Resources, Water Supply & Kalpsar Department (WRD) to carry out topographic and bathymetric surveys of thirteen reservoirs in the Saurashtra and northern Gujarat regions; namely Bhadar-1, Bhadar-2, Brahmani-1, Und-1, Machhu-1, Machhu-2, Khodiyar, Aaji-1, Nara, Tappar, Rudramata, Mitti and Fatehghadh.

This report describes the results of the topographic and bathymetric survey services provided by OSaS to WRD for topographic and bathymetric mapping of the Bhadar-2 reservoir in Saurashtra, Gujarat.

### 1.1 Background of survey area

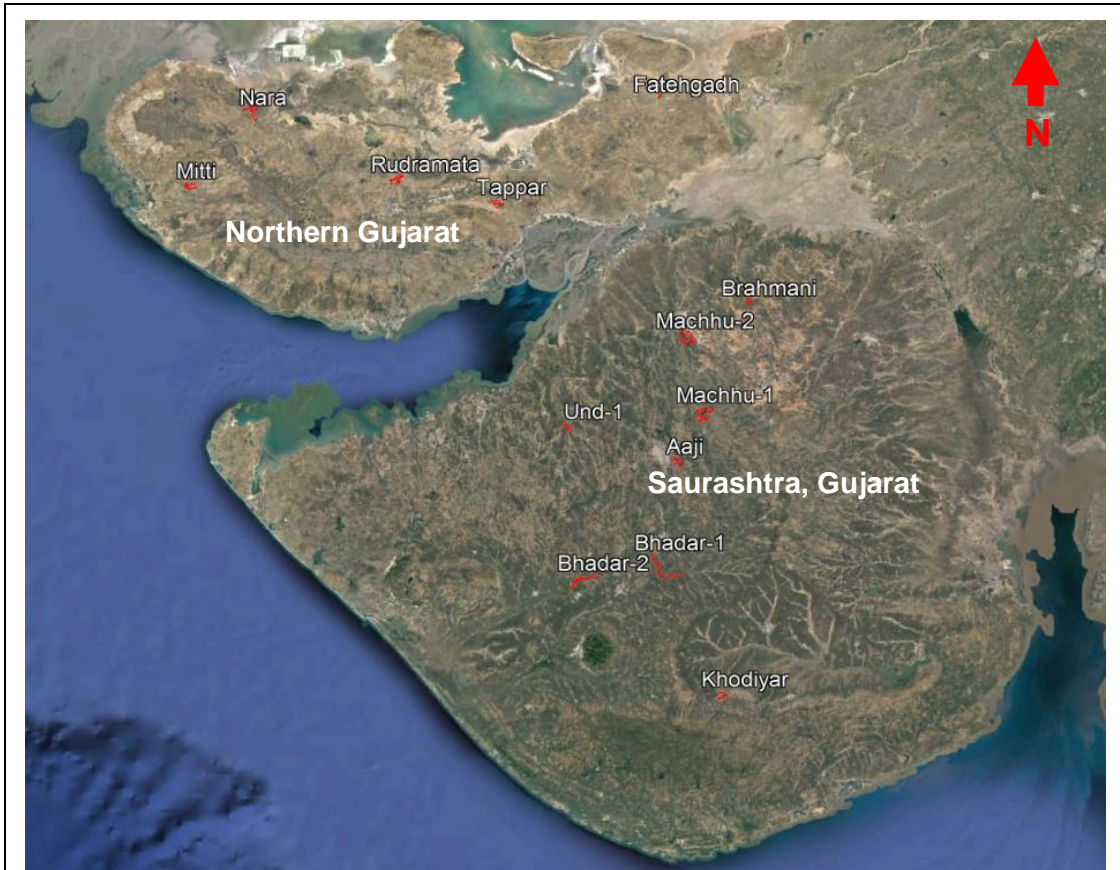
Bhadar river is in the Saurashtra peninsula, in the western Indian state of Gujarat. It flows south from its origin through Jasdan, then turns south-west and generally heads west until it empties into the Arabian sea near Porbandar. The total catchment area of the basin is 7,094 sq km. It is impounded by two reservoirs; Bhadar-1 reservoir with a capacity of 238 M.cu.m and downstream from that, Bhadar-2 reservoir with a capacity of 49 M.cu.m.

The average rainfall in the Bhadar basin is 625 mm. In winter, the temperature varies between 4°C and 15°C in different parts of the region. May is the hottest month. Maximum temperature varies between 40°C and 45°C. At present, there are 12 completed structures, either reservoirs or weirs, in Bhadar catchment.

Bhadar-2 dam was constructed in the year 2000 with a gross storage of 49Mm<sup>3</sup>. It is an earthen and brick type dam. This dam fulfills its operating purpose of irrigation and water supply efficiently.

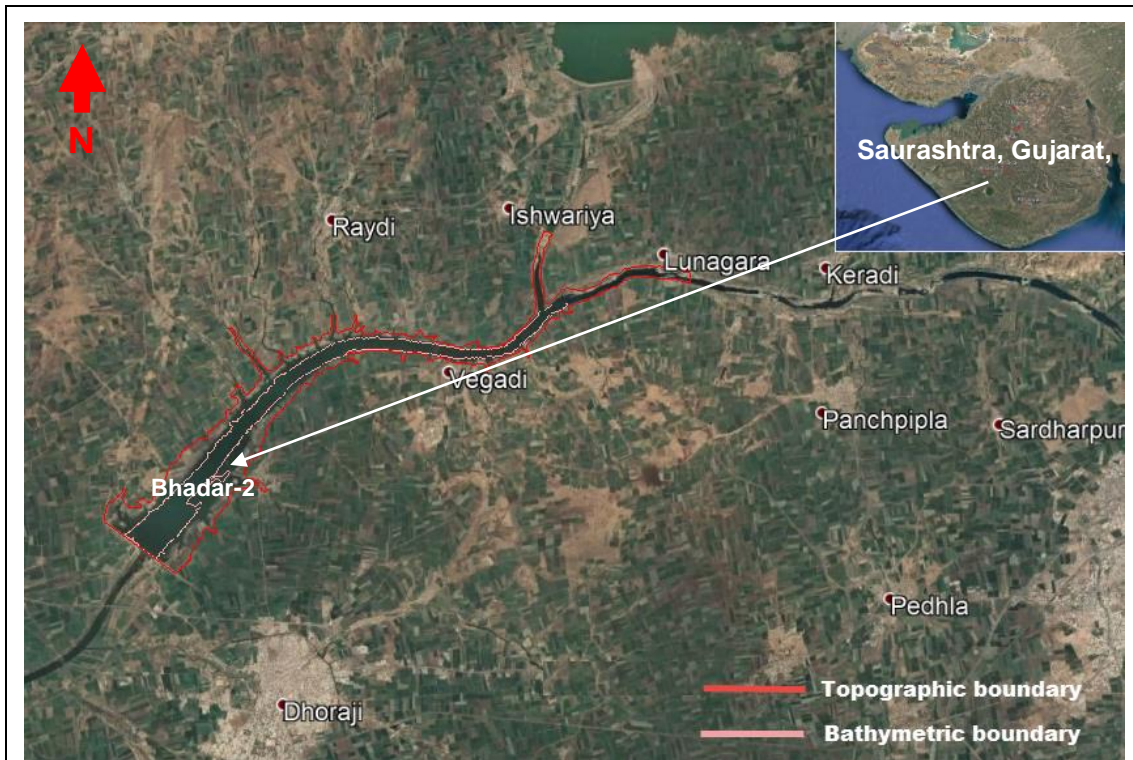
### 1.2 General Location

The reservoirs of Saurashtra and Northern Gujarat region are shown on the Google Earth image in **Figure 1**.



**Figure 1: Survey areas/reservoirs of Saurashtra and Northern Gujarat regions**

This report specifically focuses on the results of topographic and bathymetric survey of the Bhadar-2 reservoir situated within the Saurashtra region, shown in the Google earth image below:



**Figure 2: Survey area – Reservoir Bhadar-2**

## 2 SCOPE OF WORK

The scope of work for the survey was:

- To mobilize requisite topographic equipment and personnel at the sites specified by the client.
- To mobilize a suitable vessel along with requisite bathymetric equipment and personnel at the sites specified by the client.
- To carry out topographic and single beam echo sounder bathymetric survey in the specified areas.
- To estimate and study the sedimentation behaviour of the reservoirs in different zones including horizontal zones throughout the reservoirs as well as vertical zones namely (a) dead storage (b) live storage (c) flood storage, if any.
- The integrated bathymetric system will be used to collect data on depth and bottom topography of the reservoirs and rivers. Primary application is reservoir sedimentation surveying; products will be reservoir capacity figures as a function of depth, depth contours and bottom topography change over time.
- To upgrade elevation-area-capacity tables /curves of the reservoirs.
- To prepare contour plan, Longitudinal profile (L-section), Cross section profiles...etc.

### 2.1 Salient features of Survey Area

The Bhadar-2 reservoir with a capacity of 49M.cu.m is situated across the Bhadar River in the Saurashtra peninsula, in the Western Indian state of Gujarat. The construction works of Bhadar 2 was commenced in 1998 and completed in 2000. Gated Ogy type spillway and gates were completed in 2003. An area-capacity table was provided by client and confirmed that the data was acquired in the year 2005. Information at the time of impounding the reservoir is not available from any of the source. The salient features of Bhadar 2 reservoir based on area-capacity table obtained in 2005 are given below.

a. Location	
Latitude	: 21 <sup>0</sup> – 47.2' N
Longitude	: 70 <sup>0</sup> – 26.3' E
b. Catchment Area	: 612.78 Sq.Km
c. Full Reservoir Level (F.R.L)	: 53.1 m
d. High Flood Level (H.F.L)	: 53.1 m
e. Dead Water Level (D.W.L/O.S.L)	: 45.44 m
f. Gross Storage	: 49 M.Cu.m
g. Dead Storage	: 7.15 M.Cu.m
h. Live Storage	: 41.85 M.Cu.m
i. Area at F.R.L	: 8.5 Sq.Km

### 2.2 Survey Design

The topographic and bathymetric survey lines were planned and executed at intervals of 25m throughout the area of survey. Topographic survey was conducted using RTK base and rover system. The limit of topographic survey was up to the H.F.L of the reservoir, which is 53.1m (174.21ft.) above MSL, as provided by the client. The bathymetric survey was conducted using RTK positioning system and single beam echo sounder.

The topographic and bathymetric surveyed areas (in sq.km) for the Bhadar-2 reservoir are provided in **Table 1** below.

<b>Name of Reservoir</b>	<b>Bathymetric area surveyed (sq. km.)</b>	<b>Topographic area surveyed (sq.km.)</b>
Bhadar-2	3.66	4.79

**Table 1: Surveyed areas for Bhadar-2 reservoir**

### 3 SURVEY CONTROL

#### 3.1 Geodesy

The survey operations were conducted in WGS 84 Spheroid, Universal Transverse Mercator projection system, based on the geodetic parameters as presented below. All co-ordinates given within this document are with reference to it.

GEODETTIC PARAMETERS	
Satellite Datum	
Datum, Spheroid	WGS-84
Semi-Major Axis	6378137.000 m
Semi Minor Axis	6356752.314 m
Inverse Flattening	298.2572
Projection Parameters	
Grid Projection	Universal Transverse Mercator
Latitude of Origin of Projection	0° (Equator)
Longitude of Origin of Projection	69° E, Zone 42 North
Hemisphere	North
False Easting (metres)	500000 E
False Northing (metres)	0
Scale Factor on CM	0.9996
Units	Metres

**Table 2: Geodetic Parameters**

#### 3.2 Horizontal and vertical Control

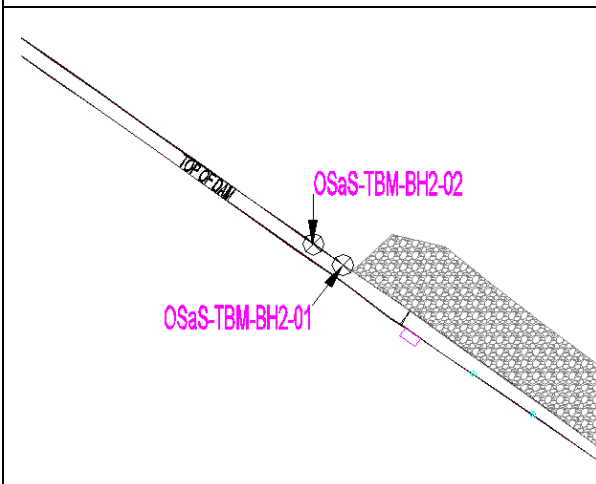

##### 3.2.1 Topographic survey

Two reference stations were established as temporary control points/temporary benchmarks (TBM). The levelling of these TBMs was carried out using an auto level with respect to the known level of F.R.L which is given as 53.1m above MSL, as provided by the client. The base stations of the RTK were set up at these positions and two-hour long continuous observations were conducted using a Hemisphere RTK positioning system to fix the consistency of the position for horizontal control. The system provides real time correction signals, providing centimetre level accuracy. Additional TBMs were established at various parts of the survey area to keep the rover in range with respect to the base station.

The details of the reference stations OSaS-TBM-BH2-01 and OSaS-TBM-BH2-02 are given in **Figure 3** and **Figure 4**.

<b>Station Number:</b>	OSaS-TBM-BH2--01	<b>Latitude:</b>	21° 45' 37.295" N
<b>Locality:</b>	Bhukhi, Gujarat	<b>Longitude:</b>	70° 25' 29.379" E
<b>Geodetic Datum:</b>	WGS84	<b>Northing:</b>	2406981.76 m N
<b>Projection:</b>	Mercator	<b>Easting:</b>	647328.81 m E
<b>Date:</b>	10 <sup>th</sup> March 2021	<b>Elevation:</b>	59.666m above MSL
<b>Station Description:</b>	A circle with text OSaS-TBM-BH2-1 is drawn with yellow paint on the walkway to the crest of the Dam.		
<b>Access:</b>	Road to the top of the reservoir over the spillway. TBM is situated on the walkway to the crest of the Dam.		
<b>Sketch:</b>			
<b>Map:</b>			
			

**Figure 3: Details of OSaS-TBM-BH2--01**

<b>Station Number:</b>	OSaS-TBM-BH2--02	<b>Latitude:</b>	21° 45' 37.581"N
<b>Locality:</b>	Bhukhi, Gujarat	<b>Longitude:</b>	70° 25' 28.956"E
<b>Geodetic Datum:</b>	WGS84	<b>Northing:</b>	2406990.44 m N
<b>Projection:</b>	Mercator	<b>Easting:</b>	647316.56 m E
<b>Date:</b>	10 <sup>th</sup> March 2021	<b>Elevation:</b>	59.663m above MSL
<b>Station Description:</b>	A circle with text OSaS-TBM-BH2-2 is drawn with yellow paint on the walkway to the crest of the Dam.		
<b>Access:</b>	Road to the top of the reservoir over the spillway. TBM is situated on the walkway to the crest of the Dam. TBM02 is situated 15m northwest of TBM01.		
<b>Sketch:</b>			
<b>Map:</b>			

**Figure 4: Details of OSaS-TBM-BH2-02**

Additional temporary control points were established in the field to maintain the moving rover within the range of the base reference point. The following table summarises the details of all the temporary control points (TBMs) established at the site during the survey.

Sr. No.	Station Name	Latitude (N)	Longitude (E)	Easting (m)	Northing (m)	Elevations (m) w.r.t MSL
1	OSaS-TBM-BH2-01	21° 45' 37.295"	70° 25' 29.379"	647328.81	2406981.76	59.666
2	OSaS-TBM-BH2-02	21° 45' 37.581"	70° 25' 28.956"	647316.56	2406990.44	59.663
3	OSaS-TBM-BH2-03	21° 45' 32.081"	70° 25' 59.620"	648199.01	2406829.44	59.017
4	OSaS-TBM-BH2-04	21° 46' 56.642"	70° 26' 39.644"	649324.48	2409440.60	56.015
5	OSaS-TBM-BH2-04A	21° 47' 45.606"	70° 27' 38.336"	650996.02	2410962.22	53.723
6	OSaS-TBM-BH2-05	21° 47' 13.951"	70° 26' 57.041"	649819.17	2409977.56	58.403
7	OSaS-TBM-BH2-06	21° 47' 48.257"	70° 28' 03.933"	651730.40	2411050.72	61.400
8	OSaS-TBM-BH2-06A	21° 47' 49.043"	70° 28' 50.902"	653079.12	2411087.79	58.573
9	OSaS-TBM-BH2-08	21° 48' 40.661"	70° 31' 29.518"	657618.92	2412719.59	67.955
10	OSaS-TBM-BH2-09	21° 48' 44.306"	70° 30' 53.507"	656583.68	2412821.50	56.639
11	OSaS-TBM-BH2-09A	21° 48' 56.127"	70° 30' 23.080"	655706.34	2413176.46	70.812
12	OSaS-TBM-BH2-10	21° 48' 20.558"	70° 29' 57.115"	654971.35	2412075.35	63.033
13	OSaS-TBM-BH2-13	21° 48' 16.374"	70° 27' 38.796"	651000.26	2411908.55	62.336

**Table 3: Details of TBMs**

### 3.2.2 Bathymetric survey

The same two reference stations, established as temporary control points/temporary benchmark (TBM) for topographic survey were also used as the base stations for RTK positioning during the bathymetric survey. The rover fixed in the survey boat can receive calculated X Y Z of its position at any point with centimeter level accuracy with respect to the known base positions. The details of these reference stations are given in **Figure 3** and **Figure 4**

The water level of the reservoir with respect to the known value of F.R.L (53.1 above MSL) was measured twice a day during the survey. The mean value of these two readings was taken as the datum for the day's work. The depths recorded by the echo sounder were deducted from these levels to obtain the bed levels with respect to M.S.L. The observed water levels are given in **Table 4**.

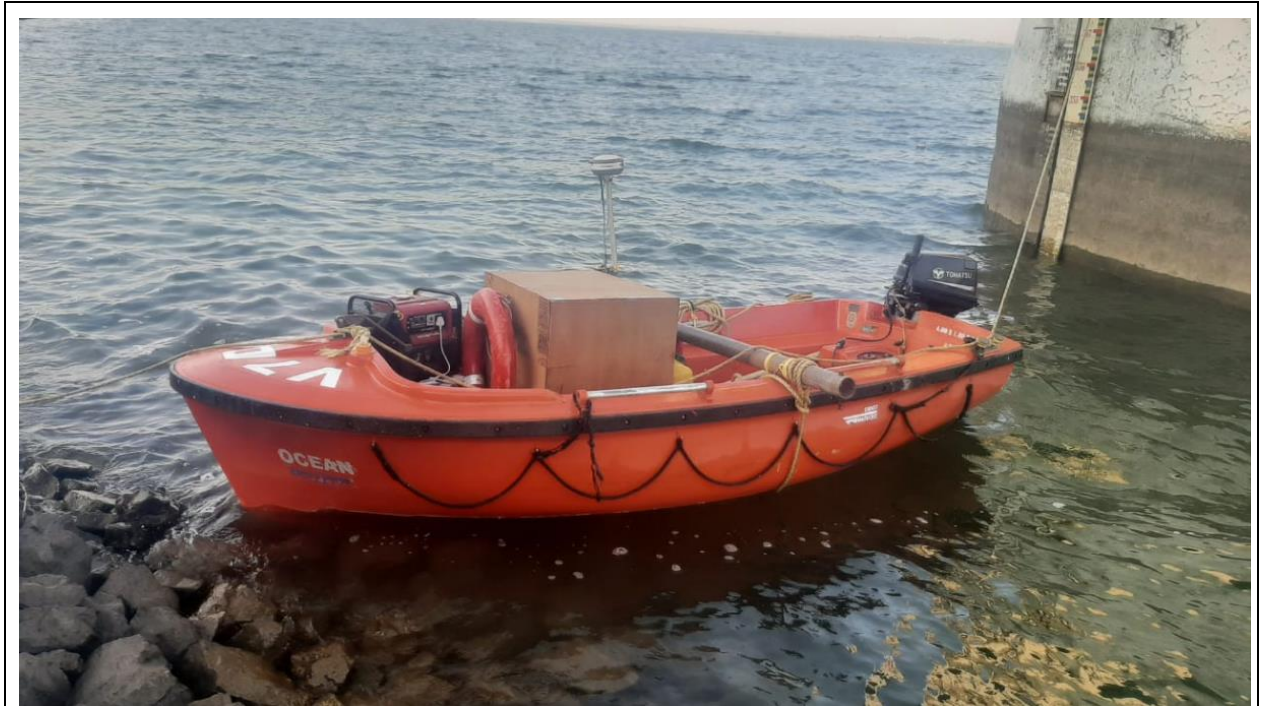
Date	Water level				Average level in metres (MSL, m)
	Start		End		
	Time (AM)	Level (MSL, m)	Time (PM)	Level (MSL, m)	
12-03-21	10:00	49.062	5:00	49.050	49.056
13-03-21	10:00	49.045	5:00	49.034	49.040
14-03-21	10:00	49.016	5:00	49.006	49.011
15-03-21	10:00	48.989	5:00	48.97	48.980
16-03-21	10:00	48.929	5:00	48.913	48.921
17-03-21	10:00	48.872	5:00	48.852	48.862
18-03-21	10:00	48.813	5:00	48.796	48.805
19-03-21	10:00	48.757	5:00	48.74	48.749
20-03-21	10:00	48.701	5:00	48.69	48.696

**Table 4: Observed Water Levels**



### 3.3 Survey Vessel

A company owned boat, SMB Ocean, was utilised for conducting the survey operations.



**Figure 5: Survey vessel – SMB Ocean**

## 4 PERSONNEL

The following survey personnel were involved during the survey period.

Name	Designation	Duration
Santokh Chand	Project Manager	Project Duration (In Navi-Mumbai office)
Gaurav Sharma	Party Chief / Survey Engineer	09 <sup>th</sup> - 25 <sup>th</sup> March 2021
Amit Bhardwaj	Surveyor	09 <sup>th</sup> - 25 <sup>th</sup> March 2021
Binu Kumar	Surveyor	09 <sup>th</sup> - 16 <sup>th</sup> March 2021
Sanjeev Kumar	Survey Engineer	16 <sup>th</sup> - 25 <sup>th</sup> March 2021
Mayank Putani	Client Representative	Project duration

**Table 5: Survey Personnel**

## 5 SURVEY EQUIPMENT DETAILS

### 5.1 General

The equipment used for the survey is described below.

#### Bathymetry:

- Hemisphere GPS S320 GNSS RTK Base and Rover system with accessories
- Odom MK III dual frequency single beam echo sounder system with accessories
- TSS HS50 heave sensor
- Hypack navigation system
- 2 x computers with associated accessories

#### Topography:

- Hemisphere GPS S320 GNSS RTK Base and Rover system with accessories
- Geomax Auto Level with accessories.

Adequate spares and back-ups for critical items will be carried on board the survey vessel to ensure that failure of any hardware unit does not adversely affect progress of field work.

### 5.2 RTK Positioning and Navigation

An RTK system was mobilised at the site to carry out the topographic and bathymetric survey. The system comprises the following:

- Hemisphere GPS R320 GNSS base station
- Hemisphere GPS R320 rover

The base station of the RTK was set up at the temporary benchmark. Real Time Kinematic (RTK) is a technique used to increase the accuracy of GPS signals by using a fixed base station which wirelessly sends out corrections to a moving receiver. By utilising these corrections, the GPS engine can fix the position of the antenna to within 1 - 2cm. GPS Real-Time Kinematic (RTK) operation provides centimetre-level accuracy by eliminating errors that are present in the GPS system. For obtaining corrected positions, a rover receiver and a source of corrections from a base station were used.

Vessel positioning was carried out by the RTK DGPS system and its heading determined by the course made good method (CMG). The positioning system was interfaced to the Hypack navigation software. Vessel track and offset positions were recorded digitally in the navigation software. DGPS positioning accuracy of the moving vessel was better than  $\pm 1$ m.

The vessel's computed position from the DGPS receiver was interfaced to the navigation computer system. Hypack navigation and data acquisition software was used to provide track guidance information for the survey crew and also output the vessel position to assist the helmsman in maintaining the selected track guidance line. The VDU displays the selected survey line, the vessel position in relation to that line and numerical data to assist the helmsman such as the along-line and off-line distances, vessel speed and course made good, gyro heading, distance and bearing to end of line and water depth. The position of each fix, together with other information such as fix numbers, depths, and down line distances were logged to the hard drive.

Sensor offsets on the survey vessel were accurately measured during mobilisation and are included in the mobilisation report.

### **5.3 Single Beam Echo Sounder System**

Bathymetric data was acquired using a dual frequency 33/200 kHz Echotrac DF 3200 MK III single beam echo sounder. The SBES transducer assembly was side-mounted on a pole on the port side of the boat. A hard copy (paper) record was produced in real-time, annotated with line name, fix number, time and date. The digital output was logged by the navigation computer for post-processing.

#### Calibration

The echo sounder was calibrated at the survey location by conducting a bar-check. The bar-check is carried out by lowering a horizontal steel plate to known, fixed depths below the water surface directly below the echo sounder transducer. Acoustic reflections from the plate at different depths are then recorded and adjustments made to the settings for sound velocity and draft to get accurate results. A bar-check was carried out before commencing the survey and the average speed of sound obtained was entered into the unit.

### **5.4 Heave Sensor**

A MRU-PD heave sensor was fixed on the deck of the boat about 0.2m ahead of the COG. Its output was given to the SBES unit.

### **5.5 Auto Level Geomax**

A Geomax Auto Level was used to establish the local benchmark by transfer and level the TBM with respect to the known level of F.R.L at 53.1m above M.S.L, as provided by the client.

### **5.6 Real Time Kinematic (RTK) For Topographic Survey**

A Hemisphere R320 GNSS RTK system with base station and rover was used to conduct the survey. Base stations were established with respect to F.R.L at the TBM and rover used to fix the positions. This is a positioning system which can measure and calculate the X Y Z of any given point with centimetre level accuracy with respect to the known base positions. An AutoCAD drawing can be generated with the help of the XYZ values obtained from this equipment.

### **5.7 HyPack Software**

Navigation data was processed using the Hypack navigation software. Single beam data from the Echotrac DF 3200 MK III echo sounder was also processed using the Hypack software. Hypack provides all of the tools necessary to complete the hydrographic survey requirements. It provides a tool to design a survey, collect data, apply corrections to soundings, remove outliers, plot field sheets, export data to CAD, compute volume quantities, generate contours, create side scan mosaics and create/modify electronic charts.

## 6 DATA PROCESSING AND INTERPRETATION

This section explains the established terminology and standards for the project and how they were applied to the survey data.

### 6.1 Navigation Data

Raw DGPS and gyro data were processed and merged to form an edited vessel track file. The final navigation data was reviewed in AutoCAD to confirm the validity of the vessel's position and to aid in the correlation between navigation data and chart location.

The survey track plots were then used for data interpretation and generation of the survey charts.

### 6.2 Bathymetric Data

Single beam data from the Echotrac DF 3200 MK III echo sounder was processed using the Hypack navigation package. The vertical datum for all bathymetric measurements was the known MSL value of F.R.L. The depth soundings obtained from the single beam echo sounder were reduced to MSL with the help of the observed water level in the reservoir.

Recorded depth data was adjusted for transducer draft and changes in water mass acoustic velocity as measured during the bar-check.

#### Lakebed Gradient Classification

The following terms were used to describe the lakebed gradients.

CLASSIFICATION	GRADIENT (in terms of Degrees and Slope Interval)	
Very Gentle	<1°	< 1 in 57
Gentle	1° – 4.9°	1 in 57 to 1 in 11.7
Moderate	5° – 9.9°	1 in 11.7 to 1 in 5.7
Steep	10° – 14.9°	1 in 5.7 to 1 in 3.7
Very Steep	>15°	> 1 in 3.7

**Table 6: Classification of gradients**

Gradients documented in the report should be taken as an indication of general slopes for the area. The localised gradients, particularly near features such as depressions or trenches may occasionally be steeper.

Following the data processing and interpretation phase, the charts were prepared at the OSaS data processing centre, in Navi Mumbai. A team comprising a bathymetry data processor, CAD processor and geophysicist prepared the report and accompanying charts to WRD's specifications.

### 6.3 Topographic Data

A Hemisphere R320 GNSS RTK system with base station and rover was used to conduct the survey. This is a positioning system which can measure and calculate the X Y Z of any given point with centimetre level accuracy with respect to the known base positions. The data is downloaded from the controller system, processed in the OSaS Data Processing Centre in Navi Mumbai and formatted to a compatible ASCII format for plotting in AutoCAD.

### 6.4 Charting

The results of the survey conducted during March 2021 are presented in ten charts. The chart details are given after the List of Tables in the beginning of this report.

## 7 SURVEY RESULTS

### 7.1 Survey Area

The elevations mentioned in this report and associated charts have been reduced to Mean Sea Level (M.S.L) using the observed average water level of the Bhadar 2 reservoir for the corresponding survey day. So all the bathymetric and topographic values mentioned in this report are with respect to M.S.L

The M.S.L-reduced bathymetric and topographic data are plotted in 1:5000 scale in a 25m X 25m grid. A total of three charts were created for the purpose of plotting bathymetric and topographic data. For more details refer to **Charting**

The RTK positioning accuracy is metric, resulting in a similar positioning accuracy of single beam echo sounder data since the sensor was side-mounted on the vessel.

The following observations are obtained after the processing and interpretation of all the bathymetric and topographic data acquired during the entire period of survey.

A minimum elevation of 36.5m was observed in the southwestern portion of the survey area within the bathymetric section. A maximum topographic elevation value of 61.58m is observed in the northeastern portion of the survey area.

Bhadar 2 reservoir is constructed across Bhadar river. The primary source of water in Bhadar 2 dam is Bhadar river. In addition, a number of medium and small sized rivers bring water to the dam area. Most of these rivers flow from north to south whereas Bhadar river flows generally from east to west.

Within the survey area, the central portion is observed with a prominent river channel all along the bathymetric section. The average elevation change within the bathymetric area is between 36.5m and 49.5m. Within the bathymetric area, a few elevated areas were observed in the southwestern portion.

The processed topographic data shows the land is sloping from all the sides of the survey area towards the river channel and dam area. The average elevation change within the topographic area is between 45.13m and 61.58m. Features like temples, well, waterlogged areas and houses were observed within the topographic survey area. A bridge, which is a part of the Junagadh – Jamnagar highway, was mapped across the survey area in the central portion. A locally made temporary bridge was observed in the northeastern portion of the survey area.

Most of the outer survey area is observed around the 53m elevation contour. A maximum contour of 61m is observed in the northeastern portion of the survey area. In the extreme northern portion of the survey area is observed with a change in elevation contour between 49m to 61m associated with river channel and irregular rock exposures. Further towards west, the river initially heads southwest, then turns westwards and then again to the southwest till it is obstructed by the dam wall in the extreme southwestern portion of the survey area.

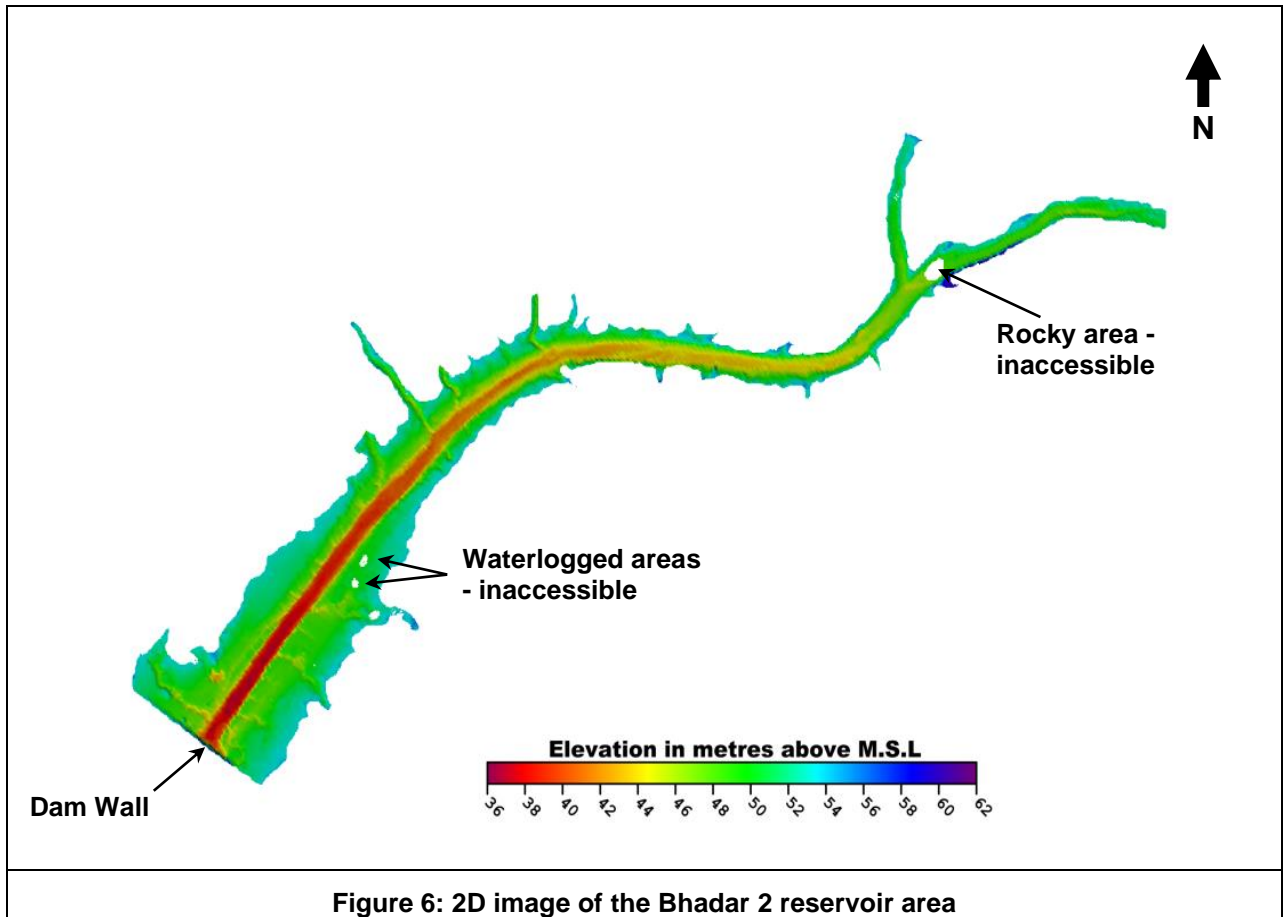
Within the survey area, the river channel exhibits a change in contour levels from 50m in the northeast to 37m in the southwest. In the extreme northeastern portion, the riverbed shows an irregular morphology due to exposed rocks. Towards the central portion it becomes flatter, with a change in elevation between 44m and 46m. The central portion exhibits slightly irregular morphology with a change in elevation between 41m and 45m.

The southwestern portion exhibits a minimum contour of 37m. Contour levels between 37m and 40m occur in the southeastern portion, significantly marking the maximum river bed depth within the survey area. Within the southern part of the survey area, a major part of the river channel is below the 45m elevation contour.

Most of the portion of the river bank is mapped around the 50m elevation contour. Further upslope towards the survey boundary the river bank exhibits an irregular topography with moderate to steep slopes between the 50m and 53m contours.

Bathymetric and topographic survey was restricted at some places due to the presence of bushes, shallow area, waterlogged areas, small streams with unsafe and inaccessible marshy ground and exposed rocks in the river.

The following **Figure 6** shows a 2-dimensional image of the Bhadar 2 reservoir area using the gridded bathymetric and topographic data.



## 7.2 Longitudinal Profile

A longitudinal profile of the reservoir was prepared from the line created by connecting the lowest bed level for each survey line. For more details refer to the charts listed in the section on **Charting**.

## 7.3 Cross Section Profiles

Cross section profiles consist of the bed levels along the survey lines at 100m intervals. The cross section profiles will also be provided in a Compact Disk/USB as per the instructions mentioned for deliverables. For more details refer to the charts listed in the section on **Charting**.

## 8 CAPACITY SURVEY RESULTS

### 8.1 General

It is natural for lakes and reservoirs to trap a major part of the sediment brought into them by the streams in the catchment. Sedimentation of reservoirs is therefore a natural process resulting from the geologic and geo-morphologic processes of water borne erosion.

Sedimentation of reservoirs leads to a gradual loss of their storage capacities available for regulation of supplies. Apart from this, it can cause operational problems created by the entry of large volumes of sediments in the canals or in the turbines, as also due to jamming of hydraulic gates. Reservoir sedimentation can also cause ecological problems due to turbidity, and due to gradual delta formation at the upstream end of the reservoirs. Therefore, sedimentation of reservoirs is a matter of vital concern in all water resources development projects.

The two dominant factors which influence the rate of silting in any storage reservoir are: (i) the relationship of capacity to inflow and (ii) the content of sediment in the inflow. The other factors that modify the long-term loss of storage capacities are (a) the trap efficiency of the reservoir, (b) the character of the sediment, and (c) the method of reservoir operation. Basically, these three factors mentioned are modifiers and do not usually have a major effect as compared to the capacity-inflow ratio and the sediment content in the inflow.

It is generally recommended to carry out capacity survey of reservoirs periodically so that the quantity of sedimentation taking place can be assessed and timely remedial measures taken. This also serves as a guide for proper sedimentation planning of future reservoirs to ensure that the reservoir sedimentation does not cause unexpected problems in the useful operation of the reservoir.

The capacity surveys in general, show that the observed rate of sedimentation is higher than the rate of sedimentation adopted in the original designs. However, it is observed that the rate of sedimentation decreases with the passage of time and the useful life of the reservoir may not get unduly reduced in most cases.

### 8.2 Effect of Sedimentation in Planning of Reservoirs

It is important to note that storage reservoirs built across rivers and streams lose their capacity on account of deposition of sediment. This deposition, which takes place progressively in time, reduces the active capacity of the reservoir to provide the outputs of water through the passage of time. Accumulation of sediment at or near the dam may interfere with the future functioning of water intakes and hence affects decisions regarding location and height of various outlets. It may also result in greater flow of water into canals / water conveyance systems drawing water from the reservoir. Problems of rise in flood levels in the head reaches and unsightly deposition of sediment from a recreation point of view may also crop up in the course of time.

In this regard, the Bureau of Indian Standards code IS: 12182 - 1987 "Guidelines for determination of effects of sedimentation in planning and performance of reservoir" is an important document which discusses some of the aspects of sedimentation that have to be considered while planning reservoirs. Some of the important points from the code are as follows:

While planning a reservoir, the degree of seriousness and the effect of sedimentation at the proposed location have to be judged from studies, which normally consist of a combination of:

1. Performance Assessment (Simulation) Studies with varying rate of sedimentation.
2. Likely effects of sedimentation at the dam face.

In special cases, where the effects of sedimentation on backwater levels are likely to be significant, backwater studies would be useful to understand the size of river water levels. The steps to be followed

for performance assessment studies with varying rates of sedimentation are as follows:

- a. Estimation of annual sediment yields into the reservoir or the average annual sediment yield and of trap efficiency expected.
- b. Distribution of sediment within the reservoir to obtain a sediment elevation and capacity curve at any appropriate time.

### 8.3 EARLIER CAPACITY SURVEY

#### 8.3.1 Capacity survey of 2005

An area-capacity table was provided by client and confirmed that the data was acquired in the year 2005. Information at the time of impounding the reservoir is not available from any source. The salient features of Bhadar 2 reservoir based on area-capacity table obtained in 2005 are given below.

- |                                   |                             |
|-----------------------------------|-----------------------------|
| a. Location                       |                             |
| Latitude                          | : 21 <sup>0</sup> – 47.2' N |
| Longitude                         | : 70 <sup>0</sup> – 26.3' E |
| b. Catchment Area                 | : 612.78 Sq.Km              |
| c. Full Reservoir Level (F.R.L)   | : 53.1 m                    |
| d. High Flood Level (H.F.L)       | : 53.1 m                    |
| e. Dead Water Level (D.W.L/O.S.L) | : 45.44 m                   |
| f. Gross Storage                  | : 49 M.Cu.m                 |
| g. Dead Storage                   | : 7.15 M.Cu.m               |
| h. Live Storage                   | : 41.85 M.Cu.m              |
| i. Area at F.R.L                  | : 8.5 Sq.Km                 |

The old report that was provided had data at intervals of 0.05m and the documented F.R.L at 53.1m. For the ease of further calculations and preparation of Elevation-Area-capacity curve, the data has been extracted at regular intervals of approximately 0.5m. **Table 7** shows the Elevation-Area-capacity of 2005 data at these intervals. The complete data of 2005 is given in Annexure 3

#### 8.3.2 Capacity survey of 2021

The water spread area and its corresponding capacity has been calculated from the acquired bathymetry and topographic data. Hypack software's TIN (Triangulated Irregular Network) MODEL package was used to calculate the Area and Capacity of the Bhadar-2 reservoir at intervals of 0.01m with respect to the corresponding elevation above MSL. Within the survey area a few places were not accessible to the survey personnel due to the existing marshy streams, waterlogged areas, houses and rocky areas. However, these areas were taken into account while calculating the water spread area by assigning interpolated values with respect to the acquired values around the restricted areas. The detailed Elevation-Area-Capacity data at 0.01m is available in **Annexure 1**. The F.R.L is considered at 53.1m according to the information from the reservoir salient features. For ease of further calculations and preparation of Elevation-Area-capacity curve, the data has been selected at regular intervals of approximately 0.5m. The following **Table 7** shows the Elevation-Area-capacity at these intervals.



## 8.4 ELEVATION-AREA-CAPACITY CURVES

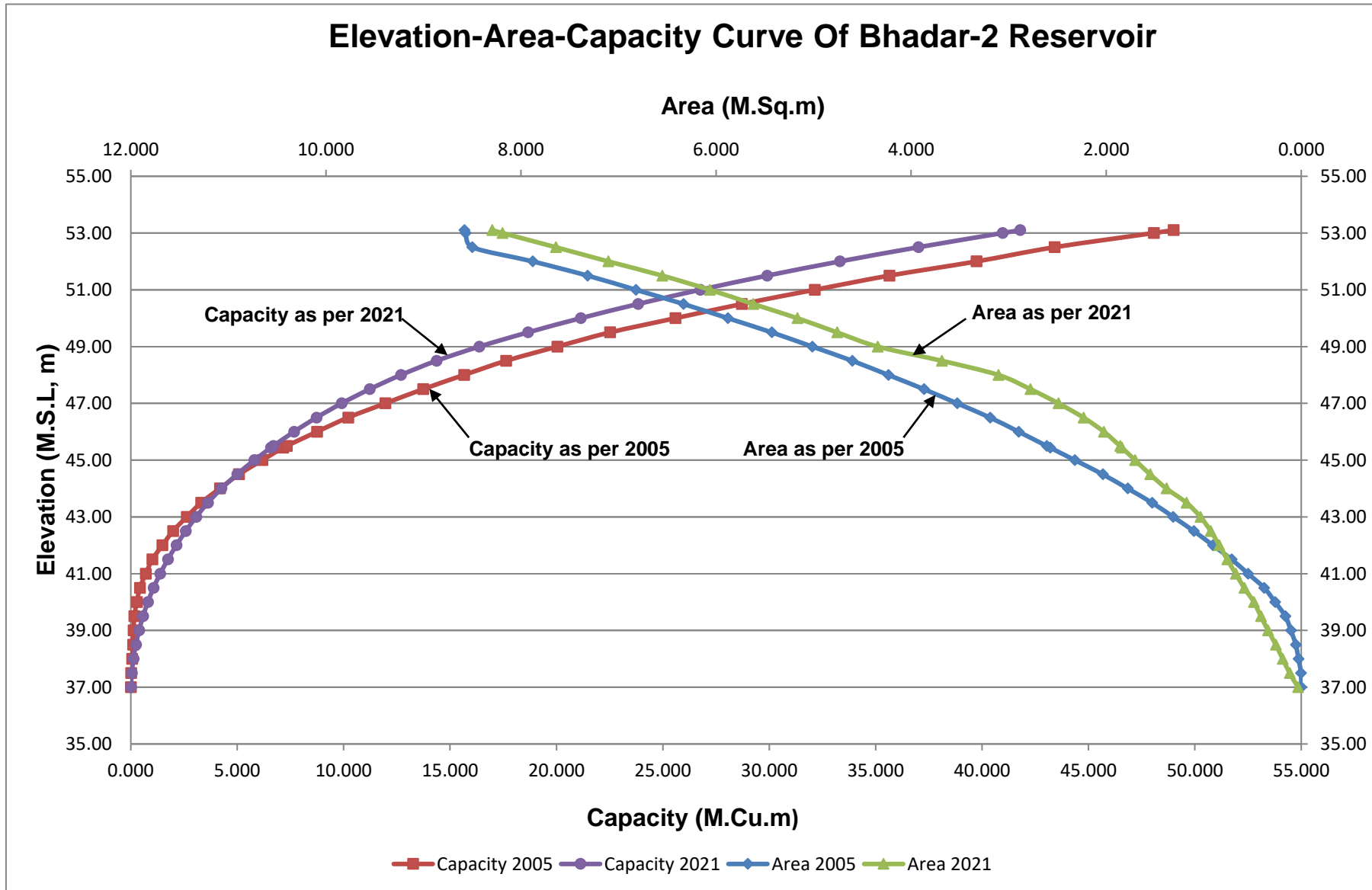
One of the most important physical characteristics of dams and their reservoirs are Elevation-Area-Capacity curves. These curves are important for defining the storage capacity of the reservoir and thereby can be used in reservoir operation, reservoir flood routing, determination of capacity and water spread corresponding to each elevation. Area-capacity data at the time of impounding hasn't been made available for Bhadar-2 reservoir which was constructed in 2000, whereas data is available at intervals of 0.05m from the capacity survey conducted in 2005. The current survey was conducted in 2021 and the data was provided at intervals of 0.01m. For ease of further calculations and preparation of Elevation-Area-capacity curve, the data has been selected at regular intervals of approximately 0.5m. The following **Table 7** shows the comparative statement of data between 2005 and 2021 at intervals of approximately 0.5m.

Elevation (Above MSL, m)	As per 2005 survey		As per 2021 survey		Remarks
	Gross Capacity (M.Cu.m)	Area (M.Sq.m or Sq.Km)	Gross Capacity (M.Cu.m)	Area (M.Sq.m or Sq.Km)	
37.00	0.000	0.000	0.005	0.033	DSL
37.50	0.006	0.003	0.043	0.119	
38.00	0.056	0.028	0.121	0.191	
38.50	0.103	0.056	0.235	0.262	
39.00	0.128	0.106	0.386	0.340	
39.50	0.164	0.163	0.574	0.415	
40.00	0.284	0.268	0.799	0.486	
40.50	0.424	0.380	1.065	0.585	
41.00	0.704	0.545	1.381	0.672	
41.50	1.007	0.713	1.738	0.759	
42.00	1.482	0.906	2.139	0.842	
42.50	1.978	1.101	2.580	0.928	
43.00	2.628	1.313	3.070	1.033	
43.50	3.305	1.530	3.619	1.177	
44.00	4.180	1.780	4.259	1.382	
44.50	5.082	2.035	4.994	1.550	
45.00	6.182	2.322	5.806	1.703	
45.44 (OSL)	7.150	2.575	6.586	1.840	
45.50	7.321	2.610	6.697	1.858	
46.00	8.746	2.897	7.666	2.024	
46.50	10.210	3.191	8.728	2.233	
47.00	11.960	3.528	9.906	2.489	
47.50	13.731	3.869	11.222	2.777	FRL
48.00	15.656	4.234	12.690	3.105	
48.50	17.638	4.604	14.365	3.687	

Elevation (Above MSL, m)	As per 2005 survey		As per 2021 survey		Remarks
	Gross Capacity (M.Cu.m)	Area (M.Sq.m or Sq.Km)	Gross Capacity (M.Cu.m)	Area (M.Sq.m or Sq.Km)	
49.00	20.038	5.014	16.376	4.343	
49.50	22.519	5.429	18.662	4.759	
50.00	25.594	5.879	21.138	5.166	
50.50	28.711	6.334	23.832	5.619	
51.00	32.136	6.821	26.753	6.063	
51.50	35.642	7.318	29.903	6.553	
52.00	39.742	7.880	33.316	7.105	
52.50	43.400	8.500	37.002	7.642	
53.00	48.067	8.567	40.962	8.190	
53.10 (F.R.L)	49.000	8.580	41.786	8.294	

**Table 7: Comparative statement of Bhadar-2 reservoir**

The above data were used for the preparation of Elevation-Area-Capacity curves. The following figure shows the Elevation-Area-Capacity curves of 2021 superimposed on the 2005 Elevation-Area-Capacity curves.



**Figure 7: Elevation-Area-Capacity Curves**

## 8.5 DATA COMPARISON BETWEEN 2005 AND 2021

### Definitions

**Full Reservoir Level:** Denoted by F.R.L this level corresponds to the storage which includes both inactive and active storage and also the flood storage, it is the highest reservoir level that can be maintained without spillway discharge.

**Minimum Drawdown Level (M.D.D.L):** This is the level below which the water from the reservoir will not be drawn down to maintain a minimum head required in power projects.

**Maximum Water Level (MWL):** This is the water level that is likely to be attained during the passage of the design flood. This level is also called the highest reservoir level or the highest flood level.

**Live storage:** This is the volume of water actually available at any time between the Dead Storage Level and the Full Reservoir Level.

**Outlet Sill Level (O.S.L) / Dead Storage Level (D.S.L):** This is the level below which there are no outlets to drain the water in the reservoir by gravity.

**Dead storage:** This is the total storage below the invert level of the lowest discharge outlet from the reservoir. It may be available to contain sedimentation, provided the sediment does not adversely affect the lowest discharge.

#### 8.5.1 Rate of siltation

Capacity at F.R.L (53.1m) as per as per the 2005 survey	= 49.000 M.Cu.m
Capacity at F.R.L (53.1m) as per 2021 survey	= 41.786 M.Cu.m
Silting in 16 years (2005-2021)	= 49.000 – 41.786 = 7.214 M.Cu.m
Annual Siltation	= 7.214/16= 0.451 M.Cu.m/yr
Rate of Siltation (Silt Index)	= (0.451/612.78) x 1000 = 0.74 Th.Cu.m/sq.km/year = <b>7.4 Ha.m/100sq.km./year</b>

#### 8.5.2 Loss of gross storage capacity at F.R.L

Capacity at F.R.L (53.1m) as per as per the 2005 survey	= 49.000 M.Cu.m
Capacity at F.R.L (53.1m) as per 2021 survey	= 41.786 M.Cu.m
Loss of storage capacity in 16 years (2005-2021)	= 49.000 – 41.786 = 7.214 M.Cu.m
Percentage loss of Gross storage capacity up to F.R.L in 16 years	=(7.214/49.000) x 100 = 14.72%
Annual percentage loss	= 14.72/16 = <b>0.92%</b>

#### 8.5.3 Loss of dead storage capacity

Capacity at D.S.L/O.S.L (45.44m) as per as per the 2005 survey	= 7.150 M.Cu.m
Capacity at D.S.L/ O.S.L as per 2021 survey	= 6.586 M.Cu.m
Loss of storage capacity in 16 years (2005-2021)	= 7.150 – 6.586 = 0.564 M.Cu.m
Percentage loss of Dead storage capacity up to O.S.L in 16 years	= (0.564/7.150) x 100 = 7.89%

Annual percentage loss =  $7.89/16$   
= **0.49%**

#### 8.5.4 *Loss of live storage capacity*

Live storage capacity as per as per the 2005 survey =  $49.000 - 7.150$   
= 41.850 M.Cu.m

Live storage capacity as per 2021 survey =  $41.786 - 6.586$   
= 35.200 M.Cu.m

Loss of Live storage capacity in 16 years (2005-2021) =  $41.850 - 35.200$   
= 6.650 M.Cu.m

Percentage loss of live storage capacity in 16 years =  $(6.650/41.850) \times 100$   
= 15.89%

Annual percentage loss =  $15.89/16$   
= **0.99%**

## 8.6 SUMMARY OF CAPACITY SURVEYS (2005 and 2021)

### Reservoir Data as per 2005 Silt Survey:

Year of impounding	: 2000
Year of Silt Survey	: 2005
Catchment Area	: 612.78 Sq.Km
Spread area at F.R.L (53.1m)	: 8.50 Sq.Km
Gross storage at F.R.L (53.1m)	: 49.0 M.Cu.m
Dead storage at D.S.L (45.44m)	: 7.15 M.Cu.m
Live storage at F.R.L (53.1m)	: 41.85 M.Cu.m

Rate of sedimentation (at F.R.L 53.1m) with respect to the silt survey data in the year 2005													
Sr. No	Year of Survey	Capacity in M.Cu.m			Silt Deposited in M.Cu.M	Period in years	Silt Rate in M.Cu.m/Year	Loss in Capacity in M.Cu.M and percentage			Silt Index ham/100 Sq.Km/Yr	Annual % loss of capacity	Remarks
		Dead	Live	Gross				Dead	Live	Gross			
1	2005	7.15	41.85	49	-	-	-	-	-	-	-	-	-
2	2021	6.586	35.2	41.786	7.214	16	0.451	0.564 7.89%	6.65 15.89%	7.214 14.72%	7.4	0.92	<b>Serious Category</b>

Table 8: Rate of Sedimentation at F.R.L (53.1m)

### According to IS-12182 (1987)

#### Annual % loss - Class of Reservoir

Up to 0.1	-	Insignificant
0.1 to 0.5	-	Significant
Above 0.5	-	Serious

Rate of Silt	-	Loss in Gross Capacity/No of Years
Silt Index	-	Silt rate/Catchment area) x 10000
Annual % Loss	-	Loss in % of Gross Capacity/No. of years

## 8.7 LOSS OF STORAGE DUE TO SEDIMENT DEPOSIT

Reservoirs, created by dams on rivers, lose their storage capacity due to sedimentation. A large proportion of the transported silt eventually gets deposited at different levels of a reservoir and causes reduction not only in dead storage but also in live storage capacities. The consequence of loss in storage due to sediment accumulation may even cause operational problems. Periodic capacity survey of a reservoir is thus essential to ascertain the rate of sedimentation and reduction in storage capacity for efficient and productive management of water resources. Reservoir siltation affects the safety of an old reservoir since the sediment in the reservoirs increases the load on the wall of the dam.

For ease of reporting, the previous capacity data in 2005 survey and current capacity data in 2021 survey were selected at regular intervals.

For Bhadar 2 reservoir, the detailed comparison of current capacity data at different levels to the previous capacity data of 2005 survey shows an increase in capacity within the dead storage area particularly below 44.00m. This could be due to the further deepening of the river channel or the sediment removal possibly due to a flood. The capacity at D.S.L (45.44m) reduced from 7.150 M.Cu.m to 6.586 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 7.89 percent. The amount of sediment deposited during this period at D.S.L is 0.564 M.Cu.m.

Above 44.0m, the reservoir shows a significant reduction of capacity at different levels up to F.R.L. The increase or loss in capacity within in the reservoir is directly proportional to the amount of sediment removed or deposited within the reservoir. This sediment removal or deposition can occur at any levels of the reservoir throughout the live and dead storage area. The capacity at F.R.L (53.10m) reduced from 49.000 M.Cu.m to 41.786 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 14.72 percent. The amount of sediment deposited during this period at F.R.L is 7.214M.Cu.m.

For Bhadar 2, the comparison reveals that the sediment gets eroded below 44.0m and above this level the sediment gets deposited. This removal or deposition of the sediment within the reservoir results in a corresponding increase or loss of capacity.

The following **Table 9** shows the amount of erosion and deposition of sediment at different levels from the reservoir bed to F.R.L and corresponding percentage increase or loss in capacity at different levels.

Elevation (Above MSL, m)	Capacity 2005 (M.Cu.m)	Area 2021 (M.Sq.m or Sq.Km)	Capacity 2021 (M.Cu.m)	Erosion / Deposition of Sediment (M.Cu.m)	% Increase / Loss of Capacity
37.00	0.000	0.033	0.005	0.005*	0.005**
37.50	0.006	0.119	0.043	0.037*	616.67**
38.00	0.056	0.191	0.121	0.065*	116.07**
38.50	0.103	0.262	0.235	0.132*	128.16**
39.00	0.128	0.340	0.386	0.258*	201.56**
39.50	0.164	0.415	0.574	0.410*	250.00**
40.00	0.284	0.486	0.799	0.515*	181.34**
40.50	0.424	0.585	1.065	0.641*	151.18**
41.00	0.704	0.672	1.381	0.677*	96.16**
41.50	1.007	0.759	1.738	0.731*	72.59**

Elevation (Above MSL, m)	Capacity 2005 (M.Cu.m)	Area 2021 (M.Sq.m or Sq.Km)	Capacity 2021 (M.Cu.m)	Erosion / Deposition of Sediment (M.Cu.m)	% Increase / Loss of Capacity
42.00	1.482	0.842	2.139	0.657*	44.33**
42.50	1.978	0.928	2.580	0.602*	30.43**
43.00	2.628	1.033	3.070	0.442*	16.82**
43.50	3.305	1.177	3.619	0.314*	9.50**
44.00	4.180	1.382	4.259	0.079*	1.89**
44.50	5.082	1.550	4.994	0.088	1.73
45.00	6.182	1.703	5.806	0.376	6.08
45.44 (D.S.L / O.S.L)	7.150	1.840	6.586	0.564	7.89
45.50	7.321	1.858	6.697	0.624	8.52
46.00	8.746	2.024	7.666	1.080	12.35
46.50	10.210	2.233	8.728	1.482	14.52
47.00	11.960	2.489	9.906	2.054	17.17
47.50	13.731	2.777	11.222	2.509	18.27
48.00	15.656	3.105	12.690	2.966	18.94
48.50	17.638	3.687	14.365	3.273	18.56
49.00	20.038	4.343	16.376	3.662	18.28
49.50	22.519	4.759	18.662	3.857	17.13
50.00	25.594	5.166	21.138	4.456	17.41
50.50	28.711	5.619	23.832	4.879	16.99
51.00	32.136	6.063	26.753	5.383	16.75
51.50	35.642	6.553	29.903	5.739	16.10
52.00	39.742	7.105	33.316	6.426	16.17
52.50	43.400	7.642	37.002	6.398	14.74
53.00	48.067	8.190	40.962	7.105	14.78
53.10 (F.R.L)	49.000	8.294	41.786	7.214	14.72

**Table 9: Loss/increase of storage capacity between 2005 and 2021**

Note:

- Values highlighted with single asterisks (\*) represents the volume of sediment eroded.
- Values highlighted with double asterisks (\*\*) represents the percentage (%) increase of storage capacity.

The amount of silt present in any reservoir is attributed to the geological nature of the area surrounding



the reservoir. If the area is rich in silt, definitely any reservoir located within the area will have a greater proportion of silt in any sediment transported into it. Since erosion sedimentation is a serious problem in different parts of the world today resulting in several reservoirs becoming completely silted over, designers should aim at the following mitigation measures of soil erosion and sediment transport processes:

- Prevention of further land degradation in any catchment to reduce siltation
- Prevention of soil erosion from catchment to reduce siltation of reservoir
- Ensuring adequate irrigation water to the demand area
- Improving land capability moisture regime in the watershed
- Improving land use to match capability
- Maintaining ecological balance in a catchment area
- Educating people in the management of a catchment

## **8.8 CONTROL OF SEDIMENTATION IN RESERVOIRS**

Sedimentation in a reservoir is a natural process which affects the capacity of the reservoir. Excess deposition of sediment directly affects the useful capacity of the reservoir based on the project requirements like irrigation, hydroelectric power, flood control etc. The rate of deposition of sediment largely depends on the annual sediment load carried by the streams and up to what extent the sediment is retained in the reservoir. This, in turn, depends upon a number of factors such as the area and nature of the catchment, level use pattern (cultivation practices, grazing, logging, construction activities and conservation practices), rainfall pattern, storage capacity, period of storage in relation to the sediment load of the stream, particle size distribution in the suspended sediment, channel hydraulics, location and sizes of sluices, outlet works, configuration of the reservoir, and the method and purpose of releases through the dam. An appropriate approach to these factors mentioned above is essential for efficient control of sedimentation and therefore to extend the life of the reservoir.

There are numerous techniques developed to control the sedimentation in reservoirs, broadly classified as

- I. Suitable design of reservoir
- II. Restrict the sediment inflow
- III. Limit the sediment deposition
- IV. Regular removal of deposited sediment

### *8.8.1 Suitable design of reservoir*

The volume of discharge directly affects the rate of sedimentation. The rate of sedimentation increases with the volume of discharge. The higher deposition of sediment within a reservoir increases the surface area of the water, thereby resulting in greater loss of water by evaporation. This will ultimately result in decrease of storage capacity which in turn lowers the trap efficiency of the reservoir.

The capacity of the reservoir and the size and characteristics of the reservoir and its drainage area are the most important factors governing the annual rate of accumulation of sediment. Periodic reservoir sediment surveys provide information about the rate of sediment deposited, and hence can enable us to make necessary steps to limit the same. The sedimentation may take place not only in the dead storage area of a reservoir; reservoir studies have revealed significant deposition of sediment in the live storage area of a reservoir as well.

The capacity of reservoirs largely depends on various factors. Hence the following points need to be considered for their optimum design.

- Topographical, geological and geomorphological factors which directly affect the sediment yield
- Sediment delivery characteristics of the channel system
- The efficiency of the reservoir as a sediment trap

- The ratio of capacity of the reservoir to the inflow
- Configuration of the reservoir
- Method of operation of the reservoir
- Provisions for silt exclusion

### 8.8.2 *Restrict the sediment inflow*

The sediment inflow to the reservoirs can be controlled by proper watershed management and soil conservation measures to check production and transport of sediment to the catchment area. Also adopt adequate preventive measures to check the inflow of sediment into the reservoir. Soil conservation involves the prevention of loss of the topmost layer of the soil from erosion or prevention of reduced fertility caused by over usage, acidification, salinization or other chemical soil contamination. The soil conservation measures are further sub-divided as

- Engineering
- Agronomy
- Forestry

#### ***Engineering methods***

##### *Check dams*

One of the methods of soil conservation is the use of check dams. A check dam is a small dam which can be either temporary or permanent, built across a minor channel, swale, or drainage ditch. They are used to slow the velocity of concentrated water flows, a practice that helps reduce erosion.

##### *Contour trenching and bunding*

In the contour trenching method, the surrounding area of the reservoir is ploughed, like contour lines. These contour lines create a water break which reduces the formation of rills and gullies during times of heavy precipitation, allowing more time for the water to settle into the soil. Also, trenches can be artificially dug along the contour lines. Water flowing down the hill is retained by the trenches, and infiltrates the soil below. Manually dug trenches are smaller, machine dug trenches can be deeper. The dimensions and the format of the trenches should correspond to the local climate and soil conditions.

A similar practice is contour bunding where stones are placed around the contours of slopes. Contour bunding or contour bundling, and contour farming involves the placement of lines of stones along the natural rises of a landscape. These techniques help to capture and hold rainfall before it can become runoff. Contour bunds also help to control soil erosion.

##### *Gully Plugging*

A gully plug is a small, temporary or permanent dam constructed across a drainage ditch, swale, or channel to lower the speed of concentrated flows. These dams can be constructed using locally available materials. These small dams reduce the speed of water flow and minimise the erosive power of runoff. They also promote the deposition of eroded materials to further stabilise the gullies.

#### ***Agronomy methods***

Agronomic conservation measures function by reducing the impact of raindrops through interception and thus reducing soil erosion and increasing infiltration rates, and also reducing surface runoff and soil erosion. The major agronomic soil and water conservation practices are strip cropping, mixed cropping, intercropping, fallowing, mulching, contour ploughing, crop rotation, conservation tillage, and agroforestry.

#### ***Forestry methods***

Forestry measures include forest conservancy, control on grazing, lumbering operations and forest fires

along with management and protection of forest plantations.

### 8.8.3 *Limit sediment deposition*

The amount of suspended sediment is comparatively large during and just after flood flow. The settlement of sediment in the reservoir can be controlled by adequate operation of outlets in such a manner as to permit selective withdrawals of water having a higher-than-average sediment content. Thus, more water wasted at peak time of inflow will result a low level of sediment to deposit in the reservoir. There are two methods:

#### ***Density Current***

Water at various levels of a reservoir often contains radically different concentrations of suspended sediment, particularly during and after flood flows and if all waste-water could be withdrawn at those levels where the concentration is highest, a significant amount of sediment might be removed from the reservoir. The density differences between the sediment-laden inflow and the clear water in the reservoir leads to a turbidity current which plunges beneath the clear water and moves towards the dam as a submerged current. The proper allocation of gates or sluices can remove a significant amount of sediment-saturated water and therefore can reduce the amount of sedimentation.

#### ***Waste-Water Release***

This method is applicable only when a reservoir is of such a size that a small part of large flood flows will fill it. A series of outlets at various elevations can eject sediment-saturated water. This method, which can remove considerable amount of sediment from the reservoir through proper gate control, will differ greatly with different locations. The drawback of this method is that waste-water release is only possible when water can be or should be wasted.

### 8.8.4 *Regular removal of deposited sediment*

Removal of accumulated sediment is considered as the last resort as the operations are very expensive unless the excavated sediment is economically usable. The removal of sediment deposits may be accomplished by a variety of mechanical and hydraulic methods, such as excavation, dredging, draining and flushing, sluicing aided by such measures as hydraulic or mechanical agitation or blasting of the sediment.

#### ***Excavation***

Excavation is the removal of the sediment by hand or power operated shovel, dragline scraper or other mechanical means after draining most of the water. The excavation of silt and clay which constitute most of the material in larger reservoirs is more difficult than the excavation of sand and gravel. Fine-textured sediment cannot be excavated easily from larger reservoirs unless it is relatively fluid or relatively compact.

#### ***Dredging***

In this method, the deposit is removed from the bottom of the reservoir irrespective of the level of storage using mechanical or hydraulic equipment. The various types of dredging are mechanical dredging by bucket, suction dredging with floating pipeline and a pump on a barge and siphon dredging with a floating pipe extending over the dam or connected to an opening in the dam and with a pump on a barge.

#### ***Draining and flushing***

This method, also called flood sluicing, involves a relatively slow release of all stored water in a reservoir through gates or valves located near the bottom of the dam and the maintenance thereafter of open outlets for a shorter or longer period during which normal stream flow cuts into or is directed against the

sediment deposits.

### ***Sluicing with Controlled Water***

In this method the controlled water supply permits choosing the time of sluicing more advantageously and the water may be directed more effectively against the sediment deposits. While the flood sluicing depends either on the occurrence of flood or on being able to release rapidly all of a full or nearly full supply of water in the main reservoir. The advantage of this method is that generally more sediment can be removed per unit of water used than in flood scouring or draining and flushing.

### ***Sluicing with Hydraulics and Mechanical Agitation***

In this method, stirring up, breaking up or moving deposits of a sediment into a stream current moving through a drained reservoir basin or into a full reservoir will tend to make the removal of sediment from the reservoir more complete. Wherever draining, flushing or sluicing appear to be warranted, the additional use of hydraulic means for stirring up the sediment deposits, or sloughing them off, into a stream flowing through the reservoir basin should be considered.

## 9 CONCLUSIONS

- The construction work of Bhadar 2 commenced in 1998 and was completed in 2000. Gated Ogee type spillway and gates were completed in 2003. With an area of 8.5 km<sup>2</sup>, Full Reservoir Level (F.R.L) of the Bhadar 2 reservoir is 53.1m above M.S.L over a catchment area of 612.78 km<sup>2</sup>. The gross storage (at F.R.L:53.1m) and dead storage (at D.S.L:45.44m) as per 2005 survey are 49.0 M.Cu.m and 7.15 M.Cu.m respectively.
- Bathymetric and topographic survey was restricted at some places due to the presence of bushes, shallow areas, waterlogged areas, small streams with unsafe and inaccessible marshy ground and exposed rocks in the river.
- Capacity survey conducted in 2005 was provided to us for comparison with the current survey.
- In the current bathymetric and topographic survey, a minimum elevation of 36.5m was observed in the southwestern portion of the survey area within the bathymetric section. A maximum topographic elevation value of 61.58m is observed in the northwestern portion of the survey area.
- The survey was extended till the High Flood Level (H.F.L:53.1m). Within the survey area, the river channel exhibits a change in contours from 50m in the northeast to 37m in the southwest. The extreme northeastern portion is irregular but further towards the central part the river bed becomes slightly irregular with a localised flat riverbed.
- Most of the portion of the river bank follows a 50m elevation contour. Further upslope towards the survey boundary the river bank exhibits an irregular topography with moderate to steep slopes, between the 50m and 53m contours.
- The comparison between 2005 and 2021 (16 years) data results shows a rate of siltation (Silt Index) at a rate of 7.4 Ha.m/100sq.km./year. Annual percentage loss of gross storage capacity, live storage capacity and dead storage capacity are 0.92%, 0.99% and 0.49% respectively.
- The detailed comparison of current capacity data at different levels to the previous capacity data of 2005 survey shows an increase in capacity within the dead storage area particularly below 44.00m, possibly due to further deepening of the river channel or the sediment removal possibly due to a flood.
- Above 44.0m, the reservoir exhibits a significant reduction of capacity at different levels up to F.R.L. due to sediment deposit at different levels of the reservoir, occurring in part of the dead storage area and throughout the live storage area.
- The capacity at D.S.L (45.44m) reduced from 7.150 M.Cu.m to 6.586 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 7.89 percent. The amount of sediment deposited during this period at D.S.L is 0.564 M.Cu.m.
- The capacity at F.R.L (53.10m) reduced from 49.000 M.Cu.m to 41.786 M.Cu.m between the years 2005 and 2021 with a loss in capacity of about 14.72 percent. The amount of sediment deposited during this period at F.R.L is 7.214M.Cu.m.
- The removal or deposition of the sediment within the reservoir results in a corresponding increase or loss of storage capacity.

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**Annexure - 1**  
**Elevation Area Capacity**  
**Bhadar 2 Reservoir**

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
120.37	36.69	0.00	0.00	0.050	0.005	0.000	0.000	0.017	0.000
120.41	36.70	0.00	0.00	0.054	0.005	0.000	0.000	0.018	0.001
120.44	36.71	0.00	0.00	0.059	0.005	0.000	0.000	0.020	0.001
120.47	36.72	0.00	0.00	0.063	0.006	0.000	0.000	0.022	0.001
120.51	36.73	0.00	0.00	0.069	0.006	0.000	0.000	0.024	0.001
120.54	36.74	0.00	0.00	0.074	0.007	0.000	0.000	0.027	0.001
120.57	36.75	0.00	0.00	0.080	0.007	0.000	0.000	0.029	0.001
120.60	36.76	0.00	0.00	0.086	0.008	0.000	0.000	0.032	0.001
120.64	36.77	0.00	0.00	0.092	0.009	0.000	0.000	0.035	0.001
120.67	36.78	0.00	0.00	0.099	0.009	0.000	0.000	0.038	0.001
120.70	36.79	0.00	0.00	0.106	0.010	0.000	0.000	0.041	0.001
120.73	36.80	0.00	0.00	0.114	0.011	0.000	0.000	0.045	0.001
120.77	36.81	0.00	0.00	0.123	0.011	0.000	0.000	0.049	0.001
120.80	36.82	0.00	0.00	0.131	0.012	0.000	0.000	0.053	0.002
120.83	36.83	0.00	0.00	0.141	0.013	0.000	0.000	0.058	0.002
120.87	36.84	0.00	0.00	0.151	0.014	0.000	0.000	0.062	0.002
120.90	36.85	0.00	0.00	0.161	0.015	0.000	0.000	0.068	0.002
120.93	36.86	0.00	0.00	0.172	0.016	0.000	0.000	0.073	0.002
120.96	36.87	0.00	0.00	0.183	0.017	0.000	0.000	0.079	0.002
121.00	36.88	0.00	0.00	0.194	0.018	0.000	0.000	0.085	0.002
121.03	36.89	0.00	0.00	0.206	0.019	0.000	0.000	0.092	0.003
121.06	36.90	0.00	0.00	0.217	0.020	0.000	0.000	0.098	0.003
121.10	36.91	0.00	0.00	0.228	0.021	0.000	0.000	0.106	0.003
121.13	36.92	0.00	0.00	0.241	0.022	0.000	0.000	0.113	0.003



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
121.16	36.93	0.00	0.00	0.254	0.024	0.000	0.000	0.122	0.003
121.19	36.94	0.00	0.00	0.267	0.025	0.000	0.000	0.130	0.004
121.23	36.95	0.00	0.00	0.281	0.026	0.000	0.000	0.139	0.004
121.26	36.96	0.00	0.00	0.295	0.027	0.000	0.000	0.149	0.004
121.29	36.97	0.00	0.00	0.309	0.029	0.000	0.000	0.158	0.004
121.33	36.98	0.00	0.00	0.323	0.030	0.000	0.000	0.169	0.005
121.36	36.99	0.00	0.00	0.338	0.031	0.000	0.000	0.180	0.005
121.39	37.00	0.00	0.00	0.353	0.033	0.000	0.000	0.191	0.005
121.42	37.01	0.00	0.00	0.368	0.034	0.000	0.000	0.203	0.006
121.46	37.02	0.00	0.00	0.383	0.036	0.000	0.000	0.215	0.006
121.49	37.03	0.00	0.00	0.399	0.037	0.000	0.000	0.228	0.006
121.52	37.04	0.00	0.00	0.414	0.039	0.000	0.000	0.241	0.007
121.56	37.05	0.00	0.00	0.430	0.040	0.000	0.000	0.255	0.007
121.59	37.06	0.00	0.00	0.447	0.042	0.000	0.000	0.270	0.008
121.62	37.07	0.00	0.00	0.464	0.043	0.000	0.000	0.285	0.008
121.65	37.08	0.00	0.00	0.482	0.045	0.000	0.000	0.300	0.008
121.69	37.09	0.00	0.00	0.499	0.046	0.000	0.000	0.316	0.009
121.72	37.10	0.00	0.00	0.517	0.048	0.000	0.000	0.333	0.009
121.75	37.11	0.00	0.00	0.535	0.050	0.000	0.000	0.350	0.010
121.78	37.12	0.00	0.00	0.553	0.051	0.000	0.000	0.368	0.010
121.82	37.13	0.00	0.00	0.571	0.053	0.000	0.000	0.386	0.011
121.85	37.14	0.00	0.00	0.589	0.055	0.000	0.000	0.405	0.011
121.88	37.15	0.00	0.00	0.608	0.056	0.000	0.000	0.425	0.012
121.92	37.16	0.00	0.00	0.626	0.058	0.000	0.000	0.445	0.013

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
121.95	37.17	0.00	0.00	0.645	0.060	0.000	0.000	0.466	0.013
121.98	37.18	0.00	0.00	0.664	0.062	0.000	0.000	0.488	0.014
122.01	37.19	0.00	0.00	0.684	0.064	0.000	0.000	0.510	0.014
122.05	37.20	0.00	0.00	0.705	0.066	0.000	0.000	0.533	0.015
122.08	37.21	0.00	0.00	0.725	0.067	0.000	0.000	0.556	0.016
122.11	37.22	0.00	0.00	0.745	0.069	0.000	0.000	0.580	0.016
122.15	37.23	0.00	0.00	0.765	0.071	0.000	0.000	0.605	0.017
122.18	37.24	0.00	0.00	0.786	0.073	0.000	0.000	0.630	0.018
122.21	37.25	0.00	0.00	0.807	0.075	0.000	0.000	0.657	0.019
122.24	37.26	0.00	0.00	0.828	0.077	0.000	0.000	0.683	0.019
122.28	37.27	0.00	0.00	0.850	0.079	0.000	0.000	0.711	0.020
122.31	37.28	0.00	0.00	0.872	0.081	0.000	0.000	0.739	0.021
122.34	37.29	0.00	0.00	0.894	0.083	0.000	0.000	0.768	0.022
122.38	37.30	0.00	0.00	0.916	0.085	0.000	0.000	0.798	0.023
122.41	37.31	0.00	0.00	0.937	0.087	0.000	0.000	0.828	0.023
122.44	37.32	0.00	0.00	0.959	0.089	0.000	0.000	0.859	0.024
122.47	37.33	0.00	0.00	0.979	0.091	0.000	0.000	0.891	0.025
122.51	37.34	0.00	0.00	0.999	0.093	0.000	0.000	0.924	0.026
122.54	37.35	0.00	0.00	1.019	0.095	0.000	0.000	0.957	0.027
122.57	37.36	0.00	0.00	1.038	0.096	0.000	0.000	0.990	0.028
122.60	37.37	0.00	0.00	1.058	0.098	0.000	0.000	1.025	0.029
122.64	37.38	0.00	0.00	1.077	0.100	0.000	0.000	1.060	0.030
122.67	37.39	0.00	0.00	1.096	0.102	0.000	0.000	1.095	0.031
122.70	37.40	0.00	0.00	1.115	0.104	0.000	0.000	1.132	0.032

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
122.74	37.41	0.00	0.00	1.132	0.105	0.000	0.000	1.169	0.033
122.77	37.42	0.00	0.00	1.150	0.107	0.000	0.000	1.206	0.034
122.80	37.43	0.00	0.00	1.166	0.108	0.000	0.000	1.244	0.035
122.83	37.44	0.00	0.00	1.183	0.110	0.000	0.000	1.283	0.036
122.87	37.45	0.00	0.00	1.200	0.111	0.000	0.000	1.322	0.037
122.90	37.46	0.00	0.00	1.216	0.113	0.000	0.000	1.361	0.039
122.93	37.47	0.00	0.00	1.232	0.115	0.000	0.000	1.401	0.040
122.97	37.48	0.00	0.00	1.249	0.116	0.000	0.000	1.442	0.041
123.00	37.49	0.00	0.00	1.265	0.118	0.000	0.000	1.483	0.042
123.03	37.50	0.00	0.00	1.282	0.119	0.000	0.000	1.525	0.043
123.06	37.51	0.00	0.00	1.298	0.121	0.000	0.000	1.568	0.044
123.10	37.52	0.00	0.00	1.315	0.122	0.000	0.000	1.610	0.046
123.13	37.53	0.00	0.00	1.331	0.124	0.000	0.000	1.654	0.047
123.16	37.54	0.00	0.00	1.348	0.125	0.000	0.000	1.698	0.048
123.20	37.55	0.00	0.00	1.364	0.127	0.000	0.000	1.742	0.049
123.23	37.56	0.00	0.00	1.381	0.128	0.000	0.000	1.787	0.051
123.26	37.57	0.00	0.00	1.398	0.130	0.000	0.000	1.833	0.052
123.29	37.58	0.00	0.00	1.415	0.131	0.000	0.000	1.879	0.053
123.33	37.59	0.00	0.00	1.432	0.133	0.000	0.000	1.926	0.055
123.36	37.60	0.00	0.00	1.449	0.135	0.000	0.000	1.973	0.056
123.39	37.61	0.00	0.00	1.466	0.136	0.000	0.000	2.021	0.057
123.43	37.62	0.00	0.00	1.483	0.138	0.000	0.000	2.069	0.059
123.46	37.63	0.00	0.00	1.500	0.139	0.000	0.000	2.118	0.060
123.49	37.64	0.00	0.00	1.516	0.141	0.000	0.000	2.168	0.061

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
123.52	37.65	0.00	0.00	1.533	0.142	0.000	0.000	2.218	0.063
123.56	37.66	0.00	0.00	1.549	0.144	0.000	0.000	2.268	0.064
123.59	37.67	0.00	0.00	1.566	0.146	0.000	0.000	2.319	0.066
123.62	37.68	0.00	0.00	1.583	0.147	0.000	0.000	2.371	0.067
123.65	37.69	0.00	0.00	1.600	0.149	0.000	0.000	2.423	0.069
123.69	37.70	0.00	0.00	1.616	0.150	0.000	0.000	2.476	0.070
123.72	37.71	0.00	0.00	1.632	0.152	0.000	0.000	2.529	0.072
123.75	37.72	0.00	0.00	1.648	0.153	0.000	0.000	2.583	0.073
123.79	37.73	0.00	0.00	1.664	0.155	0.000	0.000	2.637	0.075
123.82	37.74	0.00	0.00	1.680	0.156	0.000	0.000	2.692	0.076
123.85	37.75	0.00	0.00	1.696	0.158	0.000	0.000	2.748	0.078
123.88	37.76	0.00	0.00	1.711	0.159	0.000	0.000	2.804	0.079
123.92	37.77	0.00	0.00	1.726	0.160	0.000	0.000	2.860	0.081
123.95	37.78	0.00	0.00	1.740	0.162	0.000	0.000	2.917	0.083
123.98	37.79	0.00	0.00	1.754	0.163	0.000	0.000	2.974	0.084
124.02	37.80	0.00	0.00	1.768	0.164	0.000	0.000	3.032	0.086
124.05	37.81	0.00	0.00	1.782	0.166	0.000	0.000	3.090	0.088
124.08	37.82	0.00	0.00	1.795	0.167	0.000	0.000	3.149	0.089
124.11	37.83	0.00	0.00	1.809	0.168	0.000	0.000	3.208	0.091
124.15	37.84	0.00	0.00	1.822	0.169	0.000	0.000	3.267	0.093
124.18	37.85	0.00	0.00	1.836	0.171	0.000	0.000	3.327	0.094
124.21	37.86	0.00	0.00	1.850	0.172	0.000	0.000	3.388	0.096
124.25	37.87	0.00	0.00	1.863	0.173	0.000	0.000	3.449	0.098
124.28	37.88	0.00	0.00	1.877	0.174	0.000	0.000	3.510	0.099

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
124.31	37.89	0.00	0.00	1.891	0.176	0.000	0.000	3.572	0.101
124.34	37.90	0.00	0.00	1.905	0.177	0.000	0.000	3.634	0.103
124.38	37.91	0.00	0.00	1.919	0.178	0.000	0.000	3.697	0.105
124.41	37.92	0.00	0.00	1.933	0.180	0.000	0.000	3.760	0.106
124.44	37.93	0.00	0.00	1.947	0.181	0.000	0.000	3.824	0.108
124.48	37.94	0.00	0.00	1.961	0.182	0.000	0.000	3.888	0.110
124.51	37.95	0.00	0.00	1.976	0.184	0.000	0.000	3.953	0.112
124.54	37.96	0.00	0.00	1.990	0.185	0.000	0.000	4.018	0.114
124.57	37.97	0.00	0.00	2.005	0.186	0.000	0.000	4.083	0.116
124.61	37.98	0.00	0.00	2.021	0.188	0.000	0.000	4.149	0.117
124.64	37.99	0.00	0.00	2.037	0.189	0.000	0.000	4.216	0.119
124.67	38.00	0.00	0.00	2.054	0.191	0.000	0.000	4.283	0.121
124.70	38.01	0.00	0.00	2.071	0.192	0.000	0.000	4.351	0.123
124.74	38.02	0.00	0.00	2.088	0.194	0.000	0.000	4.419	0.125
124.77	38.03	0.00	0.00	2.106	0.196	0.000	0.000	4.488	0.127
124.80	38.04	0.00	0.00	2.124	0.197	0.000	0.000	4.557	0.129
124.84	38.05	0.00	0.00	2.142	0.199	0.000	0.000	4.627	0.131
124.87	38.06	0.00	0.00	2.159	0.201	0.000	0.000	4.697	0.133
124.90	38.07	0.00	0.00	2.176	0.202	0.000	0.000	4.769	0.135
124.93	38.08	0.00	0.00	2.193	0.204	0.000	0.000	4.840	0.137
124.97	38.09	0.00	0.00	2.210	0.205	0.000	0.000	4.913	0.139
125.00	38.10	0.00	0.00	2.227	0.207	0.000	0.000	4.985	0.141
125.03	38.11	0.00	0.00	2.243	0.208	0.000	0.000	5.059	0.143
125.07	38.12	0.00	0.00	2.260	0.210	0.000	0.000	5.133	0.145

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
125.10	38.13	0.00	0.00	2.277	0.212	0.000	0.000	5.207	0.147
125.13	38.14	0.00	0.00	2.294	0.213	0.000	0.000	5.282	0.150
125.16	38.15	0.00	0.00	2.310	0.215	0.000	0.000	5.357	0.152
125.20	38.16	0.00	0.00	2.326	0.216	0.000	0.000	5.434	0.154
125.23	38.17	0.00	0.00	2.343	0.218	0.000	0.000	5.510	0.156
125.26	38.18	0.00	0.00	2.359	0.219	0.000	0.000	5.587	0.158
125.30	38.19	0.00	0.00	2.375	0.221	0.000	0.000	5.665	0.160
125.33	38.20	0.00	0.00	2.391	0.222	0.000	0.000	5.743	0.163
125.36	38.21	0.00	0.00	2.407	0.224	0.000	0.000	5.822	0.165
125.39	38.22	0.00	0.00	2.423	0.225	0.000	0.000	5.901	0.167
125.43	38.23	0.00	0.00	2.438	0.227	0.000	0.000	5.981	0.169
125.46	38.24	0.00	0.00	2.454	0.228	0.000	0.000	6.061	0.172
125.49	38.25	0.00	0.00	2.469	0.229	0.000	0.000	6.142	0.174
125.52	38.26	0.00	0.00	2.483	0.231	0.000	0.000	6.223	0.176
125.56	38.27	0.00	0.00	2.498	0.232	0.000	0.000	6.305	0.179
125.59	38.28	0.00	0.00	2.513	0.233	0.000	0.000	6.387	0.181
125.62	38.29	0.00	0.00	2.527	0.235	0.000	0.000	6.470	0.183
125.66	38.30	0.00	0.00	2.541	0.236	0.000	0.000	6.553	0.186
125.69	38.31	0.00	0.00	2.556	0.237	0.000	0.000	6.636	0.188
125.72	38.32	0.00	0.00	2.570	0.239	0.000	0.000	6.720	0.190
125.75	38.33	0.00	0.00	2.584	0.240	0.000	0.000	6.805	0.193
125.79	38.34	0.00	0.00	2.598	0.241	0.000	0.000	6.890	0.195
125.82	38.35	0.00	0.00	2.612	0.243	0.000	0.000	6.975	0.198
125.85	38.36	0.00	0.00	2.624	0.244	0.000	0.000	7.061	0.200

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
125.89	38.37	0.00	0.00	2.637	0.245	0.000	0.000	7.148	0.202
125.92	38.38	0.00	0.00	2.650	0.246	0.000	0.000	7.234	0.205
125.95	38.39	0.00	0.00	2.663	0.247	0.000	0.000	7.322	0.207
125.98	38.40	0.00	0.00	2.677	0.249	0.000	0.000	7.409	0.210
126.02	38.41	0.00	0.00	2.690	0.250	0.000	0.000	7.497	0.212
126.05	38.42	0.00	0.00	2.704	0.251	0.000	0.000	7.586	0.215
126.08	38.43	0.00	0.00	2.717	0.252	0.000	0.000	7.675	0.217
126.12	38.44	0.00	0.00	2.731	0.254	0.000	0.000	7.764	0.220
126.15	38.45	0.00	0.00	2.745	0.255	0.000	0.000	7.854	0.222
126.18	38.46	0.00	0.00	2.760	0.256	0.000	0.000	7.944	0.225
126.21	38.47	0.00	0.00	2.774	0.258	0.000	0.000	8.035	0.228
126.25	38.48	0.00	0.00	2.789	0.259	0.000	0.000	8.126	0.230
126.28	38.49	0.00	0.00	2.804	0.260	0.000	0.000	8.218	0.233
126.31	38.50	0.00	0.00	2.819	0.262	0.000	0.000	8.310	0.235
126.35	38.51	0.00	0.00	2.836	0.263	0.000	0.000	8.403	0.238
126.38	38.52	0.00	0.00	2.853	0.265	0.000	0.000	8.496	0.241
126.41	38.53	0.00	0.00	2.869	0.267	0.000	0.000	8.590	0.243
126.44	38.54	0.00	0.00	2.885	0.268	0.000	0.000	8.684	0.246
126.48	38.55	0.00	0.00	2.901	0.270	0.000	0.000	8.779	0.249
126.51	38.56	0.00	0.00	2.918	0.271	0.000	0.000	8.875	0.251
126.54	38.57	0.00	0.00	2.935	0.273	0.000	0.000	8.971	0.254
126.57	38.58	0.00	0.00	2.953	0.274	0.000	0.000	9.067	0.257
126.61	38.59	0.00	0.00	2.970	0.276	0.000	0.000	9.165	0.260
126.64	38.60	0.00	0.00	2.987	0.278	0.000	0.000	9.262	0.262

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
126.67	38.61	0.00	0.00	3.005	0.279	0.000	0.000	9.361	0.265
126.71	38.62	0.00	0.00	3.022	0.281	0.000	0.000	9.459	0.268
126.74	38.63	0.00	0.00	3.040	0.282	0.000	0.000	9.559	0.271
126.77	38.64	0.00	0.00	3.057	0.284	0.000	0.000	9.659	0.274
126.80	38.65	0.00	0.00	3.074	0.286	0.000	0.000	9.759	0.276
126.84	38.66	0.00	0.00	3.091	0.287	0.000	0.000	9.861	0.279
126.87	38.67	0.00	0.00	3.108	0.289	0.000	0.000	9.962	0.282
126.90	38.68	0.00	0.00	3.125	0.290	0.000	0.000	10.065	0.285
126.94	38.69	0.00	0.00	3.143	0.292	0.000	0.000	10.167	0.288
126.97	38.70	0.00	0.00	3.160	0.294	0.000	0.000	10.271	0.291
127.00	38.71	0.00	0.00	3.177	0.295	0.000	0.000	10.375	0.294
127.03	38.72	0.00	0.00	3.195	0.297	0.000	0.000	10.479	0.297
127.07	38.73	0.00	0.00	3.212	0.298	0.000	0.000	10.584	0.300
127.10	38.74	0.00	0.00	3.230	0.300	0.000	0.000	10.690	0.303
127.13	38.75	0.00	0.00	3.248	0.302	0.000	0.000	10.796	0.306
127.17	38.76	0.00	0.00	3.266	0.303	0.000	0.000	10.903	0.309
127.20	38.77	0.00	0.00	3.283	0.305	0.000	0.000	11.011	0.312
127.23	38.78	0.00	0.00	3.300	0.307	0.000	0.000	11.119	0.315
127.26	38.79	0.00	0.00	3.317	0.308	0.000	0.000	11.227	0.318
127.30	38.80	0.00	0.00	3.334	0.310	0.000	0.000	11.336	0.321
127.33	38.81	0.00	0.00	3.351	0.311	0.000	0.000	11.446	0.324
127.36	38.82	0.00	0.00	3.367	0.313	0.000	0.000	11.556	0.327
127.40	38.83	0.00	0.00	3.384	0.314	0.000	0.000	11.667	0.330
127.43	38.84	0.00	0.00	3.401	0.316	0.000	0.000	11.778	0.334



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
127.46	38.85	0.00	0.00	3.417	0.317	0.000	0.000	11.890	0.337
127.49	38.86	0.00	0.00	3.434	0.319	0.000	0.000	12.002	0.340
127.53	38.87	0.00	0.00	3.452	0.321	0.000	0.000	12.115	0.343
127.56	38.88	0.00	0.00	3.469	0.322	0.000	0.000	12.229	0.346
127.59	38.89	0.00	0.00	3.487	0.324	0.000	0.000	12.343	0.350
127.62	38.90	0.00	0.00	3.503	0.325	0.000	0.000	12.458	0.353
127.66	38.91	0.00	0.00	3.520	0.327	0.000	0.000	12.573	0.356
127.69	38.92	0.00	0.00	3.536	0.329	0.000	0.000	12.689	0.359
127.72	38.93	0.00	0.00	3.553	0.330	0.000	0.000	12.805	0.363
127.76	38.94	0.00	0.00	3.569	0.332	0.000	0.000	12.922	0.366
127.79	38.95	0.00	0.00	3.585	0.333	0.000	0.000	13.039	0.369
127.82	38.96	0.00	0.00	3.600	0.334	0.000	0.000	13.157	0.373
127.85	38.97	0.00	0.00	3.616	0.336	0.000	0.000	13.275	0.376
127.89	38.98	0.00	0.00	3.631	0.337	0.000	0.000	13.394	0.379
127.92	38.99	0.00	0.00	3.646	0.339	0.000	0.000	13.514	0.383
127.95	39.00	0.00	0.00	3.661	0.340	0.000	0.000	13.634	0.386
127.99	39.01	0.00	0.00	3.676	0.341	0.000	0.000	13.754	0.389
128.02	39.02	0.00	0.00	3.691	0.343	0.000	0.000	13.875	0.393
128.05	39.03	0.00	0.00	3.706	0.344	0.000	0.000	13.996	0.396
128.08	39.04	0.00	0.00	3.721	0.346	0.000	0.000	14.118	0.400
128.12	39.05	0.00	0.00	3.736	0.347	0.000	0.000	14.240	0.403
128.15	39.06	0.00	0.00	3.751	0.348	0.000	0.000	14.363	0.407
128.18	39.07	0.00	0.00	3.766	0.350	0.000	0.000	14.486	0.410
128.22	39.08	0.00	0.00	3.780	0.351	0.000	0.000	14.610	0.414

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
128.25	39.09	0.00	0.00	3.795	0.353	0.000	0.000	14.734	0.417
128.28	39.10	0.00	0.00	3.810	0.354	0.000	0.000	14.859	0.421
128.31	39.11	0.00	0.00	3.826	0.355	0.000	0.000	14.984	0.424
128.35	39.12	0.00	0.00	3.841	0.357	0.000	0.000	15.110	0.428
128.38	39.13	0.00	0.00	3.857	0.358	0.000	0.000	15.237	0.431
128.41	39.14	0.00	0.00	3.872	0.360	0.000	0.000	15.363	0.435
128.44	39.15	0.00	0.00	3.887	0.361	0.000	0.000	15.491	0.439
128.48	39.16	0.00	0.00	3.902	0.362	0.000	0.000	15.618	0.442
128.51	39.17	0.00	0.00	3.917	0.364	0.000	0.000	15.747	0.446
128.54	39.18	0.00	0.00	3.932	0.365	0.000	0.000	15.875	0.450
128.58	39.19	0.00	0.00	3.948	0.367	0.000	0.000	16.005	0.453
128.61	39.20	0.00	0.00	3.963	0.368	0.000	0.000	16.134	0.457
128.64	39.21	0.00	0.00	3.979	0.370	0.000	0.000	16.265	0.461
128.67	39.22	0.00	0.00	3.995	0.371	0.000	0.000	16.396	0.464
128.71	39.23	0.00	0.00	4.011	0.373	0.000	0.000	16.527	0.468
128.74	39.24	0.00	0.00	4.028	0.374	0.000	0.000	16.659	0.472
128.77	39.25	0.00	0.00	4.044	0.376	0.000	0.000	16.791	0.475
128.81	39.26	0.00	0.00	4.060	0.377	0.000	0.000	16.924	0.479
128.84	39.27	0.00	0.00	4.076	0.379	0.000	0.000	17.058	0.483
128.87	39.28	0.00	0.00	4.092	0.380	0.000	0.000	17.192	0.487
128.90	39.29	0.00	0.00	4.108	0.382	0.000	0.000	17.326	0.491
128.94	39.30	0.00	0.00	4.125	0.383	0.000	0.000	17.461	0.494
128.97	39.31	0.00	0.00	4.141	0.385	0.000	0.000	17.597	0.498
129.00	39.32	0.00	0.00	4.158	0.386	0.000	0.000	17.733	0.502

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
129.04	39.33	0.00	0.00	4.175	0.388	0.000	0.000	17.870	0.506
129.07	39.34	0.00	0.00	4.191	0.389	0.000	0.000	18.007	0.510
129.10	39.35	0.00	0.00	4.208	0.391	0.000	0.000	18.145	0.514
129.13	39.36	0.00	0.00	4.226	0.393	0.000	0.000	18.283	0.518
129.17	39.37	0.00	0.00	4.244	0.394	0.000	0.000	18.422	0.522
129.20	39.38	0.00	0.00	4.261	0.396	0.000	0.000	18.561	0.526
129.23	39.39	0.00	0.00	4.278	0.397	0.000	0.000	18.701	0.530
129.27	39.40	0.00	0.00	4.294	0.399	0.000	0.000	18.842	0.534
129.30	39.41	0.00	0.00	4.310	0.400	0.000	0.000	18.983	0.538
129.33	39.42	0.00	0.00	4.328	0.402	0.000	0.000	19.125	0.542
129.36	39.43	0.00	0.00	4.345	0.404	0.000	0.000	19.267	0.546
129.40	39.44	0.00	0.00	4.362	0.405	0.000	0.000	19.410	0.550
129.43	39.45	0.00	0.00	4.379	0.407	0.000	0.000	19.553	0.554
129.46	39.46	0.00	0.00	4.396	0.408	0.000	0.000	19.697	0.558
129.49	39.47	0.00	0.00	4.413	0.410	0.000	0.000	19.842	0.562
129.53	39.48	0.00	0.00	4.430	0.412	0.000	0.000	19.987	0.566
129.56	39.49	0.00	0.00	4.447	0.413	0.000	0.000	20.133	0.570
129.59	39.50	0.00	0.00	4.463	0.415	0.000	0.000	20.279	0.574
129.63	39.51	0.00	0.00	4.480	0.416	0.000	0.000	20.425	0.578
129.66	39.52	0.00	0.00	4.496	0.418	0.000	0.000	20.573	0.583
129.69	39.53	0.00	0.00	4.512	0.419	0.000	0.000	20.720	0.587
129.72	39.54	0.00	0.00	4.529	0.421	0.000	0.000	20.869	0.591
129.76	39.55	0.00	0.00	4.546	0.422	0.000	0.000	21.018	0.595
129.79	39.56	0.00	0.00	4.562	0.424	0.000	0.000	21.167	0.599

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
129.82	39.57	0.00	0.00	4.579	0.425	0.000	0.000	21.317	0.604
129.86	39.58	0.00	0.00	4.595	0.427	0.000	0.000	21.467	0.608
129.89	39.59	0.00	0.00	4.611	0.428	0.000	0.000	21.618	0.612
129.92	39.60	0.00	0.00	4.627	0.430	0.000	0.000	21.770	0.616
129.95	39.61	0.00	0.00	4.643	0.431	0.000	0.000	21.922	0.621
129.99	39.62	0.00	0.00	4.659	0.433	0.000	0.000	22.075	0.625
130.02	39.63	0.00	0.00	4.674	0.434	0.000	0.000	22.228	0.629
130.05	39.64	0.00	0.00	4.690	0.436	0.000	0.000	22.381	0.634
130.09	39.65	0.00	0.00	4.705	0.437	0.000	0.000	22.536	0.638
130.12	39.66	0.00	0.00	4.721	0.439	0.000	0.000	22.690	0.643
130.15	39.67	0.00	0.00	4.737	0.440	0.000	0.000	22.845	0.647
130.18	39.68	0.00	0.00	4.752	0.441	0.000	0.000	23.001	0.651
130.22	39.69	0.00	0.00	4.766	0.443	0.000	0.000	23.157	0.656
130.25	39.70	0.00	0.00	4.781	0.444	0.000	0.000	23.314	0.660
130.28	39.71	0.00	0.00	4.795	0.445	0.000	0.000	23.471	0.665
130.31	39.72	0.00	0.00	4.809	0.447	0.000	0.000	23.628	0.669
130.35	39.73	0.00	0.00	4.823	0.448	0.000	0.000	23.786	0.674
130.38	39.74	0.00	0.00	4.837	0.449	0.000	0.000	23.945	0.678
130.41	39.75	0.00	0.00	4.851	0.451	0.000	0.000	24.104	0.683
130.45	39.76	0.00	0.00	4.865	0.452	0.000	0.000	24.263	0.687
130.48	39.77	0.00	0.00	4.879	0.453	0.000	0.000	24.423	0.692
130.51	39.78	0.00	0.00	4.893	0.455	0.000	0.000	24.583	0.696
130.54	39.79	0.00	0.00	4.908	0.456	0.000	0.000	24.744	0.701
130.58	39.80	0.00	0.00	4.922	0.457	0.000	0.000	24.905	0.705

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
130.61	39.81	0.00	0.00	4.936	0.459	0.000	0.000	25.067	0.710
130.64	39.82	0.00	0.00	4.950	0.460	0.000	0.000	25.229	0.714
130.68	39.83	0.00	0.00	4.964	0.461	0.000	0.000	25.392	0.719
130.71	39.84	0.00	0.00	4.978	0.462	0.000	0.000	25.555	0.724
130.74	39.85	0.00	0.00	4.992	0.464	0.000	0.000	25.719	0.728
130.77	39.86	0.00	0.00	5.006	0.465	0.000	0.000	25.883	0.733
130.81	39.87	0.00	0.00	5.020	0.466	0.000	0.000	26.047	0.738
130.84	39.88	0.00	0.00	5.034	0.468	0.000	0.000	26.212	0.742
130.87	39.89	0.00	0.00	5.049	0.469	0.000	0.000	26.377	0.747
130.91	39.90	0.00	0.00	5.064	0.470	0.000	0.000	26.543	0.752
130.94	39.91	0.00	0.00	5.080	0.472	0.000	0.000	26.710	0.756
130.97	39.92	0.00	0.00	5.095	0.473	0.000	0.000	26.877	0.761
131.00	39.93	0.00	0.00	5.112	0.475	0.000	0.000	27.044	0.766
131.04	39.94	0.00	0.00	5.128	0.476	0.000	0.000	27.212	0.771
131.07	39.95	0.00	0.00	5.145	0.478	0.000	0.000	27.380	0.775
131.10	39.96	0.00	0.00	5.162	0.480	0.000	0.000	27.550	0.780
131.14	39.97	0.00	0.00	5.179	0.481	0.000	0.000	27.719	0.785
131.17	39.98	0.00	0.00	5.196	0.483	0.000	0.000	27.889	0.790
131.20	39.99	0.00	0.00	5.214	0.484	0.000	0.000	28.060	0.795
131.23	40.00	0.00	0.00	5.231	0.486	0.000	0.000	28.231	0.799
131.27	40.01	0.00	0.00	5.248	0.488	0.000	0.000	28.403	0.804
131.30	40.02	0.00	0.00	5.265	0.489	0.000	0.000	28.576	0.809
131.33	40.03	0.00	0.00	5.282	0.491	0.000	0.000	28.749	0.814
131.36	40.04	0.00	0.00	5.300	0.492	0.000	0.000	28.922	0.819

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
131.40	40.05	0.00	0.00	5.318	0.494	0.000	0.000	29.097	0.824
131.43	40.06	0.00	0.00	5.336	0.496	0.000	0.000	29.271	0.829
131.46	40.07	0.00	0.00	5.354	0.497	0.000	0.000	29.447	0.834
131.50	40.08	0.00	0.00	5.372	0.499	0.000	0.000	29.623	0.839
131.53	40.09	0.00	0.00	5.390	0.501	0.000	0.000	29.799	0.844
131.56	40.10	0.00	0.00	5.407	0.502	0.000	0.000	29.976	0.849
131.59	40.11	0.00	0.00	5.425	0.504	0.000	0.000	30.154	0.854
131.63	40.12	0.00	0.00	5.443	0.506	0.000	0.000	30.332	0.859
131.66	40.13	0.00	0.00	5.461	0.507	0.000	0.000	30.511	0.864
131.69	40.14	0.00	0.00	5.479	0.509	0.000	0.000	30.691	0.869
131.73	40.15	0.00	0.00	5.498	0.511	0.000	0.000	30.871	0.874
131.76	40.16	0.00	0.00	5.516	0.512	0.000	0.000	31.051	0.879
131.79	40.17	0.00	0.00	5.533	0.514	0.000	0.000	31.233	0.884
131.82	40.18	0.00	0.00	5.551	0.516	0.000	0.000	31.414	0.890
131.86	40.19	0.00	0.00	5.568	0.517	0.000	0.000	31.597	0.895
131.89	40.20	0.00	0.00	5.586	0.519	0.000	0.000	31.780	0.900
131.92	40.21	0.00	0.00	5.604	0.521	0.000	0.000	31.963	0.905
131.96	40.22	0.00	0.00	5.624	0.522	0.000	0.000	32.148	0.910
131.99	40.23	0.00	0.00	5.644	0.524	0.000	0.000	32.332	0.916
132.02	40.24	0.00	0.00	5.667	0.526	0.000	0.000	32.518	0.921
132.05	40.25	0.00	0.00	5.691	0.529	0.000	0.000	32.704	0.926
132.09	40.26	0.00	0.00	5.716	0.531	0.000	0.000	32.891	0.931
132.12	40.27	0.00	0.00	5.740	0.533	0.000	0.000	33.079	0.937
132.15	40.28	0.00	0.00	5.765	0.536	0.000	0.000	33.268	0.942

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
132.19	40.29	0.00	0.00	5.790	0.538	0.000	0.000	33.458	0.947
132.22	40.30	0.00	0.00	5.814	0.540	0.000	0.000	33.648	0.953
132.25	40.31	0.00	0.00	5.837	0.542	0.000	0.000	33.839	0.958
132.28	40.32	0.00	0.00	5.861	0.544	0.000	0.000	34.031	0.964
132.32	40.33	0.00	0.00	5.885	0.547	0.000	0.000	34.224	0.969
132.35	40.34	0.00	0.00	5.909	0.549	0.000	0.000	34.417	0.975
132.38	40.35	0.00	0.00	5.934	0.551	0.000	0.000	34.611	0.980
132.41	40.36	0.00	0.00	5.959	0.554	0.000	0.000	34.806	0.986
132.45	40.37	0.00	0.00	5.984	0.556	0.000	0.000	35.002	0.991
132.48	40.38	0.00	0.00	6.009	0.558	0.000	0.000	35.199	0.997
132.51	40.39	0.00	0.00	6.034	0.561	0.000	0.000	35.397	1.002
132.55	40.40	0.00	0.00	6.060	0.563	0.000	0.000	35.595	1.008
132.58	40.41	0.00	0.00	6.087	0.566	0.000	0.000	35.794	1.014
132.61	40.42	0.00	0.00	6.113	0.568	0.000	0.000	35.994	1.019
132.64	40.43	0.00	0.00	6.137	0.570	0.000	0.000	36.195	1.025
132.68	40.44	0.00	0.00	6.161	0.572	0.000	0.000	36.397	1.031
132.71	40.45	0.00	0.00	6.184	0.575	0.000	0.000	36.600	1.036
132.74	40.46	0.00	0.00	6.207	0.577	0.000	0.000	36.803	1.042
132.78	40.47	0.00	0.00	6.230	0.579	0.000	0.000	37.007	1.048
132.81	40.48	0.00	0.00	6.252	0.581	0.000	0.000	37.212	1.054
132.84	40.49	0.00	0.00	6.274	0.583	0.000	0.000	37.417	1.060
132.87	40.50	0.00	0.00	6.296	0.585	0.000	0.000	37.623	1.065
132.91	40.51	0.00	0.00	6.318	0.587	0.000	0.000	37.830	1.071
132.94	40.52	0.00	0.00	6.340	0.589	0.000	0.000	38.038	1.077

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
132.97	40.53	0.00	0.00	6.361	0.591	0.000	0.000	38.246	1.083
133.01	40.54	0.00	0.00	6.381	0.593	0.000	0.000	38.455	1.089
133.04	40.55	0.00	0.00	6.402	0.595	0.000	0.000	38.665	1.095
133.07	40.56	0.00	0.00	6.424	0.597	0.000	0.000	38.875	1.101
133.10	40.57	0.00	0.00	6.445	0.599	0.000	0.000	39.087	1.107
133.14	40.58	0.00	0.00	6.467	0.601	0.000	0.000	39.298	1.113
133.17	40.59	0.00	0.00	6.489	0.603	0.000	0.000	39.511	1.119
133.20	40.60	0.00	0.00	6.511	0.605	0.000	0.000	39.724	1.125
133.23	40.61	0.00	0.00	6.533	0.607	0.000	0.000	39.938	1.131
133.27	40.62	0.00	0.00	6.555	0.609	0.000	0.000	40.153	1.137
133.30	40.63	0.00	0.00	6.577	0.611	0.000	0.000	40.368	1.143
133.33	40.64	0.00	0.00	6.598	0.613	0.000	0.000	40.584	1.149
133.37	40.65	0.00	0.00	6.619	0.615	0.000	0.000	40.801	1.155
133.40	40.66	0.00	0.00	6.639	0.617	0.000	0.000	41.019	1.162
133.43	40.67	0.00	0.00	6.659	0.619	0.000	0.000	41.237	1.168
133.46	40.68	0.00	0.00	6.679	0.621	0.000	0.000	41.456	1.174
133.50	40.69	0.00	0.00	6.698	0.622	0.000	0.000	41.675	1.180
133.53	40.70	0.00	0.00	6.717	0.624	0.000	0.000	41.895	1.186
133.56	40.71	0.00	0.00	6.736	0.626	0.000	0.000	42.116	1.193
133.60	40.72	0.00	0.00	6.754	0.627	0.000	0.000	42.337	1.199
133.63	40.73	0.00	0.00	6.771	0.629	0.000	0.000	42.559	1.205
133.66	40.74	0.00	0.00	6.788	0.631	0.000	0.000	42.782	1.211
133.69	40.75	0.00	0.00	6.805	0.632	0.000	0.000	43.004	1.218
133.73	40.76	0.00	0.00	6.822	0.634	0.000	0.000	43.228	1.224



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
133.76	40.77	0.00	0.00	6.839	0.635	0.000	0.000	43.452	1.230
133.79	40.78	0.00	0.00	6.858	0.637	0.000	0.000	43.677	1.237
133.83	40.79	0.00	0.00	6.876	0.639	0.000	0.000	43.902	1.243
133.86	40.80	0.00	0.00	6.894	0.640	0.000	0.000	44.128	1.250
133.89	40.81	0.00	0.00	6.912	0.642	0.000	0.000	44.354	1.256
133.92	40.82	0.00	0.00	6.929	0.644	0.000	0.000	44.582	1.262
133.96	40.83	0.00	0.00	6.946	0.645	0.000	0.000	44.809	1.269
133.99	40.84	0.00	0.00	6.964	0.647	0.000	0.000	45.037	1.275
134.02	40.85	0.00	0.00	6.981	0.649	0.000	0.000	45.266	1.282
134.06	40.86	0.00	0.00	6.997	0.650	0.000	0.000	45.495	1.288
134.09	40.87	0.00	0.00	7.014	0.652	0.000	0.000	45.725	1.295
134.12	40.88	0.00	0.00	7.031	0.653	0.000	0.000	45.956	1.301
134.15	40.89	0.00	0.00	7.048	0.655	0.000	0.000	46.187	1.308
134.19	40.90	0.00	0.00	7.066	0.656	0.000	0.000	46.418	1.314
134.22	40.91	0.00	0.00	7.084	0.658	0.000	0.000	46.650	1.321
134.25	40.92	0.00	0.00	7.102	0.660	0.000	0.000	46.883	1.328
134.28	40.93	0.00	0.00	7.120	0.661	0.000	0.000	47.116	1.334
134.32	40.94	0.00	0.00	7.137	0.663	0.000	0.000	47.350	1.341
134.35	40.95	0.00	0.00	7.154	0.665	0.000	0.000	47.585	1.347
134.38	40.96	0.00	0.00	7.171	0.666	0.000	0.000	47.820	1.354
134.42	40.97	0.00	0.00	7.188	0.668	0.000	0.000	48.055	1.361
134.45	40.98	0.00	0.00	7.204	0.669	0.000	0.000	48.291	1.367
134.48	40.99	0.00	0.00	7.221	0.671	0.000	0.000	48.528	1.374
134.51	41.00	0.00	0.00	7.238	0.672	0.000	0.000	48.765	1.381

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
134.55	41.01	0.00	0.00	7.255	0.674	0.000	0.000	49.003	1.388
134.58	41.02	0.00	0.00	7.272	0.676	0.000	0.000	49.241	1.394
134.61	41.03	0.00	0.00	7.289	0.677	0.000	0.000	49.480	1.401
134.65	41.04	0.00	0.00	7.307	0.679	0.000	0.000	49.719	1.408
134.68	41.05	0.00	0.00	7.325	0.681	0.000	0.000	49.959	1.415
134.71	41.06	0.00	0.00	7.344	0.682	0.000	0.000	50.200	1.422
134.74	41.07	0.00	0.00	7.362	0.684	0.000	0.000	50.441	1.428
134.78	41.08	0.00	0.00	7.380	0.686	0.000	0.000	50.683	1.435
134.81	41.09	0.00	0.00	7.399	0.687	0.000	0.000	50.925	1.442
134.84	41.10	0.00	0.00	7.417	0.689	0.000	0.000	51.169	1.449
134.88	41.11	0.00	0.00	7.435	0.691	0.000	0.000	51.412	1.456
134.91	41.12	0.00	0.00	7.453	0.692	0.000	0.000	51.656	1.463
134.94	41.13	0.00	0.00	7.471	0.694	0.000	0.000	51.901	1.470
134.97	41.14	0.00	0.00	7.488	0.696	0.000	0.000	52.147	1.477
135.01	41.15	0.00	0.00	7.506	0.697	0.000	0.000	52.393	1.484
135.04	41.16	0.00	0.00	7.524	0.699	0.000	0.000	52.639	1.491
135.07	41.17	0.00	0.00	7.542	0.701	0.000	0.000	52.886	1.498
135.10	41.18	0.00	0.00	7.561	0.702	0.000	0.000	53.134	1.505
135.14	41.19	0.00	0.00	7.580	0.704	0.000	0.000	53.382	1.512
135.17	41.20	0.00	0.00	7.601	0.706	0.000	0.000	53.631	1.519
135.20	41.21	0.00	0.00	7.622	0.708	0.000	0.000	53.881	1.526
135.24	41.22	0.00	0.00	7.643	0.710	0.000	0.000	54.132	1.533
135.27	41.23	0.00	0.00	7.663	0.712	0.000	0.000	54.383	1.540
135.30	41.24	0.00	0.00	7.682	0.714	0.000	0.000	54.634	1.547

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
135.33	41.25	0.00	0.00	7.701	0.715	0.000	0.000	54.887	1.554
135.37	41.26	0.00	0.00	7.719	0.717	0.000	0.000	55.140	1.561
135.40	41.27	0.00	0.00	7.738	0.719	0.000	0.000	55.393	1.569
135.43	41.28	0.00	0.00	7.756	0.721	0.000	0.000	55.647	1.576
135.47	41.29	0.00	0.00	7.774	0.722	0.000	0.000	55.902	1.583
135.50	41.30	0.00	0.00	7.793	0.724	0.000	0.000	56.158	1.590
135.53	41.31	0.00	0.00	7.811	0.726	0.000	0.000	56.413	1.597
135.56	41.32	0.00	0.00	7.830	0.727	0.000	0.000	56.670	1.605
135.60	41.33	0.00	0.00	7.849	0.729	0.000	0.000	56.927	1.612
135.63	41.34	0.00	0.00	7.867	0.731	0.000	0.000	57.185	1.619
135.66	41.35	0.00	0.00	7.886	0.733	0.000	0.000	57.444	1.627
135.70	41.36	0.00	0.00	7.905	0.734	0.000	0.000	57.703	1.634
135.73	41.37	0.00	0.00	7.925	0.736	0.000	0.000	57.962	1.641
135.76	41.38	0.00	0.00	7.944	0.738	0.000	0.000	58.223	1.649
135.79	41.39	0.00	0.00	7.964	0.740	0.000	0.000	58.484	1.656
135.83	41.40	0.00	0.00	7.982	0.742	0.000	0.000	58.745	1.663
135.86	41.41	0.00	0.00	8.001	0.743	0.000	0.000	59.007	1.671
135.89	41.42	0.00	0.00	8.019	0.745	0.000	0.000	59.270	1.678
135.93	41.43	0.00	0.00	8.038	0.747	0.000	0.000	59.534	1.686
135.96	41.44	0.00	0.00	8.057	0.749	0.000	0.000	59.798	1.693
135.99	41.45	0.00	0.00	8.076	0.750	0.000	0.000	60.062	1.701
136.02	41.46	0.00	0.00	8.094	0.752	0.000	0.000	60.327	1.708
136.06	41.47	0.00	0.00	8.112	0.754	0.000	0.000	60.593	1.716
136.09	41.48	0.00	0.00	8.131	0.755	0.000	0.000	60.860	1.723

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
136.12	41.49	0.00	0.00	8.150	0.757	0.000	0.000	61.127	1.731
136.15	41.50	0.00	0.00	8.169	0.759	0.000	0.000	61.395	1.738
136.19	41.51	0.00	0.00	8.189	0.761	0.000	0.000	61.663	1.746
136.22	41.52	0.00	0.00	8.208	0.763	0.000	0.000	61.932	1.754
136.25	41.53	0.00	0.00	8.227	0.764	0.000	0.000	62.201	1.761
136.29	41.54	0.00	0.00	8.245	0.766	0.000	0.000	62.472	1.769
136.32	41.55	0.00	0.00	8.264	0.768	0.000	0.000	62.742	1.777
136.35	41.56	0.00	0.00	8.282	0.769	0.000	0.000	63.014	1.784
136.38	41.57	0.00	0.00	8.300	0.771	0.000	0.000	63.286	1.792
136.42	41.58	0.00	0.00	8.318	0.773	0.000	0.000	63.559	1.800
136.45	41.59	0.00	0.00	8.335	0.774	0.000	0.000	63.832	1.808
136.48	41.60	0.00	0.00	8.353	0.776	0.000	0.000	64.105	1.815
136.52	41.61	0.00	0.00	8.370	0.778	0.000	0.000	64.380	1.823
136.55	41.62	0.00	0.00	8.388	0.779	0.000	0.000	64.655	1.831
136.58	41.63	0.00	0.00	8.406	0.781	0.000	0.000	64.930	1.839
136.61	41.64	0.00	0.00	8.424	0.783	0.000	0.000	65.206	1.846
136.65	41.65	0.00	0.00	8.442	0.784	0.000	0.000	65.483	1.854
136.68	41.66	0.00	0.00	8.460	0.786	0.000	0.000	65.760	1.862
136.71	41.67	0.00	0.00	8.477	0.788	0.000	0.000	66.038	1.870
136.75	41.68	0.00	0.00	8.495	0.789	0.000	0.000	66.316	1.878
136.78	41.69	0.00	0.00	8.513	0.791	0.000	0.000	66.595	1.886
136.81	41.70	0.00	0.00	8.532	0.793	0.000	0.000	66.875	1.894
136.84	41.71	0.00	0.00	8.550	0.794	0.000	0.000	67.155	1.902
136.88	41.72	0.00	0.00	8.568	0.796	0.000	0.000	67.436	1.910

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
136.91	41.73	0.00	0.00	8.587	0.798	0.000	0.000	67.718	1.918
136.94	41.74	0.00	0.00	8.605	0.799	0.000	0.000	68.000	1.926
136.98	41.75	0.00	0.00	8.624	0.801	0.000	0.000	68.282	1.934
137.01	41.76	0.00	0.00	8.642	0.803	0.000	0.000	68.565	1.942
137.04	41.77	0.00	0.00	8.660	0.805	0.000	0.000	68.849	1.950
137.07	41.78	0.00	0.00	8.678	0.806	0.000	0.000	69.134	1.958
137.11	41.79	0.00	0.00	8.696	0.808	0.000	0.000	69.419	1.966
137.14	41.80	0.00	0.00	8.714	0.810	0.000	0.000	69.704	1.974
137.17	41.81	0.00	0.00	8.732	0.811	0.000	0.000	69.990	1.982
137.20	41.82	0.00	0.00	8.749	0.813	0.000	0.000	70.277	1.990
137.24	41.83	0.00	0.00	8.767	0.815	0.000	0.000	70.565	1.998
137.27	41.84	0.00	0.00	8.785	0.816	0.000	0.000	70.852	2.006
137.30	41.85	0.00	0.00	8.803	0.818	0.000	0.000	71.141	2.014
137.34	41.86	0.00	0.00	8.821	0.819	0.000	0.000	71.430	2.023
137.37	41.87	0.00	0.00	8.839	0.821	0.000	0.000	71.720	2.031
137.40	41.88	0.00	0.00	8.857	0.823	0.000	0.000	72.010	2.039
137.43	41.89	0.00	0.00	8.875	0.824	0.000	0.000	72.301	2.047
137.47	41.90	0.00	0.00	8.893	0.826	0.000	0.000	72.592	2.056
137.50	41.91	0.00	0.00	8.910	0.828	0.000	0.000	72.884	2.064
137.53	41.92	0.00	0.00	8.927	0.829	0.000	0.000	73.177	2.072
137.57	41.93	0.00	0.00	8.943	0.831	0.000	0.000	73.470	2.080
137.60	41.94	0.00	0.00	8.959	0.832	0.000	0.000	73.764	2.089
137.63	41.95	0.00	0.00	8.976	0.834	0.000	0.000	74.058	2.097
137.66	41.96	0.00	0.00	8.992	0.835	0.000	0.000	74.353	2.105

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
137.70	41.97	0.00	0.00	9.009	0.837	0.000	0.000	74.648	2.114
137.73	41.98	0.00	0.00	9.025	0.838	0.000	0.000	74.944	2.122
137.76	41.99	0.00	0.00	9.042	0.840	0.000	0.000	75.240	2.131
137.80	42.00	0.00	0.00	9.058	0.842	0.000	0.000	75.537	2.139
137.83	42.01	0.00	0.00	9.075	0.843	0.000	0.000	75.835	2.147
137.86	42.02	0.00	0.00	9.092	0.845	0.000	0.000	76.133	2.156
137.89	42.03	0.00	0.00	9.109	0.846	0.000	0.000	76.431	2.164
137.93	42.04	0.00	0.00	9.127	0.848	0.000	0.000	76.730	2.173
137.96	42.05	0.00	0.00	9.144	0.849	0.000	0.000	77.030	2.181
137.99	42.06	0.00	0.00	9.161	0.851	0.000	0.000	77.330	2.190
138.02	42.07	0.00	0.00	9.178	0.853	0.000	0.000	77.631	2.198
138.06	42.08	0.00	0.00	9.195	0.854	0.000	0.000	77.933	2.207
138.09	42.09	0.00	0.00	9.212	0.856	0.000	0.000	78.235	2.215
138.12	42.10	0.00	0.00	9.228	0.857	0.000	0.000	78.537	2.224
138.16	42.11	0.00	0.00	9.244	0.859	0.000	0.000	78.840	2.233
138.19	42.12	0.00	0.00	9.261	0.860	0.000	0.000	79.144	2.241
138.22	42.13	0.00	0.00	9.277	0.862	0.000	0.000	79.448	2.250
138.25	42.14	0.00	0.00	9.294	0.863	0.000	0.000	79.752	2.258
138.29	42.15	0.00	0.00	9.311	0.865	0.000	0.000	80.058	2.267
138.32	42.16	0.00	0.00	9.328	0.867	0.000	0.000	80.363	2.276
138.35	42.17	0.00	0.00	9.345	0.868	0.000	0.000	80.670	2.284
138.39	42.18	0.00	0.00	9.363	0.870	0.000	0.000	80.977	2.293
138.42	42.19	0.00	0.00	9.381	0.872	0.000	0.000	81.284	2.302
138.45	42.20	0.00	0.00	9.399	0.873	0.000	0.000	81.592	2.310

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
138.48	42.21	0.00	0.00	9.417	0.875	0.000	0.000	81.901	2.319
138.52	42.22	0.00	0.00	9.435	0.877	0.000	0.000	82.210	2.328
138.55	42.23	0.00	0.00	9.455	0.878	0.000	0.000	82.520	2.337
138.58	42.24	0.00	0.00	9.473	0.880	0.000	0.000	82.830	2.345
138.62	42.25	0.00	0.00	9.492	0.882	0.000	0.000	83.142	2.354
138.65	42.26	0.00	0.00	9.512	0.884	0.000	0.000	83.453	2.363
138.68	42.27	0.00	0.00	9.531	0.885	0.000	0.000	83.766	2.372
138.71	42.28	0.00	0.00	9.550	0.887	0.000	0.000	84.079	2.381
138.75	42.29	0.00	0.00	9.569	0.889	0.000	0.000	84.392	2.390
138.78	42.30	0.00	0.00	9.588	0.891	0.000	0.000	84.707	2.399
138.81	42.31	0.00	0.00	9.607	0.893	0.000	0.000	85.021	2.408
138.85	42.32	0.00	0.00	9.626	0.894	0.000	0.000	85.337	2.416
138.88	42.33	0.00	0.00	9.646	0.896	0.000	0.000	85.653	2.425
138.91	42.34	0.00	0.00	9.665	0.898	0.000	0.000	85.970	2.434
138.94	42.35	0.00	0.00	9.685	0.900	0.000	0.000	86.287	2.443
138.98	42.36	0.00	0.00	9.705	0.902	0.000	0.000	86.605	2.452
139.01	42.37	0.00	0.00	9.725	0.903	0.000	0.000	86.924	2.461
139.04	42.38	0.00	0.00	9.745	0.905	0.000	0.000	87.244	2.470
139.07	42.39	0.00	0.00	9.765	0.907	0.000	0.000	87.564	2.480
139.11	42.40	0.00	0.00	9.787	0.909	0.000	0.000	87.884	2.489
139.14	42.41	0.00	0.00	9.808	0.911	0.000	0.000	88.206	2.498
139.17	42.42	0.00	0.00	9.829	0.913	0.000	0.000	88.528	2.507
139.21	42.43	0.00	0.00	9.849	0.915	0.000	0.000	88.851	2.516
139.24	42.44	0.00	0.00	9.869	0.917	0.000	0.000	89.174	2.525

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
139.27	42.45	0.00	0.00	9.889	0.919	0.000	0.000	89.498	2.534
139.30	42.46	0.00	0.00	9.910	0.921	0.000	0.000	89.823	2.544
139.34	42.47	0.00	0.00	9.930	0.923	0.000	0.000	90.149	2.553
139.37	42.48	0.00	0.00	9.950	0.924	0.000	0.000	90.475	2.562
139.40	42.49	0.00	0.00	9.970	0.926	0.000	0.000	90.801	2.571
139.44	42.50	0.00	0.00	9.991	0.928	0.000	0.000	91.129	2.580
139.47	42.51	0.00	0.00	10.011	0.930	0.000	0.000	91.457	2.590
139.50	42.52	0.00	0.00	10.031	0.932	0.000	0.000	91.786	2.599
139.53	42.53	0.00	0.00	10.052	0.934	0.000	0.000	92.115	2.608
139.57	42.54	0.00	0.00	10.073	0.936	0.000	0.000	92.445	2.618
139.60	42.55	0.00	0.00	10.094	0.938	0.000	0.000	92.776	2.627
139.63	42.56	0.00	0.00	10.115	0.940	0.000	0.000	93.108	2.637
139.67	42.57	0.00	0.00	10.137	0.942	0.000	0.000	93.440	2.646
139.70	42.58	0.00	0.00	10.159	0.944	0.000	0.000	93.773	2.655
139.73	42.59	0.00	0.00	10.181	0.946	0.000	0.000	94.106	2.665
139.76	42.60	0.00	0.00	10.203	0.948	0.000	0.000	94.441	2.674
139.80	42.61	0.00	0.00	10.226	0.950	0.000	0.000	94.776	2.684
139.83	42.62	0.00	0.00	10.249	0.952	0.000	0.000	95.112	2.693
139.86	42.63	0.00	0.00	10.272	0.954	0.000	0.000	95.448	2.703
139.90	42.64	0.00	0.00	10.295	0.956	0.000	0.000	95.786	2.712
139.93	42.65	0.00	0.00	10.318	0.959	0.000	0.000	96.124	2.722
139.96	42.66	0.00	0.00	10.340	0.961	0.000	0.000	96.463	2.732
139.99	42.67	0.00	0.00	10.363	0.963	0.000	0.000	96.803	2.741
140.03	42.68	0.00	0.00	10.385	0.965	0.000	0.000	97.143	2.751



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
140.06	42.69	0.00	0.00	10.407	0.967	0.000	0.000	97.484	2.760
140.09	42.70	0.00	0.00	10.429	0.969	0.000	0.000	97.826	2.770
140.12	42.71	0.00	0.00	10.451	0.971	0.000	0.000	98.168	2.780
140.16	42.72	0.00	0.00	10.473	0.973	0.000	0.000	98.512	2.790
140.19	42.73	0.00	0.00	10.495	0.975	0.000	0.000	98.855	2.799
140.22	42.74	0.00	0.00	10.517	0.977	0.000	0.000	99.200	2.809
140.26	42.75	0.00	0.00	10.540	0.979	0.000	0.000	99.546	2.819
140.29	42.76	0.00	0.00	10.562	0.981	0.000	0.000	99.892	2.829
140.32	42.77	0.00	0.00	10.584	0.983	0.000	0.000	100.239	2.838
140.35	42.78	0.00	0.00	10.606	0.985	0.000	0.000	100.586	2.848
140.39	42.79	0.00	0.00	10.628	0.987	0.000	0.000	100.935	2.858
140.42	42.80	0.00	0.00	10.650	0.989	0.000	0.000	101.284	2.868
140.45	42.81	0.00	0.00	10.674	0.992	0.000	0.000	101.633	2.878
140.49	42.82	0.00	0.00	10.697	0.994	0.000	0.000	101.984	2.888
140.52	42.83	0.00	0.00	10.719	0.996	0.000	0.000	102.335	2.898
140.55	42.84	0.00	0.00	10.742	0.998	0.000	0.000	102.687	2.908
140.58	42.85	0.00	0.00	10.765	1.000	0.000	0.000	103.040	2.918
140.62	42.86	0.00	0.00	10.789	1.002	0.000	0.000	103.394	2.928
140.65	42.87	0.00	0.00	10.813	1.005	0.000	0.000	103.748	2.938
140.68	42.88	0.00	0.00	10.837	1.007	0.000	0.000	104.103	2.948
140.72	42.89	0.00	0.00	10.861	1.009	0.000	0.000	104.459	2.958
140.75	42.90	0.00	0.00	10.884	1.011	0.000	0.000	104.816	2.968
140.78	42.91	0.00	0.00	10.908	1.013	0.000	0.000	105.173	2.978
140.81	42.92	0.00	0.00	10.932	1.016	0.000	0.000	105.532	2.988

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
140.85	42.93	0.00	0.00	10.955	1.018	0.000	0.000	105.891	2.998
140.88	42.94	0.00	0.00	10.979	1.020	0.000	0.000	106.250	3.009
140.91	42.95	0.00	0.00	11.003	1.022	0.000	0.000	106.611	3.019
140.94	42.96	0.00	0.00	11.026	1.024	0.000	0.000	106.972	3.029
140.98	42.97	0.00	0.00	11.050	1.027	0.000	0.000	107.335	3.039
141.01	42.98	0.00	0.00	11.075	1.029	0.000	0.000	107.698	3.050
141.04	42.99	0.00	0.00	11.099	1.031	0.000	0.000	108.061	3.060
141.08	43.00	0.00	0.00	11.124	1.033	0.000	0.000	108.426	3.070
141.11	43.01	0.00	0.00	11.148	1.036	0.000	0.000	108.791	3.081
141.14	43.02	0.00	0.00	11.172	1.038	0.000	0.000	109.157	3.091
141.17	43.03	0.00	0.00	11.196	1.040	0.000	0.000	109.524	3.101
141.21	43.04	0.00	0.00	11.219	1.042	0.000	0.000	109.892	3.112
141.24	43.05	0.00	0.00	11.243	1.045	0.000	0.000	110.260	3.122
141.27	43.06	0.00	0.00	11.267	1.047	0.000	0.000	110.630	3.133
141.31	43.07	0.00	0.00	11.291	1.049	0.000	0.000	111.000	3.143
141.34	43.08	0.00	0.00	11.315	1.051	0.000	0.000	111.371	3.154
141.37	43.09	0.00	0.00	11.339	1.053	0.000	0.000	111.742	3.164
141.40	43.10	0.00	0.00	11.364	1.056	0.000	0.000	112.115	3.175
141.44	43.11	0.00	0.00	11.389	1.058	0.000	0.000	112.488	3.185
141.47	43.12	0.00	0.00	11.414	1.060	0.000	0.000	112.862	3.196
141.50	43.13	0.00	0.00	11.441	1.063	0.000	0.000	113.237	3.207
141.54	43.14	0.00	0.00	11.468	1.065	0.000	0.000	113.613	3.217
141.57	43.15	0.00	0.00	11.495	1.068	0.000	0.000	113.989	3.228
141.60	43.16	0.00	0.00	11.522	1.070	0.000	0.000	114.367	3.239

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
141.63	43.17	0.00	0.00	11.548	1.073	0.000	0.000	114.745	3.249
141.67	43.18	0.00	0.00	11.575	1.075	0.000	0.000	115.125	3.260
141.70	43.19	0.00	0.00	11.602	1.078	0.000	0.000	115.505	3.271
141.73	43.20	0.00	0.00	11.630	1.080	0.000	0.000	115.886	3.282
141.77	43.21	0.00	0.00	11.659	1.083	0.000	0.000	116.268	3.292
141.80	43.22	0.00	0.00	11.688	1.086	0.000	0.000	116.651	3.303
141.83	43.23	0.00	0.00	11.718	1.089	0.000	0.000	117.035	3.314
141.86	43.24	0.00	0.00	11.749	1.091	0.000	0.000	117.420	3.325
141.90	43.25	0.00	0.00	11.780	1.094	0.000	0.000	117.806	3.336
141.93	43.26	0.00	0.00	11.812	1.097	0.000	0.000	118.193	3.347
141.96	43.27	0.00	0.00	11.843	1.100	0.000	0.000	118.581	3.358
141.99	43.28	0.00	0.00	11.874	1.103	0.000	0.000	118.970	3.369
142.03	43.29	0.00	0.00	11.906	1.106	0.000	0.000	119.360	3.380
142.06	43.30	0.00	0.00	11.939	1.109	0.000	0.000	119.751	3.391
142.09	43.31	0.00	0.00	11.971	1.112	0.000	0.000	120.143	3.402
142.13	43.32	0.00	0.00	12.004	1.115	0.000	0.000	120.537	3.413
142.16	43.33	0.00	0.00	12.037	1.118	0.000	0.000	120.931	3.424
142.19	43.34	0.00	0.00	12.070	1.121	0.000	0.000	121.327	3.436
142.22	43.35	0.00	0.00	12.103	1.124	0.000	0.000	121.723	3.447
142.26	43.36	0.00	0.00	12.136	1.128	0.000	0.000	122.121	3.458
142.29	43.37	0.00	0.00	12.171	1.131	0.000	0.000	122.520	3.469
142.32	43.38	0.00	0.00	12.206	1.134	0.000	0.000	122.919	3.481
142.36	43.39	0.00	0.00	12.242	1.137	0.000	0.000	123.321	3.492
142.39	43.40	0.00	0.00	12.278	1.141	0.000	0.000	123.723	3.503

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
142.42	43.41	0.00	0.00	12.315	1.144	0.000	0.000	124.126	3.515
142.45	43.42	0.00	0.00	12.352	1.148	0.000	0.000	124.531	3.526
142.49	43.43	0.00	0.00	12.391	1.151	0.000	0.000	124.937	3.538
142.52	43.44	0.00	0.00	12.430	1.155	0.000	0.000	125.344	3.549
142.55	43.45	0.00	0.00	12.468	1.158	0.000	0.000	125.752	3.561
142.59	43.46	0.00	0.00	12.508	1.162	0.000	0.000	126.162	3.573
142.62	43.47	0.00	0.00	12.548	1.166	0.000	0.000	126.573	3.584
142.65	43.48	0.00	0.00	12.588	1.169	0.000	0.000	126.985	3.596
142.68	43.49	0.00	0.00	12.629	1.173	0.000	0.000	127.399	3.608
142.72	43.50	0.00	0.00	12.669	1.177	0.000	0.000	127.814	3.619
142.75	43.51	0.00	0.00	12.710	1.181	0.000	0.000	128.230	3.631
142.78	43.52	0.00	0.00	12.751	1.185	0.000	0.000	128.648	3.643
142.81	43.53	0.00	0.00	12.793	1.188	0.000	0.000	129.067	3.655
142.85	43.54	0.00	0.00	12.835	1.192	0.000	0.000	129.487	3.667
142.88	43.55	0.00	0.00	12.878	1.196	0.000	0.000	129.909	3.679
142.91	43.56	0.00	0.00	12.921	1.200	0.000	0.000	130.332	3.691
142.95	43.57	0.00	0.00	12.964	1.204	0.000	0.000	130.757	3.703
142.98	43.58	0.00	0.00	13.007	1.208	0.000	0.000	131.183	3.715
143.01	43.59	0.00	0.00	13.051	1.213	0.000	0.000	131.611	3.727
143.04	43.60	0.00	0.00	13.095	1.217	0.000	0.000	132.040	3.739
143.08	43.61	0.00	0.00	13.139	1.221	0.000	0.000	132.470	3.751
143.11	43.62	0.00	0.00	13.182	1.225	0.000	0.000	132.902	3.763
143.14	43.63	0.00	0.00	13.225	1.229	0.000	0.000	133.335	3.776
143.18	43.64	0.00	0.00	13.269	1.233	0.000	0.000	133.769	3.788

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
143.21	43.65	0.00	0.00	13.312	1.237	0.000	0.000	134.205	3.800
143.24	43.66	0.00	0.00	13.357	1.241	0.000	0.000	134.643	3.813
143.27	43.67	0.00	0.00	13.401	1.245	0.000	0.000	135.082	3.825
143.31	43.68	0.00	0.00	13.446	1.249	0.000	0.000	135.522	3.838
143.34	43.69	0.00	0.00	13.491	1.253	0.000	0.000	135.964	3.850
143.37	43.70	0.00	0.00	13.536	1.258	0.000	0.000	136.408	3.863
143.41	43.71	0.00	0.00	13.583	1.262	0.000	0.000	136.852	3.875
143.44	43.72	0.00	0.00	13.628	1.266	0.000	0.000	137.299	3.888
143.47	43.73	0.00	0.00	13.673	1.270	0.000	0.000	137.747	3.901
143.50	43.74	0.00	0.00	13.719	1.274	0.000	0.000	138.196	3.913
143.54	43.75	0.00	0.00	13.764	1.279	0.000	0.000	138.647	3.926
143.57	43.76	0.00	0.00	13.809	1.283	0.000	0.000	139.099	3.939
143.60	43.77	0.00	0.00	13.855	1.287	0.000	0.000	139.553	3.952
143.64	43.78	0.00	0.00	13.900	1.291	0.000	0.000	140.008	3.965
143.67	43.79	0.00	0.00	13.947	1.296	0.000	0.000	140.465	3.978
143.70	43.80	0.00	0.00	13.994	1.300	0.000	0.000	140.923	3.991
143.73	43.81	0.00	0.00	14.041	1.304	0.000	0.000	141.383	4.004
143.77	43.82	0.00	0.00	14.088	1.309	0.000	0.000	141.845	4.017
143.80	43.83	0.00	0.00	14.134	1.313	0.000	0.000	142.308	4.030
143.83	43.84	0.00	0.00	14.181	1.317	0.000	0.000	142.772	4.043
143.86	43.85	0.00	0.00	14.228	1.322	0.000	0.000	143.238	4.056
143.90	43.86	0.00	0.00	14.274	1.326	0.000	0.000	143.706	4.069
143.93	43.87	0.00	0.00	14.319	1.330	0.000	0.000	144.175	4.083
143.96	43.88	0.00	0.00	14.364	1.334	0.000	0.000	144.645	4.096

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
144.00	43.89	0.00	0.00	14.409	1.339	0.000	0.000	145.117	4.109
144.03	43.90	0.00	0.00	14.453	1.343	0.000	0.000	145.591	4.123
144.06	43.91	0.00	0.00	14.496	1.347	0.000	0.000	146.066	4.136
144.09	43.92	0.00	0.00	14.539	1.351	0.000	0.000	146.542	4.150
144.13	43.93	0.00	0.00	14.581	1.355	0.000	0.000	147.020	4.163
144.16	43.94	0.00	0.00	14.623	1.359	0.000	0.000	147.499	4.177
144.19	43.95	0.00	0.00	14.666	1.363	0.000	0.000	147.979	4.190
144.23	43.96	0.00	0.00	14.708	1.366	0.000	0.000	148.461	4.204
144.26	43.97	0.00	0.00	14.751	1.370	0.000	0.000	148.944	4.218
144.29	43.98	0.00	0.00	14.793	1.374	0.000	0.000	149.429	4.231
144.32	43.99	0.00	0.00	14.834	1.378	0.000	0.000	149.915	4.245
144.36	44.00	0.00	0.00	14.876	1.382	0.000	0.000	150.402	4.259
144.39	44.01	0.00	0.00	14.918	1.386	0.000	0.000	150.891	4.273
144.42	44.02	0.00	0.00	14.959	1.390	0.000	0.000	151.381	4.287
144.46	44.03	0.00	0.00	14.999	1.393	0.000	0.000	151.873	4.301
144.49	44.04	0.00	0.00	15.040	1.397	0.000	0.000	152.365	4.315
144.52	44.05	0.00	0.00	15.081	1.401	0.000	0.000	152.860	4.328
144.55	44.06	0.00	0.00	15.122	1.405	0.000	0.000	153.355	4.343
144.59	44.07	0.00	0.00	15.162	1.409	0.000	0.000	153.852	4.357
144.62	44.08	0.00	0.00	15.202	1.412	0.000	0.000	154.350	4.371
144.65	44.09	0.00	0.00	15.241	1.416	0.000	0.000	154.849	4.385
144.69	44.10	0.00	0.00	15.279	1.420	0.000	0.000	155.350	4.399
144.72	44.11	0.00	0.00	15.318	1.423	0.000	0.000	155.852	4.413
144.75	44.12	0.00	0.00	15.357	1.427	0.000	0.000	156.355	4.427

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
144.78	44.13	0.00	0.00	15.396	1.430	0.000	0.000	156.860	4.442
144.82	44.14	0.00	0.00	15.434	1.434	0.000	0.000	157.365	4.456
144.85	44.15	0.00	0.00	15.472	1.437	0.000	0.000	157.872	4.470
144.88	44.16	0.00	0.00	15.511	1.441	0.000	0.000	158.381	4.485
144.91	44.17	0.00	0.00	15.548	1.444	0.000	0.000	158.890	4.499
144.95	44.18	0.00	0.00	15.585	1.448	0.000	0.000	159.401	4.514
144.98	44.19	0.00	0.00	15.623	1.451	0.000	0.000	159.913	4.528
145.01	44.20	0.00	0.00	15.660	1.455	0.000	0.000	160.426	4.543
145.05	44.21	0.00	0.00	15.696	1.458	0.000	0.000	160.940	4.557
145.08	44.22	0.00	0.00	15.733	1.462	0.000	0.000	161.456	4.572
145.11	44.23	0.00	0.00	15.769	1.465	0.000	0.000	161.973	4.587
145.14	44.24	0.00	0.00	15.806	1.468	0.000	0.000	162.491	4.601
145.18	44.25	0.00	0.00	15.842	1.472	0.000	0.000	163.010	4.616
145.21	44.26	0.00	0.00	15.878	1.475	0.000	0.000	163.530	4.631
145.24	44.27	0.00	0.00	15.914	1.478	0.000	0.000	164.052	4.645
145.28	44.28	0.00	0.00	15.949	1.482	0.000	0.000	164.574	4.660
145.31	44.29	0.00	0.00	15.983	1.485	0.000	0.000	165.098	4.675
145.34	44.30	0.00	0.00	16.018	1.488	0.000	0.000	165.623	4.690
145.37	44.31	0.00	0.00	16.052	1.491	0.000	0.000	166.149	4.705
145.41	44.32	0.00	0.00	16.086	1.494	0.000	0.000	166.676	4.720
145.44	44.33	0.00	0.00	16.121	1.498	0.000	0.000	167.205	4.735
145.47	44.34	0.00	0.00	16.154	1.501	0.000	0.000	167.734	4.750
145.51	44.35	0.00	0.00	16.188	1.504	0.000	0.000	168.265	4.765
145.54	44.36	0.00	0.00	16.221	1.507	0.000	0.000	168.796	4.780

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
145.57	44.37	0.00	0.00	16.255	1.510	0.000	0.000	169.329	4.795
145.60	44.38	0.00	0.00	16.289	1.513	0.000	0.000	169.863	4.810
145.64	44.39	0.00	0.00	16.323	1.516	0.000	0.000	170.398	4.825
145.67	44.40	0.00	0.00	16.357	1.520	0.000	0.000	170.934	4.840
145.70	44.41	0.00	0.00	16.390	1.523	0.000	0.000	171.471	4.856
145.73	44.42	0.00	0.00	16.424	1.526	0.000	0.000	172.009	4.871
145.77	44.43	0.00	0.00	16.459	1.529	0.000	0.000	172.549	4.886
145.80	44.44	0.00	0.00	16.492	1.532	0.000	0.000	173.089	4.901
145.83	44.45	0.00	0.00	16.526	1.535	0.000	0.000	173.631	4.917
145.87	44.46	0.00	0.00	16.559	1.538	0.000	0.000	174.174	4.932
145.90	44.47	0.00	0.00	16.592	1.541	0.000	0.000	174.718	4.947
145.93	44.48	0.00	0.00	16.624	1.544	0.000	0.000	175.262	4.963
145.96	44.49	0.00	0.00	16.656	1.547	0.000	0.000	175.808	4.978
146.00	44.50	0.00	0.00	16.687	1.550	0.000	0.000	176.355	4.994
146.03	44.51	0.00	0.00	16.719	1.553	0.000	0.000	176.903	5.009
146.06	44.52	0.00	0.00	16.750	1.556	0.000	0.000	177.452	5.025
146.10	44.53	0.00	0.00	16.781	1.559	0.000	0.000	178.002	5.040
146.13	44.54	0.00	0.00	16.813	1.562	0.000	0.000	178.554	5.056
146.16	44.55	0.00	0.00	16.844	1.565	0.000	0.000	179.106	5.072
146.19	44.56	0.00	0.00	16.875	1.568	0.000	0.000	179.659	5.087
146.23	44.57	0.00	0.00	16.907	1.571	0.000	0.000	180.213	5.103
146.26	44.58	0.00	0.00	16.939	1.574	0.000	0.000	180.768	5.119
146.29	44.59	0.00	0.00	16.970	1.577	0.000	0.000	181.324	5.135
146.33	44.60	0.00	0.00	17.002	1.580	0.000	0.000	181.882	5.150



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
146.36	44.61	0.00	0.00	17.034	1.583	0.000	0.000	182.440	5.166
146.39	44.62	0.00	0.00	17.066	1.585	0.000	0.000	182.999	5.182
146.42	44.63	0.00	0.00	17.098	1.588	0.000	0.000	183.560	5.198
146.46	44.64	0.00	0.00	17.130	1.591	0.000	0.000	184.121	5.214
146.49	44.65	0.00	0.00	17.163	1.594	0.000	0.000	184.684	5.230
146.52	44.66	0.00	0.00	17.196	1.598	0.000	0.000	185.248	5.246
146.56	44.67	0.00	0.00	17.228	1.601	0.000	0.000	185.812	5.262
146.59	44.68	0.00	0.00	17.261	1.604	0.000	0.000	186.378	5.278
146.62	44.69	0.00	0.00	17.293	1.607	0.000	0.000	186.945	5.294
146.65	44.70	0.00	0.00	17.326	1.610	0.000	0.000	187.513	5.310
146.69	44.71	0.00	0.00	17.358	1.613	0.000	0.000	188.082	5.326
146.72	44.72	0.00	0.00	17.390	1.616	0.000	0.000	188.652	5.342
146.75	44.73	0.00	0.00	17.422	1.619	0.000	0.000	189.223	5.358
146.78	44.74	0.00	0.00	17.454	1.622	0.000	0.000	189.795	5.374
146.82	44.75	0.00	0.00	17.486	1.625	0.000	0.000	190.368	5.391
146.85	44.76	0.00	0.00	17.518	1.627	0.000	0.000	190.942	5.407
146.88	44.77	0.00	0.00	17.550	1.630	0.000	0.000	191.518	5.423
146.92	44.78	0.00	0.00	17.582	1.633	0.000	0.000	192.094	5.439
146.95	44.79	0.00	0.00	17.615	1.636	0.000	0.000	192.671	5.456
146.98	44.80	0.00	0.00	17.648	1.640	0.000	0.000	193.250	5.472
147.01	44.81	0.00	0.00	17.681	1.643	0.000	0.000	193.829	5.489
147.05	44.82	0.00	0.00	17.715	1.646	0.000	0.000	194.410	5.505
147.08	44.83	0.00	0.00	17.749	1.649	0.000	0.000	194.992	5.522
147.11	44.84	0.00	0.00	17.782	1.652	0.000	0.000	195.575	5.538

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
147.15	44.85	0.00	0.00	17.816	1.655	0.000	0.000	196.159	5.555
147.18	44.86	0.00	0.00	17.849	1.658	0.000	0.000	196.744	5.571
147.21	44.87	0.00	0.00	17.883	1.661	0.000	0.000	197.330	5.588
147.24	44.88	0.00	0.00	17.917	1.665	0.000	0.000	197.917	5.604
147.28	44.89	0.00	0.00	17.952	1.668	0.000	0.000	198.505	5.621
147.31	44.90	0.00	0.00	17.986	1.671	0.000	0.000	199.095	5.638
147.34	44.91	0.00	0.00	18.022	1.674	0.000	0.000	199.686	5.654
147.38	44.92	0.00	0.00	18.057	1.678	0.000	0.000	200.278	5.671
147.41	44.93	0.00	0.00	18.093	1.681	0.000	0.000	200.871	5.688
147.44	44.94	0.00	0.00	18.128	1.684	0.000	0.000	201.465	5.705
147.47	44.95	0.00	0.00	18.163	1.687	0.000	0.000	202.060	5.722
147.51	44.96	0.00	0.00	18.198	1.691	0.000	0.000	202.657	5.739
147.54	44.97	0.00	0.00	18.233	1.694	0.000	0.000	203.254	5.756
147.57	44.98	0.00	0.00	18.267	1.697	0.000	0.000	203.853	5.772
147.60	44.99	0.00	0.00	18.302	1.700	0.000	0.000	204.453	5.789
147.64	45.00	0.00	0.00	18.336	1.703	0.000	0.000	205.054	5.806
147.67	45.01	0.00	0.00	18.370	1.707	0.000	0.000	205.656	5.824
147.70	45.02	0.00	0.00	18.404	1.710	0.000	0.000	206.259	5.841
147.74	45.03	0.00	0.00	18.438	1.713	0.000	0.000	206.864	5.858
147.77	45.04	0.00	0.00	18.471	1.716	0.000	0.000	207.469	5.875
147.80	45.05	0.00	0.00	18.504	1.719	0.000	0.000	208.076	5.892
147.83	45.06	0.00	0.00	18.537	1.722	0.000	0.000	208.683	5.909
147.87	45.07	0.00	0.00	18.571	1.725	0.000	0.000	209.292	5.926
147.90	45.08	0.00	0.00	18.604	1.728	0.000	0.000	209.902	5.944

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
147.93	45.09	0.00	0.00	18.637	1.731	0.000	0.000	210.513	5.961
147.97	45.10	0.00	0.00	18.671	1.735	0.000	0.000	211.125	5.978
148.00	45.11	0.00	0.00	18.704	1.738	0.000	0.000	211.738	5.996
148.03	45.12	0.00	0.00	18.737	1.741	0.000	0.000	212.352	6.013
148.06	45.13	0.00	0.00	18.770	1.744	0.000	0.000	212.967	6.031
148.10	45.14	0.00	0.00	18.804	1.747	0.000	0.000	213.584	6.048
148.13	45.15	0.00	0.00	18.836	1.750	0.000	0.000	214.201	6.065
148.16	45.16	0.00	0.00	18.869	1.753	0.000	0.000	214.820	6.083
148.20	45.17	0.00	0.00	18.902	1.756	0.000	0.000	215.439	6.101
148.23	45.18	0.00	0.00	18.935	1.759	0.000	0.000	216.060	6.118
148.26	45.19	0.00	0.00	18.967	1.762	0.000	0.000	216.682	6.136
148.29	45.20	0.00	0.00	19.001	1.765	0.000	0.000	217.304	6.153
148.33	45.21	0.00	0.00	19.034	1.768	0.000	0.000	217.928	6.171
148.36	45.22	0.00	0.00	19.067	1.771	0.000	0.000	218.553	6.189
148.39	45.23	0.00	0.00	19.100	1.774	0.000	0.000	219.180	6.206
148.43	45.24	0.00	0.00	19.132	1.777	0.000	0.000	219.807	6.224
148.46	45.25	0.00	0.00	19.165	1.780	0.000	0.000	220.435	6.242
148.49	45.26	0.00	0.00	19.197	1.784	0.000	0.000	221.064	6.260
148.52	45.27	0.00	0.00	19.230	1.787	0.000	0.000	221.695	6.278
148.56	45.28	0.00	0.00	19.263	1.790	0.000	0.000	222.326	6.296
148.59	45.29	0.00	0.00	19.295	1.793	0.000	0.000	222.959	6.313
148.62	45.30	0.00	0.00	19.329	1.796	0.000	0.000	223.592	6.331
148.65	45.31	0.00	0.00	19.362	1.799	0.000	0.000	224.227	6.349
148.69	45.32	0.00	0.00	19.396	1.802	0.000	0.000	224.863	6.367

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
148.72	45.33	0.00	0.00	19.430	1.805	0.000	0.000	225.500	6.385
148.75	45.34	0.00	0.00	19.464	1.808	0.000	0.000	226.138	6.403
148.79	45.35	0.00	0.00	19.498	1.811	0.000	0.000	226.777	6.422
148.82	45.36	0.00	0.00	19.532	1.815	0.000	0.000	227.417	6.440
148.85	45.37	0.00	0.00	19.566	1.818	0.000	0.000	228.058	6.458
148.88	45.38	0.00	0.00	19.600	1.821	0.000	0.000	228.701	6.476
148.92	45.39	0.00	0.00	19.633	1.824	0.000	0.000	229.344	6.494
148.95	45.40	0.00	0.00	19.667	1.827	0.000	0.000	229.989	6.513
148.98	45.41	0.00	0.00	19.701	1.830	0.000	0.000	230.635	6.531
149.02	45.42	0.00	0.00	19.734	1.833	0.000	0.000	231.282	6.549
149.05	45.43	0.00	0.00	19.767	1.836	0.000	0.000	231.930	6.568
149.08	45.44	0.00	0.00	19.801	1.840	0.000	0.000	232.579	6.586
149.11	45.45	0.03	0.01	19.834	1.843	0.650	0.018	233.229	6.604
149.15	45.46	0.07	0.02	19.867	1.846	1.301	0.037	233.880	6.623
149.18	45.47	0.10	0.03	19.900	1.849	1.954	0.055	234.533	6.641
149.21	45.48	0.13	0.04	19.933	1.852	2.607	0.074	235.186	6.660
149.25	45.49	0.16	0.05	19.966	1.855	3.262	0.092	235.841	6.678
149.28	45.50	0.20	0.06	19.999	1.858	3.917	0.111	236.496	6.697
149.31	45.51	0.23	0.07	20.033	1.861	4.574	0.130	237.153	6.715
149.34	45.52	0.26	0.08	20.066	1.864	5.232	0.148	237.811	6.734
149.38	45.53	0.30	0.09	20.100	1.867	5.891	0.167	238.470	6.753
149.41	45.54	0.33	0.10	20.134	1.871	6.551	0.185	239.130	6.771
149.44	45.55	0.36	0.11	20.168	1.874	7.212	0.204	239.791	6.790
149.48	45.56	0.39	0.12	20.202	1.877	7.874	0.223	240.453	6.809

O.S.L/D.S.L

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
149.51	45.57	0.43	0.13	20.235	1.880	8.537	0.242	241.116	6.828
149.54	45.58	0.46	0.14	20.268	1.883	9.202	0.261	241.781	6.846
149.57	45.59	0.49	0.15	20.302	1.886	9.867	0.279	242.446	6.865
149.61	45.60	0.52	0.16	20.336	1.889	10.534	0.298	243.113	6.884
149.64	45.61	0.56	0.17	20.369	1.892	11.202	0.317	243.781	6.903
149.67	45.62	0.59	0.18	20.403	1.895	11.871	0.336	244.449	6.922
149.70	45.63	0.62	0.19	20.436	1.899	12.540	0.355	245.119	6.941
149.74	45.64	0.66	0.20	20.470	1.902	13.212	0.374	245.790	6.960
149.77	45.65	0.69	0.21	20.503	1.905	13.884	0.393	246.463	6.979
149.80	45.66	0.72	0.22	20.537	1.908	14.557	0.412	247.136	6.998
149.84	45.67	0.75	0.23	20.570	1.911	15.231	0.431	247.810	7.017
149.87	45.68	0.79	0.24	20.604	1.914	15.907	0.450	248.486	7.036
149.90	45.69	0.82	0.25	20.638	1.917	16.583	0.470	249.162	7.055
149.93	45.70	0.85	0.26	20.673	1.921	17.261	0.489	249.840	7.075
149.97	45.71	0.89	0.27	20.707	1.924	17.940	0.508	250.519	7.094
150.00	45.72	0.92	0.28	20.742	1.927	18.620	0.527	251.199	7.113
150.03	45.73	0.95	0.29	20.777	1.930	19.301	0.547	251.880	7.132
150.07	45.74	0.98	0.30	20.813	1.934	19.983	0.566	252.562	7.152
150.10	45.75	1.02	0.31	20.848	1.937	20.666	0.585	253.245	7.171
150.13	45.76	1.05	0.32	20.884	1.940	21.351	0.605	253.930	7.190
150.16	45.77	1.08	0.33	20.919	1.943	22.037	0.624	254.616	7.210
150.20	45.78	1.12	0.34	20.955	1.947	22.724	0.643	255.302	7.229
150.23	45.79	1.15	0.35	20.991	1.950	23.412	0.663	255.991	7.249
150.26	45.80	1.18	0.36	21.027	1.953	24.101	0.682	256.680	7.268

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
150.30	45.81	1.21	0.37	21.064	1.957	24.791	0.702	257.370	7.288
150.33	45.82	1.25	0.38	21.101	1.960	25.483	0.722	258.062	7.307
150.36	45.83	1.28	0.39	21.138	1.964	26.176	0.741	258.755	7.327
150.39	45.84	1.31	0.40	21.175	1.967	26.870	0.761	259.449	7.347
150.43	45.85	1.35	0.41	21.212	1.971	27.565	0.781	260.144	7.366
150.46	45.86	1.38	0.42	21.249	1.974	28.262	0.800	260.841	7.386
150.49	45.87	1.41	0.43	21.286	1.978	28.960	0.820	261.539	7.406
150.52	45.88	1.44	0.44	21.323	1.981	29.659	0.840	262.238	7.426
150.56	45.89	1.48	0.45	21.360	1.984	30.359	0.860	262.938	7.446
150.59	45.90	1.51	0.46	21.397	1.988	31.060	0.880	263.639	7.465
150.62	45.91	1.54	0.47	21.435	1.991	31.763	0.899	264.342	7.485
150.66	45.92	1.57	0.48	21.472	1.995	32.467	0.919	265.046	7.505
150.69	45.93	1.61	0.49	21.509	1.998	33.172	0.939	265.751	7.525
150.72	45.94	1.64	0.50	21.547	2.002	33.878	0.959	266.457	7.545
150.75	45.95	1.67	0.51	21.584	2.005	34.586	0.979	267.165	7.565
150.79	45.96	1.71	0.52	21.623	2.009	35.294	0.999	267.873	7.585
150.82	45.97	1.74	0.53	21.662	2.012	36.004	1.020	268.583	7.605
150.85	45.98	1.77	0.54	21.701	2.016	36.716	1.040	269.295	7.626
150.89	45.99	1.80	0.55	21.741	2.020	37.428	1.060	270.007	7.646
150.92	46.00	1.84	0.56	21.781	2.024	38.142	1.080	270.721	7.666
150.95	46.01	1.87	0.57	21.822	2.027	38.858	1.100	271.437	7.686
150.98	46.02	1.90	0.58	21.862	2.031	39.574	1.121	272.153	7.707
151.02	46.03	1.94	0.59	21.903	2.035	40.292	1.141	272.871	7.727
151.05	46.04	1.97	0.60	21.943	2.039	41.011	1.161	273.590	7.747

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
151.08	46.05	2.00	0.61	21.984	2.042	41.732	1.182	274.311	7.768
151.12	46.06	2.03	0.62	22.025	2.046	42.454	1.202	275.033	7.788
151.15	46.07	2.07	0.63	22.065	2.050	43.177	1.223	275.756	7.809
151.18	46.08	2.10	0.64	22.105	2.054	43.902	1.243	276.481	7.829
151.21	46.09	2.13	0.65	22.145	2.057	44.628	1.264	277.207	7.850
151.25	46.10	2.17	0.66	22.186	2.061	45.355	1.284	277.934	7.870
151.28	46.11	2.20	0.67	22.226	2.065	46.084	1.305	278.662	7.891
151.31	46.12	2.23	0.68	22.267	2.069	46.813	1.326	279.392	7.912
151.35	46.13	2.26	0.69	22.309	2.073	47.545	1.346	280.124	7.932
151.38	46.14	2.30	0.70	22.352	2.077	48.277	1.367	280.856	7.953
151.41	46.15	2.33	0.71	22.394	2.080	49.011	1.388	281.590	7.974
151.44	46.16	2.36	0.72	22.436	2.084	49.747	1.409	282.326	7.995
151.48	46.17	2.40	0.73	22.478	2.088	50.483	1.430	283.062	8.015
151.51	46.18	2.43	0.74	22.521	2.092	51.222	1.450	283.801	8.036
151.54	46.19	2.46	0.75	22.563	2.096	51.961	1.471	284.540	8.057
151.57	46.20	2.49	0.76	22.607	2.100	52.702	1.492	285.281	8.078
151.61	46.21	2.53	0.77	22.651	2.104	53.445	1.513	286.024	8.099
151.64	46.22	2.56	0.78	22.695	2.108	54.189	1.534	286.767	8.120
151.67	46.23	2.59	0.79	22.740	2.113	54.934	1.556	287.513	8.141
151.71	46.24	2.62	0.80	22.784	2.117	55.681	1.577	288.259	8.163
151.74	46.25	2.66	0.81	22.829	2.121	56.429	1.598	289.008	8.184
151.77	46.26	2.69	0.82	22.874	2.125	57.179	1.619	289.757	8.205
151.80	46.27	2.72	0.83	22.920	2.129	57.930	1.640	290.509	8.226
151.84	46.28	2.76	0.84	22.966	2.134	58.683	1.662	291.261	8.248

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
151.87	46.29	2.79	0.85	23.013	2.138	59.437	1.683	292.016	8.269
151.90	46.30	2.82	0.86	23.060	2.142	60.193	1.704	292.771	8.290
151.94	46.31	2.85	0.87	23.107	2.147	60.950	1.726	293.529	8.312
151.97	46.32	2.89	0.88	23.155	2.151	61.709	1.747	294.288	8.333
152.00	46.33	2.92	0.89	23.203	2.156	62.469	1.769	295.048	8.355
152.03	46.34	2.95	0.90	23.252	2.160	63.231	1.791	295.810	8.376
152.07	46.35	2.99	0.91	23.300	2.165	63.995	1.812	296.574	8.398
152.10	46.36	3.02	0.92	23.349	2.169	64.760	1.834	297.339	8.420
152.13	46.37	3.05	0.93	23.398	2.174	65.527	1.856	298.106	8.441
152.17	46.38	3.08	0.94	23.447	2.178	66.296	1.877	298.874	8.463
152.20	46.39	3.12	0.95	23.497	2.183	67.066	1.899	299.644	8.485
152.23	46.40	3.15	0.96	23.546	2.187	67.837	1.921	300.416	8.507
152.26	46.41	3.18	0.97	23.595	2.192	68.611	1.943	301.189	8.529
152.30	46.42	3.22	0.98	23.644	2.197	69.386	1.965	301.964	8.551
152.33	46.43	3.25	0.99	23.693	2.201	70.162	1.987	302.741	8.573
152.36	46.44	3.28	1.00	23.742	2.206	70.940	2.009	303.519	8.595
152.40	46.45	3.31	1.01	23.791	2.210	71.720	2.031	304.299	8.617
152.43	46.46	3.35	1.02	23.840	2.215	72.501	2.053	305.080	8.639
152.46	46.47	3.38	1.03	23.889	2.219	73.284	2.075	305.863	8.661
152.49	46.48	3.41	1.04	23.939	2.224	74.069	2.097	306.648	8.683
152.53	46.49	3.44	1.05	23.988	2.229	74.855	2.120	307.434	8.706
152.56	46.50	3.48	1.06	24.037	2.233	75.643	2.142	308.222	8.728
152.59	46.51	3.51	1.07	24.086	2.238	76.432	2.164	309.011	8.750
152.62	46.52	3.54	1.08	24.135	2.242	77.223	2.187	309.802	8.773



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
152.66	46.53	3.58	1.09	24.184	2.247	78.016	2.209	310.595	8.795
152.69	46.54	3.61	1.10	24.234	2.251	78.810	2.232	311.389	8.818
152.72	46.55	3.64	1.11	24.284	2.256	79.606	2.254	312.185	8.840
152.76	46.56	3.67	1.12	24.334	2.261	80.404	2.277	312.982	8.863
152.79	46.57	3.71	1.13	24.384	2.265	81.203	2.299	313.782	8.885
152.82	46.58	3.74	1.14	24.435	2.270	82.004	2.322	314.583	8.908
152.85	46.59	3.77	1.15	24.487	2.275	82.806	2.345	315.385	8.931
152.89	46.60	3.81	1.16	24.539	2.280	83.610	2.368	316.189	8.953
152.92	46.61	3.84	1.17	24.592	2.285	84.416	2.390	316.995	8.976
152.95	46.62	3.87	1.18	24.644	2.290	85.224	2.413	317.803	8.999
152.99	46.63	3.90	1.19	24.697	2.294	86.033	2.436	318.612	9.022
153.02	46.64	3.94	1.20	24.750	2.299	86.845	2.459	319.423	9.045
153.05	46.65	3.97	1.21	24.803	2.304	87.657	2.482	320.236	9.068
153.08	46.66	4.00	1.22	24.856	2.309	88.472	2.505	321.051	9.091
153.12	46.67	4.04	1.23	24.910	2.314	89.288	2.528	321.867	9.114
153.15	46.68	4.07	1.24	24.963	2.319	90.107	2.552	322.685	9.137
153.18	46.69	4.10	1.25	25.018	2.324	90.926	2.575	323.505	9.161
153.22	46.70	4.13	1.26	25.072	2.329	91.748	2.598	324.327	9.184
153.25	46.71	4.17	1.27	25.128	2.334	92.572	2.621	325.151	9.207
153.28	46.72	4.20	1.28	25.184	2.340	93.397	2.645	325.976	9.231
153.31	46.73	4.23	1.29	25.239	2.345	94.224	2.668	326.803	9.254
153.35	46.74	4.27	1.30	25.294	2.350	95.053	2.692	327.632	9.277
153.38	46.75	4.30	1.31	25.350	2.355	95.884	2.715	328.463	9.301
153.41	46.76	4.33	1.32	25.405	2.360	96.716	2.739	329.295	9.325

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
153.44	46.77	4.36	1.33	25.461	2.365	97.551	2.762	330.130	9.348
153.48	46.78	4.40	1.34	25.517	2.371	98.387	2.786	330.966	9.372
153.51	46.79	4.43	1.35	25.574	2.376	99.225	2.810	331.804	9.396
153.54	46.80	4.46	1.36	25.631	2.381	100.065	2.834	332.644	9.419
153.58	46.81	4.49	1.37	25.689	2.387	100.907	2.857	333.486	9.443
153.61	46.82	4.53	1.38	25.746	2.392	101.751	2.881	334.330	9.467
153.64	46.83	4.56	1.39	25.803	2.397	102.596	2.905	335.175	9.491
153.67	46.84	4.59	1.40	25.861	2.403	103.444	2.929	336.023	9.515
153.71	46.85	4.63	1.41	25.919	2.408	104.293	2.953	336.872	9.539
153.74	46.86	4.66	1.42	25.976	2.413	105.145	2.977	337.724	9.563
153.77	46.87	4.69	1.43	26.034	2.419	105.998	3.002	338.577	9.587
153.81	46.88	4.72	1.44	26.092	2.424	106.853	3.026	339.432	9.612
153.84	46.89	4.76	1.45	26.151	2.429	107.710	3.050	340.289	9.636
153.87	46.90	4.79	1.46	26.210	2.435	108.569	3.074	341.148	9.660
153.90	46.91	4.82	1.47	26.268	2.440	109.430	3.099	342.009	9.685
153.94	46.92	4.86	1.48	26.327	2.446	110.293	3.123	342.871	9.709
153.97	46.93	4.89	1.49	26.386	2.451	111.157	3.148	343.736	9.734
154.00	46.94	4.92	1.50	26.444	2.457	112.024	3.172	344.603	9.758
154.04	46.95	4.95	1.51	26.501	2.462	112.892	3.197	345.471	9.783
154.07	46.96	4.99	1.52	26.559	2.467	113.763	3.221	346.342	9.807
154.10	46.97	5.02	1.53	26.618	2.473	114.635	3.246	347.214	9.832
154.13	46.98	5.05	1.54	26.677	2.478	115.509	3.271	348.088	9.857
154.17	46.99	5.09	1.55	26.737	2.484	116.386	3.296	348.965	9.882
154.20	47.00	5.12	1.56	26.797	2.489	117.264	3.321	349.843	9.906

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
154.23	47.01	5.15	1.57	26.857	2.495	118.144	3.345	350.723	9.931
154.27	47.02	5.18	1.58	26.917	2.501	119.026	3.370	351.605	9.956
154.30	47.03	5.22	1.59	26.979	2.506	119.910	3.395	352.489	9.981
154.33	47.04	5.25	1.60	27.040	2.512	120.796	3.421	353.375	10.006
154.36	47.05	5.28	1.61	27.101	2.518	121.685	3.446	354.263	10.032
154.40	47.06	5.31	1.62	27.161	2.523	122.575	3.471	355.154	10.057
154.43	47.07	5.35	1.63	27.223	2.529	123.467	3.496	356.046	10.082
154.46	47.08	5.38	1.64	27.283	2.535	124.361	3.522	356.940	10.107
154.49	47.09	5.41	1.65	27.344	2.540	125.257	3.547	357.836	10.133
154.53	47.10	5.45	1.66	27.405	2.546	126.155	3.572	358.734	10.158
154.56	47.11	5.48	1.67	27.466	2.552	127.055	3.598	359.634	10.184
154.59	47.12	5.51	1.68	27.527	2.557	127.957	3.623	360.536	10.209
154.63	47.13	5.54	1.69	27.588	2.563	128.862	3.649	361.440	10.235
154.66	47.14	5.58	1.70	27.648	2.569	129.768	3.675	362.347	10.261
154.69	47.15	5.61	1.71	27.709	2.574	130.676	3.700	363.255	10.286
154.72	47.16	5.64	1.72	27.770	2.580	131.586	3.726	364.165	10.312
154.76	47.17	5.68	1.73	27.831	2.586	132.498	3.752	365.077	10.338
154.79	47.18	5.71	1.74	27.891	2.591	133.412	3.778	365.991	10.364
154.82	47.19	5.74	1.75	27.953	2.597	134.328	3.804	366.907	10.390
154.86	47.20	5.77	1.76	28.014	2.603	135.246	3.830	367.825	10.416
154.89	47.21	5.81	1.77	28.076	2.608	136.166	3.856	368.745	10.442
154.92	47.22	5.84	1.78	28.138	2.614	137.088	3.882	369.667	10.468
154.95	47.23	5.87	1.79	28.199	2.620	138.013	3.908	370.591	10.494
154.99	47.24	5.91	1.80	28.260	2.625	138.939	3.934	371.518	10.520

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
155.02	47.25	5.94	1.81	28.321	2.631	139.867	3.961	372.446	10.546
155.05	47.26	5.97	1.82	28.382	2.637	140.797	3.987	373.376	10.573
155.09	47.27	6.00	1.83	28.443	2.642	141.729	4.013	374.308	10.599
155.12	47.28	6.04	1.84	28.504	2.648	142.663	4.040	375.242	10.626
155.15	47.29	6.07	1.85	28.565	2.654	143.600	4.066	376.178	10.652
155.18	47.30	6.10	1.86	28.627	2.660	144.538	4.093	377.117	10.679
155.22	47.31	6.14	1.87	28.690	2.665	145.478	4.119	378.057	10.705
155.25	47.32	6.17	1.88	28.753	2.671	146.420	4.146	378.999	10.732
155.28	47.33	6.20	1.89	28.816	2.677	147.365	4.173	379.944	10.759
155.31	47.34	6.23	1.90	28.878	2.683	148.311	4.200	380.890	10.786
155.35	47.35	6.27	1.91	28.942	2.689	149.260	4.227	381.839	10.812
155.38	47.36	6.30	1.92	29.005	2.695	150.210	4.253	382.789	10.839
155.41	47.37	6.33	1.93	29.069	2.701	151.163	4.280	383.742	10.866
155.45	47.38	6.36	1.94	29.132	2.706	152.118	4.307	384.697	10.893
155.48	47.39	6.40	1.95	29.196	2.712	153.074	4.335	385.653	10.920
155.51	47.40	6.43	1.96	29.260	2.718	154.033	4.362	386.612	10.948
155.54	47.41	6.46	1.97	29.323	2.724	154.994	4.389	387.573	10.975
155.58	47.42	6.50	1.98	29.386	2.730	155.958	4.416	388.536	11.002
155.61	47.43	6.53	1.99	29.449	2.736	156.923	4.444	389.502	11.029
155.64	47.44	6.56	2.00	29.512	2.742	157.890	4.471	390.469	11.057
155.68	47.45	6.59	2.01	29.576	2.748	158.859	4.498	391.438	11.084
155.71	47.46	6.63	2.02	29.639	2.754	159.831	4.526	392.409	11.112
155.74	47.47	6.66	2.03	29.702	2.759	160.804	4.553	393.383	11.139
155.77	47.48	6.69	2.04	29.765	2.765	161.780	4.581	394.358	11.167

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
155.81	47.49	6.73	2.05	29.829	2.771	162.757	4.609	395.336	11.195
155.84	47.50	6.76	2.06	29.893	2.777	163.737	4.637	396.316	11.222
155.87	47.51	6.79	2.07	29.958	2.783	164.719	4.664	397.297	11.250
155.91	47.52	6.82	2.08	30.022	2.789	165.703	4.692	398.281	11.278
155.94	47.53	6.86	2.09	30.085	2.795	166.689	4.720	399.267	11.306
155.97	47.54	6.89	2.10	30.148	2.801	167.677	4.748	400.255	11.334
156.00	47.55	6.92	2.11	30.211	2.807	168.667	4.776	401.246	11.362
156.04	47.56	6.96	2.12	30.274	2.813	169.659	4.804	402.238	11.390
156.07	47.57	6.99	2.13	30.338	2.818	170.653	4.832	403.232	11.418
156.10	47.58	7.02	2.14	30.401	2.824	171.650	4.861	404.228	11.446
156.14	47.59	7.05	2.15	30.465	2.830	172.648	4.889	405.227	11.475
156.17	47.60	7.09	2.16	30.529	2.836	173.649	4.917	406.228	11.503
156.20	47.61	7.12	2.17	30.594	2.842	174.651	4.946	407.230	11.531
156.23	47.62	7.15	2.18	30.659	2.848	175.656	4.974	408.235	11.560
156.27	47.63	7.19	2.19	30.724	2.854	176.663	5.003	409.242	11.588
156.30	47.64	7.22	2.20	30.790	2.860	177.672	5.031	410.251	11.617
156.33	47.65	7.25	2.21	30.856	2.867	178.683	5.060	411.262	11.646
156.36	47.66	7.28	2.22	30.923	2.873	179.697	5.088	412.276	11.674
156.40	47.67	7.32	2.23	30.992	2.879	180.713	5.117	413.291	11.703
156.43	47.68	7.35	2.24	31.062	2.886	181.730	5.146	414.309	11.732
156.46	47.69	7.38	2.25	31.132	2.892	182.751	5.175	415.330	11.761
156.50	47.70	7.41	2.26	31.201	2.899	183.773	5.204	416.352	11.790
156.53	47.71	7.45	2.27	31.269	2.905	184.798	5.233	417.377	11.819
156.56	47.72	7.48	2.28	31.338	2.911	185.825	5.262	418.404	11.848

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
156.59	47.73	7.51	2.29	31.407	2.918	186.854	5.291	419.433	11.877
156.63	47.74	7.55	2.30	31.477	2.924	187.886	5.320	420.465	11.906
156.66	47.75	7.58	2.31	31.547	2.931	188.920	5.350	421.499	11.936
156.69	47.76	7.61	2.32	31.619	2.937	189.956	5.379	422.535	11.965
156.73	47.77	7.64	2.33	31.691	2.944	190.995	5.408	423.573	11.994
156.76	47.78	7.68	2.34	31.765	2.951	192.035	5.438	424.614	12.024
156.79	47.79	7.71	2.35	31.839	2.958	193.079	5.467	425.658	12.053
156.82	47.80	7.74	2.36	31.913	2.965	194.125	5.497	426.704	12.083
156.86	47.81	7.78	2.37	31.986	2.972	195.173	5.527	427.752	12.113
156.89	47.82	7.81	2.38	32.059	2.978	196.223	5.556	428.802	12.142
156.92	47.83	7.84	2.39	32.132	2.985	197.277	5.586	429.855	12.172
156.96	47.84	7.87	2.40	32.207	2.992	198.332	5.616	430.911	12.202
156.99	47.85	7.91	2.41	32.282	2.999	199.390	5.646	431.969	12.232
157.02	47.86	7.94	2.42	32.358	3.006	200.450	5.676	433.029	12.262
157.05	47.87	7.97	2.43	32.436	3.013	201.513	5.706	434.092	12.292
157.09	47.88	8.01	2.44	32.516	3.021	202.579	5.736	435.157	12.322
157.12	47.89	8.04	2.45	32.594	3.028	203.647	5.767	436.226	12.353
157.15	47.90	8.07	2.46	32.671	3.035	204.717	5.797	437.296	12.383
157.19	47.91	8.10	2.47	32.747	3.042	205.790	5.827	438.369	12.413
157.22	47.92	8.14	2.48	32.822	3.049	206.866	5.858	439.445	12.444
157.25	47.93	8.17	2.49	32.898	3.056	207.944	5.888	440.523	12.474
157.28	47.94	8.20	2.50	32.973	3.063	209.025	5.919	441.604	12.505
157.32	47.95	8.23	2.51	33.049	3.070	210.108	5.950	442.687	12.535
157.35	47.96	8.27	2.52	33.124	3.077	211.193	5.980	443.772	12.566

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
157.38	47.97	8.30	2.53	33.199	3.084	212.281	6.011	444.860	12.597
157.41	47.98	8.33	2.54	33.274	3.091	213.372	6.042	445.951	12.628
157.45	47.99	8.37	2.55	33.349	3.098	214.465	6.073	447.043	12.659
157.48	48.00	8.40	2.56	33.425	3.105	215.560	6.104	448.139	12.690
157.51	48.01	8.43	2.57	33.502	3.112	216.658	6.135	449.237	12.721
157.55	48.02	8.46	2.58	33.580	3.120	217.758	6.166	450.337	12.752
157.58	48.03	8.50	2.59	33.659	3.127	218.861	6.197	451.440	12.783
157.61	48.04	8.53	2.60	33.739	3.134	219.967	6.229	452.546	12.815
157.64	48.05	8.56	2.61	33.820	3.142	221.075	6.260	453.654	12.846
157.68	48.06	8.60	2.62	33.902	3.150	222.186	6.292	454.765	12.877
157.71	48.07	8.63	2.63	33.984	3.157	223.300	6.323	455.878	12.909
157.74	48.08	8.66	2.64	34.066	3.165	224.416	6.355	456.995	12.941
157.78	48.09	8.69	2.65	34.149	3.173	225.535	6.386	458.114	12.972
157.81	48.10	8.73	2.66	34.232	3.180	226.657	6.418	459.236	13.004
157.84	48.11	8.76	2.67	34.316	3.188	227.781	6.450	460.360	13.036
157.87	48.12	8.79	2.68	34.401	3.196	228.908	6.482	461.487	13.068
157.91	48.13	8.83	2.69	34.487	3.204	230.038	6.514	462.617	13.100
157.94	48.14	8.86	2.70	34.576	3.212	231.171	6.546	463.750	13.132
157.97	48.15	8.89	2.71	34.665	3.221	232.307	6.578	464.886	13.164
158.01	48.16	8.92	2.72	34.755	3.229	233.446	6.610	466.025	13.196
158.04	48.17	8.96	2.73	34.846	3.237	234.588	6.643	467.167	13.229
158.07	48.18	8.99	2.74	34.940	3.246	235.732	6.675	468.311	13.261
158.10	48.19	9.02	2.75	35.035	3.255	236.880	6.708	469.459	13.294
158.14	48.20	9.06	2.76	35.131	3.264	238.031	6.740	470.610	13.326

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
158.17	48.21	9.09	2.77	35.230	3.273	239.186	6.773	471.765	13.359
158.20	48.22	9.12	2.78	35.332	3.282	240.343	6.806	472.922	13.392
158.23	48.23	9.15	2.79	35.437	3.292	241.504	6.839	474.083	13.425
158.27	48.24	9.19	2.80	35.545	3.302	242.668	6.872	475.247	13.457
158.30	48.25	9.22	2.81	35.656	3.313	243.836	6.905	476.415	13.491
158.33	48.26	9.25	2.82	35.770	3.323	245.008	6.938	477.587	13.524
158.37	48.27	9.28	2.83	35.888	3.334	246.184	6.971	478.763	13.557
158.40	48.28	9.32	2.84	36.008	3.345	247.363	7.005	479.942	13.590
158.43	48.29	9.35	2.85	36.141	3.358	248.547	7.038	481.125	13.624
158.46	48.30	9.38	2.86	36.282	3.371	249.735	7.072	482.314	13.658
158.50	48.31	9.42	2.87	36.432	3.385	250.927	7.105	483.506	13.691
158.53	48.32	9.45	2.88	36.596	3.400	252.125	7.139	484.704	13.725
158.56	48.33	9.48	2.89	36.793	3.418	253.329	7.173	485.908	13.759
158.60	48.34	9.51	2.90	36.989	3.436	254.540	7.208	487.118	13.794
158.63	48.35	9.55	2.91	37.196	3.456	255.757	7.242	488.335	13.828
158.66	48.36	9.58	2.92	37.401	3.475	256.980	7.277	489.559	13.863
158.69	48.37	9.61	2.93	37.597	3.493	258.211	7.312	490.789	13.898
158.73	48.38	9.65	2.94	37.787	3.511	259.447	7.347	492.026	13.933
158.76	48.39	9.68	2.95	37.971	3.528	260.690	7.382	493.269	13.968
158.79	48.40	9.71	2.96	38.146	3.544	261.939	7.417	494.518	14.003
158.83	48.41	9.74	2.97	38.315	3.560	263.193	7.453	495.772	14.039
158.86	48.42	9.78	2.98	38.478	3.575	264.453	7.488	497.032	14.074
158.89	48.43	9.81	2.99	38.640	3.590	265.718	7.524	498.297	14.110
158.92	48.44	9.84	3.00	38.797	3.604	266.988	7.560	499.567	14.146



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
158.96	48.45	9.88	3.01	38.954	3.619	268.264	7.596	500.842	14.182
158.99	48.46	9.91	3.02	39.108	3.633	269.544	7.633	502.123	14.219
159.02	48.47	9.94	3.03	39.257	3.647	270.830	7.669	503.409	14.255
159.06	48.48	9.97	3.04	39.401	3.660	272.120	7.706	504.699	14.291
159.09	48.49	10.01	3.05	39.542	3.674	273.415	7.742	505.994	14.328
159.12	48.50	10.04	3.06	39.681	3.687	274.715	7.779	507.293	14.365
159.15	48.51	10.07	3.07	39.824	3.700	276.019	7.816	508.598	14.402
159.19	48.52	10.10	3.08	39.967	3.713	277.328	7.853	509.907	14.439
159.22	48.53	10.14	3.09	40.110	3.726	278.641	7.890	511.220	14.476
159.25	48.54	10.17	3.10	40.252	3.740	279.960	7.928	512.539	14.513
159.28	48.55	10.20	3.11	40.393	3.753	281.283	7.965	513.861	14.551
159.32	48.56	10.24	3.12	40.535	3.766	282.610	8.003	515.189	14.589
159.35	48.57	10.27	3.13	40.674	3.779	283.942	8.040	516.521	14.626
159.38	48.58	10.30	3.14	40.813	3.792	285.279	8.078	517.858	14.664
159.42	48.59	10.33	3.15	40.955	3.805	286.620	8.116	519.199	14.702
159.45	48.60	10.37	3.16	41.101	3.818	287.966	8.154	520.545	14.740
159.48	48.61	10.40	3.17	41.249	3.832	289.317	8.193	521.896	14.778
159.51	48.62	10.43	3.18	41.399	3.846	290.673	8.231	523.252	14.817
159.55	48.63	10.47	3.19	41.549	3.860	292.034	8.269	524.613	14.855
159.58	48.64	10.50	3.20	41.695	3.874	293.399	8.308	525.978	14.894
159.61	48.65	10.53	3.21	41.840	3.887	294.770	8.347	527.349	14.933
159.65	48.66	10.56	3.22	41.987	3.901	296.145	8.386	528.724	14.972
159.68	48.67	10.60	3.23	42.133	3.914	297.525	8.425	530.104	15.011
159.71	48.68	10.63	3.24	42.280	3.928	298.910	8.464	531.488	15.050

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
159.74	48.69	10.66	3.25	42.428	3.942	300.299	8.504	532.878	15.089
159.78	48.70	10.70	3.26	42.582	3.956	301.694	8.543	534.273	15.129
159.81	48.71	10.73	3.27	42.732	3.970	303.093	8.583	535.672	15.169
159.84	48.72	10.76	3.28	42.882	3.984	304.498	8.622	537.077	15.208
159.88	48.73	10.79	3.29	43.035	3.998	305.907	8.662	538.486	15.248
159.91	48.74	10.83	3.30	43.184	4.012	307.321	8.702	539.900	15.288
159.94	48.75	10.86	3.31	43.331	4.026	308.741	8.743	541.319	15.328
159.97	48.76	10.89	3.32	43.481	4.040	310.165	8.783	542.744	15.369
160.01	48.77	10.93	3.33	43.631	4.053	311.594	8.823	544.173	15.409
160.04	48.78	10.96	3.34	43.782	4.067	313.028	8.864	545.607	15.450
160.07	48.79	10.99	3.35	43.933	4.081	314.467	8.905	547.045	15.491
160.10	48.80	11.02	3.36	44.082	4.095	315.910	8.946	548.489	15.531
160.14	48.81	11.06	3.37	44.231	4.109	317.359	8.987	549.938	15.572
160.17	48.82	11.09	3.38	44.381	4.123	318.813	9.028	551.392	15.614
160.20	48.83	11.12	3.39	44.527	4.137	320.271	9.069	552.850	15.655
160.24	48.84	11.15	3.40	44.669	4.150	321.734	9.110	554.313	15.696
160.27	48.85	11.19	3.41	44.811	4.163	323.202	9.152	555.781	15.738
160.30	48.86	11.22	3.42	44.951	4.176	324.675	9.194	557.254	15.780
160.33	48.87	11.25	3.43	45.091	4.189	326.152	9.236	558.731	15.821
160.37	48.88	11.29	3.44	45.231	4.202	327.633	9.278	560.212	15.863
160.40	48.89	11.32	3.45	45.369	4.215	329.120	9.320	561.699	15.906
160.43	48.90	11.35	3.46	45.501	4.227	330.610	9.362	563.189	15.948
160.47	48.91	11.38	3.47	45.632	4.239	332.105	9.404	564.684	15.990
160.50	48.92	11.42	3.48	45.759	4.251	333.605	9.447	566.183	16.033

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
160.53	48.93	11.45	3.49	45.885	4.263	335.108	9.489	567.687	16.075
160.56	48.94	11.48	3.50	46.008	4.274	336.615	9.532	569.194	16.118
160.60	48.95	11.52	3.51	46.134	4.286	338.127	9.575	570.706	16.161
160.63	48.96	11.55	3.52	46.260	4.298	339.642	9.618	572.221	16.203
160.66	48.97	11.58	3.53	46.382	4.309	341.162	9.661	573.741	16.247
160.70	48.98	11.61	3.54	46.502	4.320	342.686	9.704	575.265	16.290
160.73	48.99	11.65	3.55	46.624	4.332	344.214	9.747	576.792	16.333
160.76	49.00	11.68	3.56	46.742	4.343	345.745	9.790	578.324	16.376
160.79	49.01	11.71	3.57	46.859	4.353	347.281	9.834	579.860	16.420
160.83	49.02	11.75	3.58	46.975	4.364	348.820	9.877	581.399	16.463
160.86	49.03	11.78	3.59	47.092	4.375	350.363	9.921	582.942	16.507
160.89	49.04	11.81	3.60	47.210	4.386	351.910	9.965	584.489	16.551
160.93	49.05	11.84	3.61	47.329	4.397	353.461	10.009	586.040	16.595
160.96	49.06	11.88	3.62	47.449	4.408	355.015	10.053	587.594	16.639
160.99	49.07	11.91	3.63	47.567	4.419	356.574	10.097	589.153	16.683
161.02	49.08	11.94	3.64	47.691	4.431	358.137	10.141	590.716	16.727
161.06	49.09	11.98	3.65	47.816	4.442	359.704	10.186	592.282	16.772
161.09	49.10	12.01	3.66	47.940	4.454	361.274	10.230	593.853	16.816
161.12	49.11	12.04	3.67	48.055	4.464	362.849	10.275	595.428	16.861
161.15	49.12	12.07	3.68	48.159	4.474	364.427	10.319	597.006	16.905
161.19	49.13	12.11	3.69	48.258	4.483	366.009	10.364	598.588	16.950
161.22	49.14	12.14	3.70	48.353	4.492	367.594	10.409	600.173	16.995
161.25	49.15	12.17	3.71	48.446	4.501	369.182	10.454	601.761	17.040
161.29	49.16	12.20	3.72	48.537	4.509	370.773	10.499	603.352	17.085

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
161.32	49.17	12.24	3.73	48.629	4.518	372.367	10.544	604.946	17.130
161.35	49.18	12.27	3.74	48.720	4.526	373.964	10.589	606.543	17.175
161.38	49.19	12.30	3.75	48.813	4.535	375.564	10.635	608.142	17.221
161.42	49.20	12.34	3.76	48.902	4.543	377.167	10.680	609.745	17.266
161.45	49.21	12.37	3.77	48.989	4.551	378.772	10.726	611.351	17.312
161.48	49.22	12.40	3.78	49.073	4.559	380.381	10.771	612.960	17.357
161.52	49.23	12.43	3.79	49.156	4.567	381.992	10.817	614.571	17.403
161.55	49.24	12.47	3.80	49.238	4.574	383.606	10.863	616.185	17.448
161.58	49.25	12.50	3.81	49.317	4.582	385.223	10.908	617.802	17.494
161.61	49.26	12.53	3.82	49.395	4.589	386.842	10.954	619.421	17.540
161.65	49.27	12.57	3.83	49.473	4.596	388.464	11.000	621.043	17.586
161.68	49.28	12.60	3.84	49.550	4.603	390.089	11.046	622.668	17.632
161.71	49.29	12.63	3.85	49.627	4.610	391.716	11.092	624.294	17.678
161.75	49.30	12.66	3.86	49.703	4.618	393.345	11.138	625.924	17.724
161.78	49.31	12.70	3.87	49.780	4.625	394.977	11.184	627.556	17.770
161.81	49.32	12.73	3.88	49.857	4.632	396.611	11.231	629.190	17.817
161.84	49.33	12.76	3.89	49.934	4.639	398.248	11.277	630.827	17.863
161.88	49.34	12.80	3.90	50.011	4.646	399.888	11.324	632.467	17.909
161.91	49.35	12.83	3.91	50.089	4.653	401.530	11.370	634.109	17.956
161.94	49.36	12.86	3.92	50.166	4.661	403.175	11.417	635.754	18.003
161.98	49.37	12.89	3.93	50.242	4.668	404.822	11.463	637.401	18.049
162.01	49.38	12.93	3.94	50.318	4.675	406.471	11.510	639.050	18.096
162.04	49.39	12.96	3.95	50.394	4.682	408.123	11.557	640.702	18.143
162.07	49.40	12.99	3.96	50.470	4.689	409.778	11.604	642.357	18.190

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
162.11	49.41	13.02	3.97	50.546	4.696	411.435	11.651	644.014	18.236
162.14	49.42	13.06	3.98	50.623	4.703	413.095	11.698	645.674	18.283
162.17	49.43	13.09	3.99	50.699	4.710	414.757	11.745	647.336	18.330
162.20	49.44	13.12	4.00	50.774	4.717	416.421	11.792	649.000	18.378
162.24	49.45	13.16	4.01	50.850	4.724	418.088	11.839	650.667	18.425
162.27	49.46	13.19	4.02	50.925	4.731	419.758	11.886	652.337	18.472
162.30	49.47	13.22	4.03	51.000	4.738	421.430	11.934	654.009	18.519
162.34	49.48	13.25	4.04	51.075	4.745	423.104	11.981	655.683	18.567
162.37	49.49	13.29	4.05	51.150	4.752	424.781	12.028	657.360	18.614
162.40	49.50	13.32	4.06	51.225	4.759	426.461	12.076	659.040	18.662
162.43	49.51	13.35	4.07	51.300	4.766	428.143	12.124	660.721	18.710
162.47	49.52	13.39	4.08	51.376	4.773	429.827	12.171	662.406	18.757
162.50	49.53	13.42	4.09	51.451	4.780	431.514	12.219	664.093	18.805
162.53	49.54	13.45	4.10	51.527	4.787	433.203	12.267	665.782	18.853
162.57	49.55	13.48	4.11	51.603	4.794	434.895	12.315	667.474	18.901
162.60	49.56	13.52	4.12	51.680	4.801	436.589	12.363	669.168	18.949
162.63	49.57	13.55	4.13	51.756	4.808	438.286	12.411	670.865	18.997
162.66	49.58	13.58	4.14	51.832	4.815	439.985	12.459	672.564	19.045
162.70	49.59	13.62	4.15	51.909	4.822	441.687	12.507	674.266	19.093
162.73	49.60	13.65	4.16	51.986	4.830	443.391	12.555	675.970	19.141
162.76	49.61	13.68	4.17	52.064	4.837	445.098	12.604	677.677	19.190
162.80	49.62	13.71	4.18	52.144	4.844	446.808	12.652	679.386	19.238
162.83	49.63	13.75	4.19	52.224	4.852	448.520	12.701	681.099	19.287
162.86	49.64	13.78	4.20	52.306	4.859	450.234	12.749	682.813	19.335

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
162.89	49.65	13.81	4.21	52.389	4.867	451.952	12.798	684.531	19.384
162.93	49.66	13.85	4.22	52.473	4.875	453.672	12.847	686.251	19.432
162.96	49.67	13.88	4.23	52.559	4.883	455.395	12.895	687.974	19.481
162.99	49.68	13.91	4.24	52.645	4.891	457.121	12.944	689.700	19.530
163.02	49.69	13.94	4.25	52.730	4.899	458.849	12.993	691.428	19.579
163.06	49.70	13.98	4.26	52.815	4.907	460.581	13.042	693.160	19.628
163.09	49.71	14.01	4.27	52.900	4.915	462.315	13.091	694.894	19.677
163.12	49.72	14.04	4.28	52.985	4.922	464.052	13.140	696.631	19.726
163.16	49.73	14.07	4.29	53.070	4.930	465.792	13.190	698.371	19.776
163.19	49.74	14.11	4.30	53.156	4.938	467.534	13.239	700.113	19.825
163.22	49.75	14.14	4.31	53.242	4.946	469.280	13.289	701.858	19.874
163.25	49.76	14.17	4.32	53.328	4.954	471.028	13.338	703.607	19.924
163.29	49.77	14.21	4.33	53.415	4.962	472.779	13.388	705.358	19.973
163.32	49.78	14.24	4.34	53.503	4.971	474.533	13.437	707.112	20.023
163.35	49.79	14.27	4.35	53.594	4.979	476.289	13.487	708.868	20.073
163.39	49.80	14.30	4.36	53.685	4.988	478.049	13.537	710.628	20.123
163.42	49.81	14.34	4.37	53.777	4.996	479.812	13.587	712.391	20.173
163.45	49.82	14.37	4.38	53.869	5.005	481.578	13.637	714.157	20.223
163.48	49.83	14.40	4.39	53.963	5.013	483.347	13.687	715.926	20.273
163.52	49.84	14.44	4.40	54.055	5.022	485.119	13.737	717.698	20.323
163.55	49.85	14.47	4.41	54.148	5.030	486.894	13.787	719.473	20.373
163.58	49.86	14.50	4.42	54.241	5.039	488.672	13.838	721.251	20.424
163.62	49.87	14.53	4.43	54.335	5.048	490.453	13.888	723.032	20.474
163.65	49.88	14.57	4.44	54.429	5.057	492.237	13.939	724.816	20.524

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
163.68	49.89	14.60	4.45	54.523	5.065	494.024	13.989	726.603	20.575
163.71	49.90	14.63	4.46	54.618	5.074	495.815	14.040	728.394	20.626
163.75	49.91	14.67	4.47	54.714	5.083	497.608	14.091	730.187	20.677
163.78	49.92	14.70	4.48	54.810	5.092	499.405	14.142	731.984	20.727
163.81	49.93	14.73	4.49	54.908	5.101	501.205	14.193	733.784	20.778
163.85	49.94	14.76	4.50	55.008	5.110	503.008	14.244	735.587	20.829
163.88	49.95	14.80	4.51	55.108	5.120	504.814	14.295	737.393	20.881
163.91	49.96	14.83	4.52	55.208	5.129	506.624	14.346	739.203	20.932
163.94	49.97	14.86	4.53	55.308	5.138	508.437	14.397	741.016	20.983
163.98	49.98	14.90	4.54	55.407	5.147	510.253	14.449	742.832	21.035
164.01	49.99	14.93	4.55	55.505	5.157	512.072	14.500	744.651	21.086
164.04	50.00	14.96	4.56	55.603	5.166	513.895	14.552	746.474	21.138
164.07	50.01	14.99	4.57	55.698	5.175	515.721	14.604	748.300	21.189
164.11	50.02	15.03	4.58	55.793	5.183	517.550	14.655	750.129	21.241
164.14	50.03	15.06	4.59	55.886	5.192	519.382	14.707	751.961	21.293
164.17	50.04	15.09	4.60	55.979	5.201	521.217	14.759	753.796	21.345
164.21	50.05	15.12	4.61	56.073	5.209	523.055	14.811	755.634	21.397
164.24	50.06	15.16	4.62	56.166	5.218	524.896	14.863	757.475	21.449
164.27	50.07	15.19	4.63	56.260	5.227	526.740	14.916	759.319	21.502
164.30	50.08	15.22	4.64	56.354	5.235	528.588	14.968	761.167	21.554
164.34	50.09	15.26	4.65	56.449	5.244	530.438	15.020	763.017	21.606
164.37	50.10	15.29	4.66	56.543	5.253	532.292	15.073	764.871	21.659
164.40	50.11	15.32	4.67	56.638	5.262	534.148	15.125	766.727	21.711
164.44	50.12	15.35	4.68	56.733	5.271	536.008	15.178	768.587	21.764

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
164.47	50.13	15.39	4.69	56.828	5.280	537.871	15.231	770.450	21.817
164.50	50.14	15.42	4.70	56.923	5.288	539.737	15.284	772.316	21.870
164.53	50.15	15.45	4.71	57.018	5.297	541.606	15.337	774.185	21.922
164.57	50.16	15.49	4.72	57.113	5.306	543.478	15.390	776.057	21.975
164.60	50.17	15.52	4.73	57.208	5.315	545.354	15.443	777.933	22.029
164.63	50.18	15.55	4.74	57.304	5.324	547.232	15.496	779.811	22.082
164.67	50.19	15.58	4.75	57.398	5.332	549.114	15.549	781.693	22.135
164.70	50.20	15.62	4.76	57.493	5.341	550.999	15.603	783.577	22.188
164.73	50.21	15.65	4.77	57.587	5.350	552.886	15.656	785.465	22.242
164.76	50.22	15.68	4.78	57.681	5.359	554.777	15.710	787.356	22.295
164.80	50.23	15.72	4.79	57.776	5.368	556.671	15.763	789.250	22.349
164.83	50.24	15.75	4.80	57.871	5.376	558.568	15.817	791.147	22.403
164.86	50.25	15.78	4.81	57.966	5.385	560.469	15.871	793.047	22.457
164.90	50.26	15.81	4.82	58.062	5.394	562.372	15.925	794.951	22.510
164.93	50.27	15.85	4.83	58.158	5.403	564.278	15.979	796.857	22.564
164.96	50.28	15.88	4.84	58.255	5.412	566.188	16.033	798.767	22.619
164.99	50.29	15.91	4.85	58.352	5.421	568.101	16.087	800.680	22.673
165.03	50.30	15.94	4.86	58.449	5.430	570.017	16.141	802.596	22.727
165.06	50.31	15.98	4.87	58.548	5.439	571.936	16.195	804.515	22.781
165.09	50.32	16.01	4.88	58.650	5.449	573.859	16.250	806.438	22.836
165.12	50.33	16.04	4.89	58.753	5.458	575.785	16.304	808.364	22.890
165.16	50.34	16.08	4.90	58.855	5.468	577.714	16.359	810.293	22.945
165.19	50.35	16.11	4.91	58.956	5.477	579.647	16.414	812.225	23.000
165.22	50.36	16.14	4.92	59.057	5.487	581.582	16.469	814.161	23.054



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
165.26	50.37	16.17	4.93	59.160	5.496	583.522	16.523	816.101	23.109
165.29	50.38	16.21	4.94	59.263	5.506	585.464	16.578	818.043	23.164
165.32	50.39	16.24	4.95	59.368	5.516	587.410	16.634	819.989	23.219
165.35	50.40	16.27	4.96	59.473	5.525	589.360	16.689	821.939	23.275
165.39	50.41	16.31	4.97	59.574	5.535	591.313	16.744	823.892	23.330
165.42	50.42	16.34	4.98	59.675	5.544	593.269	16.799	825.848	23.385
165.45	50.43	16.37	4.99	59.776	5.553	595.228	16.855	827.807	23.441
165.49	50.44	16.40	5.00	59.876	5.563	597.191	16.911	829.770	23.496
165.52	50.45	16.44	5.01	59.976	5.572	599.157	16.966	831.736	23.552
165.55	50.46	16.47	5.02	60.076	5.581	601.127	17.022	833.706	23.608
165.58	50.47	16.50	5.03	60.176	5.591	603.099	17.078	835.678	23.664
165.62	50.48	16.54	5.04	60.277	5.600	605.075	17.134	837.654	23.720
165.65	50.49	16.57	5.05	60.378	5.609	607.055	17.190	839.633	23.776
165.68	50.50	16.60	5.06	60.478	5.619	609.037	17.246	841.616	23.832
165.72	50.51	16.63	5.07	60.577	5.628	611.023	17.302	843.602	23.888
165.75	50.52	16.67	5.08	60.678	5.637	613.012	17.359	845.591	23.944
165.78	50.53	16.70	5.09	60.779	5.647	615.004	17.415	847.583	24.001
165.81	50.54	16.73	5.10	60.878	5.656	617.000	17.471	849.579	24.057
165.85	50.55	16.77	5.11	60.979	5.665	618.999	17.528	851.578	24.114
165.88	50.56	16.80	5.12	61.081	5.675	621.001	17.585	853.580	24.171
165.91	50.57	16.83	5.13	61.181	5.684	623.007	17.642	855.586	24.227
165.94	50.58	16.86	5.14	61.280	5.693	625.016	17.698	857.595	24.284
165.98	50.59	16.90	5.15	61.379	5.702	627.028	17.755	859.607	24.341
166.01	50.60	16.93	5.16	61.478	5.711	629.043	17.813	861.622	24.398

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
166.04	50.61	16.96	5.17	61.576	5.721	631.062	17.870	863.641	24.456
166.08	50.62	16.99	5.18	61.674	5.730	633.084	17.927	865.663	24.513
166.11	50.63	17.03	5.19	61.772	5.739	635.109	17.984	867.688	24.570
166.14	50.64	17.06	5.20	61.868	5.748	637.137	18.042	869.716	24.628
166.17	50.65	17.09	5.21	61.963	5.757	639.168	18.099	871.747	24.685
166.21	50.66	17.13	5.22	62.057	5.765	641.203	18.157	873.782	24.743
166.24	50.67	17.16	5.23	62.151	5.774	643.240	18.215	875.819	24.800
166.27	50.68	17.19	5.24	62.244	5.783	645.281	18.272	877.860	24.858
166.31	50.69	17.22	5.25	62.335	5.791	647.325	18.330	879.904	24.916
166.34	50.70	17.26	5.26	62.426	5.800	649.371	18.388	881.950	24.974
166.37	50.71	17.29	5.27	62.518	5.808	651.421	18.446	884.000	25.032
166.40	50.72	17.32	5.28	62.608	5.817	653.473	18.504	886.052	25.090
166.44	50.73	17.36	5.29	62.699	5.825	655.529	18.562	888.108	25.148
166.47	50.74	17.39	5.30	62.790	5.833	657.588	18.621	890.166	25.207
166.50	50.75	17.42	5.31	62.882	5.842	659.649	18.679	892.228	25.265
166.54	50.76	17.45	5.32	62.974	5.850	661.714	18.738	894.293	25.324
166.57	50.77	17.49	5.33	63.066	5.859	663.781	18.796	896.360	25.382
166.60	50.78	17.52	5.34	63.158	5.868	665.852	18.855	898.431	25.441
166.63	50.79	17.55	5.35	63.251	5.876	667.926	18.914	900.504	25.499
166.67	50.80	17.59	5.36	63.345	5.885	670.002	18.972	902.581	25.558
166.70	50.81	17.62	5.37	63.439	5.894	672.082	19.031	904.661	25.617
166.73	50.82	17.65	5.38	63.534	5.903	674.165	19.090	906.744	25.676
166.77	50.83	17.68	5.39	63.630	5.911	676.251	19.149	908.830	25.735
166.80	50.84	17.72	5.40	63.726	5.920	678.340	19.208	910.919	25.794

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
166.83	50.85	17.75	5.41	63.821	5.929	680.432	19.268	913.011	25.854
166.86	50.86	17.78	5.42	63.917	5.938	682.528	19.327	915.107	25.913
166.90	50.87	17.81	5.43	64.013	5.947	684.627	19.386	917.205	25.972
166.93	50.88	17.85	5.44	64.110	5.956	686.728	19.446	919.307	26.032
166.96	50.89	17.88	5.45	64.206	5.965	688.833	19.506	921.412	26.091
166.99	50.90	17.91	5.46	64.302	5.974	690.941	19.565	923.520	26.151
167.03	50.91	17.95	5.47	64.398	5.983	693.052	19.625	925.631	26.211
167.06	50.92	17.98	5.48	64.494	5.992	695.167	19.685	927.746	26.271
167.09	50.93	18.01	5.49	64.590	6.001	697.284	19.745	929.863	26.331
167.13	50.94	18.04	5.50	64.686	6.010	699.405	19.805	931.984	26.391
167.16	50.95	18.08	5.51	64.782	6.018	701.529	19.865	934.108	26.451
167.19	50.96	18.11	5.52	64.878	6.027	703.656	19.925	936.235	26.511
167.22	50.97	18.14	5.53	64.976	6.036	705.786	19.986	938.365	26.572
167.26	50.98	18.18	5.54	65.074	6.046	707.919	20.046	940.498	26.632
167.29	50.99	18.21	5.55	65.171	6.055	710.056	20.107	942.635	26.692
167.32	51.00	18.24	5.56	65.267	6.063	712.196	20.167	944.775	26.753
167.36	51.01	18.27	5.57	65.362	6.072	714.339	20.228	946.917	26.814
167.39	51.02	18.31	5.58	65.459	6.081	716.485	20.289	949.063	26.874
167.42	51.03	18.34	5.59	65.555	6.090	718.634	20.349	951.213	26.935
167.45	51.04	18.37	5.60	65.650	6.099	720.786	20.410	953.365	26.996
167.49	51.05	18.41	5.61	65.745	6.108	722.942	20.471	955.520	27.057
167.52	51.06	18.44	5.62	65.839	6.117	725.100	20.533	957.679	27.118
167.55	51.07	18.47	5.63	65.933	6.125	727.262	20.594	959.841	27.180
167.59	51.08	18.50	5.64	66.027	6.134	729.426	20.655	962.005	27.241

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
167.62	51.09	18.54	5.65	66.122	6.143	731.594	20.716	964.173	27.302
167.65	51.10	18.57	5.66	66.217	6.152	733.765	20.778	966.344	27.364
167.68	51.11	18.60	5.67	66.313	6.161	735.939	20.839	968.518	27.425
167.72	51.12	18.64	5.68	66.412	6.170	738.116	20.901	970.695	27.487
167.75	51.13	18.67	5.69	66.512	6.179	740.297	20.963	972.876	27.549
167.78	51.14	18.70	5.70	66.615	6.189	742.481	21.025	975.060	27.611
167.81	51.15	18.73	5.71	66.720	6.198	744.668	21.087	977.247	27.673
167.85	51.16	18.77	5.72	66.824	6.208	746.859	21.149	979.437	27.735
167.88	51.17	18.80	5.73	66.930	6.218	749.053	21.211	981.632	27.797
167.91	51.18	18.83	5.74	67.038	6.228	751.250	21.273	983.829	27.859
167.95	51.19	18.86	5.75	67.145	6.238	753.452	21.335	986.030	27.921
167.98	51.20	18.90	5.76	67.253	6.248	755.656	21.398	988.235	27.984
168.01	51.21	18.93	5.77	67.365	6.258	757.865	21.460	990.443	28.046
168.04	51.22	18.96	5.78	67.473	6.268	760.076	21.523	992.655	28.109
168.08	51.23	19.00	5.79	67.579	6.278	762.292	21.586	994.871	28.172
168.11	51.24	19.03	5.80	67.684	6.288	764.511	21.649	997.090	28.234
168.14	51.25	19.06	5.81	67.789	6.298	766.733	21.711	999.312	28.297
168.18	51.26	19.09	5.82	67.893	6.307	768.959	21.774	1001.538	28.360
168.21	51.27	19.13	5.83	67.995	6.317	771.188	21.838	1003.767	28.423
168.24	51.28	19.16	5.84	68.098	6.326	773.420	21.901	1005.999	28.487
168.27	51.29	19.19	5.85	68.201	6.336	775.656	21.964	1008.235	28.550
168.31	51.30	19.23	5.86	68.306	6.346	777.896	22.028	1010.475	28.613
168.34	51.31	19.26	5.87	68.411	6.356	780.138	22.091	1012.717	28.677
168.37	51.32	19.29	5.88	68.517	6.365	782.385	22.155	1014.963	28.741

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
168.41	51.33	19.32	5.89	68.623	6.375	784.634	22.218	1017.213	28.804
168.44	51.34	19.36	5.90	68.731	6.385	786.887	22.282	1019.466	28.868
168.47	51.35	19.39	5.91	68.840	6.395	789.144	22.346	1021.723	28.932
168.50	51.36	19.42	5.92	68.950	6.406	791.404	22.410	1023.983	28.996
168.54	51.37	19.46	5.93	69.060	6.416	793.668	22.474	1026.247	29.060
168.57	51.38	19.49	5.94	69.170	6.426	795.936	22.538	1028.515	29.124
168.60	51.39	19.52	5.95	69.280	6.436	798.207	22.603	1030.786	29.189
168.64	51.40	19.55	5.96	69.390	6.447	800.482	22.667	1033.061	29.253
168.67	51.41	19.59	5.97	69.500	6.457	802.760	22.732	1035.339	29.318
168.70	51.42	19.62	5.98	69.611	6.467	805.042	22.796	1037.621	29.382
168.73	51.43	19.65	5.99	69.722	6.477	807.328	22.861	1039.907	29.447
168.77	51.44	19.69	6.00	69.838	6.488	809.617	22.926	1042.196	29.512
168.80	51.45	19.72	6.01	69.953	6.499	811.911	22.991	1044.489	29.577
168.83	51.46	19.75	6.02	70.066	6.509	814.207	23.056	1046.786	29.642
168.86	51.47	19.78	6.03	70.180	6.520	816.508	23.121	1049.087	29.707
168.90	51.48	19.82	6.04	70.297	6.531	818.812	23.186	1051.391	29.772
168.93	51.49	19.85	6.05	70.415	6.542	821.121	23.252	1053.700	29.837
168.96	51.50	19.88	6.06	70.531	6.553	823.433	23.317	1056.012	29.903
169.00	51.51	19.91	6.07	70.649	6.563	825.749	23.383	1058.328	29.968
169.03	51.52	19.95	6.08	70.765	6.574	828.069	23.448	1060.647	30.034
169.06	51.53	19.98	6.09	70.882	6.585	830.392	23.514	1062.971	30.100
169.09	51.54	20.01	6.10	70.999	6.596	832.720	23.580	1065.299	30.166
169.13	51.55	20.05	6.11	71.117	6.607	835.051	23.646	1067.630	30.232
169.16	51.56	20.08	6.12	71.233	6.618	837.386	23.712	1069.965	30.298

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
169.19	51.57	20.11	6.13	71.348	6.628	839.725	23.778	1072.304	30.364
169.23	51.58	20.14	6.14	71.464	6.639	842.068	23.845	1074.647	30.431
169.26	51.59	20.18	6.15	71.581	6.650	844.414	23.911	1076.993	30.497
169.29	51.60	20.21	6.16	71.698	6.661	846.765	23.978	1079.344	30.564
169.32	51.61	20.24	6.17	71.814	6.672	849.119	24.044	1081.698	30.630
169.36	51.62	20.28	6.18	71.935	6.683	851.477	24.111	1084.056	30.697
169.39	51.63	20.31	6.19	72.057	6.694	853.839	24.178	1086.418	30.764
169.42	51.64	20.34	6.20	72.179	6.706	856.205	24.245	1088.784	30.831
169.46	51.65	20.37	6.21	72.299	6.717	858.575	24.312	1091.154	30.898
169.49	51.66	20.41	6.22	72.419	6.728	860.949	24.379	1093.528	30.965
169.52	51.67	20.44	6.23	72.539	6.739	863.327	24.447	1095.906	31.033
169.55	51.68	20.47	6.24	72.659	6.750	865.709	24.514	1098.288	31.100
169.59	51.69	20.51	6.25	72.780	6.761	868.095	24.582	1100.674	31.168
169.62	51.70	20.54	6.26	72.901	6.773	870.484	24.649	1103.063	31.235
169.65	51.71	20.57	6.27	73.019	6.784	872.878	24.717	1105.457	31.303
169.69	51.72	20.60	6.28	73.135	6.795	875.276	24.785	1107.855	31.371
169.72	51.73	20.64	6.29	73.251	6.805	877.677	24.853	1110.256	31.439
169.75	51.74	20.67	6.30	73.366	6.816	880.082	24.921	1112.661	31.507
169.78	51.75	20.70	6.31	73.481	6.827	882.491	24.989	1115.070	31.575
169.82	51.76	20.73	6.32	73.598	6.837	884.904	25.058	1117.483	31.644
169.85	51.77	20.77	6.33	73.715	6.848	887.320	25.126	1119.899	31.712
169.88	51.78	20.80	6.34	73.832	6.859	889.741	25.195	1122.320	31.781
169.91	51.79	20.83	6.35	73.950	6.870	892.165	25.263	1124.744	31.849
169.95	51.80	20.87	6.36	74.064	6.881	894.593	25.332	1127.172	31.918

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
169.98	51.81	20.90	6.37	74.180	6.892	897.025	25.401	1129.604	31.987
170.01	51.82	20.93	6.38	74.296	6.902	899.461	25.470	1132.039	32.056
170.05	51.83	20.96	6.39	74.414	6.913	901.900	25.539	1134.479	32.125
170.08	51.84	21.00	6.40	74.533	6.924	904.343	25.608	1136.922	32.194
170.11	51.85	21.03	6.41	74.650	6.935	906.791	25.677	1139.370	32.263
170.14	51.86	21.06	6.42	74.766	6.946	909.242	25.747	1141.821	32.333
170.18	51.87	21.10	6.43	74.884	6.957	911.697	25.816	1144.276	32.402
170.21	51.88	21.13	6.44	75.003	6.968	914.155	25.886	1146.734	32.472
170.24	51.89	21.16	6.45	75.123	6.979	916.618	25.956	1149.197	32.542
170.28	51.90	21.19	6.46	75.243	6.990	919.085	26.026	1151.664	32.611
170.31	51.91	21.23	6.47	75.365	7.002	921.555	26.096	1154.134	32.681
170.34	51.92	21.26	6.48	75.487	7.013	924.030	26.166	1156.609	32.751
170.37	51.93	21.29	6.49	75.609	7.024	926.509	26.236	1159.087	32.822
170.41	51.94	21.33	6.50	75.733	7.036	928.991	26.306	1161.570	32.892
170.44	51.95	21.36	6.51	75.858	7.047	931.478	26.376	1164.057	32.962
170.47	51.96	21.39	6.52	75.982	7.059	933.969	26.447	1166.548	33.033
170.51	51.97	21.42	6.53	76.107	7.071	936.464	26.518	1169.042	33.104
170.54	51.98	21.46	6.54	76.230	7.082	938.963	26.588	1171.541	33.174
170.57	51.99	21.49	6.55	76.352	7.093	941.466	26.659	1174.044	33.245
170.60	52.00	21.52	6.56	76.473	7.105	943.973	26.730	1176.551	33.316
170.64	52.01	21.56	6.57	76.591	7.116	946.483	26.801	1179.062	33.387
170.67	52.02	21.59	6.58	76.708	7.126	948.998	26.873	1181.577	33.459
170.70	52.03	21.62	6.59	76.826	7.137	951.517	26.944	1184.096	33.530
170.73	52.04	21.65	6.60	76.944	7.148	954.039	27.015	1186.618	33.601

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
170.77	52.05	21.69	6.61	77.062	7.159	956.566	27.087	1189.145	33.673
170.80	52.06	21.72	6.62	77.180	7.170	959.096	27.159	1191.675	33.744
170.83	52.07	21.75	6.63	77.296	7.181	961.630	27.230	1194.209	33.816
170.87	52.08	21.78	6.64	77.411	7.192	964.168	27.302	1196.747	33.888
170.90	52.09	21.82	6.65	77.523	7.202	966.709	27.374	1199.288	33.960
170.93	52.10	21.85	6.66	77.636	7.213	969.255	27.446	1201.833	34.032
170.96	52.11	21.88	6.67	77.748	7.223	971.804	27.518	1204.382	34.104
171.00	52.12	21.92	6.68	77.861	7.234	974.356	27.591	1206.935	34.177
171.03	52.13	21.95	6.69	77.973	7.244	976.913	27.663	1209.491	34.249
171.06	52.14	21.98	6.70	78.084	7.254	979.473	27.736	1212.051	34.321
171.10	52.15	22.01	6.71	78.195	7.265	982.036	27.808	1214.615	34.394
171.13	52.16	22.05	6.72	78.306	7.275	984.603	27.881	1217.182	34.467
171.16	52.17	22.08	6.73	78.418	7.285	987.174	27.954	1219.753	34.540
171.19	52.18	22.11	6.74	78.529	7.296	989.749	28.027	1222.328	34.612
171.23	52.19	22.15	6.75	78.641	7.306	992.327	28.100	1224.906	34.685
171.26	52.20	22.18	6.76	78.752	7.316	994.909	28.173	1227.488	34.759
171.29	52.21	22.21	6.77	78.863	7.327	997.495	28.246	1230.074	34.832
171.33	52.22	22.24	6.78	78.974	7.337	1000.084	28.319	1232.663	34.905
171.36	52.23	22.28	6.79	79.086	7.347	1002.677	28.393	1235.256	34.979
171.39	52.24	22.31	6.80	79.200	7.358	1005.273	28.466	1237.852	35.052
171.42	52.25	22.34	6.81	79.315	7.369	1007.874	28.540	1240.452	35.126
171.46	52.26	22.38	6.82	79.434	7.380	1010.478	28.614	1243.057	35.199
171.49	52.27	22.41	6.83	79.558	7.391	1013.086	28.687	1245.665	35.273
171.52	52.28	22.44	6.84	79.675	7.402	1015.698	28.761	1248.277	35.347



levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
171.56	52.29	22.47	6.85	79.798	7.413	1018.314	28.835	1250.893	35.421
171.59	52.30	22.51	6.86	79.918	7.425	1020.934	28.910	1253.513	35.496
171.62	52.31	22.54	6.87	80.035	7.436	1023.558	28.984	1256.137	35.570
171.65	52.32	22.57	6.88	80.151	7.446	1026.186	29.058	1258.765	35.644
171.69	52.33	22.60	6.89	80.267	7.457	1028.817	29.133	1261.396	35.719
171.72	52.34	22.64	6.90	80.383	7.468	1031.453	29.207	1264.031	35.793
171.75	52.35	22.67	6.91	80.499	7.479	1034.092	29.282	1266.671	35.868
171.78	52.36	22.70	6.92	80.615	7.489	1036.735	29.357	1269.314	35.943
171.82	52.37	22.74	6.93	80.731	7.500	1039.381	29.432	1271.960	36.018
171.85	52.38	22.77	6.94	80.847	7.511	1042.032	29.507	1274.611	36.093
171.88	52.39	22.80	6.95	80.964	7.522	1044.686	29.582	1277.265	36.168
171.92	52.40	22.83	6.96	81.083	7.533	1047.345	29.657	1279.923	36.243
171.95	52.41	22.87	6.97	81.199	7.544	1050.007	29.733	1282.586	36.319
171.98	52.42	22.90	6.98	81.316	7.554	1052.673	29.808	1285.252	36.394
172.01	52.43	22.93	6.99	81.433	7.565	1055.342	29.884	1287.921	36.470
172.05	52.44	22.97	7.00	81.551	7.576	1058.016	29.960	1290.595	36.546
172.08	52.45	23.00	7.01	81.669	7.587	1060.694	30.035	1293.272	36.621
172.11	52.46	23.03	7.02	81.787	7.598	1063.375	30.111	1295.954	36.697
172.15	52.47	23.06	7.03	81.906	7.609	1066.060	30.187	1298.639	36.773
172.18	52.48	23.10	7.04	82.025	7.620	1068.749	30.264	1301.328	36.849
172.21	52.49	23.13	7.05	82.144	7.631	1071.442	30.340	1304.021	36.926
172.24	52.50	23.16	7.06	82.262	7.642	1074.139	30.416	1306.718	37.002
172.28	52.51	23.20	7.07	82.383	7.654	1076.840	30.493	1309.419	37.079
172.31	52.52	23.23	7.08	82.504	7.665	1079.545	30.569	1312.124	37.155

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
172.34	52.53	23.26	7.09	82.624	7.676	1082.254	30.646	1314.833	37.232
172.38	52.54	23.29	7.10	82.743	7.687	1084.967	30.723	1317.545	37.309
172.41	52.55	23.33	7.11	82.864	7.698	1087.683	30.800	1320.262	37.386
172.44	52.56	23.36	7.12	82.987	7.710	1090.404	30.877	1322.983	37.463
172.47	52.57	23.39	7.13	83.113	7.721	1093.129	30.954	1325.708	37.540
172.51	52.58	23.43	7.14	83.237	7.733	1095.857	31.031	1328.436	37.617
172.54	52.59	23.46	7.15	83.359	7.744	1098.590	31.109	1331.169	37.694
172.57	52.60	23.49	7.16	83.482	7.756	1101.327	31.186	1333.906	37.772
172.60	52.61	23.52	7.17	83.603	7.767	1104.068	31.264	1336.647	37.850
172.64	52.62	23.56	7.18	83.727	7.778	1106.813	31.341	1339.392	37.927
172.67	52.63	23.59	7.19	83.848	7.790	1109.562	31.419	1342.141	38.005
172.70	52.64	23.62	7.20	83.968	7.801	1112.315	31.497	1344.894	38.083
172.74	52.65	23.65	7.21	84.091	7.812	1115.072	31.575	1347.651	38.161
172.77	52.66	23.69	7.22	84.211	7.823	1117.833	31.653	1350.412	38.239
172.80	52.67	23.72	7.23	84.330	7.835	1120.597	31.732	1353.176	38.318
172.83	52.68	23.75	7.24	84.451	7.846	1123.366	31.810	1355.945	38.396
172.87	52.69	23.79	7.25	84.574	7.857	1126.139	31.889	1358.718	38.475
172.90	52.70	23.82	7.26	84.691	7.868	1128.916	31.967	1361.494	38.553
172.93	52.71	23.85	7.27	84.807	7.879	1131.696	32.046	1364.275	38.632
172.97	52.72	23.88	7.28	84.921	7.889	1134.480	32.125	1367.059	38.711
173.00	52.73	23.92	7.29	85.035	7.900	1137.268	32.204	1369.847	38.790
173.03	52.74	23.95	7.30	85.150	7.911	1140.060	32.283	1372.639	38.869
173.06	52.75	23.98	7.31	85.265	7.921	1142.856	32.362	1375.434	38.948
173.10	52.76	24.02	7.32	85.380	7.932	1145.655	32.441	1378.234	39.027

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
173.13	52.77	24.05	7.33	85.492	7.942	1148.458	32.521	1381.037	39.107
173.16	52.78	24.08	7.34	85.604	7.953	1151.265	32.600	1383.844	39.186
173.20	52.79	24.11	7.35	85.718	7.963	1154.075	32.680	1386.654	39.266
173.23	52.80	24.15	7.36	85.832	7.974	1156.889	32.759	1389.468	39.345
173.26	52.81	24.18	7.37	85.947	7.985	1159.707	32.839	1392.286	39.425
173.29	52.82	24.21	7.38	86.062	7.995	1162.529	32.919	1395.108	39.505
173.33	52.83	24.25	7.39	86.179	8.006	1165.354	32.999	1397.933	39.585
173.36	52.84	24.28	7.40	86.295	8.017	1168.184	33.079	1400.762	39.665
173.39	52.85	24.31	7.41	86.412	8.028	1171.017	33.159	1403.596	39.745
173.43	52.86	24.34	7.42	86.533	8.039	1173.854	33.240	1406.433	39.826
173.46	52.87	24.38	7.43	86.655	8.051	1176.695	33.320	1409.274	39.906
173.49	52.88	24.41	7.44	86.774	8.062	1179.540	33.401	1412.119	39.987
173.52	52.89	24.44	7.45	86.893	8.073	1182.389	33.481	1414.967	40.067
173.56	52.90	24.48	7.46	87.011	8.084	1185.241	33.562	1417.820	40.148
173.59	52.91	24.51	7.47	87.129	8.095	1188.098	33.643	1420.677	40.229
173.62	52.92	24.54	7.48	87.246	8.105	1190.958	33.724	1423.537	40.310
173.65	52.93	24.57	7.49	87.361	8.116	1193.823	33.805	1426.402	40.391
173.69	52.94	24.61	7.50	87.474	8.127	1196.691	33.886	1429.270	40.472
173.72	52.95	24.64	7.51	87.587	8.137	1199.563	33.968	1432.141	40.554
173.75	52.96	24.67	7.52	87.701	8.148	1202.438	34.049	1435.017	40.635
173.79	52.97	24.70	7.53	87.815	8.158	1205.317	34.131	1437.896	40.717
173.82	52.98	24.74	7.54	87.926	8.169	1208.200	34.212	1440.779	40.798
173.85	52.99	24.77	7.55	88.039	8.179	1211.087	34.294	1443.666	40.880
173.88	53.00	24.80	7.56	88.152	8.190	1213.977	34.376	1446.556	40.962

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
173.92	53.01	24.84	7.57	88.264	8.200	1216.871	34.458	1449.450	41.044
173.95	53.02	24.87	7.58	88.377	8.211	1219.769	34.540	1452.348	41.126
173.98	53.03	24.90	7.59	88.490	8.221	1222.670	34.622	1455.249	41.208
174.02	53.04	24.93	7.60	88.605	8.232	1225.575	34.704	1458.154	41.290
174.05	53.05	24.97	7.61	88.719	8.242	1228.484	34.787	1461.063	41.373
174.08	53.06	25.00	7.62	88.832	8.253	1231.397	34.869	1463.975	41.455
174.11	53.07	25.03	7.63	88.945	8.263	1234.313	34.952	1466.892	41.538
174.15	53.08	25.07	7.64	89.056	8.274	1237.233	35.034	1469.812	41.620
174.18	53.09	25.10	7.65	89.168	8.284	1240.156	35.117	1472.735	41.703
174.21	53.10	25.13	7.66	89.279	8.294	1243.084	35.200	1475.663	41.786
174.25	53.11	25.16	7.67	89.391	8.305	1246.015	35.283	1478.594	41.869
174.28	53.12	25.20	7.68	89.507	8.315	1248.949	35.366	1481.528	41.952
174.31	53.13	25.23	7.69	89.627	8.327	1251.888	35.449	1484.467	42.035
174.34	53.14	25.26	7.70	89.745	8.338	1254.830	35.533	1487.409	42.119
174.38	53.15	25.30	7.71	89.861	8.348	1257.777	35.616	1490.356	42.202
174.41	53.16	25.33	7.72	89.976	8.359	1260.727	35.700	1493.306	42.286
174.44	53.17	25.36	7.73	90.091	8.370	1263.681	35.783	1496.259	42.369
174.48	53.18	25.39	7.74	90.207	8.381	1266.638	35.867	1499.217	42.453
174.51	53.19	25.43	7.75	90.324	8.391	1269.600	35.951	1502.179	42.537
174.54	53.20	25.46	7.76	90.441	8.402	1272.565	36.035	1505.144	42.621
174.57	53.21	25.49	7.77	90.559	8.413	1275.534	36.119	1508.113	42.705
174.61	53.22	25.52	7.78	90.679	8.424	1278.507	36.203	1511.086	42.789
174.64	53.23	25.56	7.79	90.809	8.436	1281.484	36.288	1514.063	42.873
174.67	53.24	25.59	7.80	90.938	8.448	1284.466	36.372	1517.045	42.958

F.R.L/H.F.L

levation (MSL, ft)	Elevation (MSL, m)	Depth of water from D.W.L/O.S.L		Area (M.Sq.ft)	Area (M.Sq.m)	Live Capacity		Gross Capacity Total (Live + Dead)	
		ft	m			Volume (M.Cu.ft)	Volume (M.Cu.m)	Volume (M.Cu.ft)	Volume (M.Cu.m)
174.70	53.25	25.62	7.81	91.062	8.460	1287.451	36.457	1520.030	43.042
174.74	53.26	25.66	7.82	91.184	8.471	1290.441	36.541	1523.020	43.127
174.77	53.27	25.69	7.83	91.300	8.482	1293.435	36.626	1526.013	43.212
174.80	53.28	25.72	7.84	91.411	8.492	1296.432	36.711	1529.011	43.297
174.84	53.29	25.75	7.85	91.516	8.502	1299.433	36.796	1532.011	43.382
174.87	53.30	25.79	7.86	91.620	8.512	1302.437	36.881	1535.016	43.467
174.90	53.31	25.82	7.87	91.723	8.521	1305.444	36.966	1538.023	43.552
174.93	53.32	25.85	7.88	91.824	8.531	1308.455	37.051	1541.034	43.637
174.97	53.33	25.89	7.89	91.922	8.540	1311.470	37.137	1544.048	43.723
175.00	53.34	25.92	7.90	92.013	8.548	1314.487	37.222	1547.066	43.808
175.03	53.35	25.95	7.91	92.101	8.557	1317.507	37.308	1550.086	43.894
175.07	53.36	25.98	7.92	92.187	8.564	1320.530	37.393	1553.109	43.979
175.10	53.37	26.02	7.93	92.270	8.572	1323.556	37.479	1556.135	44.065
175.13	53.38	26.05	7.94	92.351	8.580	1326.585	37.565	1559.164	44.151
175.16	53.39	26.08	7.95	92.432	8.587	1329.616	37.650	1562.195	44.236
175.20	53.40	26.12	7.96	92.511	8.595	1332.650	37.736	1565.229	44.322
175.23	53.41	26.15	7.97	92.588	8.602	1335.686	37.822	1568.265	44.408
175.26	53.42	26.18	7.98	92.663	8.609	1338.725	37.908	1571.304	44.494
175.30	53.43	26.21	7.99	92.738	8.616	1341.766	37.995	1574.345	44.580
175.33	53.44	26.25	8.00	92.812	8.622	1344.810	38.081	1577.389	44.667

## **Annexure - 2**

### **Mobilisation and Calibration Report**

## 1 MOBILISATION

### 1.1 Introduction

Ocean Science & Surveying Pvt. Ltd. (OSaS) was contracted by Narmada Water Resources, Water Supply & Kalpsar Department (WRD) to carry out topographic and bathymetric survey of thirteen reservoirs in the Saurashtra region; namely Bhadar-1, Bhadar-2, Brahmani-1, Und-1, Machhu-1, Machhu-2, Khodiyar, Aaji-1, Nara, Tappar, Rudramata, Mitti and Fatehghadh.

This report documents the mobilisation and calibrations carried out by OSaS on board SMB Ocean for bathymetric survey of Bhadar-2 reservoir in Saurashtra region, Gujarat.

The survey team arrived at the survey site on 09<sup>th</sup> March 2021. After necessary meetings and discussions, the survey team started mobilisation of equipment on 10<sup>th</sup> March 2021 while the survey boat SMB Ocean was alongside at the concrete steps of Bhadar-2 dam. DGPS consistency check was done on 10<sup>th</sup> March 2021 through establishing two reference stations (TBM) using RTK systems. The levelling of these TBMs was carried out on the same day with respect to the known level of F.R.L provided by the client. Initial system preparation and equipment checks were completed on 11<sup>th</sup> March. a bar check was carried out every day before commencing the survey. The topographic survey commenced on 11<sup>th</sup> March and bathymetric survey commenced on 12<sup>th</sup> March. Bathymetric survey was completed on 20<sup>th</sup> March and topographic survey was completed on 25<sup>th</sup> March 2021.

### 1.2 HSE Checks

A safety induction was given by the Party Chief prior to survey, detailing personnel responsibilities in the event of an emergency, life jacket location, safety gear locations and procedures and signals for emergencies.

Back deck procedures were explained and enforced with no single man operations and all non-essential personnel keeping clear of operations. PPE included safety boots, hard hats and cover-alls for all personnel involved in back deck operations.

### 1.3 Survey Equipment list on SMB Ocean

#### 1.3.1 Navigation and Positioning

Item	Quantity
Hemisphere DGPS system with cables	1
Navigation computer with Hypack software	1
Moxa 8-port cable	4
Hemisphere RTK system with all accessories	3

#### 1.3.2 Single beam Echo sounder

Item	Quantity
Odom MK III Single beam echo sounder	2
Dual frequency transducer and mounting pole	2
Bar check	1
MRU-PD	2
TSS HS-50 Heave sensor	1

#### 1.3.3 Auto Level

Item	Quantity
Geomax auto level	1

#### 1.3.4 Power Systems

Item	Quantity
2KVA stabilizer	2
1 KVA generator	3
24V power supply	5
Exide battery 100AH	1

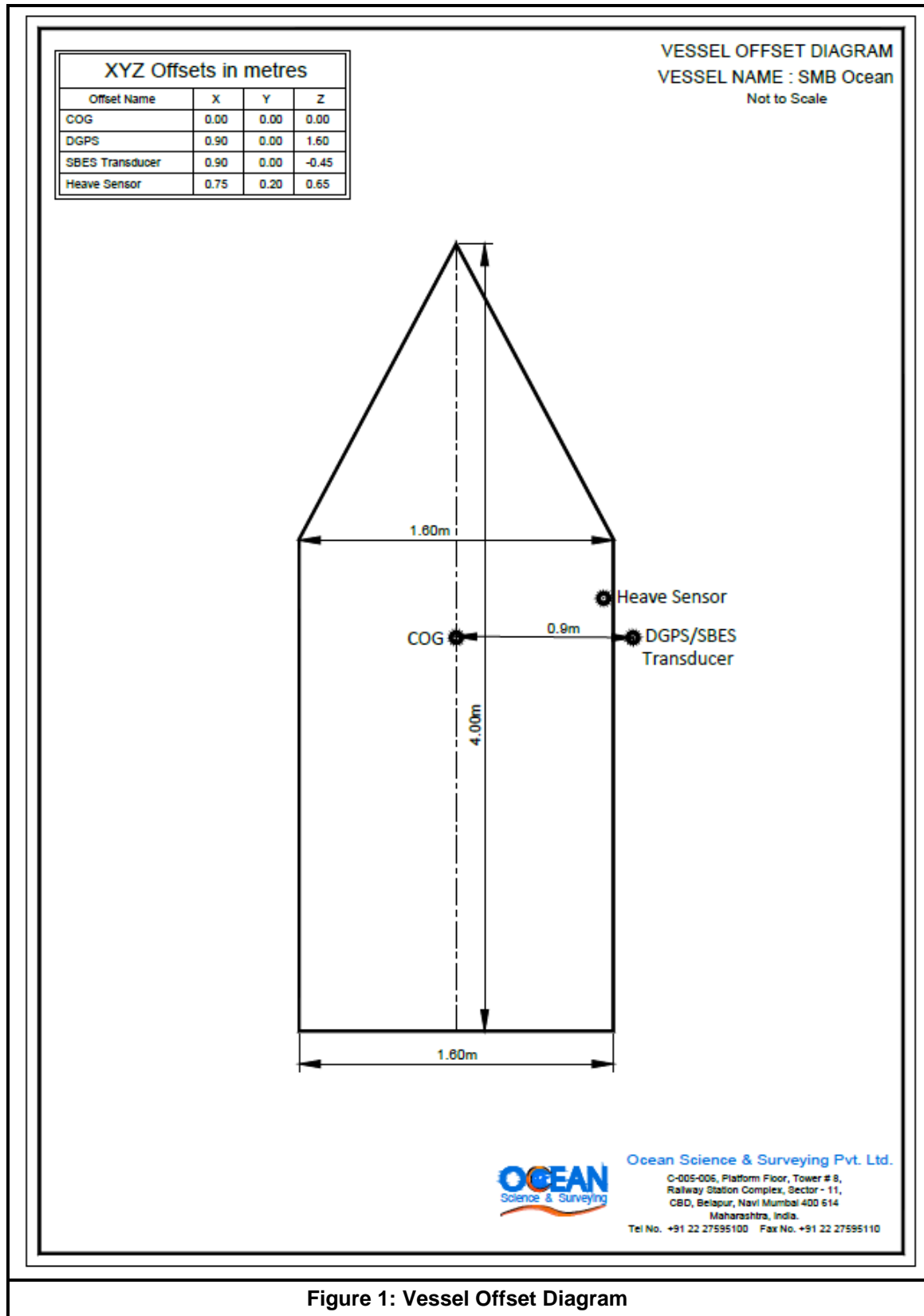
#### 1.3.5 Miscellaneous

Item	Quantity
Monitor	5
Laptop	2
LCD monitors	5
24V power supply	5
Helmets / life jackets	8
Tool box	1
Tripod and Tribrach	4 & 3
Exide battery 100AH	1
Antenna T-section	2 Sets
Echo rolls	52 nos
HP printer	1 nos
UPS	2 Sets
Switch board	9 Sets
Drill machine	1 Set



### 1.4 Vessel Offset Diagram

The equipment offsets in the Survey Motor Boat (SMB) Ocean are shown in the figure below:



## 2 EQUIPMENT CALIBRATIONS

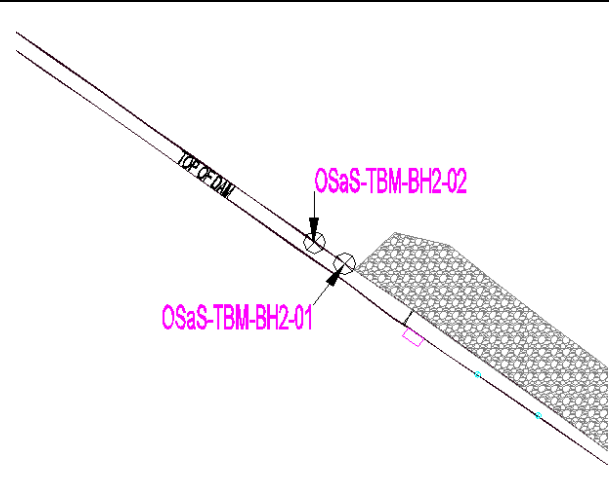


### 2.1 DGPS Calibrations

The details of the DGPS consistency checks are as follows:

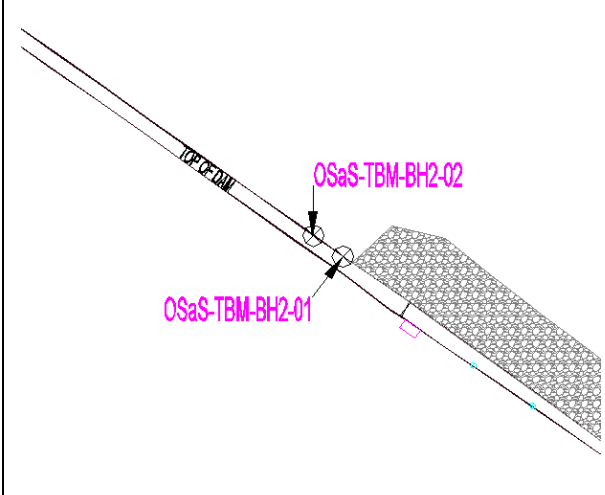

In order to determine the integrity and reliability of the positioning system, the system was checked for its consistency during mobilisation.

Two reference stations were established as temporary control points/temporary benchmarks (TBM). The levelling of these TBMs was completed using an auto level, with respect to the known level of F.R.L which is given as 53.1m above MSL, provided by the client. The base stations of the RTK were set up at these positions and two-hour continuous observations using Hemisphere RTK positioning system was conducted to fix the consistency of the position for horizontal control. The system provides real time correction signals, providing centimetre level accuracy. Additional TBMs were established at various parts of the survey area to keep the rover in range with respect to the base station.

The details of reference stations OSaS-TBM-BD2-01 and OSaS-TBM-BD2-02 are given in **Table 1** and **Table 2**.

<b>Station Number:</b>	OSaS-TBM-BH2--01	<b>Latitude:</b>	21° 45' 37.295" N
<b>Locality:</b>	Dhoraji, Gujarat	<b>Longitude:</b>	70° 25' 29.379" E
<b>Geodetic Datum:</b>	WGS84	<b>Northing:</b>	2406981.76 m N
<b>Projection:</b>	Mercator	<b>Easting:</b>	647328.81 m E
<b>Date:</b>	10 <sup>th</sup> March 2021	<b>Elevation:</b>	59.666m above MSL
<b>Station Description:</b>	A circle with text OSaS-TBM-BH2-1 is drawn with yellow paint on the walkway to the crest of the Dam.		
<b>Access:</b>	Road to the top of the reservoir over the spillway. The TBM is situated on the walkway to the crest of the Dam at the southeast end.		
<b>Sketch:</b>			
<b>Map:</b>			
			

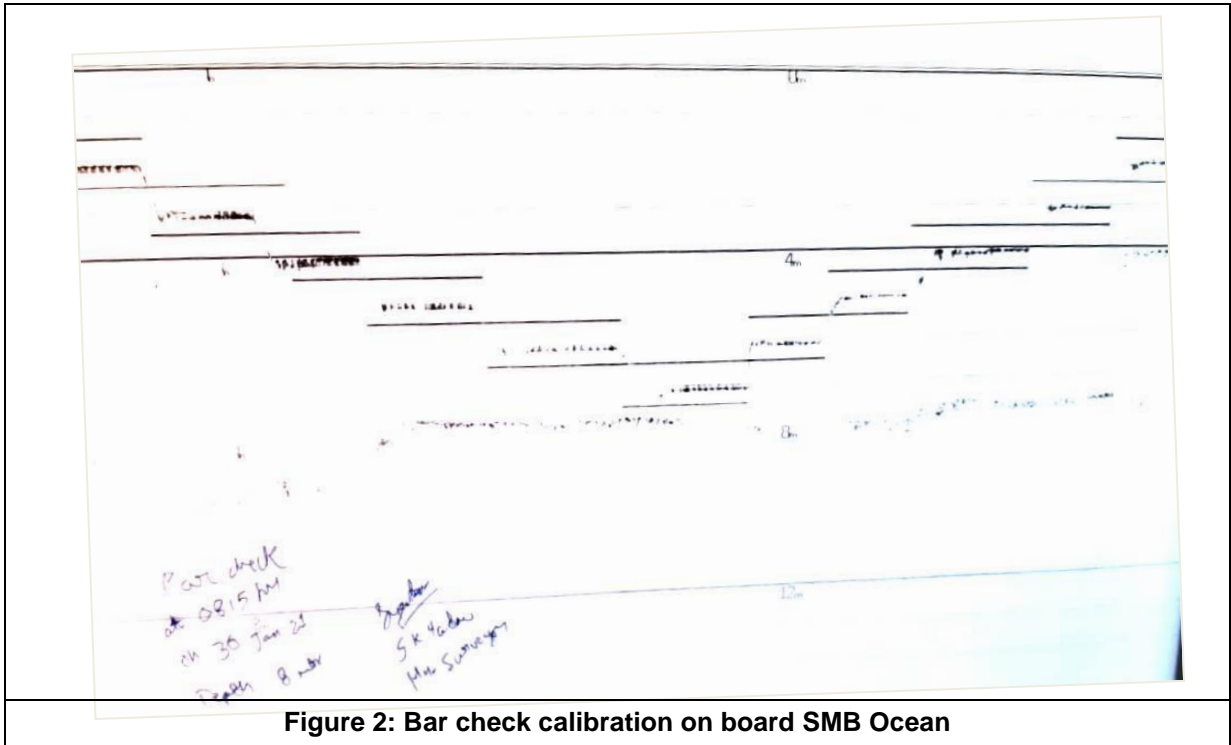
**Table 1: Details of OSaS-TBM-BD2-01**

<b>Station Number:</b>	OSaS-TBM-BH2--02	<b>Latitude:</b>	21° 45' 37.581"N
<b>Locality:</b>	Dhoraji, Gujarat	<b>Longitude:</b>	70° 25' 28.956"E
<b>Geodetic Datum:</b>	WGS84	<b>Northing:</b>	2406990.44 m N
<b>Projection:</b>	Mercator	<b>Easting:</b>	647316.56 m E
<b>Date:</b>	10 <sup>th</sup> March 2021	<b>Elevation:</b>	59.663m above MSL
<b>Station Description:</b>	A circle with text OSaS-TBM-BH2-2 is drawn with yellow paint on the walkway to the crest of the Dam.		
<b>Access:</b>	Road to the top of the reservoir over the spillway. The TBM is situated on the walkway to the crest of the Dam at the southeast end. TBM02 is situated 15m northwest of TBM01.		
<b>Sketch:</b>			
<b>Map:</b>			

**Table 2: Details of OSaS-TBM-BD2-02**

## 2.2 Single Beam Echo Sounder

The average speed of sound through the water column was input to the single beam echo sounder when a bar-check was performed before the start of survey operations. The following **Figure 2** shows the bar check extracts of the Odom MK III echo sounder used in SMB Ocean.



**Figure 2: Bar check calibration on board SMB Ocean**

### 3 CONCLUSIONS

Mobilisation for this project, including calibration and verification were carried out on board SMB Ocean in a safe and acceptable manner. All systems performed to the specifications throughout the length of the survey.

**Annexure - 3**  
**Previous Data - 2005**  
**Bhadar 2 Reservoir**

### BHADAR - II WATER RESOURCES PROJECT

F.R.L. R.L. = 53.10 Mt. / 174.21 Ft.  
H.F.L. R.L. = 53.10 Mt. / 174.21 Ft.  
O.S.L. R.L. = 45.44 Mt. / 149.08 Ft.  
Crest. R.L. = 42.43 Mt. / 139.19 Ft.

Gross Storage @ F.R.L. = 49.0000 Mcum. / 1730.44 Mcft.  
Live Storage @ F.R.L. = 41.8500 Mcum. / 1477.93 Mcft.  
Dead Storage @ O.S.L. = 7.1500 Mcum. / 252.50 Mcft.  
Crest Storage @ Crest. = 1.8900 Mcum. / 66.75 Mcft.

STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS

Sl. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqm.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
	2	3	4	5	6	7	8	9	10	11	
1	37.44	122.83	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	
2	37.45	122.87	0.00	0.00	0.001	0.005	0.001	0.036	0.000	0.000	
3	37.50	123.03	0.00	0.00	0.003	0.032	0.006	0.212	0.000	0.000	
4	37.55	123.19	0.00	0.00	0.006	0.059	0.011	0.389	0.000	0.000	
5	37.60	123.36	0.00	0.00	0.008	0.086	0.016	0.565	0.000	0.000	
6	37.65	123.52	0.00	0.00	0.011	0.113	0.021	0.742	0.000	0.000	
7	37.70	123.69	0.00	0.00	0.013	0.140	0.026	0.918	0.000	0.000	
8	37.75	123.85	0.00	0.00	0.016	0.167	0.031	1.095	0.000	0.000	
9	37.80	124.01	0.00	0.00	0.018	0.194	0.036	1.272	0.000	0.000	
10	37.85	124.18	0.00	0.00	0.021	0.221	0.041	1.448	0.000	0.000	
11	37.90	124.34	0.00	0.00	0.023	0.248	0.046	1.625	0.000	0.000	
12	37.95	124.51	0.00	0.00	0.026	0.275	0.051	1.801	0.000	0.000	
13	38.00	124.67	0.00	0.00	0.028	0.301	0.056	1.978	0.000	0.000	RIVER BED
14	38.05	124.83	0.00	0.00	0.031	0.328	0.061	2.154	0.000	0.000	
15	38.10	125.00	0.00	0.00	0.033	0.355	0.066	2.331	0.000	0.000	
16	38.15	125.16	0.00	0.00	0.036	0.382	0.071	2.507	0.000	0.000	
17	38.20	125.33	0.00	0.00	0.038	0.409	0.076	2.684	0.000	0.000	
18	38.25	125.49	0.00	0.00	0.041	0.436	0.081	2.861	0.000	0.000	
20	38.30	125.65	0.00	0.00	0.043	0.463	0.086	3.037	0.000	0.000	
21	38.40	125.82	0.00	0.00	0.046	0.490	0.091	3.214	0.000	0.000	
22	38.44	125.98	0.00	0.00	0.048	0.517	0.096	3.390	0.000	0.000	
23	38.45	126.11	0.00	0.00	0.050	0.538	0.100	3.532	0.000	0.000	
24	38.50	126.31	0.00	0.00	0.051	0.549	0.101	3.549	0.000	0.000	
25	38.55	126.47	0.00	0.00	0.056	0.603	0.103	3.637	0.000	0.000	
26	38.60	126.64	0.00	0.00	0.061	0.657	0.105	3.726	0.000	0.000	
					0.668	0.710	0.108	3.814	0.000	0.000	

STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS											
Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Fl.	Mt.	Fl.	Msgmt.	Msgft.	Mcum.	Mcft.	Mcum.	Mcft.	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
27.	38.65	126.80	0.00	0.00	0.071	0.764	0.110	3.902	0.000	0.000	
28.	38.70	126.97	0.00	0.00	0.076	0.818	0.113	3.991	0.000	0.000	
29.	38.75	127.13	0.00	0.00	0.081	0.872	0.115	4.079	0.000	0.000	
30.	38.80	127.30	0.00	0.00	0.086	0.926	0.118	4.167	0.000	0.000	
31.	38.85	127.46	0.00	0.00	0.091	0.979	0.120	4.255	0.000	0.000	
32.	38.90	127.62	0.00	0.00	0.096	1.033	0.123	4.344	0.000	0.000	
33.	38.95	127.79	0.00	0.00	0.101	1.087	0.125	4.432	0.000	0.000	
34.	39.00	127.95	0.00	0.00	0.106	1.141	0.128	4.520	0.000	0.000	
35.	39.05	128.12	0.00	0.00	0.111	1.195	0.130	4.609	0.000	0.000	
36.	39.10	128.28	0.00	0.00	0.116	1.249	0.133	4.697	0.000	0.000	
37.	39.15	128.44	0.00	0.00	0.121	1.302	0.135	4.785	0.000	0.000	
38.	39.20	128.61	0.00	0.00	0.126	1.356	0.138	4.873	0.000	0.000	
39.	39.25	128.74	0.00	0.00	0.131	1.410	0.140	4.961	0.000	0.000	
40.	39.30	128.94	0.00	0.00	0.136	1.464	0.143	5.050	0.000	0.000	
41.	39.35	129.10	0.00	0.00	0.141	1.518	0.145	5.138	0.000	0.000	
42.	39.40	129.26	0.00	0.00	0.146	1.571	0.148	5.227	0.000	0.000	
43.	39.44	129.39	0.00	0.00	0.150	1.615	0.150	5.297	0.000	0.000	
44.	39.45	129.43	0.00	0.00	0.152	1.637	0.152	5.382	0.000	0.000	
45.	39.50	129.59	0.00	0.00	0.163	1.750	0.164	5.806	0.000	0.000	
46.	39.55	129.76	0.00	0.00	0.173	1.863	0.176	6.230	0.000	0.000	
47.	39.60	129.92	0.00	0.00	0.184	1.976	0.188	6.653	0.000	0.000	
48.	39.65	130.08	0.00	0.00	0.194	2.089	0.200	7.077	0.000	0.000	
49.	39.70	130.25	0.00	0.00	0.205	2.202	0.212	7.501	0.000	0.000	
50.	39.75	130.41	0.00	0.00	0.215	2.315	0.224	7.925	0.000	0.000	
51.	39.80	130.58	0.00	0.00	0.226	2.428	0.236	8.348	0.000	0.000	
52.	39.85	130.74	0.00	0.00	0.236	2.541	0.248	8.772	0.000	0.000	



**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
53	39.90	130.90	0.00	0.00	0.247	2.654	0.260	9.196	0.000	0.000	
54	39.95	131.07	0.00	0.00	0.257	2.767	0.272	9.620	0.000	0.000	
55	40.00	131.23	0.00	0.00	0.268	2.880	0.284	10.044	0.000	0.000	
56	40.05	131.40	0.00	0.00	0.278	2.993	0.296	10.467	0.000	0.000	
57	40.10	131.56	0.00	0.00	0.289	3.106	0.308	10.891	0.000	0.000	
58	40.15	131.72	0.00	0.00	0.299	3.219	0.320	11.315	0.000	0.000	
59	40.20	131.89	0.00	0.00	0.310	3.332	0.332	11.739	0.000	0.000	
60	40.25	132.05	0.00	0.00	0.320	3.445	0.344	12.162	0.000	0.000	
61	40.30	132.22	0.00	0.00	0.331	3.558	0.356	12.586	0.000	0.000	
62	40.35	132.38	0.00	0.00	0.341	3.671	0.368	13.010	0.000	0.000	
63	40.40	132.54	0.00	0.00	0.352	3.784	0.380	13.434	0.000	0.000	
64	40.44	132.68	0.00	0.00	0.360	3.875	0.390	13.773	0.000	0.000	
65	40.45	132.71	0.00	0.00	0.363	3.910	0.396	13.971	0.000	0.000	
66	40.50	132.87	0.00	0.00	0.380	4.088	0.424	14.959	0.000	0.000	
67	40.55	133.04	0.00	0.00	0.396	4.266	0.452	15.948	0.000	0.000	
68	40.60	133.20	0.00	0.00	0.413	4.443	0.480	16.937	0.000	0.000	
69	40.65	133.36	0.00	0.00	0.429	4.621	0.508	17.926	0.000	0.000	
70	40.70	133.53	0.00	0.00	0.446	4.798	0.536	18.915	0.000	0.000	
71	40.75	133.69	0.00	0.00	0.462	4.976	0.564	19.904	0.000	0.000	
72	40.80	133.86	0.00	0.00	0.479	5.154	0.592	20.892	0.000	0.000	
73	40.85	134.02	0.00	0.00	0.495	5.331	0.620	21.881	0.000	0.000	
74	40.90	134.18	0.00	0.00	0.512	5.509	0.648	22.870	0.000	0.000	
75	40.95	134.35	0.00	0.00	0.528	5.686	0.676	23.859	0.000	0.000	
76	41.00	134.51	0.00	0.00	0.545	5.864	0.704	24.848	0.000	0.000	
77	41.05	134.68	0.00	0.00	0.561	6.042	0.732	25.836	0.000	0.000	
78	41.10	134.84	0.00	0.00	0.578	6.219	0.760	26.825	0.000	0.000	

**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcf.	Mcum.	Mcf.	
1	2	3	4	5	6	7	8	9	10	11	12
79	41.15	135.00	0.00	0.00	0.594	6.397	0.788	27.814	0.000	0.000	
80	41.20	135.17	0.00	0.00	0.611	6.574	0.816	28.803	0.000	0.000	
81	41.25	135.33	0.00	0.00	0.627	6.752	0.844	29.792	0.000	0.000	
82	41.30	135.50	0.00	0.00	0.644	6.930	0.872	30.781	0.000	0.000	
83	41.35	135.66	0.00	0.00	0.660	7.107	0.900	31.769	0.000	0.000	
84	41.40	135.83	0.00	0.00	0.677	7.285	0.928	32.758	0.000	0.000	
85	41.44	135.96	0.00	0.00	0.690	7.427	0.950	33.549	0.000	0.000	
86	41.45	135.99	0.00	0.00	0.694	7.468	0.960	33.885	0.000	0.000	
87	41.50	136.15	0.00	0.00	0.713	7.676	1.007	35.562	0.000	0.000	
88	41.55	136.32	0.00	0.00	0.732	7.883	1.054	37.240	0.000	0.000	
89	41.60	136.48	0.00	0.00	0.752	8.090	1.102	38.917	0.000	0.000	
90	41.65	136.65	0.00	0.00	0.771	8.297	1.149	40.595	0.000	0.000	
91	41.70	136.81	0.00	0.00	0.790	8.504	1.197	42.272	0.000	0.000	
92	41.75	136.97	0.00	0.00	0.809	8.712	1.244	43.950	0.000	0.000	
93	41.80	137.14	0.00	0.00	0.829	8.919	1.292	45.627	0.000	0.000	
94	41.85	137.30	0.00	0.00	0.848	9.126	1.339	47.304	0.000	0.000	
95	41.90	137.47	0.00	0.00	0.867	9.333	1.387	48.982	0.000	0.000	
96	41.95	137.63	0.00	0.00	0.886	9.540	1.434	50.659	0.000	0.000	
97	42.00	137.79	0.00	0.00	0.906	9.748	1.482	52.337	0.000	0.000	
98	42.05	137.96	0.00	0.00	0.925	9.955	1.529	54.014	0.000	0.000	
99	42.10	138.12	0.00	0.00	0.944	10.162	1.577	55.692	0.000	0.000	
100	42.15	138.29	0.00	0.00	0.963	10.369	1.624	57.369	0.000	0.000	
101	42.20	138.45	0.00	0.00	0.983	10.576	1.672	59.047	0.000	0.000	
102	42.25	138.61	0.00	0.00	1.002	10.784	1.719	60.724	0.000	0.000	
103	42.30	138.78	0.00	0.00	1.021	10.991	1.767	62.402	0.000	0.000	
104	42.35	138.94	0.00	0.00	1.040	11.198	1.814	64.079	0.000	0.000	

**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msgmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
105	42.40	139.11	0.00	0.00	1.060	11.405	1.862	65.757	0.000	0.000	
106	42.44	139.24	0.00	0.00	1.075	11.571	1.900	67.098	0.000	0.000	
107	42.45	139.27	0.00	0.00	1.079	11.617	1.913	67.558	0.000	0.000	
108	42.50	139.43	0.00	0.00	1.101	11.845	1.978	69.853	0.000	0.000	
109	42.55	139.60	0.00	0.00	1.122	12.074	2.043	72.149	0.000	0.000	
110	42.60	139.76	0.00	0.00	1.143	12.303	2.108	74.444	0.000	0.000	
111	42.65	139.93	0.00	0.00	1.164	12.532	2.173	76.739	0.000	0.000	
112	42.70	140.09	0.00	0.00	1.185	12.760	2.238	79.035	0.000	0.000	
113	42.75	140.25	0.00	0.00	1.207	12.989	2.303	81.330	0.000	0.000	
114	42.80	140.42	0.00	0.00	1.228	13.218	2.368	83.626	0.000	0.000	
115	42.85	140.58	0.00	0.00	1.249	13.446	2.433	85.921	0.000	0.000	
116	42.90	140.75	0.00	0.00	1.270	13.675	2.498	88.217	0.000	0.000	
117	42.95	140.91	0.00	0.00	1.292	13.904	2.563	90.512	0.000	0.000	
118	43.00	141.07	0.00	0.00	1.313	14.133	2.628	92.808	0.000	0.000	
119	43.05	141.24	0.00	0.00	1.334	14.361	2.693	95.103	0.000	0.000	
120	43.10	141.40	0.00	0.00	1.355	14.590	2.758	97.399	0.000	0.000	
121	43.15	141.57	0.00	0.00	1.377	14.819	2.823	99.694	0.000	0.000	
122	43.20	141.73	0.00	0.00	1.398	15.048	2.888	101.990	0.000	0.000	
123	43.25	141.89	0.00	0.00	1.419	15.276	2.953	104.285	0.000	0.000	
124	43.30	142.06	0.00	0.00	1.440	15.505	3.018	106.581	0.000	0.000	
125	43.35	142.22	0.00	0.00	1.462	15.734	3.083	108.876	0.000	0.000	
126	43.40	142.39	0.00	0.00	1.483	15.962	3.148	111.172	0.000	0.000	
127	43.44	142.52	0.00	0.00	1.500	16.145	3.200	113.008	0.000	0.000	
128	43.45	142.55	0.00	0.00	1.505	16.199	3.218	113.626	0.000	0.000	
129	43.50	142.71	0.00	0.00	1.530	16.468	3.305	116.716	0.000	0.000	
130	43.55	142.88	0.00	0.00	1.555	16.737	3.392	119.806	0.000	0.000	

STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS											
Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
131	43.60	143.04	0.00	0.00	1.580	17.007	3.480	122.896	0.000	0.000	
132	43.65	143.21	0.00	0.00	1.605	17.276	3.567	125.986	0.000	0.000	
133	43.70	143.37	0.00	0.00	1.630	17.545	3.655	129.076	0.000	0.000	
134	43.75	143.53	0.00	0.00	1.655	17.814	3.742	132.166	0.000	0.000	
135	43.80	143.70	0.00	0.00	1.680	18.083	3.830	135.256	0.000	0.000	
136	43.85	143.86	0.00	0.00	1.705	18.352	3.917	138.347	0.000	0.000	
137	43.90	144.03	0.00	0.00	1.730	18.621	4.005	141.437	0.000	0.000	
138	43.95	144.19	0.00	0.00	1.755	18.890	4.092	144.527	0.000	0.000	
139	44.00	144.36	0.00	0.00	1.780	19.160	4.180	147.617	0.000	0.000	
140	44.05	144.52	0.00	0.00	1.805	19.428	4.267	150.707	0.000	0.000	
141	44.10	144.68	0.00	0.00	1.830	19.697	4.355	153.797	0.000	0.000	
142	44.15	144.85	0.00	0.00	1.855	19.967	4.442	156.887	0.000	0.000	
143	44.20	145.01	0.00	0.00	1.880	20.236	4.530	159.977	0.000	0.000	
144	44.25	145.18	0.00	0.00	1.905	20.505	4.617	163.067	0.000	0.000	
145	44.30	145.34	0.00	0.00	1.930	20.774	4.705	166.157	0.000	0.000	
146	44.35	145.50	0.00	0.00	1.955	21.043	4.792	169.247	0.000	0.000	
147	44.40	145.67	0.00	0.00	1.980	21.312	4.880	172.337	0.000	0.000	
148	44.44	145.80	0.00	0.00	2.000	21.527	4.950	174.809	0.000	0.000	
149	44.45	145.83	0.00	0.00	2.006	21.589	4.972	175.586	0.000	0.000	
150	44.50	146.00	0.00	0.00	2.035	21.899	5.082	179.471	0.000	0.000	
151	44.55	146.16	0.00	0.00	2.063	22.208	5.192	183.355	0.000	0.000	
152	44.60	146.32	0.00	0.00	2.092	22.518	5.302	187.240	0.000	0.000	
153	44.65	146.49	0.00	0.00	2.121	22.827	5.412	191.125	0.000	0.000	
154	44.70	146.65	0.00	0.00	2.149	23.136	5.522	195.009	0.000	0.000	
155	44.75	146.82	0.00	0.00	2.178	23.446	5.632	198.894	0.000	0.000	
156	44.80	146.98	0.00	0.00	2.207	23.755	5.742	202.779	0.000	0.000	

Sr. No.	STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS										Remarks
	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcf.	Mcum.	Mcf.	
1	2	3	4	5	6	7	8	9	10	11	12
157	44.85	147.14	0.00	0.00	2,235	24,065	5.852	206.663	0.000	0.000	
158	44.90	147.31	0.00	0.00	2,264	24,374	5.962	210.548	0.000	0.000	
159	44.95	147.47	0.00	0.00	2,293	24,684	6.072	214.433	0.000	0.000	
160	45.00	147.64	0.00	0.00	2,322	24,993	6.182	218.317	0.000	0.000	
161	45.05	147.80	0.00	0.00	2,351	25,303	6.292	222.202	0.000	0.000	
162	45.10	147.96	0.00	0.00	2,379	25,612	6.402	226.087	0.000	0.000	
163	45.15	148.13	0.00	0.00	2,408	25,922	6.512	229.971	0.000	0.000	
164	45.20	148.29	0.00	0.00	2,437	26,231	6.622	233.856	0.000	0.000	
165	45.25	148.46	0.00	0.00	2,466	26,540	6.732	237.741	0.000	0.000	
166	45.30	148.62	0.00	0.00	2,494	26,850	6.842	241.625	0.000	0.000	
167	45.35	148.78	0.00	0.00	2,523	27,159	6.952	245.510	0.000	0.000	
168	45.40	148.95	0.00	0.00	2,552	27,469	7.062	249.395	0.000	0.000	
169	45.44	149.08	0.00	0.00	2,575	27,716	7,150	252.502	0.000	0.000	O.S.L.
170	45.45	149.11	0.01	0.03	2,581	27,778	7,179	253.509	0.029	1.006	
171	45.50	149.28	0.06	0.20	2,610	28,088	7,321	258.541	0.171	6.039	
172	45.55	149.44	0.11	0.36	2,638	28,397	7,463	263.574	0.313	11.071	
173	45.60	149.60	0.16	0.52	2,667	28,707	7,606	268.606	0.456	16.104	
174	45.65	149.77	0.21	0.69	2,696	29,016	7,748	273.638	0.598	21.136	
175	45.70	149.93	0.26	0.85	2,724	29,326	7,891	278.671	0.741	26.168	
176	45.75	150.10	0.31	1.02	2,753	29,635	8,033	283.703	0.883	31.201	
177	45.80	150.26	0.36	1.18	2,782	29,944	8,176	288.735	1.026	36.233	
178	45.85	150.42	0.41	1.35	2,811	30,254	8,318	293.768	1.168	41.266	
178	45.85	150.42	0.41	1.35	2,811	30,254	8,461	298.800	1.311	46.298	
179	45.90	150.59	0.46	1.51	2,839	30,563	8,603	303.833	1.453	51.330	
180	45.95	150.75	0.51	1.67	2,868	30,873	8,746	308.865	1.596	56.363	
181	46.00	150.92	0.56	1.84	2,897	31,182	8,888	313.897	1.738	61.395	
182	46.05	151.08	0.61	2.00	2,926	31,492					

**STATEMENT SHOWING THE STORAGE DETAILS-AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
183	46.10	151.24	0.66	2.17	2.954	31.801	9.031	318.930	1.881	66.428	
184	46.15	151.41	0.71	2.33	2.983	32.111	9.173	323.962	2.023	71.460	
185	46.20	151.57	0.76	2.49	3.012	32.420	9.316	328.995	2.166	76.492	
186	46.25	151.74	0.81	2.66	3.041	32.730	9.458	334.027	2.308	81.525	
187	46.30	151.90	0.86	2.82	3.069	33.039	9.601	339.059	2.451	86.557	
188	46.35	152.07	0.91	2.99	3.098	33.348	9.743	344.092	2.593	91.589	
189	46.40	152.23	0.96	3.15	3.127	33.658	9.886	349.124	2.736	96.622	
190	46.44	152.36	1.00	3.28	3.150	33.905	10.000	353.150	2.850	100.048	
191	46.45	152.39	1.01	3.31	3.157	33.978	10.035	354.386	2.885	101.884	
192	46.50	152.56	1.06	3.48	3.191	34.341	10.210	360.566	3.060	108.064	
193	46.55	152.72	1.11	3.64	3.224	34.705	10.385	366.746	3.235	114.244	
194	46.60	152.89	1.16	3.81	3.258	35.068	10.560	372.926	3.410	120.424	
195	46.65	153.05	1.21	3.97	3.292	35.431	10.735	379.107	3.585	126.604	
196	46.70	153.21	1.26	4.13	3.325	35.795	10.910	385.287	3.760	132.784	
197	46.75	153.38	1.31	4.30	3.359	36.158	11.085	391.467	3.935	138.965	
198	46.80	153.54	1.36	4.46	3.393	36.521	11.260	397.647	4.110	145.145	
199	46.85	153.71	1.41	4.63	3.427	36.884	11.435	403.827	4.285	151.325	
200	46.90	153.87	1.46	4.79	3.460	37.248	11.610	410.007	4.460	157.505	
201	46.95	154.03	1.51	4.95	3.494	37.611	11.785	416.187	4.635	163.685	
202	47.00	154.20	1.56	5.12	3.528	37.974	11.960	422.367	4.810	169.865	
203	47.05	154.36	1.61	5.28	3.562	38.337	12.135	428.548	4.985	176.045	
204	47.10	154.53	1.66	5.45	3.595	38.701	12.310	434.728	5.160	182.225	
205	47.15	154.69	1.71	5.61	3.629	39.064	12.485	440.908	5.335	188.406	
206	47.20	154.85	1.76	5.77	3.663	39.427	12.660	447.088	5.510	194.586	
207	47.25	155.02	1.81	5.94	3.697	39.791	12.835	453.268	5.685	200.766	
208	47.30	155.18	1.86	6.10	3.730	40.154	13.010	459.448	5.860	206.946	

**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
	2	3	4	5	6	7	8	9	10	11	
209	47.35	155.35	1.91	6.27	3.764	40.517	13.185	465.628	6.035	213.126	
210	47.40	155.51	1.96	6.43	3.798	40.680	13.360	471.808	6.210	219.306	
211	47.44	155.64	2.00	6.56	3.825	41.171	13.500	476.753	6.350	224.250	
212	47.45	155.67	2.01	6.59	3.832	41.250	13.539	478.112	6.389	225.610	
213	47.50	155.84	2.06	6.76	3.869	41.642	13.731	484.910	6.581	232.408	
214	47.55	156.00	2.11	6.92	3.905	42.035	13.923	491.708	6.773	239.206	
215	47.60	156.17	2.16	7.09	3.942	42.428	14.116	498.507	6.966	246.004	
216	47.65	156.33	2.21	7.25	3.978	42.821	14.308	505.305	7.158	252.802	
217	47.70	156.49	2.26	7.41	4.015	43.214	14.501	512.103	7.351	259.601	
218	47.75	156.66	2.31	7.58	4.051	43.607	14.693	518.901	7.543	266.399	
219	47.80	156.82	2.36	7.74	4.088	44.000	14.886	525.699	7.736	273.197	
220	47.85	156.99	2.41	7.91	4.124	44.939	15.078	532.497	7.928	279.995	
221	47.90	157.15	2.46	8.07	4.161	44.785	15.271	539.295	8.121	286.793	
222	47.95	157.31	2.51	8.23	4.197	45.178	15.463	546.094	8.313	293.591	
223	48.00	157.48	2.56	8.40	4.234	45.571	15.656	552.892	8.506	300.389	
224	48.05	157.64	2.61	8.56	4.270	45.964	15.848	559.690	8.698	307.188	
225	48.10	157.81	2.66	8.73	4.307	46.357	16.041	566.488	8.891	313.986	
226	48.15	157.97	2.71	8.89	4.343	46.750	16.233	573.286	9.083	320.784	
227	48.20	158.13	2.76	9.06	4.380	47.143	16.426	580.084	9.276	327.582	
228	48.25	158.30	2.81	9.22	4.416	47.536	16.618	586.882	9.468	334.380	
229	48.30	158.46	2.86	9.38	4.453	47.928	16.811	593.680	9.661	341.178	
230	48.35	158.63	2.91	9.55	4.489	48.321	17.003	600.479	9.853	347.976	
231	48.40	158.79	2.96	9.71	4.526	48.714	17.196	607.277	10.046	354.774	
232	48.44	158.92	3.00	9.84	4.555	49.028	17.350	612.715	10.200	360.213	
233	48.45	158.95	3.01	9.88	4.563	49.117	17.398	614.410	10.248	361.908	
234	48.50	159.12	3.06	10.04	4.604	49.558	17.638	622.886	10.488	370.384	

**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
235	48.55	159.28	3.11	10.20	4.645	49.999	17.878	631.362	10.728	378.859	
236	48.60	159.45	3.16	10.37	4.686	50.441	18.118	639.837	10.968	387.335	
237	48.65	159.61	3.21	10.53	4.727	50.882	18.358	648.313	11.208	395.811	
238	48.70	159.77	3.26	10.70	4.768	51.323	18.598	656.788	11.448	404.286	
239	48.75	159.94	3.31	10.86	4.809	51.765	18.838	665.264	11.688	412.762	
240	48.80	160.10	3.36	11.02	4.850	52.206	19.078	673.740	11.928	421.237	
241	48.85	160.27	3.41	11.19	4.891	52.647	19.318	682.215	12.168	429.713	
242	48.90	160.43	3.46	11.35	4.932	53.088	19.558	690.691	12.408	438.189	
243	48.95	160.60	3.51	11.52	4.973	53.530	19.798	699.166	12.648	446.664	
244	49.00	160.76	3.56	11.68	5.014	53.971	20.038	707.642	12.888	455.140	
245	49.05	160.92	3.61	11.84	5.055	54.412	20.278	716.118	13.128	463.615	
246	49.10	161.09	3.66	12.01	5.096	54.854	20.518	724.593	13.368	472.091	
247	49.15	161.25	3.71	12.17	5.137	55.295	20.758	733.069	13.608	480.567	
248	49.20	161.42	3.76	12.34	5.178	55.736	20.998	741.544	13.848	489.042	
249	49.25	161.58	3.81	12.50	5.219	56.178	21.238	750.020	14.088	497.518	
250	49.30	161.74	3.86	12.66	5.260	56.619	21.478	758.496	14.328	505.993	
251	49.35	161.91	3.91	12.83	5.301	57.060	21.718	766.971	14.568	514.469	
252	49.40	162.07	3.96	12.99	5.342	57.502	21.958	775.447	14.808	522.945	
253	49.44	162.20	4.00	13.12	5.375	57.855	22.150	782.227	15.000	529.725	
254	49.45	162.24	4.01	13.16	5.384	57.951	22.212	784.399	15.062	531.897	
255	49.50	162.40	4.06	13.32	5.429	58.436	22.519	795.258	15.369	542.756	
256	49.55	162.56	4.11	13.48	5.474	58.920	22.826	806.118	15.676	553.615	
257	49.60	162.73	4.16	13.65	5.519	59.405	23.134	816.977	15.984	564.475	
258	49.65	162.89	4.21	13.81	5.564	59.889	23.441	827.837	16.291	575.334	
259	49.70	163.06	4.26	13.98	5.609	60.373	23.749	838.696	16.599	586.194	
260	49.75	163.22	4.31	14.14	5.654	60.858	24.056	849.555	16.906	597.053	



**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From Q.S.L.		Area		Gross Storage		Net Storage		Remarks
	Ml.	Fl.	Ml.	Fl.	Msqmt.	Mscft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
261	49.80	163.38	4.36	14.30	5.699	61.342	24.364	860.415	17.214	807.912	
262	49.85	163.55	4.41	14.47	6.744	61.826	24.671	871.274	17.521	818.772	
263	49.90	163.71	4.46	14.63	5.789	62.311	24.979	882.133	17.829	629.631	
264	49.95	163.88	4.51	14.80	5.834	62.795	25.286	892.993	18.136	640.490	
265	50.00	164.04	4.56	14.96	5.879	63.279	25.594	903.852	18.444	651.350	
266	50.05	164.20	4.61	15.12	5.924	63.764	25.901	914.711	18.751	662.209	
267	50.10	164.37	4.66	15.29	5.969	64.248	26.209	925.571	19.059	673.069	
268	50.15	164.53	4.71	15.45	6.014	64.733	26.516	936.430	19.366	683.928	
269	50.20	164.70	4.76	15.62	6.059	65.217	26.824	947.290	19.674	694.787	
270	50.25	164.86	4.81	15.78	6.104	65.701	27.131	958.149	19.981	705.647	
271	50.30	165.02	4.86	15.94	6.149	66.186	27.439	969.008	20.289	716.506	
272	50.35	165.19	4.91	16.11	6.194	66.670	27.746	979.868	20.596	727.365	
273	50.40	165.35	4.96	16.27	6.239	67.154	28.054	990.727	20.904	738.225	
274	50.44	165.48	5.00	16.40	6.275	67.542	28.300	999.415	21.150	746.912	
275	50.45	165.52	5.01	16.44	6.285	67.647	28.369	1001.834	21.219	749.331	
276	50.50	165.68	5.06	16.60	6.334	68.172	28.711	1013.929	21.561	761.427	
277	50.55	165.84	5.11	16.76	6.382	68.696	29.053	1026.024	21.903	773.522	
278	50.60	166.01	5.16	16.93	6.431	69.221	29.396	1038.120	22.246	785.617	
279	50.65	166.17	5.21	17.09	6.48	69.746	29.738	1050.215	22.588	797.713	
280	50.70	166.34	5.26	17.26	6.528	70.270	30.081	1062.311	22.931	809.808	
281	50.75	166.50	5.31	17.42	6.577	70.795	30.423	1074.406	23.273	821.904	
282	50.80	166.66	5.36	17.50	6.626	71.320	30.766	1086.501	23.616	833.999	
283	50.85	166.83	5.41	17.75	6.675	71.845	31.108	1098.597	23.958	846.094	
284	50.90	166.99	5.46	17.91	6.723	72.369	31.451	1110.693	24.301	858.190	
285	50.95	167.16	5.51	18.08	6.772	72.894	31.793	1122.787	24.643	870.285	
286	51.00	167.32	5.56	18.24	6.821	73.419	32.136	1134.883	24.986	882.381	

STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS											
Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Fl.	Mt.	Fl.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
287	51.05	167.48	5.61	18.41	6.870	73.944	32.478	1146.978	25.328	894.476	
288	51.10	167.65	5.66	18.57	6.918	74.468	32.821	1159.074	25.671	906.571	
289	51.15	167.81	5.71	18.73	6.967	74.993	33.163	1171.169	26.013	918.667	
290	51.20	167.98	5.76	18.9	7.016	75.518	33.506	1183.264	26.356	930.762	
291	51.25	168.14	5.81	19.06	7.065	76.042	33.848	1159.824	26.698	942.858	2204.350
292	51.30	168.31	5.86	19.23	7.113	76.567	34.191	1207.455	27.041	954.953	
293	51.35	168.47	5.91	19.39	7.162	77.092	34.533	1219.551	27.383	967.048	
294	51.40	168.63	5.96	19.55	7.211	77.617	34.876	1231.646	27.726	979.144	
295	51.44	168.76	6.00	19.68	7.250	78.036	35.150	1241.322	28.000	988.820	
296	51.45	168.80	6.01	19.72	7.261	78.158	35.232	1244.218	28.082	991.716	
297	51.50	168.96	6.06	19.88	7.318	78.763	35.642	1258.697	28.492	1006.195	
298	51.55	169.13	6.11	20.05	7.374	79.368	36.052	1273.176	28.902	1020.674	
299	51.60	169.29	6.16	20.21	7.430	79.974	36.462	1287.656	29.312	1035.153	
300	51.65	169.45	6.21	20.37	7.486	80.579	36.872	1302.135	29.722	1049.632	
301	51.70	169.62	6.26	20.54	7.542	81.585	37.282	1316.614	30.132	1064.112	
302	51.75	169.78	6.31	20.7	7.599	81.790	37.692	1331.093	30.542	1078.591	
303	51.80	169.95	6.36	20.87	7.655	82.396	38.102	1345.572	30.952	1093.070	
304	51.85	170.11	6.41	21.03	7.711	83.001	38.512	1360.051	31.362	1107.549	
305	51.90	170.27	6.46	21.19	7.767	83.607	38.922	1374.530	31.772	1122.028	
306	51.95	170.44	6.51	21.36	7.824	84.212	39.332	1389.010	32.182	1136.507	
307	52.00	170.60	6.56	21.52	7.880	84.818	39.742	1403.489	32.592	1150.986	
308	52.05	170.77	6.61	21.69	7.936	85.423	40.152	1417.968	33.002	1165.466	
309	52.10	170.93	6.66	21.85	7.992	86.028	40.562	1432.447	33.412	1179.945	
310	52.15	171.09	6.71	22.01	8.049	86.634	40.972	1446.926	33.822	1194.424	
311	52.20	171.26	6.76	22.18	8.105	87.239	41.382	1461.405	34.232	1208.903	
312	52.25	171.42	6.81	22.34	8.161	87.845	41.792	1475.884	34.642	1223.382	

**STATEMENT SHOWING THE STORAGE DETAILS AT VARIOUS WATER LEVELS**

Sr. No.	Reservoir R.L.		Depth of Water From O.S.L.		Area		Gross Storage		Live Storage		Remarks
	Mt.	Ft.	Mt.	Ft.	Msqmt.	Msqft.	Mcum.	Mcft.	Mcum.	Mcft.	
1	2	3	4	5	6	7	8	9	10	11	12
313	52.30	171.59	6.86	22.51	8.217	88.450	42.202	1490.364	35.052	1237.861	
314	52.35	171.75	6.91	22.67	8.274	89.056	42.612	1504.843	35.462	1255.341	
315	52.40	171.91	6.96	22.83	8.330	89.661	43.022	1519.322	35.872	1266.820	
316	52.44	172.05	7.00	22.97	8.375	90.146	43.350	1530.905	36.200	1278.403	
317	52.45	172.03	7.01	23.00	8.396	90.370	43.358	1531.200	36.208	1278.698	
318	52.50	172.24	7.06	23.16	8.500	91.491	43.400	1532.671	36.250	1280.169	
319	52.55	172.41	7.11	23.33	8.507	91.563	43.867	1549.151	36.717	1296.649	
320	52.60	172.57	7.16	23.49	8.513	91.635	44.334	1565.632	37.183	1313.129	
321	52.65	172.73	7.21	23.65	8.520	91.706	44.800	1582.112	37.650	1329.610	
322	52.70	172.90	7.26	23.82	8.527	91.778	45.267	1598.592	38.117	1346.090	
323	52.75	173.06	7.31	23.98	8.533	91.850	45.733	1615.073	38.583	1362.570	
324	52.80	173.23	7.36	24.15	8.540	91.922	46.200	1631.553	39.050	1379.051	
325	52.85	173.39	7.41	24.31	8.547	91.993	46.667	1648.033	39.517	1395.531	
326	52.90	173.55	7.46	24.47	8.553	92.065	47.133	1664.514	39.983	1412.011	
327	52.95	173.72	7.51	24.64	8.560	92.137	47.600	1680.994	40.450	1428.492	
328	53.00	173.88	7.56	24.80	8.567	92.209	48.067	1697.474	40.917	1444.972	
329	53.05	174.05	7.61	24.97	8.573	92.280	48.533	1713.955	41.383	1461.452	
330	53.10	174.21	7.66	25.13	8.680	92.352	49.000	1730.435	41.850	1477.933	F.R.L./H.F.L.
331	53.15	174.37	7.71	25.29	8.752	94.204	49.301	1741.081	42.151	1488.579	
332	53.20	174.54	7.76	25.46	8.924	96.056	49.603	1751.728	42.453	1499.226	
333	53.25	174.70	7.81	25.62	9.096	97.908	49.904	1762.374	42.754	1509.872	
334	53.30	174.87	7.86	25.79	9.268	99.760	50.206	1773.021	43.056	1520.518	
335	53.35	175.03	7.91	25.95	9.440	101.612	50.507	1783.667	43.367	1531.166	
336	53.40	175.19	7.96	26.12	9.612	103.464	50.809	1794.314	43.669	1541.811	
337	53.44	175.33	8.00	26.25	9.750	104.946	51.050	1802.831	43.900	1550.328	


## **Annexure - 4**

### **Daily Progress Reports**

 <p><b>DAILY PROGRESS REPORT</b></p>	<i>Form No.:</i>	Sy01R
	<i>Revision:</i>	01
	<i>Date:</i>	11/07/2014
	<i>Approved By</i>	PKT

**BHADAR 2**


**DPR No. 001**

Client:	Narmada Water Resources, Water Supply & Kalpsar Department	Project No:	P34320		
Vessel:	OSaS SMB	Date:	09-03-2021		
Location:	Bhadar 2 Dam	Sheet No:	1 of 1		
Party Chief: Gaurav Sharma		Client Rep.			
<b>Survey Personnel:</b>					
1. Samson Chacko		2. Amit Bhardwaj		3. Binu Kumar	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		
	Water Level Meter	Bar Check	Generator		
	Computer		Heave sensor		
			Hypack		
<b>Time (hrs)</b>		<b>Activities</b>			
0800	1900	Survey boat and equipment shifted to Bhadar 2			
		<b>Today's coverage</b>		<b>Cumulative coverage</b>	
		Bathymetry: -- sq.km	Line km: --	Bathymetry: -- sq.km	Line km: --
		Topo: -- sq.km	Line km: --	Topo: -- sq.km	Line km: --
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Levelling, observation, benchmark setup, boat and obm maintenance.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <p><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
	Revision:	01
	Date:	11/07/2014
	Approved By	PKT

Bhadar 2 Dam

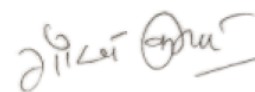
DPR No. 002

Client:	Narmada Water Resources, Water Supply & Kalpsar Department	Project No:	P34320	
Vessel:	OSaS SMB	Date:	10-03-2021	
Location:	Bhadar 2 Dam	Sheet No:	1 of 1	
Party Chief: Gaurav Sharma		Client Rep.		
<b>Survey Personnel:</b>				
1. Amit Bhardwaj	2. Binu Kumar		3.	
4.	5.		6.	
7.	8.		9.	
10.				
<b>Equipment</b>	RTK System	SBES System	Auto Level	Heave sensor
	Water Level Meter	Bar Check	Generator	Hypack
	Computer			
<b>Time (hrs)</b>	<b>Activities</b>			
0800	Meeting attended by Party Chief with Section Officer Mayank Butani at site office.			
	Established two reference stations by DGPS observation.			
	Vertical control established by level transfer from existing reference station shown by section officer to the newly established reference station (Temporary Benchmark).			
1800	Boat, OBM, generator maintenance.			
	Today's coverage		Cumulative coverage	
	Bathymetry: -- <b>sq.km</b>	Line km: --	Bathymetry: -- <b>sq.km</b>	Line km: --
	Topo: -- <b>sq.km</b>	Line km: --	Topo: -- <b>sq.km</b>	Line km: --
	Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Start RTK survey, boat mobilisation and installation of digital water level gauge.				
<b>Remarks:</b>				
			<p style="text-align: center;"><b>Client Representative</b></p>	
<b>Party Chief</b>				

 <p><b>DAILY PROGRESS REPORT</b></p>	<i>Form No.:</i>	Sy01R
	<i>Revision:</i>	01
	<i>Date:</i>	11/07/2014
	<i>Approved By</i>	PKT

Bhadar 2 Dam


DPR No. 003

Client:	Narmada Water Resources, Water Supply & Kalpsar Department	Project No:	P34320		
Vessel:	OSaS SMB	Date:	11-03-2021		
Location:	Bhadar 2 Dam	Sheet No:	1 of 1		
Party Chief: Gaurav Sharma		Client Rep.			
<b>Survey Personnel:</b>					
1. Amit Bhardwaj	2. Binu Kumar	3.			
4.	5.	6.			
7.	8.	9.			
10.					
<b>Equipment</b>	RTK system	SBES system	Auto level	Heave sensor	
	Water level meter	Bar check	Generator	Hypack	
	Computer				
<b>Time (hrs)</b>	<b>Activities</b>				
0800	0900	Boat landed at dam after maintenance			
0915	0930	Land survey team reached site and set up RTK reference station for land survey.			
0930	0945	Land survey started.			
0900	1800	Boat mobilised and digital water level gauge installed			
1830	1845	Land survey terminated and reference station secured.			
1845	1900	Land survey team returned to guest house.			
1800	1815	Bathymetric survey team returned to guest house.			
		Today's coverage	Cumulative coverage		
		Bathymetry: -- sq.km	Line km: --	Bathymetry: -- sq.km	Line km: --
		Topo: 0.32 sq.km	Line km: 12.71	Topo: 0.32 sq.km	Line km: 12.71
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Start bathymetric survey and continue with topographic survey.					
<b>Remarks:</b>					
			<p style="text-align: center;"><b>Client Representative</b></p>		
<b>Party Chief</b>					

 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
	Revision:	01
	Date:	11/07/2014
	Approved By	PKT

**Bhadar 2 Dam**

**DPR No. 004**


Client:	Narmada Water Resources, Water Supply & Kalpsar Department		Project No:	P34320	
Vessel:	OSaS SMB		Date:	12-03-2021	
Location:	BHADAR 2 DAM		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Binu Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		Heave sensor
	Water Level Meter	Bar Check	Generator		Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0730	0745	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0730	0750	Land survey team reached site and set up RTK reference station for land survey.			
0745	0800	Bar check carried out.			
0805		Bathymetric survey started.			
0750		Land survey started.			
	1800	Bathymetry survey terminated and reference station secured.			
	1830	Land survey terminated and reference station secured.			
1830	1900	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: 0.27 sq.km	Line km: 10.63	Bathymetry: 0.25 sq.km	Line km: 10.63
		Topo: 0.44 sq.km	Line km: 17.63	Topo: 0.76 sq.km	Line km: 30.34
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
			<b>Client Representative</b>		
<b>Party Chief</b>					



 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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	Approved By	PKT

**Bhadar 2 Dam**


DPR No. 005

Client:	Narmada Water Resources, Water Supply & Kalpsar Department			Project No:	P34320
Vessel:	OSaS SMB			Date:	13-03-2021
Location:	BHADAR 2 DAM			Sheet No:	1 of 1
Party Chief: Gaurav Sharma				Client Rep.	
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Binu Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System		SBES System	Auto Level	
	Water Level Meter		Bar Check	Generator	
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0745	0815	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0745	0800	Land survey team reached site and set up RTK reference station for land survey.			
0805	0820	Bar check carried out.			
0820		Bathymetric survey started.			
0800		Land survey started.			
	1810	Bathymetry survey terminated and reference station secured.			
	1900	Land survey terminated and reference station secured.			
1900	2000	Land Survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: 0.63 sq.km	Line km: 25.10	Bathymetry: 0.90 sq.km	Line km: 35.73
		Topo: 0.56 sq.km	Line km: 22.55	Topo: 1.32 sq.km	Line km: 52.89
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
			<b>Client Representative</b>		
<b>Party Chief</b>					

 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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	Date:	11/07/2014
	Approved By	PKT

**Bhadar 2 Dam**


**DPR No. 006**

Client:	Narmada Water Resources, Water Supply & Kalpsar Department		Project No:	P34320	
Vessel:	OSAS SMB		Date:	14-03-2021	
Location:	Bhadar 2 Dam		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Binu Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		Heave sensor
	Water Level Meter	Bar Check	Generator		Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0730	0800	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0730	0815	Land survey team reached site and set up RTK reference station for land survey.			
0805	0820	Bar check carried out.			
0820		Bathymetric survey started.			
0815		Land survey started.			
	1830	Bathymetry survey terminated and reference station secured.			
	1845	Land survey terminated and reference station secured.			
1845	1945	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: <b>0.72 sq.km</b>	Line km: <b>28.60</b>	Bathymetry: <b>1.62 sq.km</b>	Line km: <b>64.33</b>
		Topo: <b>0.37 sq.km</b>	Line km: <b>14.76</b>	Topo: <b>1.69 sq.km</b>	Line km: <b>67.65</b>
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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	Date:	11/07/2014
	Approved By	PKT

Bhadar 2 Dam

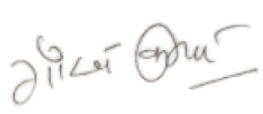
DPR No. 007

Client:	Narmada Water Resources, Water Supply & Kalpsar Department		Project No:	P34320	
Vessel:	OSAS SMB		Date:	15-03-2021	
Location:	Bhadar 2 Dam		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Binu Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level	Heave sensor	
	Water Level Meter	Bar Check	Generator	Hypack	
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0740	0805	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0740	0830	Land survey team reached site and set up RTK reference station for land survey.			
0810	0820	Bar check carried out.			
0820		Bathymetric survey started.			
0830		Land survey started.			
	1815	Bathymetry survey terminated and reference station secured.			
	1800	Land survey terminated and reference station secured.			
1800	1845	Land Survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: <b>0.60 sq.km</b>	Line km: <b>24.00</b>	Bathymetry: <b>2.22 sq.km</b>	Line km: <b>88.33</b>
		Topo: <b>0.14 sq.km</b>	Line km: <b>5.74</b>	Topo: <b>1.83 sq.km</b>	Line km: <b>73.39</b>
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <b>DAILY PROGRESS REPORT</b>	Form No.:	Sy01R
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	Approved By	PKT

Bhadar 2 Dam


DPR No. 008

Client:	Narmada Water Resources, Water Supply & Kalpsar Department			Project No:	P34320
Vessel:	OSAS SMB			Date:	16-03-2021
Location:	Bhadar 2 Dam			Sheet No:	1 of 1
Party Chief:	Gaurav Sharma			Client Rep.	
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Binu Kumar		3. Sanjeev Kumar	
4.		5.		6.	
7.		8.		9.	
10.					
Equipment	RTK System		SBES System		Auto Level
	Water Level Meter		Bar Check		Generator
	Computer				Heave sensor
		Hypack			
<b>Time (hrs)</b>		<b>Activities</b>			
0745	0800	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0745	0845	Land survey team reached site and set up RTK reference station for land survey.			
0805	0820	Bar check carried out.			
0820		Bathymetric survey started.			
0845		Land survey started.			
	1830	Bathymetry survey terminated and reference station secured.			
	1830	Land survey terminated and reference station secured.			
1830	1930	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: <b>0.77sq.km</b>		Line km: <b>30.90</b>	
		Bathymetry: <b>2.99 sq.km</b>		Line km: <b>119.23</b>	
		Topo: <b>0.16 sq.km</b>		Line km: <b>6.56</b>	
		Topo: <b>1.99 sq.km</b>		Line km: <b>79.95</b>	
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <p><b>OCEAN</b> Science &amp; Surveying</p> <p align="center"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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Bhadar 2 Dam


DPR No. 009

Client:	Narmada Water Resources, Water Supply & Kalpsar Department			Project No:	P34320
Vessel:	OSAS SMB			Date:	17-03-2021
Location:	Bhadar2 Dam			Sheet No:	1 of 1
Party Chief: Gaurav Sharma				Client Rep.	
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System		SBES System	Auto Level	Heave sensor
	Water Level Meter		Bar Check	Generator	Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0715	0730	Bathy team reached site and set up RTK reference station for bathymetric survey.			
0700	0800	Land survey team reached site and set up RTK reference station for land survey.			
0740	0800	Bar check carried out.			
0810		Bathymetric survey started.			
0800		Land survey started.			
	1800	Bathymetry survey terminated and reference station secured.			
	1845	Land survey terminated and reference station secured.			
1845	1945	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: <b>0.44sq.km</b>	Line km: <b>17.70</b>	Bathymetry: <b>3.43 sq.km</b>	Line km: <b>136.93</b>
		Topo: <b>0.23 sq.km</b>	Line km: <b>9.02</b>	Topo: <b>2.22 sq.km</b>	Line km: <b>88.97</b>
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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	Approved By	PKT

**Bhadar 2 Dam**

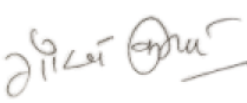
**DPR No. 010**

Client:	Narmada Water Resources, Water Supply&KalpsarDepartment			Project No:	P34320
Vessel:	OSAS SMB			Date:	18-03-2021
Location:	Bhadar 2 Dam			Sheet No:	1 of 1
Party Chief: Gaurav Sharma				Client Rep.	
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		Heave sensor
	Water Level Meter	Bar Check	Generator		Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0800	1600	Bathy team reached site and visit with client for remaining survey area.			
0715	0830	Land survey team reached site and set up RTK reference station for land survey.			
0830		Land survey started.			
	1600	Bathymetry survey team returned to guest house.			
	1830	Land survey team terminated and reference station secured.			
1830	1945	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: 0 sq.km	Line km: 0	Bathymetry: 3.43 sq.km	Line km: 136.93
		Topo: 0.34 sq.km	Line km: 13.53	Topo: 2.56 sq.km	Line km: 102.5
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		

 <p><b>DAILY PROGRESS REPORT</b></p>	<i>Form No.:</i>	Sy01R
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	<i>Date:</i>	11/07/2014
	<i>Approved By</i>	PKT

**Bhadar 2 Dam**

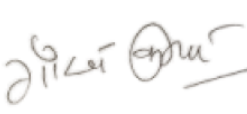
**DPR No. 011**

Client:	Narmada Water Resources, Water Supply & Kalpsar Department	Project No:	P34320																	
Vessel:	OSAS SMB	Date:	19-03-2021																	
Location:	Bhadar 2 Dam	Sheet No:	1 of 1																	
Party Chief: Gaurav Sharma			Client Rep.																	
<b>Survey Personnel:</b>																				
1. Amit Bhardwaj	2. Sanjeev Kumar		3.																	
4.	5.		6.																	
7.	8.		9.																	
10.																				
<b>Equipment</b>	RTK System	SBES System	Auto Level	Heave sensor																
	Water Level Meter	Bar Check	Generator	Hypack																
	Computer																			
<b>Time (hrs)</b>		<b>Activities</b>																		
0745	0800	Bathy team reached site and set up RTK reference station for bathymetric survey.																		
0715	0830	Land survey team reached site and set up RTK reference station for land survey.																		
0800	0815	Bar check carried out.																		
0815		Bathymetric survey started.																		
0830		Land survey started.																		
	1800	Bathymetry survey terminated and reference station secured.																		
	1845	Land survey terminated and reference station secured.																		
1845	1945	Survey teams returned to guest house.																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Today's coverage</th> <th colspan="2">Cumulative coverage</th> </tr> <tr> <td>Bathymetry: <b>0.23 sq.km</b></td> <td>Line km: <b>9.02</b></td> <td>Bathymetry: <b>3.66 sq.km</b></td> <td>Line km: <b>145.95</b></td> </tr> <tr> <td>Topo: <b>0.15 sq.km</b></td> <td>Line km: <b>6.15</b></td> <td>Topo: <b>2.71 sq.km</b></td> <td>Line km: <b>108.65</b></td> </tr> <tr> <td colspan="2">Weather downtime today: 0 hours</td> <td colspan="2">Cumulative weather downtime: 0 hours</td> </tr> </table>					Today's coverage		Cumulative coverage		Bathymetry: <b>0.23 sq.km</b>	Line km: <b>9.02</b>	Bathymetry: <b>3.66 sq.km</b>	Line km: <b>145.95</b>	Topo: <b>0.15 sq.km</b>	Line km: <b>6.15</b>	Topo: <b>2.71 sq.km</b>	Line km: <b>108.65</b>	Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
Today's coverage		Cumulative coverage																		
Bathymetry: <b>0.23 sq.km</b>	Line km: <b>9.02</b>	Bathymetry: <b>3.66 sq.km</b>	Line km: <b>145.95</b>																	
Topo: <b>0.15 sq.km</b>	Line km: <b>6.15</b>	Topo: <b>2.71 sq.km</b>	Line km: <b>108.65</b>																	
Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours																		
<b>Plan for next 24 hours:</b> Continue with bathymetric and topographic survey.																				
<b>Remarks:</b>																				
 <b>Party Chief</b>			<b>Client Representative</b>																	

 <p><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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Bhadar 2 Dam

DPR No. 012

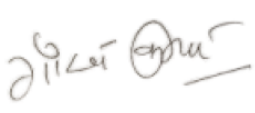
Client:	Narmada Water Resources, Water Supply&KalpsarDepartment		Project No:	P34320	
Vessel:	OSAS SMB		Date:	20-03-2021	
Location:	Bhadar 2 Dam		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		Heave sensor
	Water Level Meter	Bar Check	Generator		Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0800	0815	Bathy team reached site and set up RTK reference station for marking hillock.			
0700	0715	Land survey team reached site and set up RTK reference station for land survey.			
0715		Land survey started.			
0830	1630	Land survey started for marking hillock			
	1645	Bathymetry survey terminated and reference station secured.			
	1830	Land survey terminated and reference station secured.			
1830	1900	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: -- sq.km	Line km: --	Bathymetry: 3.66 sq.km	Line km: 145.95
		Topo: 0.56 sq.km	Line km: 22.55	Topo: 3.27 sq.km	Line km: 131.20
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with topographic survey and demobilisation bathymetry survey boat.					
<b>Remarks:</b>					
 <p><b>Party Chief</b></p>			<p><b>Client Representative</b></p>		



 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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**Bhadar 2 Dam**

DPR No. 013

Client:	Narmada Water Resources, Water Supply & Kalpsar Department		Project No:	P34320	
Vessel:	OSAS SMB		Date:	21-03-2021	
Location:	Bhadar 2 Dam		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level		Heave sensor
	Water Level Meter	Bar Check	Generator		Hypack
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0750	0810	Bathy team reached site and demobilisation begun.			
0700	0745	Land survey team reached site and set up RTK reference station for land survey.			
0830	1630	Demobilised bathymetry survey equipment from boat.			
0750		Land survey started.			
	1845	Land survey terminated and reference station secured.			
1845	1930	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: -- sq.km	Line km: --	Bathymetry: 3.65 sq.km	Line km: 145.95
		Topo: 0.51 sq.km	Line km: 20.5	Topo: 3.78 sq.km	Line km: 151.70
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with topographic survey					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		






 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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**Bhadar 2 Dam**


**DPR No. 016**

Client:	Narmada Water Resources, Water Supply & Kalpsar Department			Project No:	P34320
Vessel:	OSAS SMB			Date:	24-03-2021
Location:	Bhadar 2 Dam			Sheet No:	1 of 1
Party Chief: Gaurav Sharma				Client Rep.	
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System		SBES System	Auto Level	
	Water Level Meter		Bar Check	Generator	
	Computer				
<b>Time (hrs)</b>		<b>Activities</b>			
0730	0830	Land survey team reached site and set up RTK reference station for land survey.			
0840		Land survey started.			
	1600	Land survey terminated and reference station secured.			
1600	1715	Land survey team returned to guest house.			
		Today's coverage		Cumulative coverage	
		Bathymetry: -- sq.km	Line km: --	Bathymetry: 3.65 sq.km	Line km: 145.95
		Topo: 0.17 sq.km	Line km: 6.97	Topo: 4.74 sq.km	Line km: 190.24
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> Continue with topographic survey and Shift to Next location					
<b>Remarks:</b>					
 <p><b>Party Chief</b></p>			<p><b>Client Representative</b></p>		

 <p style="text-align: center;"><b>DAILY PROGRESS REPORT</b></p>	Form No.:	Sy01R
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	Date:	11/07/2014
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Bhadar 2 Dam

DPR No. 017

Client:	Narmada Water Resources, Water Supply & Kalpsar Department		Project No:	P34320	
Vessel:	OSAS SMB		Date:	25-03-2021	
Location:	Bhadar 2 Dam		Sheet No:	1 of 1	
Party Chief: Gaurav Sharma			Client Rep.		
<b>Survey Personnel:</b>					
1. Amit Bhardwaj		2. Sanjeev Kumar		3.	
4.		5.		6.	
7.		8.		9.	
10.					
<b>Equipment</b>	RTK System	SBES System	Auto Level	Heave sensor	
	Water Level Meter	Bar Check	Generator	Hypack	
	Computer				
<b>Time (hrs)</b>	<b>Activities</b>				
0700	0715	Land survey team reached site and set up RTK reference station for land survey.			
0715	1300	Land survey started and stabilised 5 TBMs for client.			
0800	1200	Equipment packing.			
	1315	Land survey terminated and reference station secured.			
1400	1600	All equipment and boat loaded on truck.			
	1615	Departed from Bhadar2 to Aji 1			
2015	2230	Reached on site and boat, equipment unloading.			
		Today's coverage		Cumulative coverage	
		Bathymetry: -- sq.km	Line km: --	Bathymetry: 3.66 sq.km	Line km: 145.95
		Topo: 0.05 sq.km	Line km: 2.05	Topo: 4.79 sq.km	Line km: 192.29
		Weather downtime today: 0 hours		Cumulative weather downtime: 0 hours	
<b>Plan for next 24 hours:</b> set up equipment and commence topographic & bathymetric survey at next location					
<b>Remarks:</b>					
					
<b>Party Chief</b>			<b>Client Representative</b>		