



Narmada based 360mld Indore WSS

Lifting Raw Water (with substantial abrasive Sand)

directly from the River Gorge

(vide Open Sump Pits; with 25+m water level variation & without an

All Weather Approach) since 2013



Maheshwar Dam

Narmada River

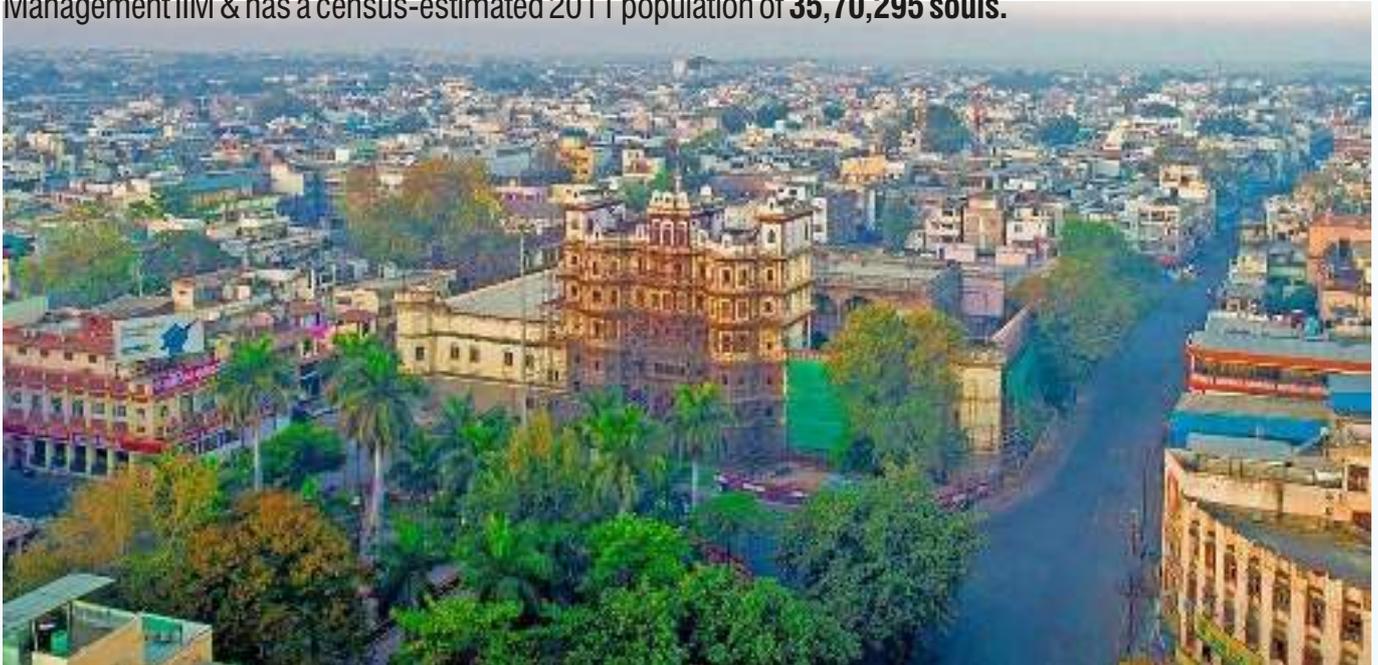
॥ नमामि देवी नर्मदे ॥

**92mld x 4 nos.
HT SubCF pumps**

**92mld x 2 nos.
LT SubCF pumps**



Indore is the most populous and the largest city in Madhya Pradesh – it is often called the “*Jewel of the Malwa*”. An Education hub, it has both - the Indian Institute of Technology IIT as well as the Indian Institute of Management IIM & has a census-estimated 2011 population of **35,70,295 souls**.



Located at an average altitude of 553m (1,814 ft) above sea level, it has the highest elevation among major cities of Central India. Bringing water to this City from 91 km away from River Narmada is a difficult task.

Situation (prior to 2013) :

Indore had 2 sources of water- the **Yeshwant Sagar lake** (constructed across the Gambhir river) & the **Bilawali Tank** - both of these were fully used up.



Being a consistently one of **India’s Fastest Growing Cities** - it’s demand for drinking water kept on rising day by day but Yeshwant Sagar & Bilawali could not cater to the increasing demand.

As a result, Indore residents were supplied Drinking Water **only on alternate days** & that too only for 20-40 minutes. Many colonies in the city & with the inclusion of 29 villages into the Municipal Limits were devoid of drinking water supply.

Opportunity:

The Narmada River (also called the *Reva*) is the 5th longest, the overall longest west-flowing river in India & the largest river in Madhya Pradesh.

Maheshwar Dam is located in Khargone district & 91 km from Indore.

Indore city has an allocation of 2000mld from the river.

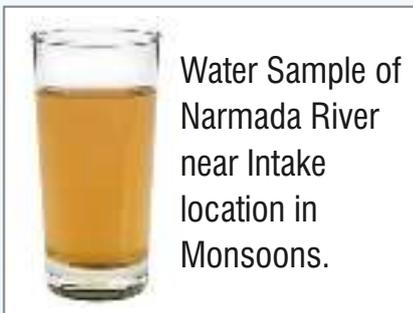




Challenges:

Despite ample quantity of water, Water supply from river Narmada was becoming a **challenging** task.  At the proposed intake site, a **dangerous combination of High Silt, High Depth & Unapproachable Location** make it a **very difficult job for Raw Water Intake pumps...!**

The raw water had to be tapped directly from the River Gorge approximately **600m away** & almost **25m below** the **nearest motorable approach point..!**



Balu mitti (a Hindi word) is a Sand Soil, is finer than gravel but more rough in texture than silt & has a lot of pebbles. Due to such loose balu sand strata & the Open Sumps design; even **minor rains** deposit a huge amount of Sand, Gravel & Pebbles in the Pump Sump (which has its Top at 146.5m – i.e. is well below the HFL of 167m). Almost **every monsoon** or whenever the **upstream Omkareshwar Hydel Dam** generates Hydro Electricity; huge amount of silt, sand & gravel would bury the Raw Water pumps.

Hence, the Raw Water Pumps had to be :

- 1) Silt Resistant,
- 2) tolerate 25m+ Water Level variation (i.e. nearly 90%+ head variation)
- 3) have to be really Maintenance Free - i.e. have a very long Mean Time Between Maintenance (MTBM)

Aqua's Solution:

92mld Raw Water submerged Centrifugal Pumpsets (ARS 5063 TQL 415, 2 Nos. 1W + 1S & ARS HPS 1st BVo 5064 M L 0590 06600 NJ, 4 Nos. 3W+1S) were the best & almost exclusive choice since it could be easily rested at the bottom of the sump. Also being Submerged Centrifugal Pumps they were suitable for working in hostile environment under 24m of flooding & frequent heavy Sand burial where in no other type of pumps were suited.

Pump Model	Capacity (m ³ /hr)	Voltage	Quantity (nos.)
ARS 5063 TQ L 415	3835 m ³ /hr	415 V	2 (1W+1S)
ARS H PS 1st BVo 5064 M L 0590 06600 NJ	3835 m ³ /hr	6600 V	4 (3W+1S)

End User	 <p>Indore Municipal Corporation (vide PHE's Project Uday wing)</p>
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Site Photos:

During flood; the pumpsets are often buried under silt but the robust pumpsets are working unhindered.

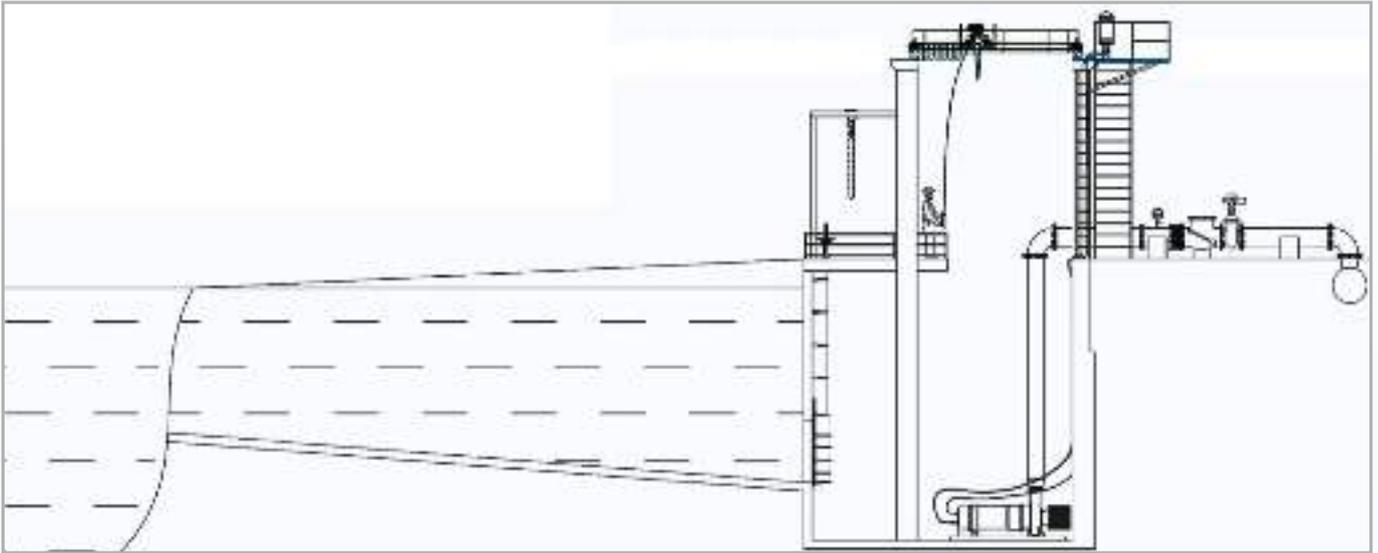


Almost Impossible Operating conditions :

- 1) 25m+ of Water Level variation;
- 2) Frequent Flooding leading to Frequent Burial under Tons of Silt &
- 3) atleast 600m away from nearest Motorable Access Point; yet 365day operation..!

Proven Ruggedness & yet High Efficiency nature of Aqua's SubCF Pumpsets ensured that AQUA is repeatedly chosen.

layout



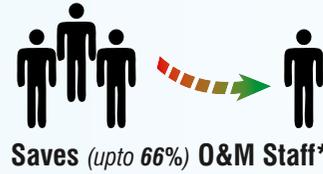
Product Benefits:

<p>Submerged Pumps</p> <p>High Silt level doesn't cause problems for Submerged pumpsets</p>		<p>VT Pumps</p> <p>High Silt level doesn't cause problems for VT Pumps</p>	
<p>Submerged Pumps</p> <p>Increased Depth doesn't cause problems for Submerged pumpsets</p>		<p>VT Pumps</p> <p>Increased Depth doesn't cause problems for VT Pumps</p>	

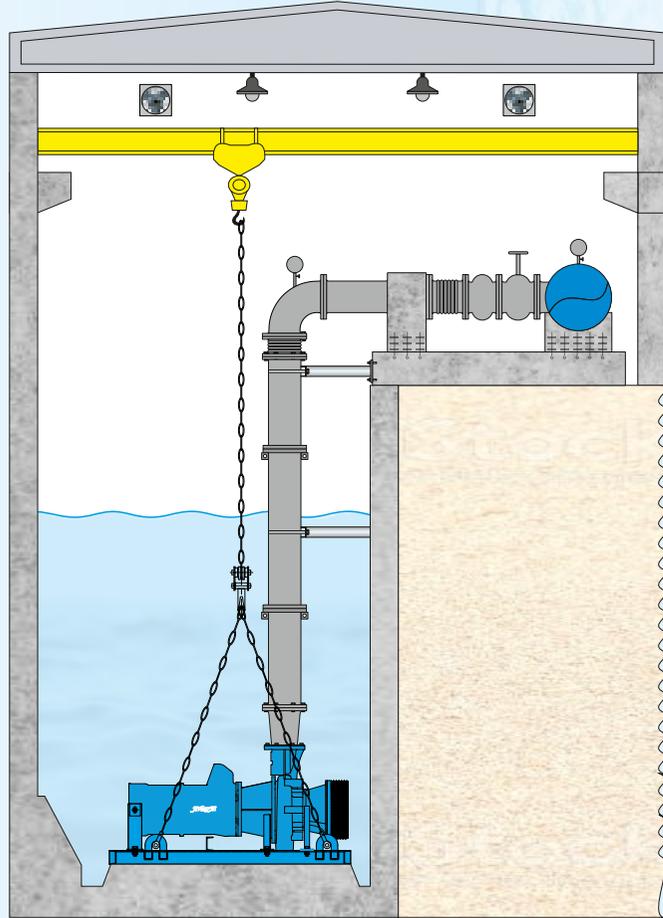
<p>Submerged Pumps</p>	<p>Pumps Bearings are Located Deep inside the motor & are Totally Sealed by Two Mechanical Seals thereby Isolated from Water & Silt for 100% Bullet Proof performance</p>	<p>VT Pumps</p>
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Zero Ancillary &/or Auxiliary Systems & Fewer Parts

Lead to a Huge Reduction in Requirement of O&M ManPower & Spare Parts



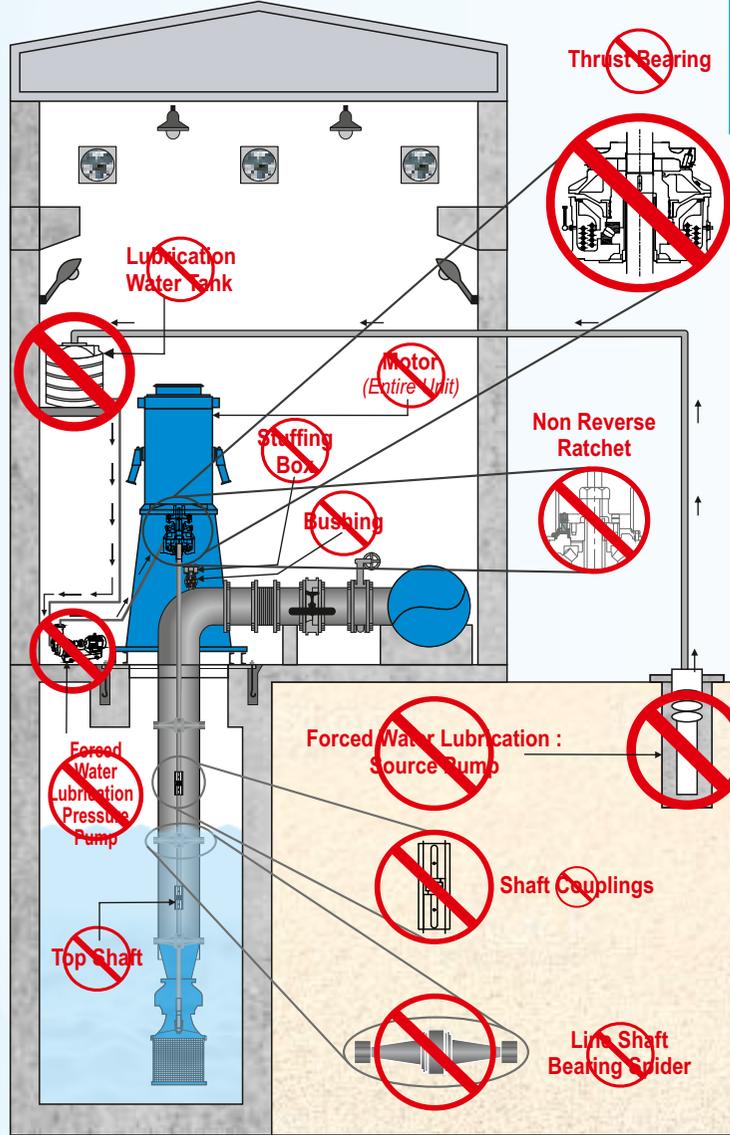
SubCF



Recommended Types of Spare Parts
to be kept in PumpHouse for 2year operation (as per DIN 24296)

1	Impeller	6	Casing wear ring
2	Rolling Element / Angular contact ball bearing	7	Impeller wear ring
3	Rolling Element / Deep Groove ball bearing	8	Cable Gland
4	O-ring	9	Motor (Rotor, Stator)
5	Mechanical seal (set)		

VT



Low Life Cycle Costs (LCC)*

(refer marketing@aquapumps.com for additional white papers)

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to be kept in PumpHouse for 2year operation (as per DIN 24296)

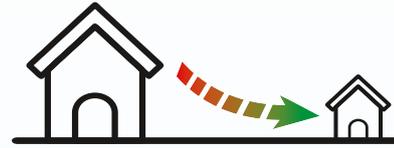
1	Pump shaft
2	Intermediate shaft
3	Top shaft
4	Impeller
5	Suction stage impeller (if)
6	Rotor
7	Rolling Element / Angular contact ball bearing
8	Rolling Element / Deep Groove ball bearing
9	Bearing carrier
10	Thrust collar
11	Gasket
12	Joint ring
13	O-ring
14	Felt ring
15	Mechanical seal (set)
16	Gland packing (set)
17	Casing wear ring
18	Impeller wear ring
19	Stage sleeve
20	Shaft protecting sleeve
21	Centring sleeve/locknut
22	Bearing sleeve
23	Bush (thrust and radial bearing)
24	Interstage bush
25	Locking sleeve, complete
26	Threaded bush
27	Bearing bush
28	Torque transmitting coupling elements
29	Conical/threaded coupling
30	Nut with two flats
31	Lock washer
32	Motor (Entire Unit)
32	

SubCF pumpsets require just 9 types of Spare Parts as compared to 32 types for VT pumpsets.....!





Saves (upto 45%) Capital Cost of Entire Pumping Stations*



Saves (upto 55%) Land Requirement*



Low Energy Cost : Due to Elimination of Suction Losses, Ancillary & Auxiliaries; **Wire to Water Power Consumption** of SCF based Pumping Station is **slightly Lower** (compared to Conventional VT Pumpset based Pumping Stations)*



No need for Frequent Periodic....



Shafts/Sleeves &/or Coupling



Gland Packing



Oil &/or Grease



Requires No Special Pre – Post / Ancillary-Auxillary Operations; like Operating & Maintaining the Forced Water Lubrication systems operation.



Minimal Noise, Vibration & Heat Emission; due to **elimination** of Auxiliary & Ancillary systems (like Forced Water Lubrication, Thrust Bearing Cooling system, Motor Heat Exchanger).



Low Life Cycle Costs (LCC)*

**(refer marketing@aquapumps.com for additional white papers)*



A Strong, Single Shaft for Fail Safe Operation

Single, Robust & oversized Shaft is **Common** between the motor & pump. It is (upto 1550 kW 4P, 1200 kW 6P, 900 kW 8P) made from **Stainless Steel** & designed without Any Sleeves (below the Mechanical Seals) thereby reducing maintenance problems & **eliminating need of spare parts.**

Shaft Sealing is by means of **Two**, Independent, high quality Bi-Directional; **Mechanical Seals** permitting reverse running due to accidental back-flow. The Primary seal is always of **Silicon Carbide** faces to withstand Erosion incase of increased silt content in water.



Seals are rated for at least **16 / 25 bar** pressure capability for **L10H** life in excess of **50,000 hours &/or 5 years.**



Anti Drip, Fully Synthetic; **Super Premium Synthetic Grease** ensures a minimum Regreasing Interval (**F_{10H}**) of **75,000h** (for Pumpsets rated upto 650kW) & **45,000h** (for larger kW) Submerged motors

Intelligent InBuilt Monitoring

Easy Monitoring (& Remote Control[#]) of your Pumpset's Health.



- **PSLD** detects Pressurized Water Leakage from Mechanical Seals.
- **CCWLD** detects Accidental Water Leakage from Cable Sheath's Cuts &/or Nicks into the Motor.
- **SBWLD** detect Accidental Water Leakage in to Motor's Stator Chamber.
- **BTDs** in the form of Bi-metallic Switches (for All Pumpsets) & RTD's (PT100 - 3 Wire Simplex type - from Size > 150kW) to Monitor Bearing Temperature (without any Additional Cost)[#].
- **WTDs** in the form of Bi-metallic Switches (for All Pumpsets) & RTD's (PT100 - 3 Wire Simplex type - 1 per each Phase - from Size > 150kW) to Monitor Winding Temperature (without any Additional Cost)[#].

[#]requires additional communication hardware

OFFICE OF THE EXECUTIVE ENGINEER,
PUBLIC HEALTH ENGG. DEPARTMENT
MAINT. DN. NO. 1 (IMC) MANDLESHWAR

Email

No. 2157/TS/MDL/2021-22

Dt. 10/9/2021

TO WHOM SO EVER IT MAY CONCERN

This is to certify that we are using 2 nos AQUA make Submerged Centrifugal Pump of Capacity 3835 m³/hr, Head- 25 mtr of Rating 355 KW in standards voltage of 415 V model ARS 5063 TQ L 475 which was installed in year 2013 at Narmada river Jalud for Indore water supply scheme Mandleshwar.

After satisfaction of AQUA pumps 4 nos Submerged Centrifugal Pump of Capacity 3835 m³/hr, Head-30.5 mtr, rated 440 KW with 6.6. KV power supply were purchased and installed in year 2016 and 2019.

We are pleased to state that the performance of all 6 nos Submerged Centrifugal pump sets as found satisfactory, since more than 7-8 years & satisfying trust of Indore city. Further also like to state that services after sales is excellent of the company.

This is issued for tender purpose only in ref. to his letter no. 001 dt. 27-8-20

Date 10-09-2021


Executive Engineer
Public Health Engg. Department
Maint. DN. No. 1 (IMC) Mandleshwar

“Due to the consistent Narmada waters (inspite of 25m+ depth, very high siltation issues & poor approach issues for operation of raw water pumps) thanks to the Robust performance of Aqua's Submerged CF pumpsets; now Indore has been declared as India's first "Water Plus City" (under the Swachh Survekshan 2021)...!”

- S V Rajwade, Incumbent SE (PHE, IMC Narmada WSS)

Aqua Machineries Private Limited

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