AMARAVATI
DEEP DIVE WORKSHOP

14, 15 DECEMBER 2017
THE GATEWAY HOTEL, VIJAYAWADA

Liveability | Economic Powerhouse
Infrastructure | Governance



Infrastructure – Water, Wastewater & Storm water

Amaravati Development Corp | Andhra Pradesh Capital Region Development Authority

Introduction

- Agenda and target discussion
- Panelists
- Background and current status
- Panel Discussion

Vision and Goals

- **Vision for Capital City**
  - A pioneering smart city in the country and
  - A true “People’s Capital” developed as per the global standards

- **Water Infrastructure**
  - Vision :
    - ✓ Water supply to all stakeholders, 24x7 supply with Unaccounted for Water target of 10%
    - ✓ Wastewater network with 100% collection, conveyance and safe disposal with 100% reuse
    - ✓ Storm water network with risk free flooding
  - Goals :
    - ✓ To ensure water security, accountability of water and sustainability of source and maintain proper water balance
    - ✓ To ensure decentralized system, tertiary level treatment and end use of horticulture (30%) and non-drinking
    - ✓ To ensure cost effective solution to maintainable drainage system

Agenda and Target Discussion

- **Water infrastructure to be**
  - Sustainable
  - Resilient
  - Align the Project Vision with ‘Smart Water Infrastructure’

- **Prepare for challenges**
  - Infrastructure phasing
  - Diversification of water portfolio: conventional and recycle/ reuse
  - Water resiliency – for quantity and quality
  - Emerging technologies for water and wastewater treatment
  - Water bodies as friendly public places,
  - Flood management

Panelists

The agenda is to explore the opportunities to incorporate the best practices in the design after envisaging the future challenges for the greenfield development. The idea is to make world's most sustainable city in terms of infrastructure which can serve the city and its people with the organic growth.



Shital Chinchwade, Associate Director, Ch2M
Over 22 years of extensive experience in master planning of water resources, water supply and sewerage projects



Prof. Jayakumar, NIT Warangal
20 yrs+ experience in Hydrology, Water Resource Management and Urban Water Management



Loh An Tuan, CLC Singapore
30 years+ in Ministry of Environment and Water resources, Singapore. Award PM's gold medal for his role in cleaning of Singapore River



Veera A, Stormwater Expert, Ch2m
14+ yrs in design of water supply systems,rainwater harvesting etc for Airports, Hospitals, IT Parks, mixed use developments and Townships.



Prof. Absar Kazmi, IIT Roorkee
Professor of Environmental Engg at IIT Roorkee with about 20 years of expertise in sustainable solid waste and wastewater treatment



Rajesh Adhyam , VP at Suez India
24 years experience with some of the leading Companies of Water Industry along with extensive experience in developing large Water Infrastructure projects in India.

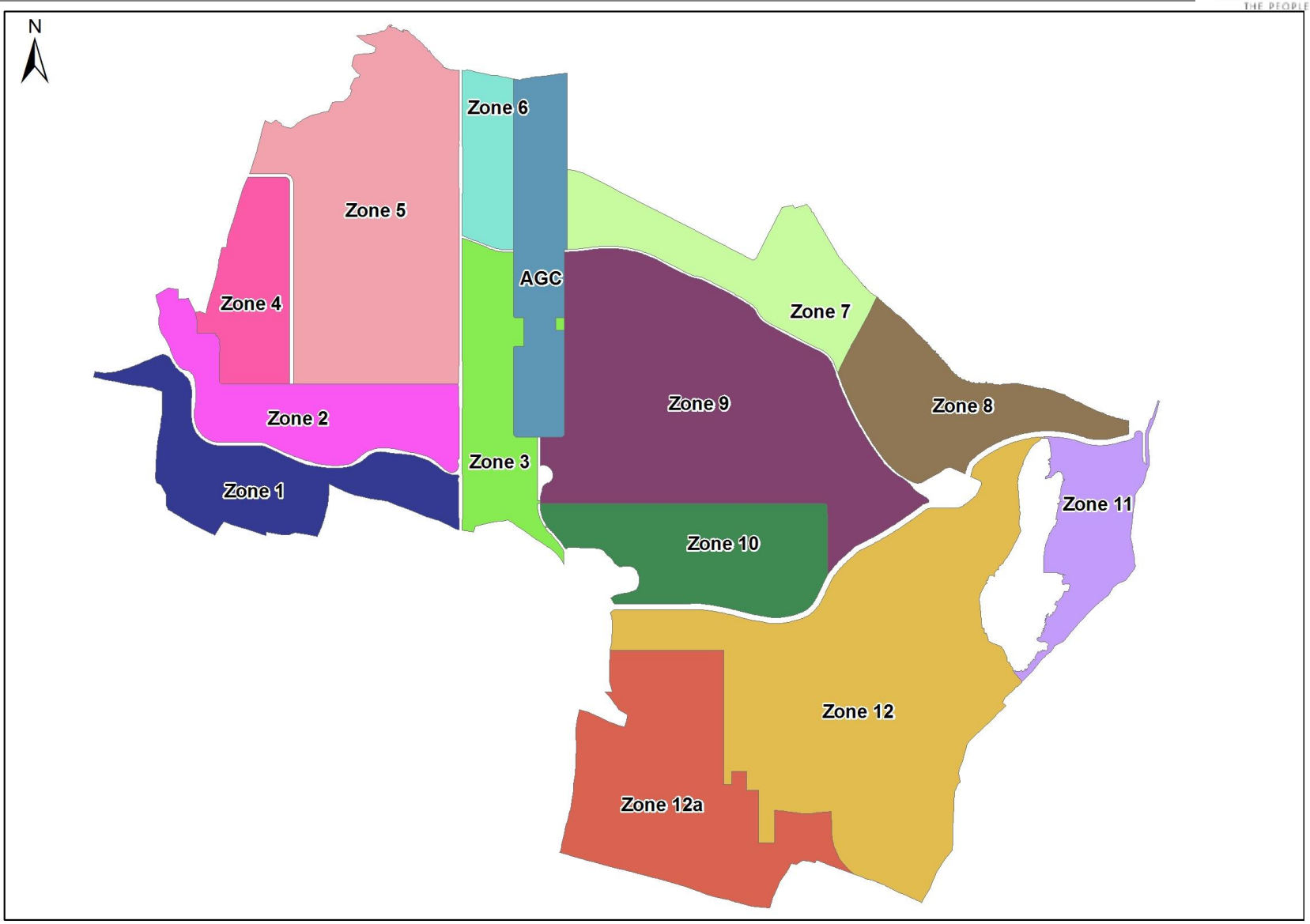


Jamie Ewert, CRCWC, Australia
Over 21 yrs experience in the water and environment industry in roles in service delivery, regulation, policy, working with cities across Australia to develop practical water sensitive projects

Amaravati Capital City



Infrastructure Zoning



Infrastructure Levels

Infrastructure Levels

- Trunk level
- LPS level
- AGC level
- Village level

Utility Infrastructure

- Water
- Waste water
- Storm water
- Recycle Water
- Power
- Roads
- ICT
- Gas
- Solar

Salient Features

- **Water infrastructure**
  - Two WTPs - 383 MLD in Phase I and 548 MLD in Phase II
  - Distribution system – 45 KM Ring Main, 24 Tapping points and 60 Water distribution districts, 49 Cushion Tanks
  - Residual pressure – Min 17m at ferule point with 24x7 delivery
- **Wastewater Infrastructure**
  - Decentralised system with 12 STPs and 1 CETP
  - Ultimate capacity of 742 MLD and initial plant capacity of 351 MLD
  - Treatment technologies – SBR, A2O, MBBR and equivalent
  - Conveyance – 1017 Km of planned network with DWC and HAC lined RCC pipes
- **Storm Water Infrastructure**
  - Flood management of Kondaveeti and Pala Vagu (drain)
  - Primary drains - Lowering of high flood level for primary drains
  - Vagu designed for 1 in 100 years and other drains for 1 in 5 year return period
  - RCC Box drain for tertiary drains and secondary drains

Current Status

- **Water infrastructure**
  - Trunk – Water Supply mains along with major roads (50m and above) contracted
  - WTP – 190 MLD on EPC mode at tender stage
  - LPS – 3 zones of 13 zones contracted, others at pre-tender stage
- **Wastewater Infrastructure**
  - Trunk – Waste water trunk infrastructure is laid with LPS infrastructure
  - LPS – 3 Zones of 13 zones contracted, others at pre-tender stage
- **Storm Water Infrastructure**
  - Trunk – Storm drains along with major roads (50m and above) contracted
  - LPS – 3 Zones out of 13 zones contracted, others at pre-tender stage
- **Flood Management**
  - Vagu & Reservoir – Master Plan and DPR finalized, pre-tender stage

Targeted questions

- Commissioning the systems inline with the growth of the city over time
- Building resiliency with regard to quality and quantity of water
- Emerging trends in Water treatment and ZLD concepts
- Ensuring the canals are also friendly public spaces

Panel discussions

- **#01 Commissioning the systems inline with the growth of the city over time**
  - Infrastructure phasing
  - Conventional cities – Utility infrastructure follows urban development
  - Capital city – Infrastructure incentivizes urban development
  - In context of capital city, discussion to prioritise the investment and decide pace of infrastructure investment over urban development

- **#02 Building Resiliency with regard to Quality and Quantity**
  - Major cities over the world facing natural calamities
  - Proposed infrastructure shall be climate change proof, flood proof and cyclone proof
  - Additional standby infrastructure with short term and long term action plan for mitigating emergency measures
  - Discussion on such emergency preparedness plans in terms of quantity and quality of water infrastructure

Panel discussions

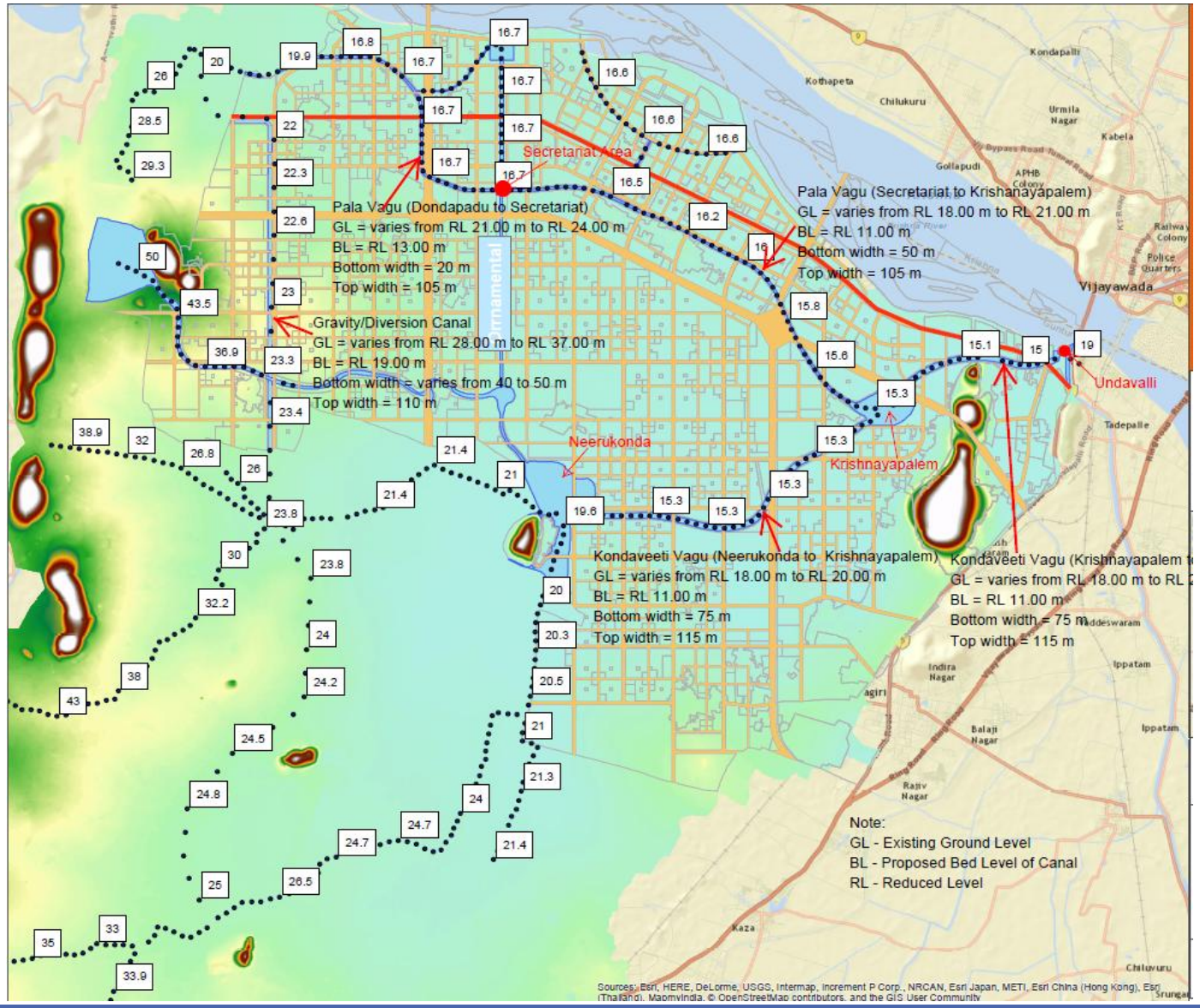
- **#03 Emerging trends in water treatment and ZLD concepts**
  - City level policies and guidelines from Govt of India
  - For water treatment, present treatment standards are for TDS and coliform levels, emerging trends to treat water for odor and other microbial parameters
  - For wastewater treatment, apart from SBR, MBBR and A2O processes, any other treatment standards for defined reuse standards of 10, 10, 10 and NP removal

- **#04 Ensuring the canals are also friendly public spaces**
  - Singapore and cities in Australia have brought people closer to the water bodies
  - Encourage public and community participation with more activities
  - How to convert the vagus and trunk drains into natural free flowing water bodies with more connect with people – touch it, feel it
  - Practical suggestions to implement Singapore type ABC program for capital city

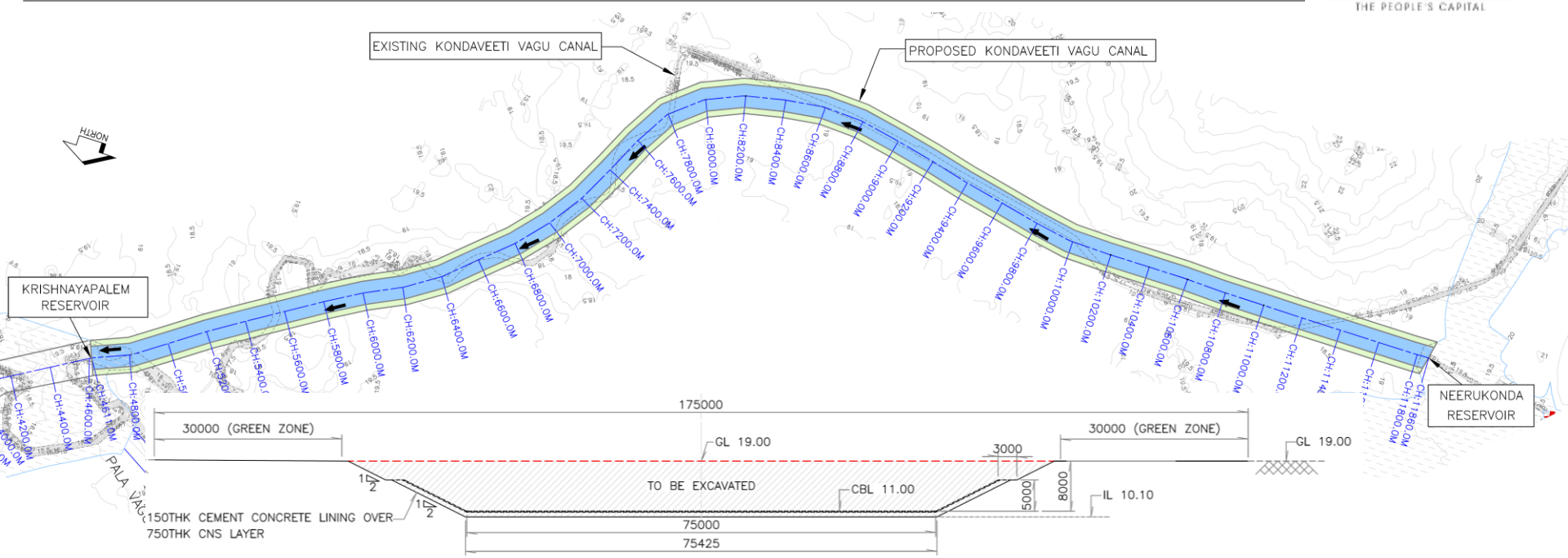
Storm water Drainage Design Criteria

S. No	Parameter	Design consideration
1	Design Frequency for Tertiary & Secondary drains	1 in 5 Years (54.77 mm/hr)
2	Design Frequency for Primary drains and Bridges	1 in 100 Years
3	Runoff Method	Rational method
4	Time of concentration	Overland flow+Time in drain
5	Runoff Co-efficient	Land use based
6	Minimum & Maximum Velocity	0.60 & 3.0 m/sec
7	Minimum size	450 mm x 450 mm
8	Type of drain	RCC Box drains
9	IDF Curves	Gannavaram Airport 1-hour rainfall data
10	Catch pit location	At 20m C/C
11	d/D ratio	Up to 0.80
12	Software used	SewerGEMS

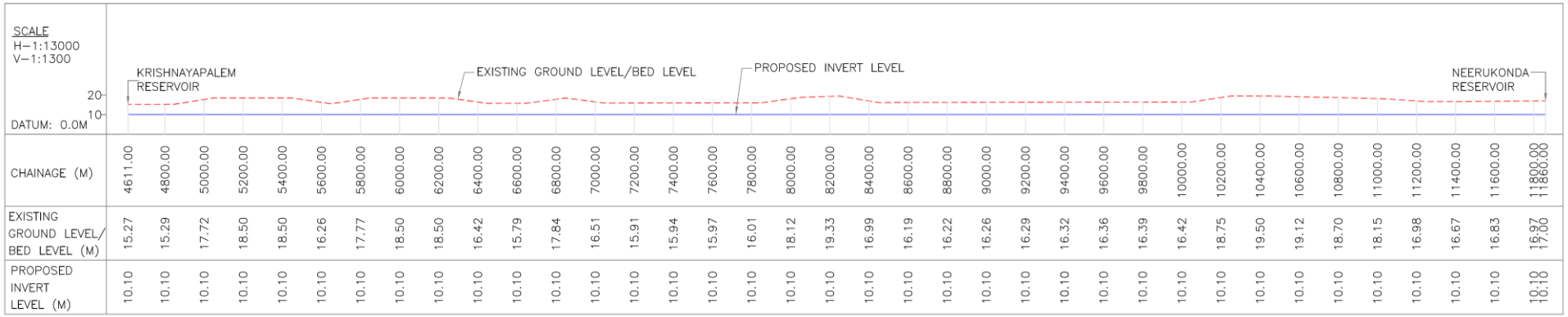
Kondaveeti Vagu Flood Management



Typical details of Kondaveeti Vagu upgradation



KONDAVEETI VAGU CANAL – CROSS SECTION AT CH:6800.00M



CHAINAGE (M)	4611.00	4800.00	5000.00	5200.00	5400.00	5600.00	5800.00	6000.00	6200.00	6400.00	6600.00	6800.00	7000.00	7200.00	7400.00	7600.00	7800.00	8000.00	8200.00	8400.00	8600.00	8800.00	9000.00	9200.00	9400.00	9600.00	9800.00	10000.00	10200.00	10400.00	10600.00	10800.00	11000.00	11200.00	11400.00	11600.00	11800.00 11860.00
EXISTING GROUND LEVEL/ BED LEVEL (M)	15.27	15.29	17.72	18.50	18.50	16.26	17.77	18.50	18.50	16.42	15.79	17.84	16.51	15.91	15.94	15.97	16.01	18.12	19.33	16.99	16.19	16.22	16.26	16.29	16.32	16.36	16.39	16.42	18.75	19.50	19.12	18.70	18.15	16.98	16.67	16.83	16.97 17.00
PROPOSED INVERT LEVEL (M)	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10	10.10 10.10

LONGITUDINAL SECTION

Panel Discussion

