

24 APRIL 2023

OUR REF: 3708

DEPARTMENT OF WATER AND SANITATION
NORTHERN CAPE REGIONAL AREA
PRIVATE BAG X6101

KIMBERLEY

8300

ATTENTION: TO WHOM IT MAY CONCERN

Sir

**WATER USE LICENSE APPLICATION (WU27435) (SCHWEIZER-RENEKE/ IPELEGENG) -
PROVISION OF ADDITIONAL INFORMATION RELATED TO THE ARTIFICIAL WETLAND**

The virtual meeting for the Water Use License Application (WU27435) (Schweizer-Reneke / Ipelegeng) held on the 13th of February 2023 refers. During the aforementioned meeting, the Department of Water and Sanitation personnel requested that an Artificial wetland be added to the treatment train of the proposed Oxidation system as a condition for the water use licence. The purpose of this documents is to provide design as well as specify information related to the Ipelegeng Artificial wetland.

Background

The wastewater network of Ipelegeng has historically be been known for regular spillages. As such the water service authority has embarked on a venture to optimise the system by implementing a bulk augmentation project. The aim of the 'Augmentation of Bulk Sewer Infrastructure in Ipelegeng' project is to optimise the wastewater system of Ipelegeng by decommissioning several pumping applications. In addition, the proposed scope of works comprises of the installation of two outfall sewer lines as well as the construction of a new oxidation ponds system. The proposed pond system will consist of a series of Anaerobic, Aerobic, and Maturation ponds within which wastewater is continuously allowed to flow from one pond to the next until the treated effluent is ultimately discharged into an Artificial Wetland. Constructed wetlands are artificial aquatic environments that are utilised to treat organic, inorganic and excess nutrient contaminants in wastewater. These wetlands consist of hydrophytes or macrophytes plants as well as coarse media to facilitate organic filtration.

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Ipelegeng - Artificial Wetland

The Artificial wetland of the Ipelegeng oxidation ponds system was designed as a meandering Subsurface flow system and will be located south east of the Ipelegeng Extension 3 (Latitude: 27°13'12.58"S & Longitude 25°17'53.51"E). The projected footprint of the wetland is 1725 m². Whereas, the total length of the proposed wetland will amount to 860 meters resulting in a wetted surface area of 860 m² and a volume of 860 m³. Attached to this document as Annexure A is detail design drawing of the proposes wetland.

As previously mentioned, the envisioned wetland will receive treated wastewater from a series of oxidation ponds. The following table displays the anticipated water quality related to the various stages of the organic treatment system:

Parameters	Raw Water	Inflow- Artificial Wetland	Effluent - Artificial Wetland
Total suspended solids	250 mg/l	41 mg/l	11 mg/l
Biological oxygen demand	250 mg/l	43 mg/l	28 mg/l
Chemical oxygen demand	600 mg/l	84 mg/l	68 mg/l
Total nitrogen	15 mg/l	4 mg/l	2 mg/l
Total phosphorus	10 mg/l	4 mg/l	1 mg/l

The Organic loading rate of the said Ipelegeng artificial wetland amounts to 0.095 Kg/m²/day (0.257 Kg/m³/day) whereas the Hydraulic loading rate is 2 012 ℓ / m²/ day (5 443 ℓ / m³/day). The retention period of the system will range between 1- and 3-day depending on various factors. In addition, the wetland was designed according to the following parameters:

- Mean annual precipitation : 485 mm/ year
- Evapotranspiration/ Infiltration : 6 mm/ day
- Flow rate : 10 -15 ℓ /s
- Aspect Ratio : 1:75
- Bed Slope : 1:200
- Subsurface flow system bed depth : 300mm

The artificial wetland will consist of a 110mm uPVC pipe laid on top of the surface and between the vegetation. The pipe will have small holes allowing wastewater to percolate and infiltrate over a large area of the wetland. The artificial wetland will be lined with an impervious plastic liner (USB Green 250 Micron) to prevent groundwater intrusion as well as wastewater leachate. The substructure of the wetland will consist of the following respective layers:

- Top layer - River sand - 100 mm
- Upper layer - Selected backfill material - 300 mm
- Lower layer - 19 mm Stone - 200 mm
- Bottom layer - 40 to 80mm Stone - 300 mm

We trust that you will find the provided information in order.

Yours faithfully



FRANS DE BEER

MOEDI CONSULTING ENGINEERS

MD\3708 Ipelegeng Bulk Sewer Aug\Comm\Letters\Enviroworks - Artificial wetland detail

Annexure A

Detail design drawings



NOTES

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PROJECT

AUGMENTATION OF BULK SEWER INFRASTRUCTURE IN IPELEGENG PHASE - 2

DRAWING TITLE

GENERAL LAYOUT AND LOCALITY PLAN

RESPONSIBLE PERSON	DATE	PROFESSIONAL ENGINEER
DESIGNED: R STEENKAMP	04/2023	
DRAWN: R STEENKAMP	04/2023	
SURVEY: A BEZUIDENHOUT	02/2022	
CHECKED: L v ROOYEN	04/2023	
CONTACT: 0832878544		

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DRAWING No. 3708 / C / 1	REVISION: -- SCALE: AS SHOWN

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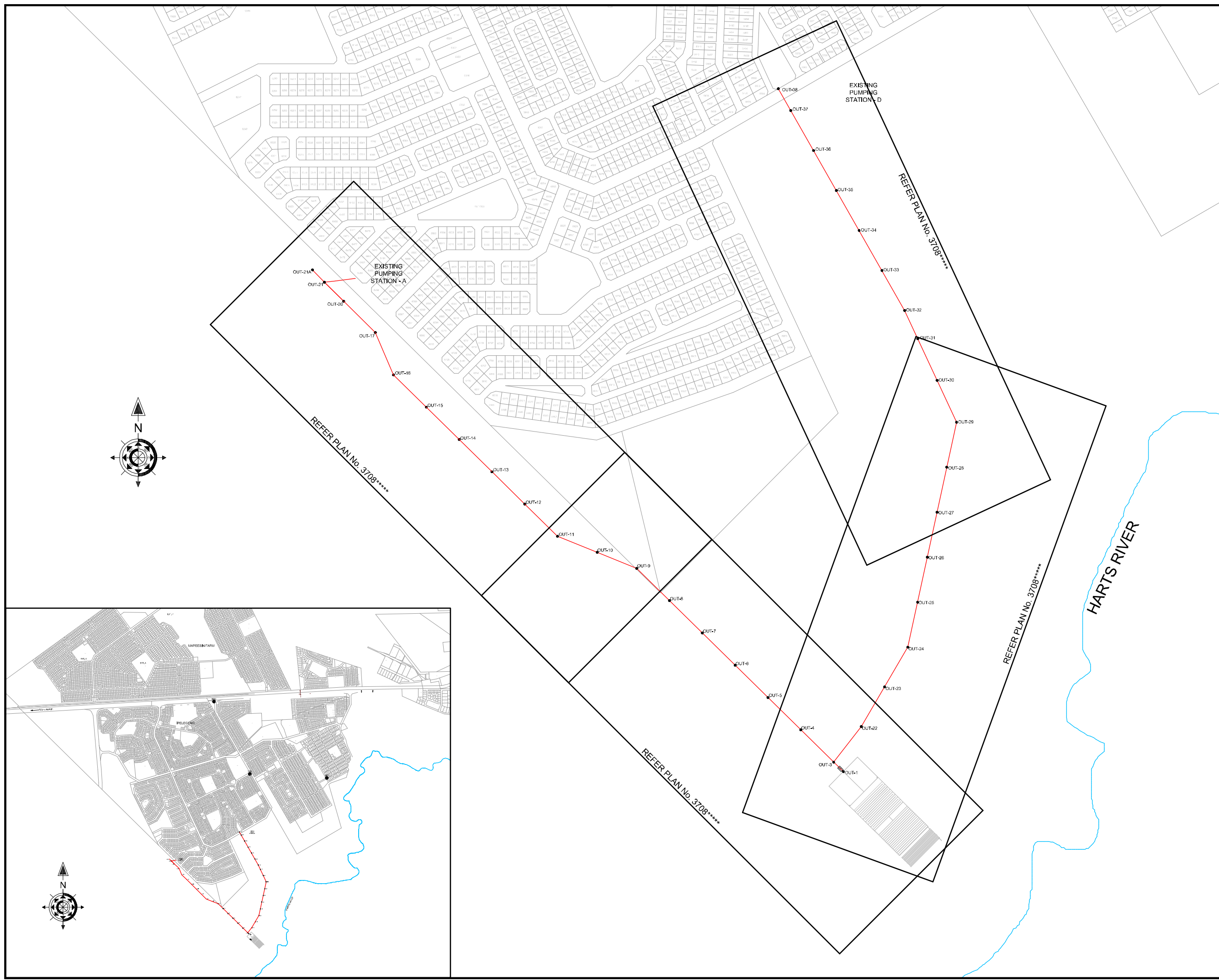
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AUGMENTATION OF BULK SEWER INFRASTRUCTURE IN IPELENG PHASE - 2

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IPELENG - OXIDATION POND SYSTEM

ISOMETRIC VIEW

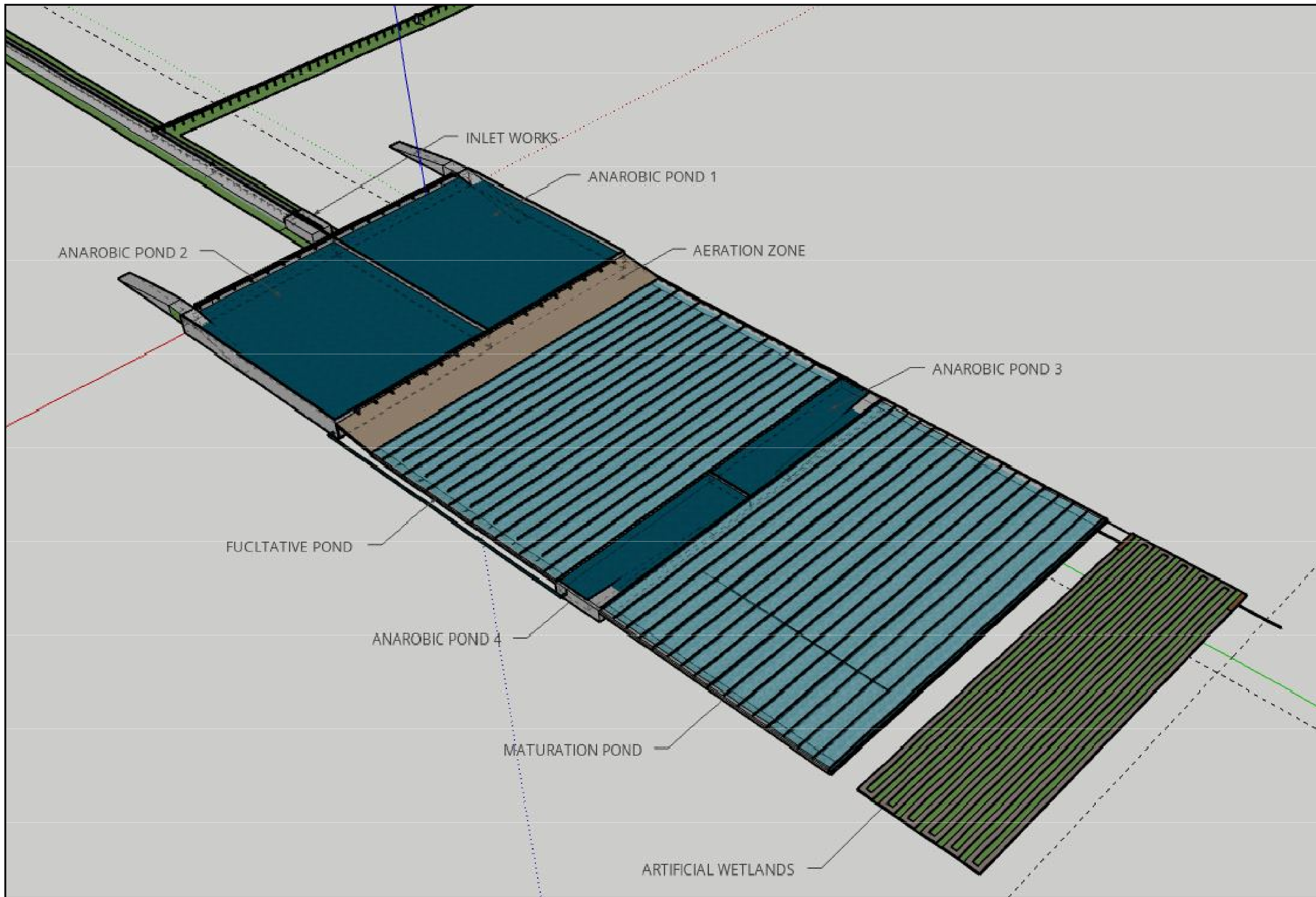
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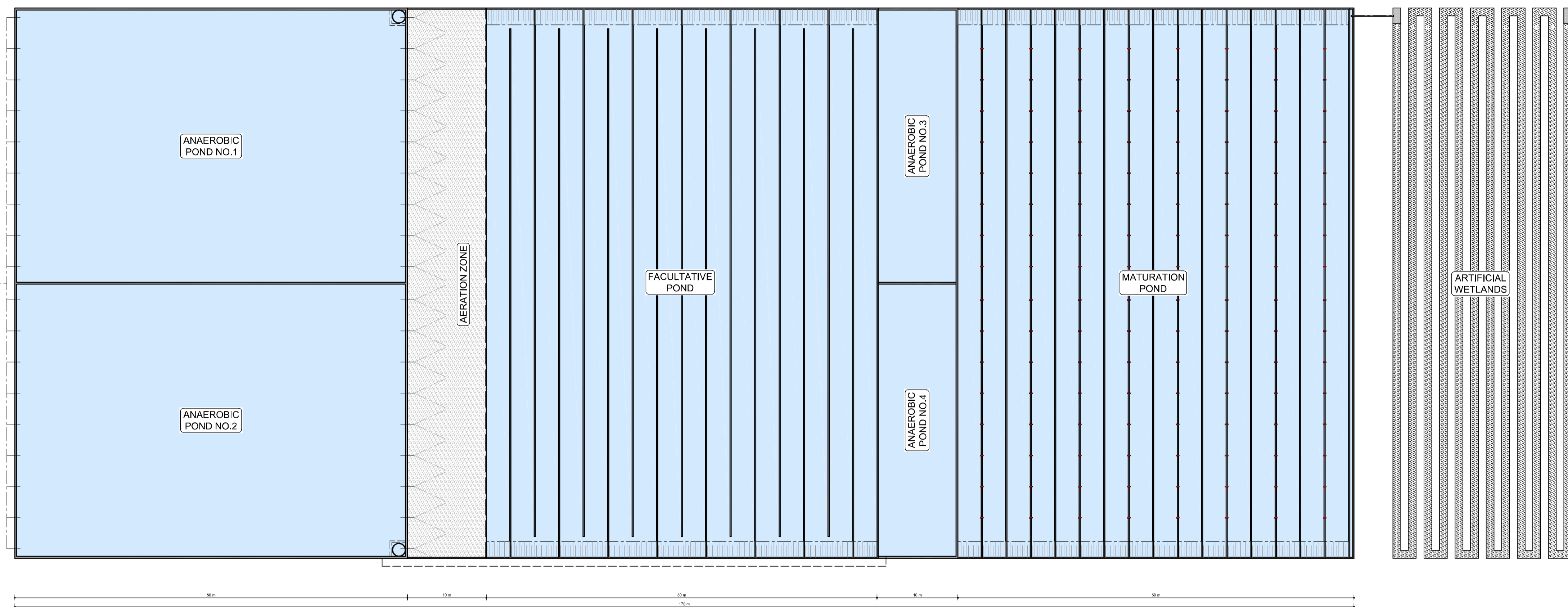
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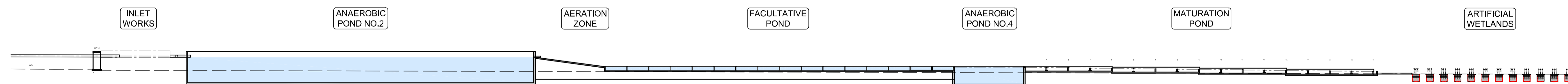
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IPELEGENG - OXIDATION POND SYSTEM
1 : 350



TYPICAL SECTION
1 : 350

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IPELEGENG - OXIDATION POND SYSTEM

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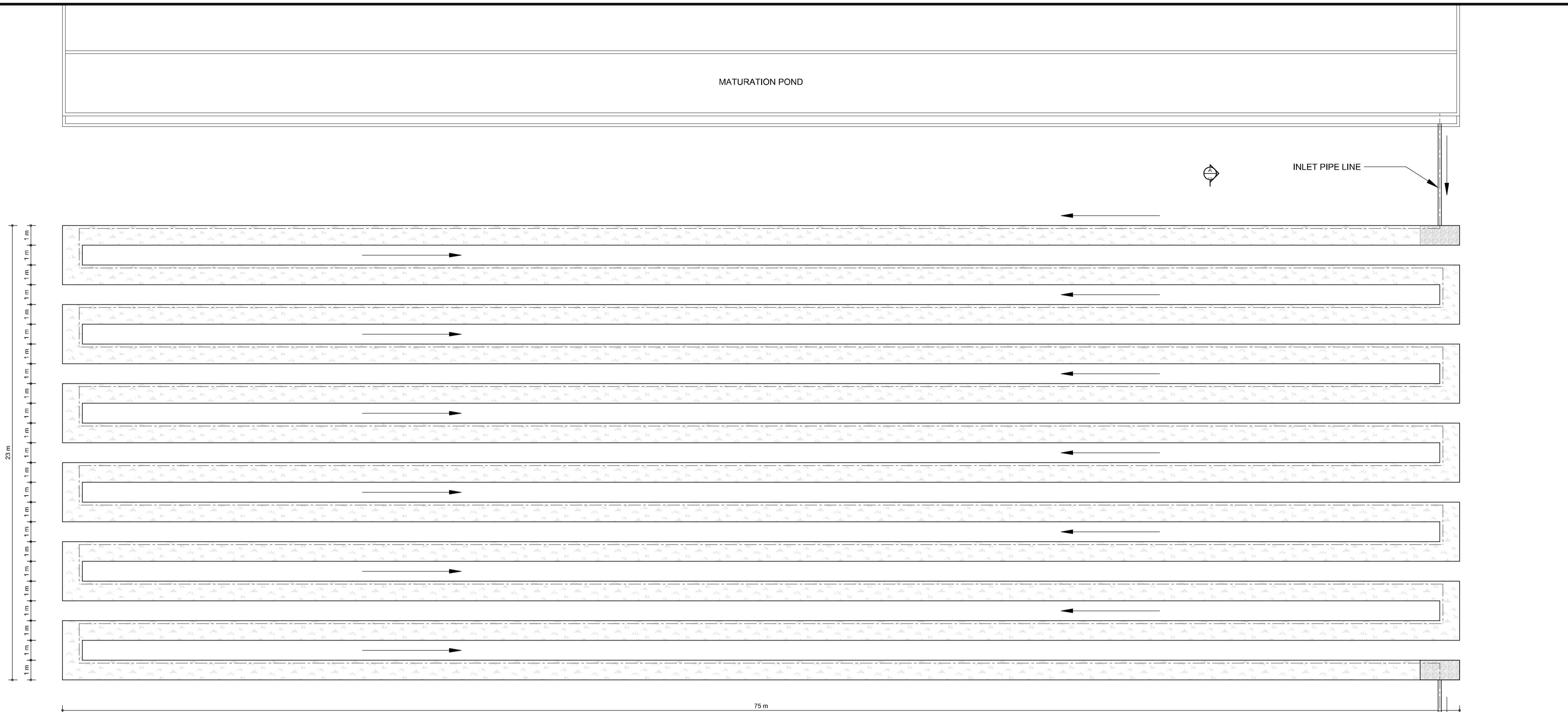
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ARTIFICIAL WETLANDS LAYOUT & SECTION

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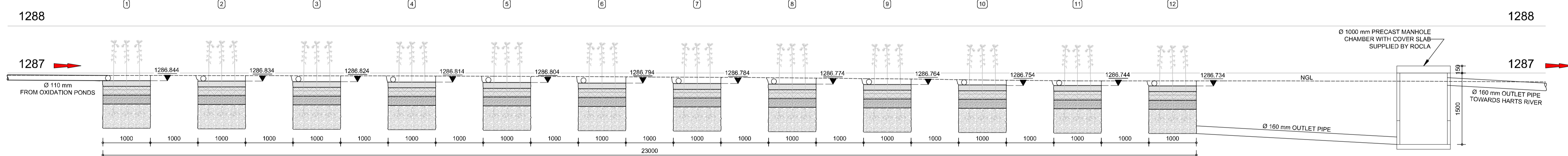
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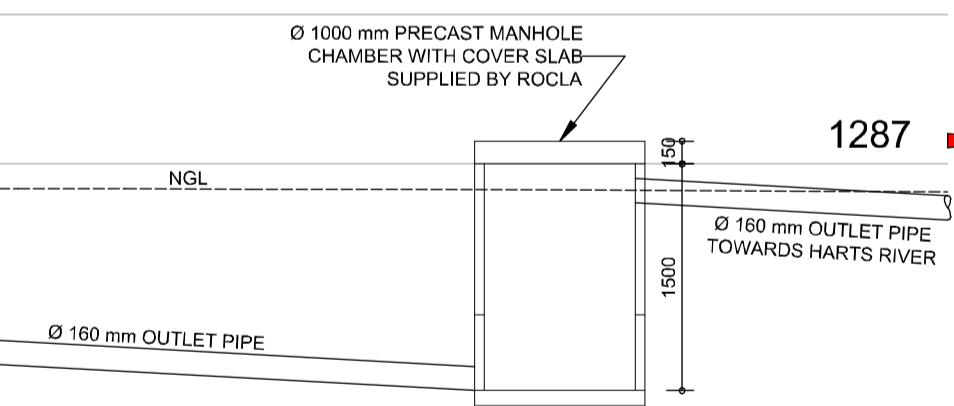


ARTIFICIAL WETLAND
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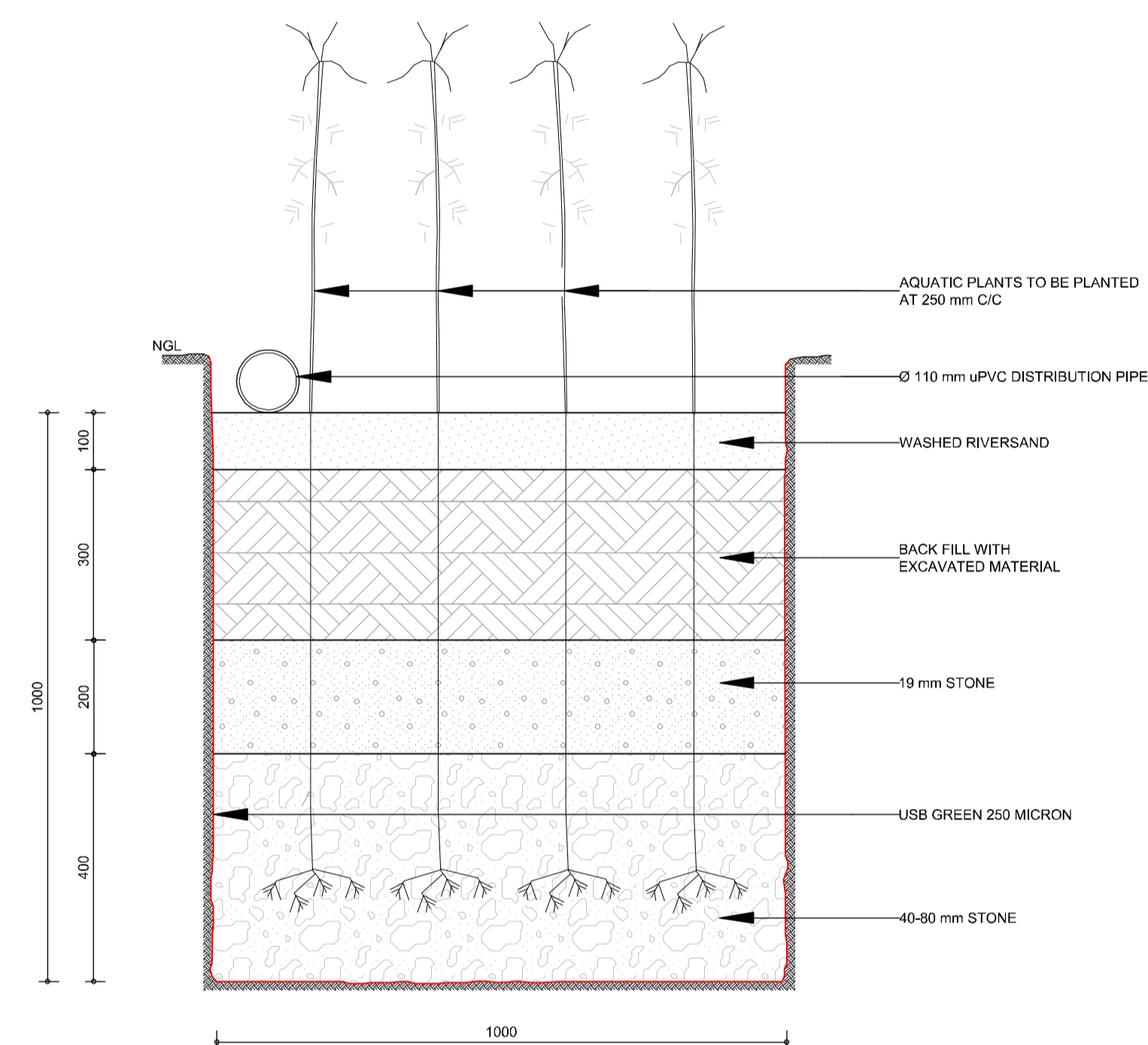
SLOPE = 1 : 200



SECTION ARTIFICIAL WETLAND
 1 : 50



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ARTIFICIAL WETLAND - DETAIL
1:10

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