KERALA WATER AUTHORITY

SEWERAGE CIRCLE THIRUVANANTHAPURAM

DPR FOR THE CONSTRUCTION OF 5 MLD STP, NETWORK & ALLIED COMPONENTS AT PANDALAM MUNICIPALITY IN PATHANAMTHITTA DISTRICT

VOLUME-I

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EXECUTIVE SUMMARY

Kerala Water Authority is a public sector undertaking under the Government of Kerala formulated to plan, execute, operate and maintained water supply and sewerage schemes in Kerala.

Government of Kerala (GoK) has launched the "Rebuild Kerala Initiative (RKI)" for infrastructure development and towns is given utmost importance considering the increasing pollution of water bodies due to lack of proper disposal of sewage. Also Honorable National Green Tribunal (NGT) have given directions to implement sewerage system for various cities of Kerala to control pollution of major water bodies.

After that as per the direction of KWA, a comprehensive sewerage plan has been developed in the year 2020 for Pathanamthitta district. As a pilot project two local urban bodies (ULBs) of Pathanamthitta district has been selected for implementation of sewerage scheme and the same is under preparation by Sewerage Circle Trivandrum.

It is quite evident that lack of a scientifically built sewerage system in the area causes poor sanitation, pollution of water bodies, unhygienic environment and much more difficulties as well as threats to the society. The septic tank, pit latrine and other means of existing practice is to be replaced with a better sanitation system for the houses in the area. A well- planned sewerage network is essential in the municipal town.

The extent of area covered is 4.5 square kilo meters having a population of 7125 (as per census 2011). The projected population including floating population in the year 2054 is 33480 and as the trend of population growth of Pandalam Municipality shows decreasing, state average growth from the present load can be used for the next 30 years. Considering the per capita water usage as 150lpcd, UFW and non-domestic consumption, total water usage is calculated as 5.7 MLD. Taking 80% of water consumption as sewerage produced, the total sewerage load is arrived as 5 MLD. The project includes laying of sewerage network of 22452m, pumping main of 7991m DI K9. The domestic sewage is collected by gravity through various underground pipes of diameter 200 mm to 450 mm HDPE PN 10 and collected in 3 collection wells.

The total cost of project comes to Rs.128.00 crores.

ABSTRACT

PANDALAM MUNICIPALITY- SEWERAGE PLAN	
Project Details	Construction of 5 mld STP, underground sewerage network and allied components in Pandalam Municipality
LSGI Covered under the scheme	Pandalam Municipality
Cost of sewer network	56.8 crores
Cost of STP	15.34 crores
O&M	18.78 crores
Compound wall	0.25 crores
GST at 18 %	16.41 crores
Total including GST	107.58 crores
Centage@10%	10.758 crores
DPR Preparation@2.5%	2.6895 crores
Land cost	6 crores
Unforseen	0.9725 crores
Grand total including GST	128.00 crores

PROJECT AT A GLANCE

PANDALAM MUNICIPALITY- SEWERAGE PLAN AT A GLANCE		
Project Details	Construction of 5 mld STP, underground sewerage network and allied components in Pandalam Municipality	
LSGI Covered under the scheme	Pandalam Municipality	
Total Scheme Area	4.5	Sq.km
Total Population (Year 2011)	7125	Nos
Floating & Seasonal population (2011)	20170	Nos
Expected Population (Year 2054)	8740	Nos
Floating & Seasonal population (2054)	24740	Nos
Total Population including Seasonal population(Year 2054)	33480	Nos
Design Period	30	years
Number of Zones	1	No
Number of Collection Wells	3	Nos
Total sewage Load to STP	5	MLD
Total Length of Network Pipe (including pumping main)	22452	m
Length of Pumping Main	7991	m
PANDALAM MUNICIPALITY- FSSM AT A GLANCE		
Total Population (Year 2011)	41974	
Floating and seasonal population(2011	12255	
Expected Population (Year 2054)	51487	
Floating & Seasonal population (2054)	15033	
Total Population including Seasonal population of FSSM Area (Year 2054)	66520	
Total Septage Load to STP (Off Season)	40 KLD	
Total Cost of Project (w/o Land cost)	**128.00**	**Crores**

CHAPTER-1

PANDALAM CITY PROFILE

1.1 Introduction

As per the direction of KWA, a sewerage plan for two local bodies has been developed in the year 2020 for Pathanamthitta district. Necessary preliminary investigation on the pre-feasibility of implementing sewerage scheme to cover the Pandalam Municipality has been carried out by the PPD, Pathanamthitta district camp team of KWA in Pathanamthitta, under the guidance of Sewerage Circle Office at Thiruvananthapuram. It has been decided to establish a scientifically planned sewerage scheme including comprehensive collection and conveyance system coupled with modern treatment plant and method of disposal for the waste water generated in the town so as to protect and conserve the serene ecology and environment of the project area and also to ensure safe and unpolluted drinking water to the people residing and pilgrims visiting here. The proposed sewerage scheme shall cover the entire Pandalam municipality area. Suitable location for the STP is identified considering the terrain, population density and envisaged master plan of the local body.

Based on the 2011 census population (49099) of the local body, a design period of 30 year is considered from the base year of 2024, expected population and quantity of sewage up to the ultimate year of 2054 are arrived. A piped network of sewerage system is proposed at the town area and at highly populated pockets whereas septage provision proposed at other area. The capital investment required for the project intended to be shared by SBM 2.0 and other stakeholders. Provision of drinking water and sanitation facilities has always been a key priority for the state as it is directly related with the health of the community. The state has achieved significant results in terms of improved water supply coverage through Kerala Water Authority. But the sanitation sector could not cope up with water supply sector.

1.2 City Profile -AREA

Pandalam is one among the two urban local bodies of Adoor Taluk of Pathanamthitta district and is a service town in the western part of the district. River Achancovil flows through the northern boundary of the town. The urban development has taken place along the major travel corridors and major portion of the town still have rural character. It is the largest urban local body in the district in terms of geographical area with an area of 28.42sq.km. The town is divided into 33 municipal wards (in Municipal council election 2015) and the studies and analysis has been made taking wards as the smallest unit.

Pandalam Municipal town spreads over two villages ie, Pandalam and Kurampala. The total area of the Municipality is 28.42sq.km and now there are 33 wards in the Municipality. Even though the geographical area was same, during the 2011 census there were only 23 wards in the Municipality. As majority of available data is based on 23 ward division the analysis in this report is done based on 23 ward division. The ward map of the town is shown in Annex. 2.1

1.2. 1. Topography

Topography of Pathanamthitta district consists of three natural divisions, the highland, the midland and the lowland. The highland stretches through the Western Ghats and descends to the midland in the Centre, down to the lowland in the West.

Pandalam falls in the midland region of the district. Pandalam presents a beautiful panorama with small hillocks and intermittent flat terrain in between. The town is located on the bank of Achankovil River. Pandalam has an average elevation of 18 meters (62 ft.) above sea level. The contour map of the town is shown in Figure 1.1.

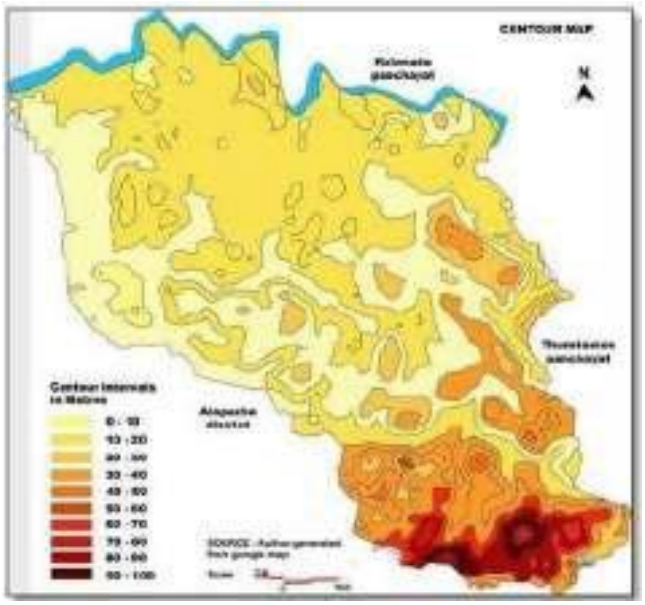

Figure 1.1contour map of the town

Pandalam town is located at a distance of about 16 km from Pathanamthitta town, the District Headquarters and in the western boundary of the district adjacent to Alappuzha district. The State Highway No.1, M.C. Road and Mavelikara - Pathanamthitta Road meet at Pandalam. The Pandalam is well connected with major centers like Kochi, Kottayam, Changanassery, Pandalam, Chengannur, Adoor, Kottarakkara, Mavelikkara, Kayankulam, Pathanmthitta and Thiruvananthapuram and distance to these centers are 116km, 50km, 32km, 25km, 15km, 12km, 32km, 18km, 25km, 16km and 95km respectively. The location of the town is shown in Figure 2.1.There is no railway linkage to Pandalam town and Chengannur is the nearest Railway Station and it is located at a distance of 15 km from Pandalam town. Thiruvananthapuram and Pandalam are thenearest International Airports located at a distance of 99km and 136km respectively from Pandalam town. The distance to nearest sea port at Pandalam is 130km.

Figure 1.2 Location of Pandalam Town

Pandalam town is bounded in the North by Kulanada GramaPanchayat and in the East by Thumpamon and Pandalam Thekkekkara Grama Panchayats, in the South by Pallickal Grama Panchayat and in the west by Venmony, Palamel and Noornad GramaPanchayats of Alappuzha district. The details of surrounding Grama Panchayats are shown in Figure2.2. The geographical location of the town is between 9 degree 10minutes 30second sand 9 degree 14 minutes 30 seconds North latitudes and between 76 degree 38 minutes 30secondsand76 degree42minutes30seconds East longitudes.

Figure 1.3 Surrounding settlements of Pandalam Town

1.2.2 Geological condition.

Topography of Pathanamthitta district consists of three natural divisions, the highland, the midland and the lowland. The highland stretches through the Western Ghats and descends to the midland in the Centre, down to the low land in the West.

Pandalam falls in the mid land region of the district. Six soil series and miscellaneous soils were found in the town. Garden land series found are Adoor, Bharanikkavu, Edavanassery and Ayroor. Wetland series occurring in the town is grouped under Erath and Sooranad series. The extent and occurrence of soil series are shown inTable1.1

Sl No	Nameof soilseries	Extent(Ha)	Occurrence	SoilType
1	Adoor	931	MidLand	Lateritesoil
2	Bharanikkavu	647	MidLand	Colluvium
3	Edavanassery	415	MidLand	Gneissic
4	Ayroor	117	MidLand	Riverine Alluvium
5	Sooranad	555	MidLand	Alluvialsoil
6	Erath	72	MidLand	Colluvium
7	Miscellaneous	43	MidLand	Transported

Table1.1 Soilseries,Extent,Occurrence and soiltype

1.2.3. Water Resources

1.2.3.1 Surface Source

AchankovilRiverpassesalongthenorthernboundaryofPandalamMunicipality.Landcomingunder water bodies mainly consists of KIP canals, naturaldrains and ponds. 93.47 hectares of land which is 3.29 % of total area comes under Water body/canal. Achankovil River passes through the municipality. The Canals of Kallada Irrigation Project (KIP), which passthrough the town for a length of 20.32 km occupies major share of the water bodies. In addition to this there area few small drains and ponds within the town. The concentration of this land use is more inwards along KIP canals. The concentration pattern of waterbodies is shown in Figures 4.12.

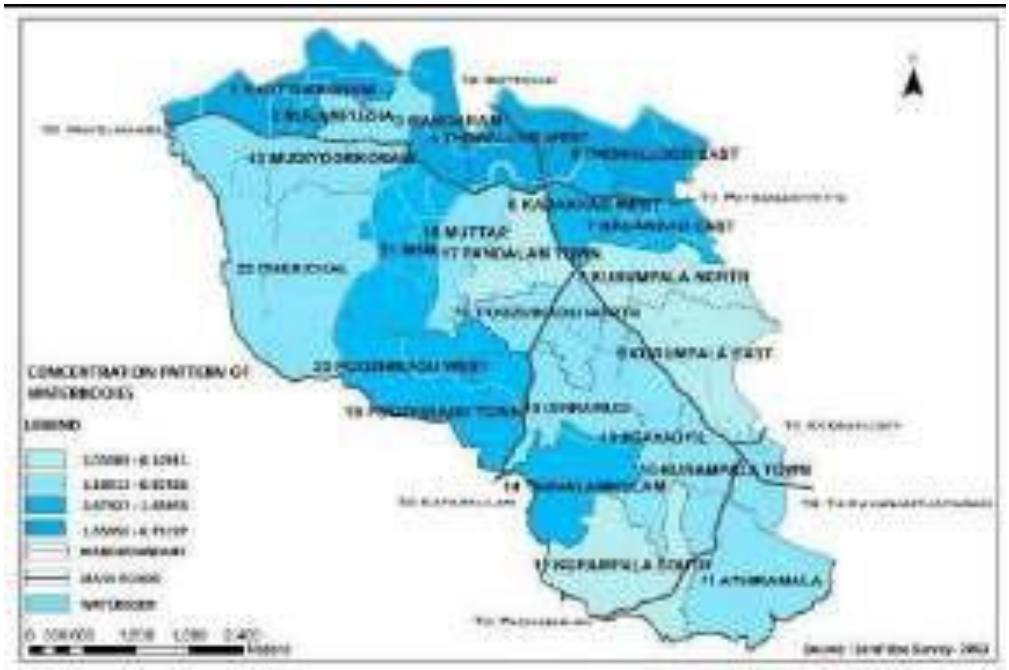

Figure1.4Concentration Pattern of Waterbody

1.2.3.2 Ground Water Potential.

Groundwater occurs under phreatic conditions in the shallow weathered portions whereas it occurs under semi confined to confined condition in the deep-seated fractures of the crystalline formation. The hard rock formations in general lack primary porosity. The water is stored in the secondary pores developed as a consequence of weathering in fractures, fissures and joints etc. The movement of groundwater is controlled by the extent of the interconnection of the fractures. In the shallow phreatic zone, the depth of dug wells varies from 3.4 to 14.8 mbgl (meters below ground level). The depth to water level in the wells ranges from 1.82 to **12.05 MBGL.**

The seepage from the rivers and accumulation ofground water owing to heavy rains make the district relatively rich in groundwater sources. But the ground water in the low land areas are not suitable for drinking purposes due to salinity. In the coastal belt, there are thick sediments within which confined aquifers ranging in cumulative thickness of 3 to 41 meters occur within a maximum depth of 175 meters below ground level. These aquifers contain water of poor chemical quality. Survey conducted by the Quality Control Division of KWA reveals that iron and chloride(brackishness) contents are very high in the ground water available in this area. As such the chances of tapping ground water by means of tube wells piercing these aquifers for meeting the water supply requirements of the area are remote.

1.2.4. Climate and Rainfall.

The area enjoys humid tropical climate with two monsoons, viz, the south west and the northeast monsoons. Maximum precipitation is received during the period from June to July. The meteorological data obtained from RRI, Chethakkal is furnished in figure 2.4 and 2.5. The average annual rainfall is 3314.4mm. The mean maximum and mean minimum temperatures are 32.26 degree Celsius and 26.92degree Celsius respectively. Mean annual temperature is 26.92 degree Celsius

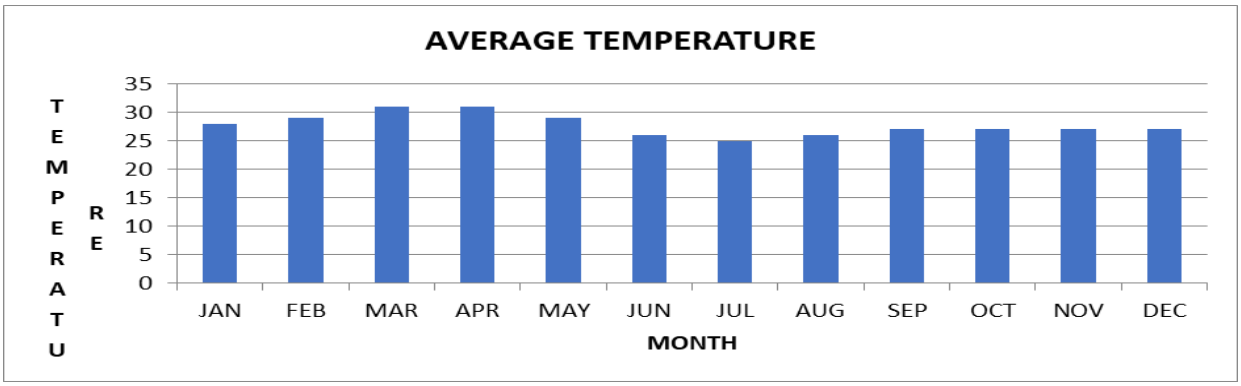

Figure 1.5 Average Temperature

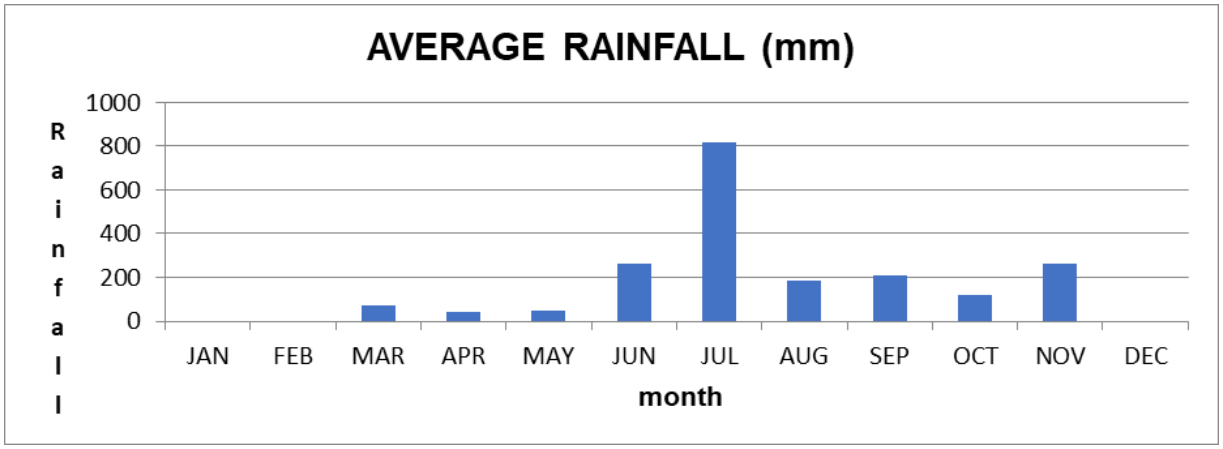

Figure 1.6 Average Rain fall in cm

1.2.5. Demography.

The state o5f Kerala is a green strip of land located in the southwest corner of India. It is only 1.18% of the total area of the country, but houses 3.43% of the country's population. It is one of the most densely populated states in the country with a density of population of 819 persons per Sq. Km. As per latest census figure, the state has registered a total population of 31.80 million and more than 25% of the population live in urban areas. Demographically the state enjoys a very advanced status with rapidly declining birth and death rates, low infant mortality and very high literacy and health delivery system.

1.2.6 Emerging Issues and Concerns.

Even though the natural growth rate of population does not show an exorbitant increase, the floating population in Pandalam Municipality is to be considered while earmarking the infrastructural requirements. There is no intensive migration to any of the cities in Kerala mainly due to the following reasons.

- Employment opportunities in the main cities are not sufficient to exert a pulling effect
  High land values in cities prohibit establishment of residences in cities especially among the middle and low-income categories.
- The homestead nature of holdings in sub urban areas allows fragmentation of property for new family housing.
- Availability of transport facilities allows daily commutation to the city from out lying areas and districts within a radius of about 100 km.

It must be noted that the daily commutation adds to the increased number of floating population in the core city. A transportation study conducted has shown that nearly 2.5 lakhs of people commute to the core city daily thereby increasing the pressure on civic amenities.

1.2.7. Literacy.

The general education status is assessed based on the literacy rate, number of educational institutions per one lakh population and educational status. The literacy rate of Pandalam Municipality as per 2011 census is 96.73 %. The literacy rate of Pathanamthitta District and Kerala State are 96.55% and 94% respectively. The literacy rate of Pandalam Municipality is higher than the district and state literacy rates. Another comparison is made with district urban literacy rates. The urban literacy rate in Pathanamthitta district is 96.9%,which is slightly greater than that of Pandalam Municipality. There is enough number of educational institutions.

1.2.9 Future Population.

The decadal growth rate of population of Pathanamthitta district was 8.15 % for the period1991-2001. But district recorded negative population growth rate in 2011 census. In the case of Pandalam Municipality and adjacent GramaPanchayaths, the population growth rate of 1991-2001was higher than the district growth rate but it shows certain fluctuation during 2001-2011. Also when comparing with the other three Municipalities in the district, the population growth rate of Pandalam Municipality during 2001-2011 is higher. The change in population of a town is directly related to the economic base of the town. Strengthening of the economic base of an area will increase the employment opportunities and this in turn will attract more people to the town and this will lead to increase in population, in addition to the natural growth rate. The projection of population of the town is done based on anticipated increase in occupational structure. Work participation rate of Pandalamby 2031 fixed as33%and the the labour force expected in Pandalam by 2031 is 20093. Based on this the population for the horizon year 2031 is estimated as 42770 persons and it is represented in Figure1.7

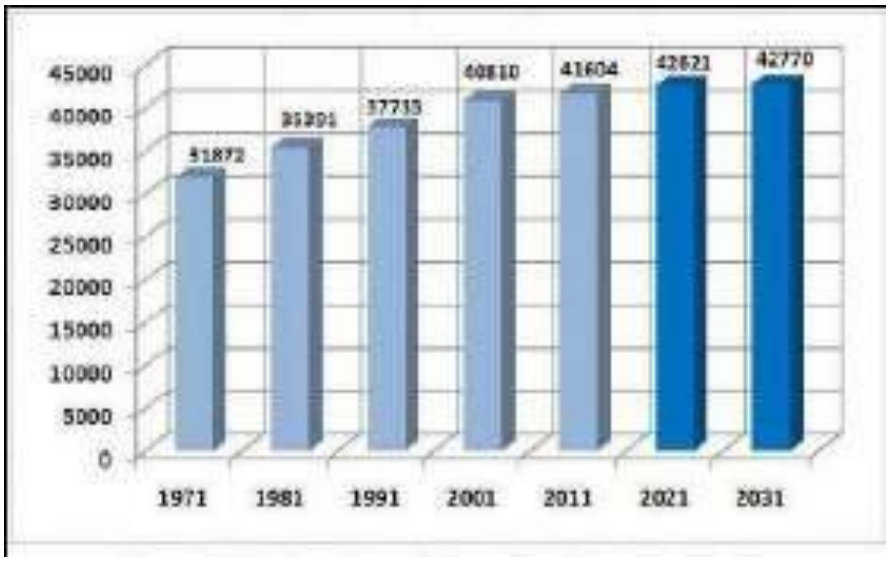

Figure 1.7 Projected population of Pandalam Municipality

1.2.10 Economic Base.

The economic growth is related to a quantitative sustained increase in the country's per capita output or income accompanied by expansion in its labour force, consumption and volume of trade. Economic development is related to qualitative changes in economic wants, goods, incentives and institutions. In this chapter the existing economic base of the town based on the occupational structure is studied. Work participation rate and its temporal variation, the occupational structure and the change that has happened over a period of time, spatial distribution of workers in the town etc. were analysed. As per 2011 census the work participation rate of Pandalam Municipality is 32.69 %. It means, out of total population of41594 persons, 13589 people are workers. The total workers are further divided into main workers and marginal workers. The total number of main workers of the town is 10213, which constitute 25 % of total population and total number of marginal workers of the town is 3386which 8 % of total population and the remaining 28005 persons are non-workers which is 67 % of total population. It is shown in Figure 1.8

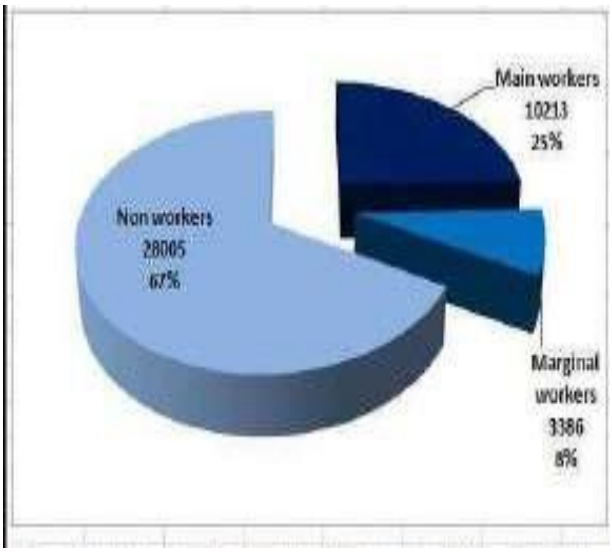

Figure 1.8 Main, Marginal and Non Workers of Pandalam Town 2011

1.2.11 Industries. .

The level of industrialization of the town is very low and only 11.73 Hectares of land which is 0.41% of the total area comes under industrial use. The industries are scattered in the town. Major or medium type industrial units are not functioning in the town and the industrial sector is limited to few industries in the category of MSME. The mini industrial estate of Industrial department is the major industrial establishment of the town. The units were scattered in different parts of the town and as per the land use analysis 11.74 hectares of land which is just 0.41 % of total town area is coming under industrial land use. Traditional industries are also not functioning in the town. Once Mannam sugar mill was a major industry of the town and it is not functioning due non availability of sugar cane, the major raw material for the industry.

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CHAPTER-2

PROJECT DEFINITION, CONCEPT AND SCOPE

2.1 Scope of the work

The project proposal envisages a well-planned system to provide waste water collection, conveyance, treatment, disposal / recharge / recycle etc. and also a plan for long term operation and maintenance of the system. The control of pollution of natural water bodies will be possible by the implementation of the sewage treatment project.

The extent of area covered is 4.5 square kilo meters having a population of 7125(as per census 2011). The projected population including floating population in the year 2054 is 33480 and as the trend of population growth of Pandalam Municipality shows decreasing, state average growth from the load can be used for the next 30 years. Considering the per capita water usage as 150lpcd, UFW and non-domestic consumption, total water usage is calculated as 5.7 MLD. Taking 80% of water consumption as sewerage produced, the total sewerage load is arrived as 5 MLD. The project includes laying of sewerage network of 22452 m, pumping main of 7991 m and construction of 3Nos of collection wells. The domestic sewage is collected by gravity through various underground pipes of diameter 200mm to 450 mm HDPE PN10 and collected in 3 collection wells.

The underutilization of the existing STP is attributed to limited connections to the KWA's networks. On completion of the proposed work approximately 1000 numbers of sewer connections to the households can be realized. The one time connection charge will also boost the revenue of KWA.

The sewer network proposed will improve

- Improve the quality of life
- Improvement in the unhygienic condition and safety to health
- Economic gains as the investment in sewerage system will be less compared to the cost of maintaining separate household sanitation system for each household and the gains resulting from improved health, less illness and more workdays will be significantly high.
- Improvement in environment by arresting pollution in the air and ground water and the reduction in nutrient level in the surrounding water bodies.

2.2 Land

The proposed proposal is to lay sewerage network lines through roads and to collect the sewage in collection wells. In roads, at an interval of 30m, man holes are proposed to avoid choking of sewer lines and to perform maintenance work. The sewage from an area is carried through pipes under gravity to collect in collection

wells. In this project four collection wells are included. Out of the four wells one is proposed to construct in the premises of STP at Mannam sugar mill and another wells are proposed to construct at a land nearby Chiramudi, Sasthamvila colony & PH Centre at Pandalam.

2.3 Collection and Conveyance System

2.3.1 Sewer Network

The proposed sewerage project for the service area comprises of collection, transmission and treatment of sewage and disposal. Engineering decisions are required to specify the area and population to be served, the design period, the per capita sewage flow, ground water infiltration, unauthorized roof water connection, nature and location of the treatment facilities and the method of disposal / utilization of the effluent. The type, quality and quantity of the materials for construction are also to be looked into. This project is prepared with adequate details for timely and proper implementation of the project.

2.3.2 Population Forecasting

Demographic forecasting is an important topic: population, household and related forecasts form the basis of social and economic planning and are fundamental to many other forecasting exercises. The many uses of population forecasts give rise to choices on several dimensions. Population forecasting is also highly uncertain. During the twentieth century, fertility was the most important component in determining population size. However, forecasting fertility proved to be difficult in the post-World War II era: neither the “baby booms” of the 1950s nor “baby busts” of the 1970s were foreseen. Neither was the post-war rapid decline in mortality foreseen. Both mortality and migration forecasting were naïve: for decades, official population forecasts widely assumed that mortality would not improve, at least beyond the immediate future, and migration was treated as an uninteresting constant.

Water supply projects and sewerage projects are designed for 30 years. After 30 years the system needs renovation or to make a new system to accommodate load at that time.

There are several methods developed for forecasting population but none of them are perfect. The population growth may change based on several factors such as attitude of community, social status, onset of pandemic diseases, war etc. which are unpredictable.

Table -2Population Forecasting

Population of Pandalam Municipality		
As per census 2011 Population		7125
Population Projected to year	2054	8740
Floating Population (21%)		24740
Total population to Year	2054	33480

As per data from NATPAC (2010), the total floating population of the town is estimated at 65,000, which is more than the resident population. The population has been forecast to a design period of 30 year from the base year of 2024 by considering a decennial growth rate of 4.91%.

2.3.3 Design Period

Sewerage projects under normal circumstances are designed for a period of 30years.The projected population including floating population in the year 2054 is 33480 and as the trend of population growth of Pandalam Municipality shows decreasing rate, the treatment facility for the present load can be used for the next 30 years also.

Considering immediate implementation this project is designed for the population in 2054 taking the base period as 2011.

2.3.4 Estimation of Sanitary Sewage

Sanitary sewers are provided to carry the spent water of the community with someground water and fraction of storm run-off, to the point of treatment and disposal.

The factors which affect the quality of sewage are

1. Per capita Sewage flow
2. Peak factor
3. Ground water infiltration
4. Unauthorized roof water connection.

2.3.4.1 Per capita Sewage flow:

The entire spent water of the community contributes to the total flow in a sanitary sewer. Since some water is lost due to evaporation and seepage, only 80% of the average water supply is taken as sewage flow. The per capita water supply of Pandalam Municipality is 150 lpcd. So the per capita sewage flow is taken as 120 lpcd (DWF).

Table No.3 Sewerage Generation from Project Area

Water Consumption @150lpcd		57.29	LPS
Add 15% for UFW and Non-Domestic		8.59	LPS
Total Consumption in the year	2021	65.88	LPS
Sewerage generated (@80% of Water Consumption)		52.70	LPS
		Which is 5 MLD	

2.3.4.2Peak Factor

There may be hourly variations in flow and also seasonal variations. The peak factor or ratio of maximum to average flow depends on the contributory population. Evidently the peak factor trends to reduce with increase in population, since the different habits and customs of several group of people in

large population, trend to reduce the variations in demand pattern. The recommended values as per CPHEEO manual are as follows.

Table -4 Peak Factor Values

SlNo.	Population	Peak Factor
1	Upto 20,000	3.00
2	20,000 to 50,000	2.50
3	50,000 to 7,50,000	2.25
4	Above 7,50,000	2.00

2.3.4.3 Ground water infiltration:

The flow in the sanitary sewers may include certain flows due to infiltration of ground water through joints. The suggested value for ground water infiltration for sewers laid below ground water table is as follows.

Table -5 Ground Water Infiltration

Norm	Minimum	Maximum
Litres/hectare/day	5000	50000
Litres/kilometer of sewer/day	500	5000
Liters/day/manhole	250	500

Infiltration in litres / Ha / day - 5000 to 50000. A value of 5000 litres / ha / day is adopted for design as per CPHEEO manual in the tool kit. However a higher infiltration rate is expecting due to the higher ground water table and nearness to backwaters.

2.3.4.4 Unauthorized roof water connection

The flow in the sanitary sewers may include certain flows due to unauthorized roof water connections from the households. Whereas the CPHEEO is of opinion that with
strict rules and regulations this should be banned. Hence this flow is taken as zero Hence the flow through the server is calculated as follows.

Table -6 Peak Flow Calculation

1	Peak Flow	PF x DWF + GW Infiltration
2	Average Flow	2 DWF + GW Infiltration
3	Minimum Flow	DWF + GW Infiltration

2.3.4.5 Hydraulics of sewer

A properly functioning sewer has to carry the peak flow for which it is designed and transport suspended solids in such a manner that the deposits in a sewer are the minimum. Open channel flow or

gravity flow is assumed in the collection sewer lines and closed conduit flow or pressure flow is assumed in pumping mains.

The various factors which are to be considered in the design of gravity sewer lines are

1. Selection of pipes
2. Depth of flow
3. Velocity of flow
4. Minimum and Maximum cover

2.3.4.6 Selection Pipes

In the selection of pipes, the various aspects such as the life, the suitability of the pipe as a sewage carrier its resistance to corrosion against the soil in which it is laid, availability, economy, easiness for installation and maintenance are considered. The following pipes are generally used for gravity sewers.

- ❖ Stone ware or vitrified clay pipes
- ❖ R.C.C. Pipes
- ❖ A.C. Pipes
- ❖ PVC /UPVC Pipes
- ❖ HDPE Pipes
- ❖ GRP Pipes.

Major portion of the area contains soil of the type clay mixed with sand. Hence, HDPE PN10 pipes are proposed for the sewer lines from diameters 200mm to 450mm. The minimum size of pipes used for sanitary sewers is 200mm. These pipes can be easily joined using solvent cement and available in length of 6.00 m. The pipe is smooth with low coefficient of friction so that higher velocity can be obtained in pipelines which prevent the silting up of the pipe line.

2.3.4.7 Depth of flow:

From the consideration of ventilation in waste water flow, the sewers are not allowed to run full. All the sewers are designed in such a way that the maximum depth of flow at ultimate peak flow is limited to 0.80 diameters. Whenever the depth of flow exceeds 0.80 D, either the diameter or the slope of the pipe is changed to adjust the depth of flow.

2.3.4.8 Velocity of flow:

The velocity of flow in the sewers lines are to be adjusted in such a way that there is minimum deposition in the line and no scouring occurs in the line. A minimum velocity of 0.6 m/s and maximum velocity of 2.00 m/s is adopted for design. The slopes of the pipes lines are adjusted to get the minimum / maximum velocity. Since the water table is high trenching in this area will be difficult. Hence in order to

limit the depth of cutting, the slopes in the pipes are adjusted in such a way that as far as possible the velocity in the line gets minimum self- cleaning velocity. But in certain initial stretches, the velocity is less than 0.6m/sec, to avoid silting in the upper reaches due to less flow, flushing will be necessary and has to be provided periodically.

2.3.4.9 Minimum and maximum cover

The minimum earth cover over the pipe line shall be 1.00 m. Due to the difficulty in trenching in the water logged area, the maximum depth of cutting is restricted to 4.5m.

The gravity sewers all designed for the peak flow. Manning's formulae for open channel flow is used for the design of gravity sewers. The coefficient of roughness "n" used in the Manning's formulae is as follows:

- Stoneware pipes = 0.015
- PVC pipes = 0.011
- R.C. C. Pipes = 0.015
- PE Pipes =0.011

2.3.4.10 Laying Sewerage lines through Roads

The project aims to lay sewerage lines through various roads in Pandalam Municipality to collect sewage in collection wells and then to pump it to the existing STP at Mannam sugar mill for further treatment. The proposed collection wells are located at

Collection well 1– Chiramudi

Collection well 2-Sasthamvila colony

Collection well 3-PH Centre

Collection well 1- PH Centre

This collection well is designed for 37 LPS and the sewage load from the well is pumped to the proposed STP at Mannam Sugar Mill area through 250 mm DI pipe for a distance of 3477 m.

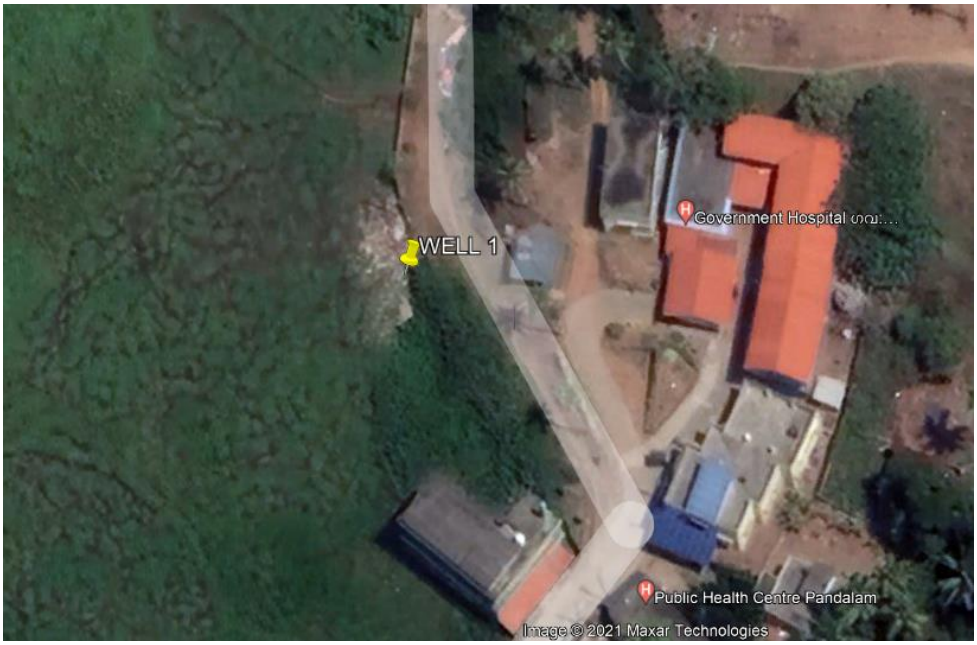

Fig. No. 2.1 Location of Proposed well Near PHC Pandalam

Collection well 2– Chiramudi

This collection well is designed for 12 LPS and the sewage load from the well is pumped to the proposed STP at Mannam Sugar Mill area through 150 mm DI pipe for a distance of 2432 m.

Fig. No. 2.2 Location of Proposed well at Chiramudi

Collection well 3- Sasthamvila colony

This collection well is designed for 4 LPS and the sewage load from the well is pumped to the proposed STP at Mannam Sugar Mill area through 100 mm DI pipe for a distance of 2082 m.

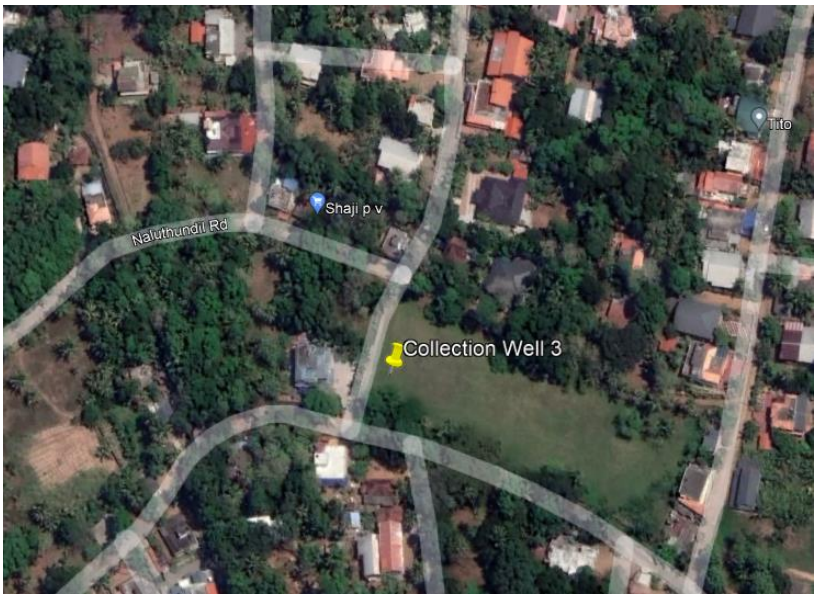

Fig. No. 2.3 Location of Proposed well at Sasthamvila

Fig. No. 2.4 Location of Proposed STP at Mannam Sugar Mill Area

2.4 Sewer Appurtenance – Manholes

Sewer appurtenances are devises necessary in addition to pipes and conduits, for the proper functioning of the sanitary sewers. These include ordinary manholes, Junction manholes, drop manholes, siphon's etc.

Man holes are provided at every 30m intervals to facilitate manual cleaning. For higher diameter pipes, in straight lengths, the interval has been increased up to 90 m maximum. Manholes are also provided

at every change of alignment, gradient and diameter. Junction man holes are proposed at junctions where two or more lines meet.

Circular man holes are proposed in all the cases. An Internal diameter of1200mm is proposed for man holes for 200 mm dia pipes, 1500 mm for 250 mm dia pipes a, 1890 mm for 315 mm dia pipes, 2400 mm for 400 mm dia pipes and 2700 mm for 450 mm dia pipes as per CPHEEO standards. Inverted siphons are proposed at places, where the sewer lines have to cross obstructions like railway lines, water bodies etc. Number of manholes proposed in this project are as follows.

Table No.6 No. of Manholes in the Project area with different Diameter

Diameter of manholes	1.2m Dia	1.5m Dia	1.89m Dia	2.4 m Dia	2.7m Dia
No. of manholes	1279	87	75	21	37

2.5 Sewage Pumping Stations - Collection well and pump house

The pump houses proposed are located in vacant lands, but to minimize the extend of land to be acquired and it is proposed to provide submerged wet well pumps and circular pump houses. Normally detention period upto2 hrs is allowed for the sewage in the collection well, before being pumped into the Treatment plant. Three numbers pump sets with 100% standby are to be housed in each pump house to meet DWF, 2DWF and 3DWF. There are 3new Pump Houses in this proposal, at PHC, Chiramudi and Sasthamvila.

2.6 Lift Manholes

At many locations which cannot naturally (with gravity flow) contribute to gravity sewers will be connected with lift manholes. These lift manholes will pump to the nearest gravity manholes.

LIFT MAN HOLES		
Nos of lift manholes	11	Nos
No of pumps per lift manholes	22	Nos
Total no of pumps required	22	Nos

CHAPTER 3

PROJECT COST

3.1 Land Development

If land is not acquiring by the Corporation authorities, approximately Rs.3 lakhs/cent is to be included in the estimate. So a lump sum amount of Rs.6 crores is provided in the cost estimate.

3.2 Physical Infrastructure.

3.2.1 Sewage Pumping mains

Total length of 7991m of DI pipes are proposed for the pumping mains and total cost of this component including labour charges comes to Rs 26635653 as per DSR 2018 rates. Detailed break up of estimate is appended.

3.2.2 Installation of pump sets

The total pump set capacity required for the 3pumping stations as per the economic size design for intermediate demand is 25 HP. All the pump sets are submersible non-clogging type. The cost is worked out as Rs.4286319 lakhs including 100% standby. Detailed estimate appended.

3.2.3 Collection Well cum Pump Houses.

There are 3 Nos of wells of which 1 no is to be constructed in the premises of PHC with diameter 8 m and depth 9 m, 1 at Sasthamvila colony with 3 m dia and 8m depth, and 1 at Chiramudi with 5 m dia and 8m depth. Provision for pump lifting equipment are included in the estimate. The total cost is Rs.23967314. Provision for compound wall amounting to Rs.15.00 lakhs is also included in the estimate. Detailed estimate enclosed.

3.2.4 Sewer Network& RCC Manholes

The total length of sewer network as per the detailed design is 22452 m of varying sizes. The hydraulic design for the network is enclosed. The total length of 200mm HDPE PN 10 pipe - 19284 m, 250 mm HDPE PN 10 pipe- 1191m, 315 mm HDPE PN 10 pipe-1057m, 400 mm HDPE PN 10 pipe-375m and 450 mm HDPE PN 10 pipe-545m are proposed in the project. Total numbers of 1279 of 1200mm diameter for 200 mm dia pipes,87 Nos manholes of 1500mm diameter for 250 mm dia pipes, 75 Nos. of 1890vmm for 315 mm dia pipes, 21 Nos of 2400 mm for 400 mm dia pipes and 37 Nos of 2700 mm for 450 mm dia pipes are proposed.

The total cost is Rs. 411242368 including embedding charges of HDPE PN10 pipes an, cost of pipes and RCC Man Holes as per DSR 2018 rates.

3.2.5 Road restoration Charges

The cost is estimated based on the standard rate for road restoration charges to be remitted to various departments. The total cost is estimated as Rs.94, 38, 3570.

3.2.6 Power Allocation and Other Allied Works.

Provision for power connection to the proposed two collections well cum pumping stations, power backup (DG Sets), Aeration blowers and allied works are included in the estimate. The estimated cost is Rs.45 Lakhs.

3.3 Cost of Shifting Utilities

The proposed area being the heart of city, the utilities such as communication cables, water supply Pipe line, Electricity cables, etc. are to be shifted for laying the sewer lines. Hence provision has been included in the estimate for the same.

3.3 Operation & Maintenance cost

Annual O&M cost for STP (10 years including centage and GST) worth Rs 10,97,50,746 crores /, and for sewer network and allied components(10 years including centage and GST) will be Rs 13,07,14,997 crores .

3.4 Unforeseen

An amount for unforeseen charges 0.9725 crores is included in the estimate.

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CHAPTER-4
DESIGN of SEWERAGE SYSTEM COMPONENTS

The components of the sewerage system have to be designed for economy, functioning to the expected level etc. The main components of the project are listed below.

1. Sewerage Network – For collecting sewerage from user end and to transport it to the main trunk and finally to collection wells.
2. Man Holes – It is required to provide man holes in the sewer line at an interval of 30m to make clear the lines if clogging or choking occurs. Flushing can also be done in man holes.
3. Collection wells – These wells collect sewerage from network and from there is pumped to the STP. It also serves as storage tank in the case of minimum flow condition to avoid frequent starting and stopping of pump sets.
4. Pumping mains – The pumping main carries sewerage from collection well to STP under pressure.
5. Pump sets – These are used to create a driving force to transport sewerage from collection well to STP with the aid of power.

4.1 Design of Sewerage Network

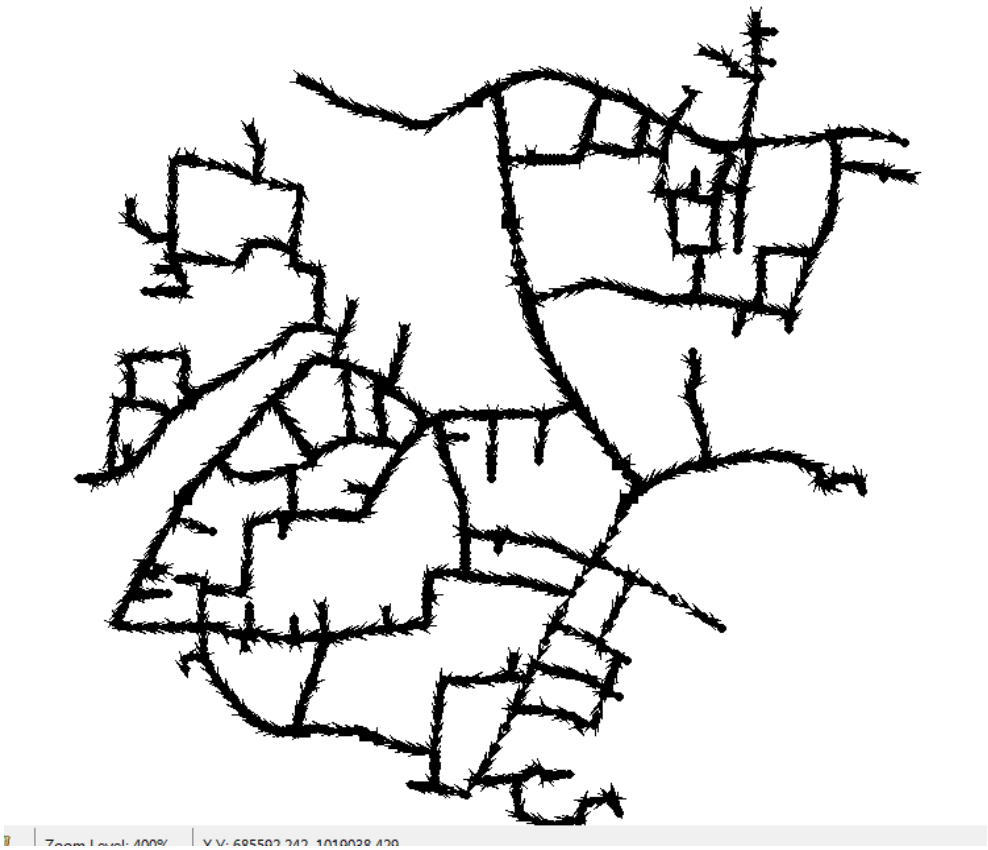
The project area is divided into 5 different zones based on the natural flow directions, ridges etc. for routing. The main roads are identified and ground levels have been extracted from available water supply data. The junction points and control points were cross-checked with field survey data with DGPS equipment as the water supply details taken years back. Social survey was done to ascertain the living conditions and amenities provided in the house holds. Reconnaissance survey was also carried out to assess the nature of buildings such as offices, institutions such as schools, colleges, hospitals, lodges, etc. The selected area consists of so many flats counting to almost 44 Nos having dwelling units ranging from 6 Nos to 75 Nos. The details of flats are given in Annexure-2.

The software EPASWMM was used to design the network owing to the fineness in the results. The EPA Storm Water Management Model (SWMM) is a dynamic rainfall-runoff simulation model used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. The runoff component of SWMM operates on a collection of subcatchment areas that receive precipitation and generate runoff and pollutant loads. The routing portion of SWMM transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators. SWMM tracks the quantity and quality of runoff generated within each sub catchment, and the flow rate, flow depth, and

quality of water in each pipe and channel during a simulation period comprised of multiple time steps. As the sewerage network system is designed by considering it as open channel flow, this software is the most apt for the design of sewer network. Moreover, we can visualize the output in a three dimensional platform and hence it can be refined to least error.

The manholes are first plotted in the scaled, geo referenced, autocad base map. Using this autocad base map prepared, a windows metafile format used as back drop in the EPASWMM window. The nodes representing manholes and links representing the conduits are plotted for developing the model in the EPASWMM software, consequently entered the parameters regarding the nodes and links. Based on the population scattered in the area especially taking into consideration, the point load from various flats located in the selected zone, the sewage load is assessed in each manhole and fed as dry weather flow in the model. The peak factor considered is 3. Flow routing is done correcting the invert levels of manholes by trial and error to the proposed outfalls. By several trials it was refined to successfully run with least error. The detailed output of EPASWMM for five zones are attached in Annexure-3.

200mm UPVC SN4 pipes are selected for the network for smooth functioning with little maintenance. The inverted level of manholes has been selected by providing the required slope for the movement of sewage with gravity. The EPASWMM model of Pandalam Municipality are as follows.



4.2 Pumping Main

In the project there are 3 Nos of collection wells proposed at PHC, Chiramudi & Sasthamvila. The pumping main is designed to carry sewerage from these wells to STP. EPANET software is used to design pumping mains. In this software, minor losses and major losses are taken into account. The software is capable of modeling system.

Well at PHC to STP

Length of Pumping main = 3477m.

Flow = 37 LPS

Assuming a velocity of 1m/s,

250mm DI pipe for a length of 3477m is proposed as pumping main.

Well at Chiramudi to STP

Length of Pumping main = 2432 m.

Flow = 12 LPS

Assuming a velocity of 1m/s,

150 mm DI pipe for a length of 2432m is proposed as pumping main

Well at Sasthamvila to STP

Length of Pumping main = 2082m.

Flow = 4 LPS

Assuming a velocity of 1m/s,

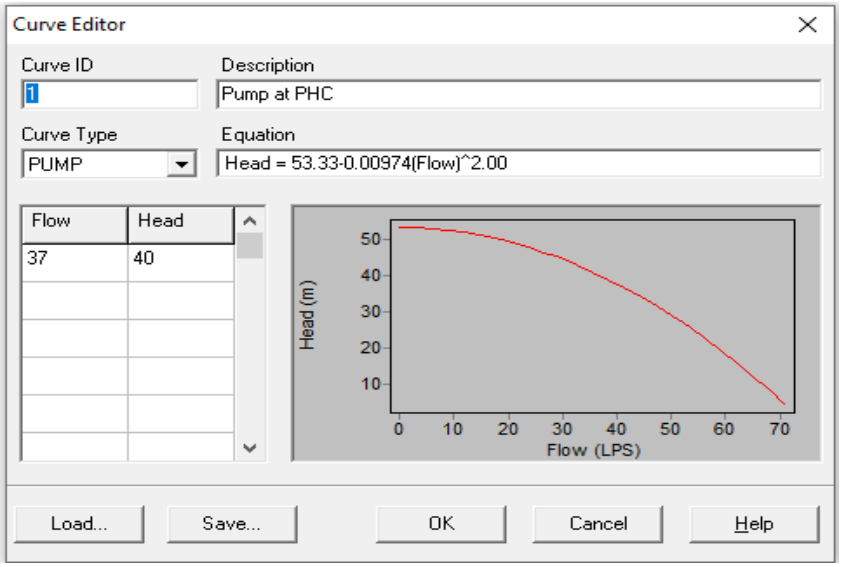
100mm ID pipe is to be used.

Hence DI Pipe with OD 125mmfor a length of 2082 m is proposed as pumping main

4.3 Pump Sets

Submersible Pump sets are proposed in this project due to simplicity of operation and absence of suction head.

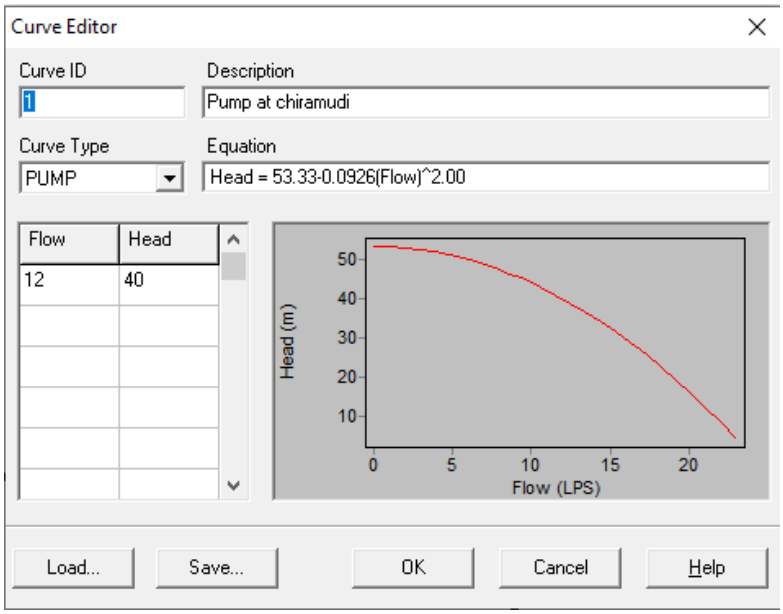
(a) For PHC to STP



HP = (37*40)/ (75*0.70) = 28.1, **Say 30 HP**

30 HP Pump sets – 2 Nos. (1 as Standby)

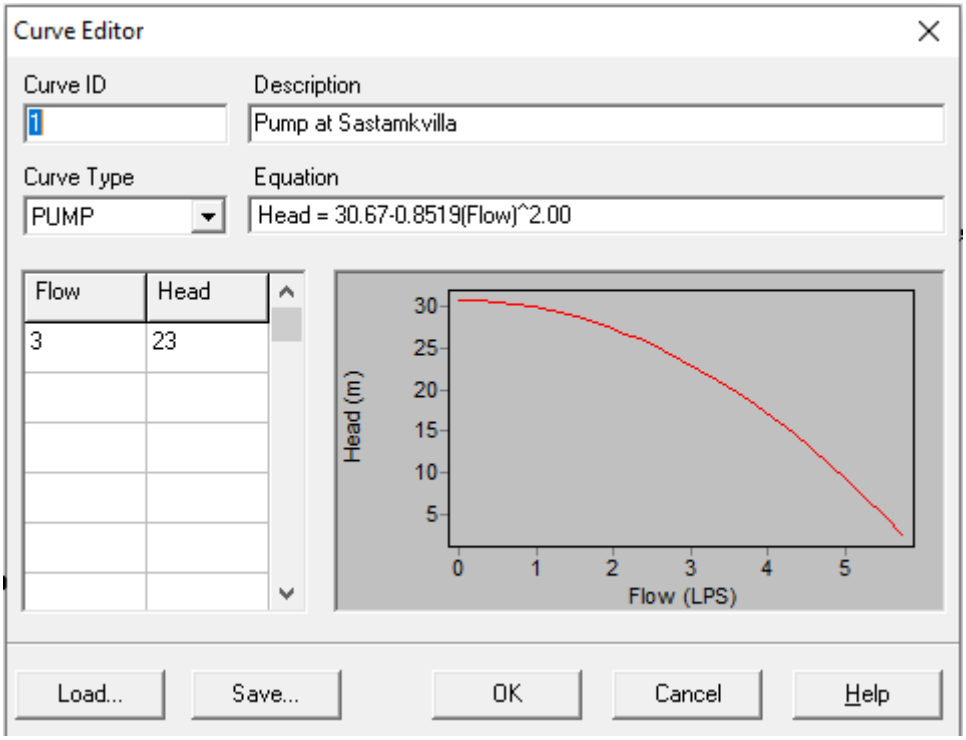
Well at Chiramudi to STP



HP= (12*40)/ (75*0.70) =9.1, **say 10 HP**

10 HP Pump sets – 2 Nos. (1 as Standby)

Well at Sasthamvila to STP



HP= (3*23/75*0.70) = 1.31, **Say 1.5 HP**

1.5 HP Pump Set- 2 Nos. (1No. as Standby)

The two pumping stations ate to be provided with Diesel Generator set with rating 63.50kVA are required as power back up.

4.3 Design of Collection Wells

There are 3 collection wells in the existing Sewerage system.

To manage the peak flow, a detention period of 2 hours is taken in the proposed new wells. As the detention period is beyond the standard limit, provision for aeration is also included in the project.

COLLECTION WELL AT CHIRAMUDI

Total Load to this Well	–12 LPS
Volume required for storage of 2 hrs	- 86.4 m^3
Depth of well from IL	– 4.614 m
Area required	– 304m^2
Diameter of well	– 4.88 m say 5m
Clearance	– 0.5m
Residual Head	– 4.614m
Depth of well from GL	–8m

COLLECTION WELL AT SASTHAMVILA COLONY

Total Load to this Well	– 3 LPS
Volume required for storage of 2 hrs	- 21.6 m^3
Depth of well from IL	– 3.159m
Area required	– 304 m^2
Diameter of well	– 2.95 m say 3 m
Clearance	– 0.5m
Residual Head	– 4.341m
Depth of well from GL	– 8m

COLLECTION WELL AT PRIMARY HEALTH CENTRE

Total Load to this Well	– 37 LPS
Volume required for storage of 2 hrs	- 260.388 m^3
Depth of well from IL	– 5.43m
Area required	– 404 m^2
Diameter of well	– 7.9 m Say 8m
Clearance	– 0.5m
Residual Head	– 4.903m
Depth of well from GL	– 9 m

All collection wells shall be provided with blower and aeration arrangements during storage.

CHAPTER 5
TECHNOLOGY FOR STP

5.1 SEWAGE TREATMENT

Sewage treatment is a type of wastewater treatment which aims to remove contaminants from sewage to produce an effluent that is suitable for discharge to the surrounding environment or an intended reuse application, thereby preventing water pollution from raw sewage discharges. Sewage contains wastewater from households and businesses and possibly pre-treated industrial wastewater. There is a high number of sewage treatment processes to choose from. These can range from decentralized systems (including on-site treatment systems) to large centralized systems involving a network of pipes and pump stations which convey the sewage to a treatment plant.

Sewage is typically transported through a sewer system. Sewage consists of wastewater discharged from residences and from commercial, institutional and public facilities that exist in the locality. Sub-types of sewage are greywater (from sinks, bathtubs, showers, dishwashers, and clothes washers) and blackwater (the water used to flush toilets, combined with the human waste that it flushes away). Sewage also contains soaps and detergents. Food waste may be present from dishwashing. Sewage may contain micro-pollutants and pollutants from industrial wastewater.

The main parameters in sewage that are measured to assess the sewage strength or quality as well as treatment options include: solids, indicators of organic matter, nitrogen, phosphorus, and indicators of fecal contamination. The following four types of pathogens from fecal matter are found in sewage: bacteria, viruses, protozoa, helminthes and their eggs. In order to quantify the organic matter, indirect methods are commonly used: mainly the Biochemical Oxygen Demand (BOD) and the Chemical Oxygen Demand (COD). Typical values for physical–chemical characteristics of raw sewage in developing countries have been published as follows: 180 g/person/d for total solids (1100 mg/L concentration), 50 g/person/d for BOD (300 mg/L), 100 g/person/d for COD (600 mg/L), 8 g/person/d for total nitrogen (45 mg/L), 4.5 g/person/d for ammonia-N (25 mg/L) and 1.0 g/person/d for total phosphorus (7 mg/L).

Sewage can be treated close to where the sewage is created, which may be called a "decentralized" system or even an "on-site" system (on-site sewage facility, septic tanks, etc.). Alternatively, sewage can be collected and transported by a network of pipes and pump stations to a municipal treatment plant. This is called a "centralized" system. The procedure for removing contaminants from the wastewater basically from the household sewage is called sewage treatment. It has to undergo the chemical, physical and biological procedure to remove these contaminants and give out an environmentally safe treated effluent.

Choosing the most suitable treatment process is complicated and requires expert inputs, often in the form of feasibility studies. This is because the main important factors to be considered when evaluating and selecting sewage treatment processes are numerous: process applicability, applicable flow, acceptable flow variation, influent characteristics, inhibiting or refractory compounds, climatic aspects, process kinetics and reactor hydraulics, performance, treatment residuals, sludge processing, environmental constraints, chemical product requirements, energy requirements, requirements of other resources, personnel requirements, operating and maintenance requirements, ancillary processes, reliability, complexity, compatibility, area availability. With regards to environmental impacts the following aspects are included in the selection process: Odors, vector attraction, sludge transportation, sanitary risks, air contamination, soil and subsoil contamination, surface water pollution or groundwater contamination, devaluation of nearby areas, inconvenience to the nearby population.

The different stages of the treatment process involved for the treatment of sewage is shown in the flow diagram.

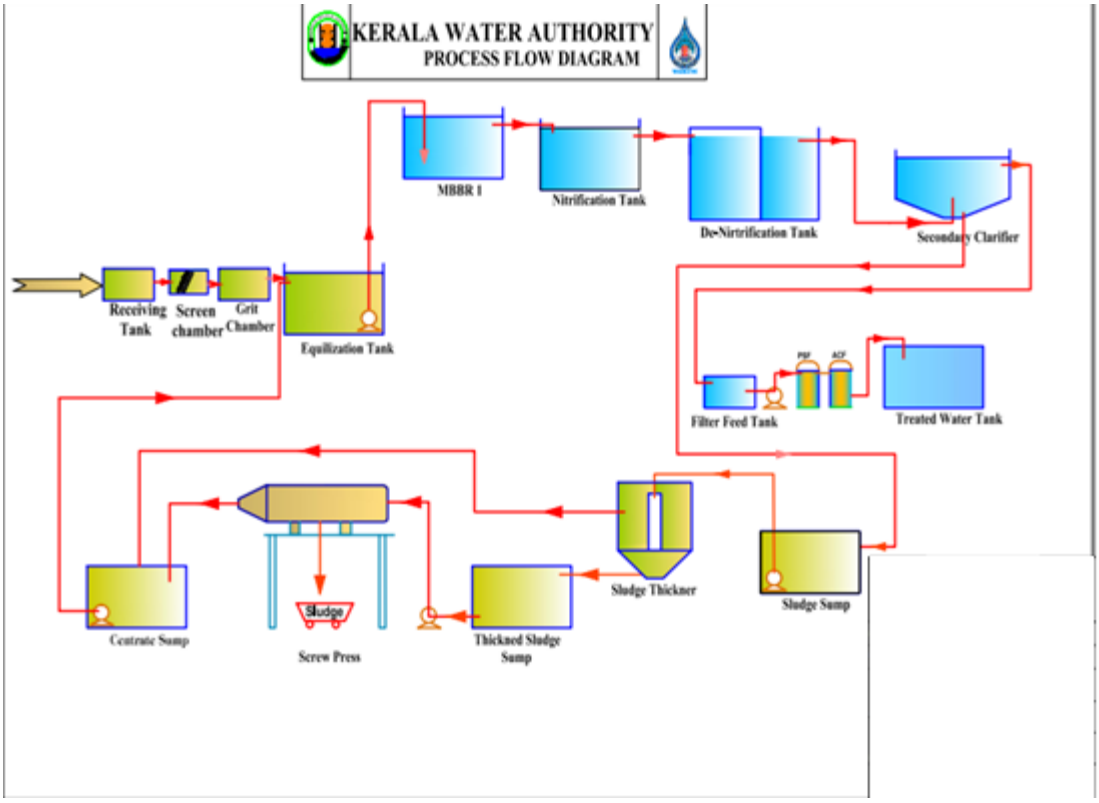


Figure- 5.1 Hydraulic Flow Diagram

5.2 TREATMENT UNITS

5.2.1 PRE-TREATMENT

Pre-treatment removes all materials that can be easily collected from the raw sewage before they damage or clog the pumps and sewage lines of treatment. Objects commonly removed during pretreatment include trash, tree limbs, and other large objects. The influent in sewage water passes through a bar screen to remove all large objects like cans, rags, sticks, plastic packets, etc. carried in the sewage stream. This is most commonly done with an automated mechanically raked bar screen in modern plants serving large populations, while in smaller or less modern plants, a manually cleaned screen may be used. The raking action of a mechanical bar screen is typically paced according to the accumulation on the bar screens and/or flow rate. The solids are collected and later disposed of in a landfill, or incinerated.

5.2.1.1 GRIT REMOVAL

Grit consists of sand, gravel, cinders, and other heavy materials. Pretreatment may include a sand or grit channel or chamber, where the velocity of the incoming sewage is adjusted to allow the settlement of sand and grit. Grit removal is necessary to

- Reduce formation of heavy deposits in aeration tanks, aerobic digesters, pipelines, channels, and conduits
- Reduce the frequency of digester cleaning caused by excessive accumulations of grit and
- Protect moving mechanical equipment from abrasion and accompanying abnormal wear.

The removal of grit is essential for equipment with closely machined metal surfaces such as comminutors, fine screens, centrifuges, heat exchangers, and high pressure diaphragm pumps. Grit chambers come in 3 types: horizontal grit chambers, aerated grit chambers, and vortex grit chambers. Sand and other

particles of specific gravity > 2.65 are settled in the Grit Chamber. Grit removal systems have been designed to remove clean inorganic particles that are greater than 0.210 millimetres, most grit passes through the grit removal flows under normal conditions. During periods of high flow deposited grit is resuspended and the quantity of grit reaching the treatment plant increases substantially. It is, therefore, important that the grit removal system not only operate efficiently during normal flow conditions but also under sustained peak flows when the greatest volume of grit reaches the plant.

5.2.1.2 PARSHALL FLUME

The Parshall flume is an open channel flow metering device that was developed to measure the flow. It is used to measure volumetric flow rate in municipal sewer lines, and influent/effluent flows in wastewater treatment plants. In Parshall flume flow should be measured at a point that is 2/3 the length of the converging wall measured back from the throat. It is important to note that this distance is NOT simply 2/3 of the distance back from the throat, but 2/3 of the length of the side wall. The advantages of the Parshall flume are

- It passes sediment and small trash easily
- It requires only a small head loss, and
- It allows accurate flow measurements even when partially submerged.

A disadvantage of the Parshall flume is that it is not accurate at low flow rates.

5.2.1.3 EQUALIZATION TANK

Flow equalization is used to minimize the variability of water and wastewater flow rates and composition. The main function of the equalization tank is to act as a buffer: to collect the raw incoming sewage that comes at widely fluctuating rates and pass it on to the rest of the sewage treatment plant at a steady flow rate. The tank is rectangular in shape to provide placement of air diffusers for full floor coverage. Each unit operation in a treatment train is designed for specific wastewater characteristics. Improved efficiency and control are possible when all unit operations are carried out at uniform flow conditions. The equalization tanks are provided (i) to balance fluctuating flows or concentrations, (ii) to assist self- neutralization, or (iii) to even out the effect of a periodic "slug" discharge from a batch process. In STP design equalization tank is provided to enable the source to operate at a predetermined rate. Waste water generated does not flow at a constant rate. Even in dry weather, the flow rate varies from hour to hour. Flow equalization is a process of controlling flow velocity and flow composition. It is necessary in many municipal treatment processes to dampen severe variation in inflow and water quality. Providing consistent flow and loading to a biological process is important to maintain optimal treatment. The principal factors considered in the design of equalization tanks are

- Location and configuration,
- Volume
- Tanks geometry,
- Mixing and air requirements,
- Appurtenances (accessories, trappings) and
- Pumping facilities

Considering the variation in hourly flow pattern adopted as shown in appendix, volume of equalization tank is arrived at around 1055 m3. Thus in order to maintain uniform flow rate the retention time is considered as 5.06 hrs. Due to the additional retention time, aeration and mixing is required to prevent the raw wastewater from becoming septic and to maintain solids in suspension. Homogeneous mixture in Equalization Tank is done via the actions of coarse bubble diffusers, oxygen transfer efficiency of a coarse bubble diffuser is 10%-20% and are capable of delivering 6 - 12 m3 / hour air , typical diameter of coarse bubble diffuser is 150 mm other role is to make water homogeneous in nature.

5.2.2 SECONDARY TREATMENT

Secondary treatment removes the soluble organic matter that escapes primary treatment. It also removes more of the suspended solids. Removal is usually accomplished by biological processes in which microbes consume the organic impurities as food, converting them into carbon dioxide, water, and energy. MBBR has been proposed as a secondary treatment option due to the following reasons.

1. MBBR has been in existence sufficiently for a long time, also in India and is a proven technology.

2. Minimum footprint
3. Better stabilized sludge
4. Better Effluent Quality
5. Less sophisticated
6. Spare parts available
7. Lower life cycle cost
8. Nil odour nuisance and other environmental hazards

The MBBR process is an attached growth biological wastewater treatment process. That is, the microorganisms that carry out the treatment are attached to a solid medium, as in trickling filters or RBC systems. The microorganisms that carry out the treatment are kept suspended in the mixed liquor in the aeration tank.

5.2.2.1 MOVING BED BIO REACTOR (MBBR) TECHNOLOGY

Moving Bed Bio Reactor (MBBR) / Fixed Aerated Bioreactor (FAB) With the moving bed bio reactor (MBBR) an economically solution is offered for waste water treatment if the "bulk" of the pollution load must be disposed of (as means of cost reduction) or if applicable discharge regulations are not as strict. With this application we offer advanced waste water treatment solutions for the industrial and municipal markets. These solutions significantly increase the capacity and efficiency of existing waste water treatment plants, while minimizing the size of new plant deployments.

This method makes it possible to attain good efficiency results of disposal with low energy consumption. This process is used for the removal of organic substances, nitrification and denitrification.

The MBBR system consists of an activated sludge aeration system where the sludge is collected on recycled plastic carriers. These carriers have an internal large surface for optimal contact water, air and bacteria.

MBBR technology employs thousands of polyethylene biofilm carriers operating in mixed motion within an aerated wastewater treatment basin. Each individual bio- carrier increases productivity through providing protected surface area to support the growth of heterotrophic and autotrophic bacteria within its cells. It is this high-density population of bacteria that achieves high-rate biodegradation within the system, while also offering process reliability and ease of operation.

This technology provides cost-effective treatment with minimal maintenance since MBBR processes self-maintain an optimum level of productive biofilm.

Additionally, the biofilm attached to the mobile bio carriers within the system automatically responds to load fluctuations.

Effluent Characteristics

The characteristics of the effluent which is coming out from the proposed plant is given below which is complying the PCB and CPHEEO standards.

Parameters	Units	Values
Biochemical Oxygen Demand (BOD)	mg/l	<10
Chemical Oxygen Demand (COD)	mg/l	<50
pH	units	6.5 - 9
Total Suspended Solids (TSS)	mg/l	<10
Oil and grease	mg/l	<10

5.2.2.2 PROCESS BENEFITS

- Compact Design: A fraction of the size of conventional systems
- Expandable: Capacity can be easily upgraded by simply increasing the fill fraction of biofilm carriers
- Single Pass Process: No return activated sludge stream required
- Load Responsive: Actively sloughed biofilm automatically responds to load fluctuations
- Minimal Maintenance

- No F/M ratios or MLSS levels to maintain MBBR processes are an excellent solution for common wastewater applications including
- BOD Reduction
- Nitrification

- Total Nitrogen Removal

- Moving Bed Biofilm Reactor systems deliver a flexible, cost-effective, and easy- to-operate means to address current wastewater requirements and the expandability to meet future loads or more stringent discharge requirements within a compact design.

Advantages of the MBBR system over other activated sludge processes are:

- Reduced footprint for the aeration tank (MBBR reactor) and overall plant footprint Relatively stable and can withstand shock loads
- Low sludge production
- Mother Liquor Suspended Solids (MLSS) is not a design parameter so no need for Return Activated Sludge (RAS) and the associated
- pumps/pumping facilities
- Modular design, easy to expand
- Utilizes medium/coarse bubble diffusers, instead of more expensive fine bubble systems

5.2.2.3 FEATURES OF MBBR

In Fluidized aerobic process a non-clogging biofilm reactor with special grade plastic media having density close to that of water is used. This plastic media has more surface area and biofilm grows on these media which move along with the water in the reactor. This movement within the reactor is generated by providing aeration with the help of diffusers placed at the bottom of the aerobic reactor. The thin biofilm on the elements enables the bacteria to act upon the biodegradable matter in sewage and reduce BOD / COD content in the presence of oxygen present in air. Area requirement for this process is 1/10 of space required for conventional sewage treatment plants. Power requirements are low as recycling of sludge is not done in this method as required in ASP. This can take shock loads and can withstand variation. Expected COD/BOD removal is more than 95%.

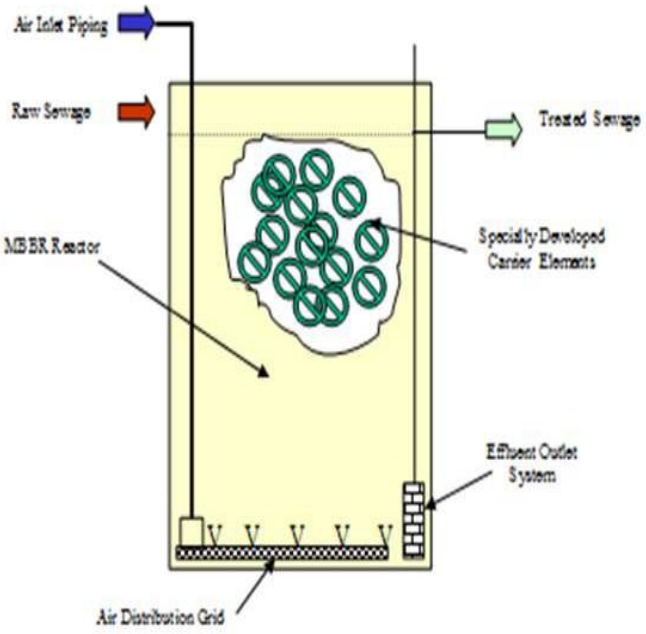


Fig 5.2: Essential Components of MBBR

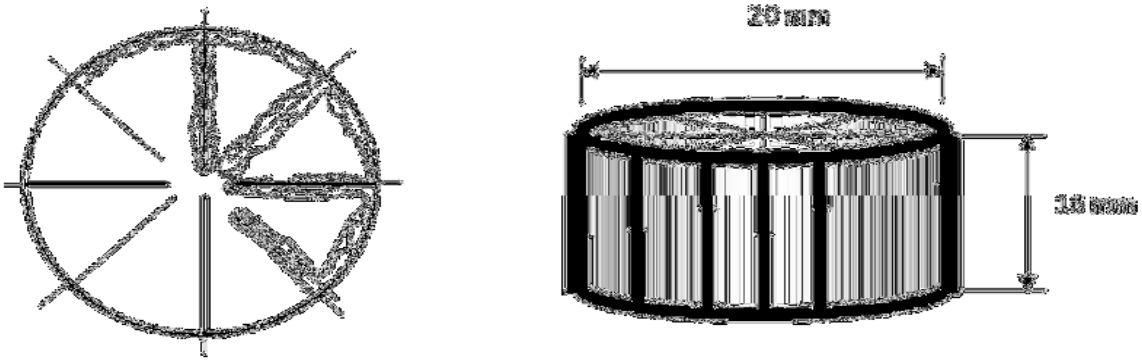


Fig 5.3: MBBR Media

5.2.2.4 MBBR WASTEWATER TREATMENTPROCESSALTERNATIVES

The MBBR wastewater treatment process is quite flexible and can be used in several different ways. The figure shows the flow diagram of the options adopted for the proposed treatment plant, with single stage BOD removal, nitrification, post anoxic denitrification with raw sewage feeding for carbon source and thereafter removing low grade BOD in the subsequent reactor.

5.2.2.5 POST ANOXIC DE-NITRIFICATION ALTERNATIVE

In order to carry out the de-nitrification of the waste water flow (removal of the Nitrogen from the waste water), it is necessary to first nitrify the waste water, conversion of ammonia nitrogen typically present in the influent wastewater to nitrate. Nitrification will only take place at a reasonable rate in the MBBR reactor if the BOD level is quite low, thus an MBBR de-nitrification process will need a reactor for BOD removal, one for nitrification and one for de-nitrification. Nitrification reactor will always follow the BOD removal reactor because of the need for low BOD level in the nitrification reactor. De-nitrification reactor is provided after the nitrification reactor as the post anoxic de-nitrification.

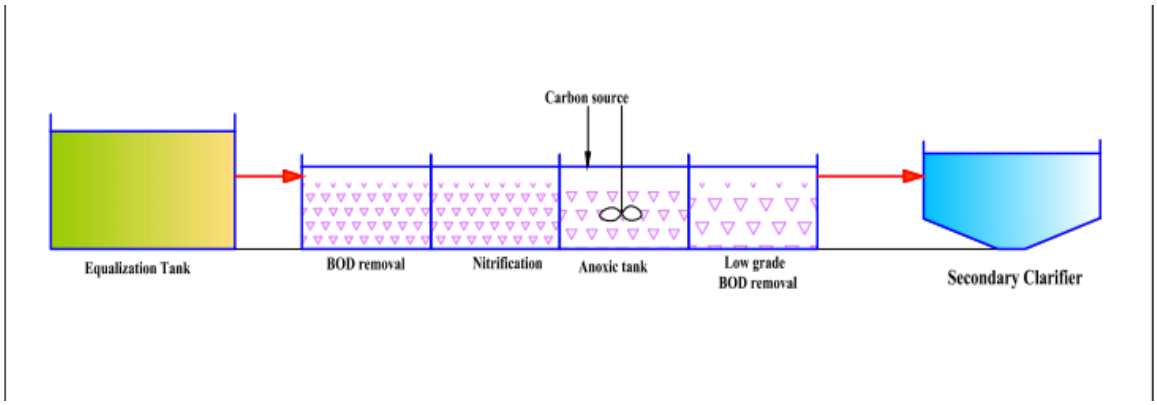


Figure 5.4 Nitrification and De-nitrification Reactors

5.2.2.6 NITRIFICATION TANK

Ammonia in wastewater could originate from a variety of sources, including Proteins (meat and blood), urea, amino acid products, casein, corrosion inhibitors, process chemicals and raw materials or cleaning chemicals containing quaternary ammonium compounds. Nitrification is a bio-chemical reaction that occurs inside bacteria. Two species of bacteria are involved in the process – Nitrosomonas and Nitrobacter.
These bacteria are collectively known as nitrifiers and are autotrophic, i.e. they get their carbon source from inorganic carbon (carbonates, bicarbonates) or carbon dioxide.
A healthy and stable population of nitrifiers (Nitrosomonas and Nitrobacter) will not exist without the following conditions:

- **OXYGEN**: Nitrifiers are obligate aerobes, i.e. they require free molecular oxygen and are killed off by anaerobic conditions. Maximum nitrification occurs at a D.O. (Dissolved Oxygen) level of 3.0 mg/l. Significant nitrification occurs at a D.O. level of 2.0 to 2.9 mg/l. Nitrification ceases at D.O. levels of <0.5 mg/l. Approximately 4.6 kg of oxygen are required for every kg of ammonium ions oxidized to nitrate (This compares with a requirement of 1 kg of oxygen to oxidize 1 kg of carbonaceous B.O.D.). An absence of oxygen for <4 hours does not adversely affect nitrifiers when oxygen is restored. To ensure effective nitrification, always maintain a D.O. level of 1.5 mg/l.

- **TEMPERATURE**: Nitrification is temperature sensitive. The optimum temperature for nitrification is generally considered to be 30°C.

TEMPERATURE	EFFECT UPON NITRIFICATION
>45°C	Nitrification ceases
28-32°C	Optimal temperature range
16°C	Approx. 50% of nitrification rate at 30°C
10°C	Significant reduction in nitrification rate – 20% of rate at 30°C
<5°C	Nitrification ceases

- **ALKALINITY AND pH**: Alkalinity is lost in an activated sludge process during nitrification. Nitrifiers use alkalinity as a carbon source, i.e., they use an inorganic form of carbon. Hydrogen ions (H+) are produced when ammonium ions are oxidized to nitrite:

$$NH_4^{++} + 1.5O_2 \longrightarrow 2H^+ + NO_2^- + 2H_2O.$$

Nitrous acid (HNO2) is also produced during the oxidation of ammonium ions. This destroys alkalinity:

$$H^+ + NO_2^- \longrightarrow HNO_2^-$$

7.14 mg of alkalinity as CaCO3 are destroyed for every mg of ammonium ions oxidized. If the pH drops below 6.7, there is a significant decrease in nitrification. Therefore, it is important to maintain an adequate alkalinity in the aeration tank to provide pH stability and also to provide inorganic carbon for nitrifiers. After complete nitrification, a residual alkalinity of 50 mg/l in the aeration tank is desirable. If this alkalinity is not present, then alkalinity should be added to the aeration tank. The optimal pH range for nitrification is 7.2 to 8.0. A substantial reduction in nitrification activity occurs at pH levels below 6.7.

- **HIGH MEAN CELL RESIDENCE TIME (SLUDGE AREA) OR LOW F:M:**

The necessary MCRT or F: M values are temperature dependent. Nitrifier activity and reproduction are decreased during cold temperatures. Therefore, in winter, an increase in the quantity of nitrifiers (MLVSS) or an increase in MCRT is often required to maintain effective nitrification. Reducing the wasting rate (WAS rate) will increase the MCRT.

INHIBITION/TOXICITY: Inhibition is temporary short-term or long-term loss of enzymatic activity. Toxicity is permanent loss of enzymatic activity or irreversible damage to cellular structure. Small increases in inhibitory wastes can cause a dramatic reduction in nitrification. Nitrifiers grow slowly and only account for a small portion of the bacterial assemblage in an aeration system. Nitrifiers are excellent indicators of toxic shock in an effluent treatment plant. Significant loss of nitrification will occur before loss in efficiency of carbonaceous BOD removal. Nitrifying bacteria are also inhibited by relatively low concentrations of free ammonia (10 mg/l for Nitrosomonas; 0.1 mg/l for Nitrobacter) and free nitrous acid (1.0 mg/l for both Nitrosomonas and Nitrobacter). Free ammonia (NH3) is produced from ammonium ions under a high pH in the aeration tank. Free nitrous acid (NHO2) is produced from nitrite ions under a low pH in the aeration tank. This type of inhibition is known as substrate inhibition. Substrate inhibition usually occurs at a concentration of 400-500 mg/l ammonium ions or when ammonium ions are converted to nitrite ions at a faster rate than nitrite ions are converted to nitrate ions.

- **BOD:** Soluble and simplistic forms of cBOD can inhibit the activity of nitrifying bacteria. They are able to enter the cells of nitrifying bacteria and inactivate their enzyme systems. This form of cBOD must be degraded significantly or completely by organotrophs in order for nitrifying bacteria to oxidize ammonium and nitrite ions. Nitrifiers are dependent on organotrophs to reduce cBOD to relatively low concentrations (<40-50 mg/l). Excess BOD can cause a significant oxygen demand, which may cause a drop in D.O. that adversely affects nitrifying bacteria. Fluctuations in BOD loading may lead to intermittent nitrification.

5.2.2.7 DE-NITRIFICATION PROCESS IN THE REACTOR

Denitrification is the process that converts nitrate to nitrogen gas, thus removing bioavailable nitrogen and returning it to the atmosphere. Unlike nitrification, denitrification is an anaerobic process, occurring mostly in soils and sediments and anoxic zones in lakes and oceans. In a biological water treatment, denitrification is generally the next step following nitrification. Here nitrate (NO3) and nitrite (NO2) are transformed into nitrogen (N2). The gaseous nitrogen escapes out of the water into the air. Air exists for 78% out of nitrogen (N2) and for 21% out of O2 (oxygen), so N2 is absolutely not polluting the atmosphere. A large number of aerobic bacteria is able to perform denitrification. When there is no oxygen in the water, these bacteria use nitrate and nitrite as a source of oxygen.

The denitrification reaction requires a carbon source. Hence raw sewage is proposed to dose from the equalization tank to the denitrification tank and BOD in the primary effluent waste water is used as the carbon source for the denitrification. Thereafter a reactor is also proposed for dealing low grade BOD in the effluent.

5.2.2.8 SECONDARY CLARIFIER

Secondary clarifiers are to separate biological floc from the treated liquid waste stream. Plate settlers are also being proposed in the clarifier to get more clarified water. Clarifiers are settling tanks built with mechanical means for continuous removal of solids being deposited by sedimentation. A clarifier is generally used to remove solid particulates or suspended solids from liquid for clarification. Necessary coagulants are being added before feeding the clarifier.

5.2.2.9 CLARIFIED WATER COLLECTION TANK

After treatment, the effluent is stored in this tank from where it is taken for further treatment.

5.2.2.10 SLUDGE COLLECTION SUMP

The dead bacteria that dies after consuming BOD and COD are retained in the form of sludge from the bottom of the tank.

5.2.2.11 DEWATERING UNIT

A dewatering unit is required to further dry the sludge. The centrate at the outlet of the dewatering unit is then recirculated to the system.

5.2.3 TERTIARY TREATMENT

Tertiary treatment refers to secondary treatment followed by a filtration step, such as media filtration, so that the turbidity and TOC concentrations are generally lower, and if coagulation with metal salts is used, then the phosphate concentration will also be reduced.

5.2.3.1 PRESSURE SAND FILTER (PSF)

The treated water which is collected in the filter feed tank shall be pumped into the Pressure Sand Filter using the Filter Feed Pumps. They are the most popular method for removal of turbidity from water. The Pressure Sand Filter consists of a multiple layer of sand with a variety in size and specific gravity. These Filters

are designed to remove turbidity and suspended particles present in the feed water with minimum pressure drop. Raw water flows downwards through the filter bed and as the suspended matter, which is treated by addition of a coagulant like alum or poly electrolyte, is retained on the sand surface and between the sand grains immediately below the surface. There is steady rise in the loss of head over a period of time and the flow reduces once the pressure drop across the filter is excessive. The filter is then taken out of service and cleaning of the filter media is affected by flow reversal also called as backwash. To assist in cleaning the bed, the backwash operation is sometimes preceded by air scouring by way of agitation through the under drain system. The air scouring agitates the sand with a scrubbing action, which loosens the intercepted particles.

Fig 5.5 Pressure Sand Filter

5.2.3.2 ACTIVATED CARBON FILTER (ACF)

Filtered wastewater from Pressure sand filter is then passed through the Activated Carbon Filter. They are generally employed in the process of removing organic compounds and/or extracting free chlorine from water, thereby making the water suitable for discharge.

Activated carbon is commonly used for removing organic constituents and residual disinfectants in water supplies. This not only improves taste and minimizes health hazards; it protects other water treatment units such as reverse osmosis membranes and ion exchange resins from possible damage due to oxidation or organic fouling. Activated carbon is a favoured water treatment technique because of its multifunctional nature and the fact that it adds nothing detrimental to the treated water. Most activated carbons are made from raw materials such as nutshells, wood, coal and petroleum.

Carbon filtering is a method of filtering that uses a bed of activated carbon to remove contaminants and impurities, using chemical adsorption. Each particle/granule of carbon provides a large surface area/pore structure, allowing contaminants the maximum possible exposure to the active sites within the filter media.

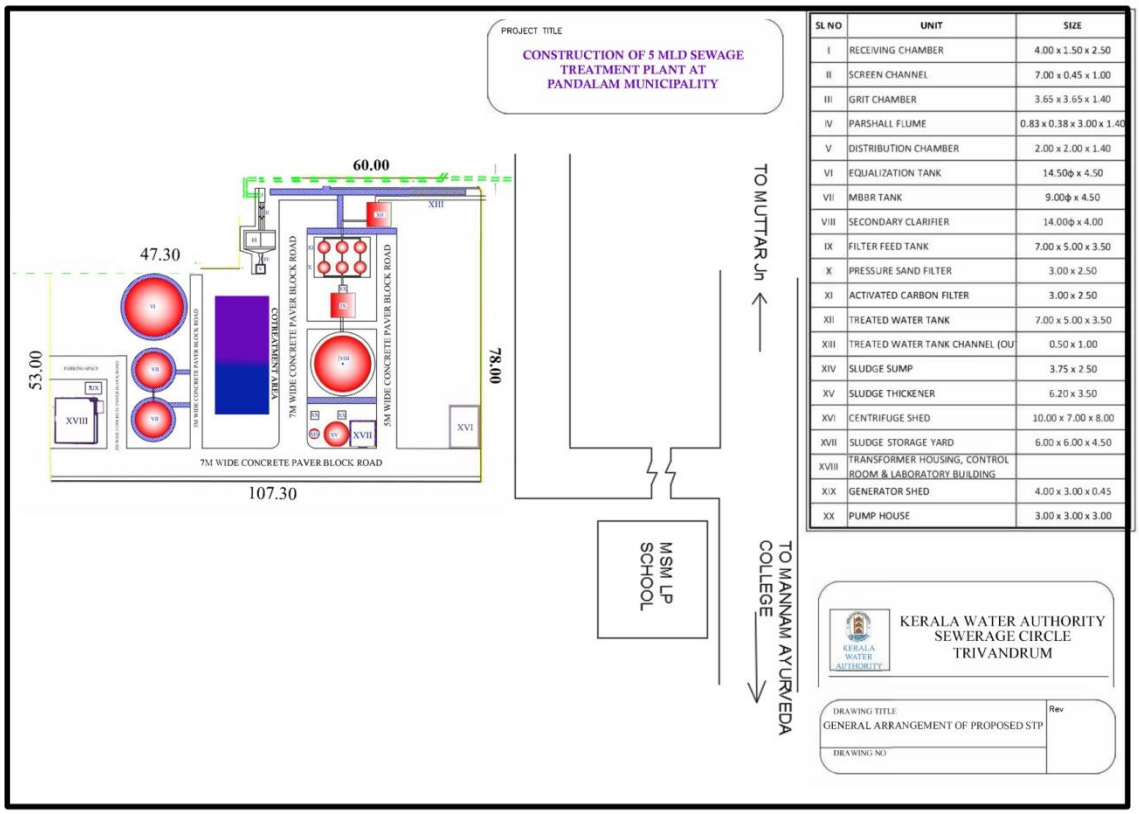
Fig 5.6 Activated Carbon Filter

5.2.3.3 CHLORINE CONTACT TANK

Chlorination is by far the most common method of wastewater disinfection and is used worldwide for the disinfection of pathogens before discharge into receiving streams, rivers or oceans. Chlorine is known to be effective in destroying a variety of bacteria, viruses and protozoa, including Salmonella, Shigella and Vibrio cholera. Disinfection is achieved at this facility through chlorination using chlorine gas. The purpose of the Chlorine Contact Tanks is to allow sufficient time for the chlorine to disinfect the water.

5.2.3.4 TREATED WATER TANK

Treated water is being collected in treated water tank before being disposed of to river.



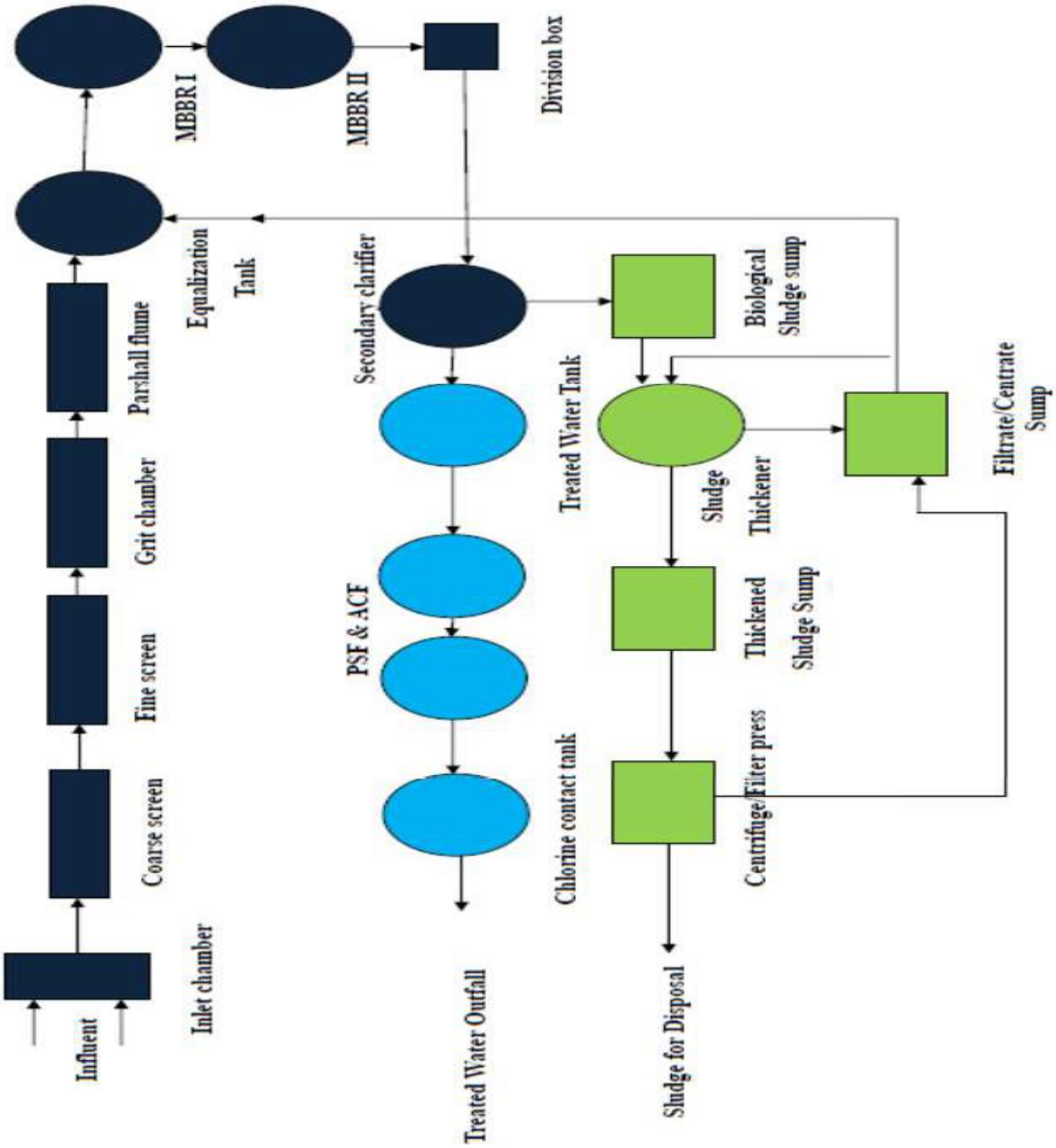
SL NO	UNIT	SIZE
I	RECEIVING CHAMBER	4.00 x 1.50 x 2.50
II	SCREEN CHANNEL	7.00 x 0.45 x 1.00
III	GRIT CHAMBER	3.65 x 3.65 x 1.40
IV	PARSHALL FLUME	0.83 x 0.38 x 3.00 x 1.40
V	DISTRIBUTION CHAMBER	2.00 x 2.00 x 1.40
VI	EQUALIZATION TANK	14.50ϕ x 4.50
VII	MBBR TANK	9.00ϕ x 4.50
VIII	SECONDARY CLARIFIER	14.00ϕ x 4.00
IX	FILTER FEED TANK	7.00 x 5.00 x 3.50
X	PRESSURE SAND FILTER	3.00 x 2.50
XI	ACTIVATED CARBON FILTER	3.00 x 2.50
XII	TREATED WATER TANK	7.00 x 5.00 x 3.50
XIII	TREATED WATER TANK CHANNEL (OU	0.50 x 1.00
XIV	SLUDGE SUMP	3.75 x 2.50
XV	SLUDGE THICKENER	6.20 x 3.50
XVI	CENTRIFUGE SHED	10.00 x 7.00 x 8.00
XVII	SLUDGE STORAGE YARD	6.00 x 6.00 x 4.50
XVIII	TRANSFORMER HOUSING, CONTROL ROOM & LABORATORY BUILDING	
XIX	GENERATOR SHED	4.00 x 3.00 x 0.45
XX	PUMP HOUSE	3.00 x 3.00 x 3.00

Figure 5.7 Layout of STP

5.2.4 SLUDGE MANAGEMENT

The solid particles separated from wastewater is in the form of slurry and known as sludge. The volume of sludge is more as it contains more water. Hence to reduce the volume of sludge, dewatering process is done with the help of centrifuges, sludge thickening units and sludge press. After this process, it is converted in the form of cake. The sludge from sewage is rich with nitrogen, phosphorous, Sulphur and other minerals which are essential for the growth of plants. Hence it can be used as a manure. Further researches are going on this field to make this cake as a construction material but is in its infant stage.

5.2.5 PROCESS FLOW AND DESIGN.



5.2.6 Process Design

MBBR PROCESS				
Capacity: Average Flow			**5MLD**	
Sl No	Description of Parameter	Value	Unit	Reference/ Remarks
a.	Quantity of Sewage Generated	5000000.00	LPD	
		5000.00	Cum/day	
		208.33	Cum/hr	
b.	Population Equivalent	41667		
c.	Assumed Peak Factor	2.50		
d.	Peak Design Flow	520.83	Cum/hr	
		0.145	Cum/sec	
RAW SEWAGE CHARACTERISTICS				
a.	Average Sewage flow entering the treatment plant	208.33	Cum/hr	
b.	Peak Sewage flow entering the treatment plant	520.83	Cum/hr	
c.	COD	500.00	mg/Lt	
d.	BOD	250.00	mg/Lt	
e.	TSS	400.00	mg/Lt	
f.	Total Nitrogen (As N)	40.00	mg/Lt	
g.	Total Phosphorous (As P)	7.00	mg/Lt	
h.	Fecal Coliform	3×10^7	mpn/100ml	
i.	E Coliform	4×10^7	mpn/100ml	
j.	Chlorides as Cl	170.00	mg/Lt	
k.	pH	6 to 9		

TREATED SEWAGE CHARACTERISTICS (AFTER FILTRATION)				
A	**COD**	**100.00**	**MG/LT**	
B	**BOD**	**10.00**	**MG/LT**	
C	**TSS**	**30.00**	**MG/LT**	
D	**TOTAL NITROGEN (AS N)**	**10.00**	**MG/LT**	
E	**TOTAL PHOSPHOROUS (AS P)**	**< 2**	**MG/LT**	
F	**PH**	**6 TO 9**		
G	**E COLLIFORM**	**1 X 10^3**	**MPN/100ML**	
1	**RECEIVING CHAMBER**			
	QUANTITY OF FLOW (AVE)	**208.33**	**CUM/HR**	
	PEAK FLOW	**520.83**	**CUM/HR**	
		0.145	**CUM/SEC**	
	AVERAGE RETENTION TIME FOR THE PEAK FLOW	**45.00**	**SEC**	
	VOLUME OF THE INLET CHAMBER	**6.51**	**CUM**	
	ASSUMED DEPTH OF FLOW	**2.00**	**M**	
	AREA REQUIRED FOR INLET CHAMBER	**3.26**	**SQ.M**	
	LENGTH OF THE TANK	**2.50**	**M**	
	BREADTH OF THE TANK	**1.30**	**M**	
	SAY	**1.50**	**M**	
PROVIDE THE DIMENSIONS OF RECEIVING CHAMBER AS 2.5 M **X** 1.5 M **X** 2 M SWD + 0.5 M FREEBOARD				
2	**MECHANICAL COARSE SCREEN CHANNEL**			
	PEAK DESIGN FLOW	**0.145**	**CUM/S**	
	NO. OF SCREEN	**1.00**	**NOS. (WORKING)**	

	PEAK FLOW RATE PER SCREEN	**0.145**	**M^3/SEC..**	
	VELOCITY AT PEAK FLOW	**0.950**	**M/SEC.**	**ASSUMED PEAK VELOCITY**
	AREA REQUIRED FOR SCREEN	**0.15**	**M^2**	
	ASSUMING DEPTH OF FLOW	**0.40**	**METER**	
	WIDTH OF OPENING	**0.38**	**METER**	
	SAY	**0.41**	**M**	
	CLEAR BAR SPACING	**20**	**MM**	
	BAR THICKNESS	**10.00**	**MM**	
	NO OF OPENING	**14**	**NOS**	
	INSIDE WIDTH OF SCREEN	**0.41**	**M**	
	PROVIDE CHAMBER WIDTH	**0.45**	**M**	
	VELOCITY	**1.15**	**M/SEC.**	
	FULL HEIGHT OF THE CHANNEL	**1.00**	**M**	
	ANGLE OF INCLINATION	**70.00**	**DEGREE**	
	ACTUAL VELOCITY AT PEAK FLOW	**0.73**	**M/SEC.**	**> 0.6M/S , HENCE OK**
	LENGTH OF CHANNEL REQUIRED D/S	**2.10**	**M**	
	SAY	**2.50**	**M**	
	LENGTH OF CHANNEL U/S	**1.50**	**M**	
	TOTAL LENGTH OF CHANNEL	**4.00**	**M**	
PROVIDE THE DIMENSIONS OF MECHANICAL COARSE SCREEN CHANNEL AS 4 M **X** 0.45 M **X** 0.4 M SWD + 0.6 M FREEBOARD				
3	**MECHANICAL FINE SCREEN CHANNEL**			
	PEAK DESIGN FLOW	**0.145**	**CUM/S**	
	NO. OF SCREEN	**1.00**	**NOS. (WORKING)**	
	PEAK FLOW RATE PER SCREEN	**0.145**	**M^3/SEC..**	

	VELOCITY AT PEAK FLOW	0.950	M/SEC.	ASSUMED PEAK VELOCITY
	AREA REQUIRED FOR SCREEN	0.15	M^2	
	ASSUMING DEPTH OF FLOW	0.40	METER	
	WIDTH OF OPENING	0.38	METER	
	SAY	0.41	METER	
	CLEAR BAR SPACING	6	MM	
	BAR THICKNESS	10.00	MM	
	NO OF OPENING	26	NOS	
	INSIDE WIDTH OF SCREEN	0.41	M	
	PROVIDE CHAMBER WIDTH	0.45	M	
	VELOCITY	2.04	M/SEC.	
	FULL HEIGHT OF THE CHANNEL	1.00	M	
	ANGLE OF INCLINATION	70.00	DEGREE	
	ACTUAL VELOCITY AT PEAK FLOW	1.29	M/SEC.	
	LENGTH OF CHANNEL REQUIRED D/S	2.10	M	
	SAY	2.50	M	
	LENGTH OF CHANNEL U/S	1.50	M	
	TOTAL LENGTH OF CHANNEL	4.00	M	
PROVIDE THE DIMENSIONS OF MECHANICAL FINE SCREEN CHANNEL AS 4M X 0.45M X 0.4 M SWD + 0.6 M FREEBOARD				
4	MANUAL COARSE SCREEN CHANNEL-STANDBY			
	PEAK DESIGN FLOW	0.145	CUM/S	
	NO. OF SCREEN	1.00	NOS. (WORKING)	
	PEAK FLOW RATE PER SCREEN	0.145	M^3/SEC..	
	VELOCITY AT PEAK FLOW	0.950	M/SEC.	ASSUMED PEAK VELOCITY

	AREA REQUIRED FOR SCREEN	**0.15**	**M^2**	
	ASSUMING DEPTH OF FLOW	**0.40**	**METER**	
	WIDTH OF OPENING	**0.38**	**METER**	
	SAY	**0.41**	**M**	
	CLEAR BAR SPACING	**20**	**MM**	
	BAR THICKNESS	**10.00**	**MM**	
	NO OF OPENING	**14.00**	**NOS**	
	INSIDE WIDTH OF SCREEN	**0.41**	**M**	
	PROVIDE CHAMBER WIDTH	**0.45**	**M**	
	VELOCITY	**1.15**	**M/SEC.**	
	FULL HEIGHT OF THE CHANNEL	**1.00**	**M**	
	ANGLE OF INCLINATION	**45.00**	**DEGREE**	
	VELOCITY AT PEAK FLOW	**0.60**	**M/SEC.**	**> 0.6M/S , HENCE OK**
	LENGTH OF CHANNEL REQUIRED D/S	**1.90**	**M**	
	SAY	**2.20**	**M**	
	LENGTH OF CHANNEL U/S	**1.50**	**M**	
	TOTAL LENGTH OF CHANNEL	**3.70**	**M**	

PROVIDE THE DIMENSIONS OF MANUAL COARSE SCREEN CHANNEL AS 3.7 M **X** 0.41 M **X 0.4** M SWD + 0.6 M FREEBOARD

DAILY SCREENING QUANTITY

	DAILY SEWAGE QUANTITY	**5000**	**M^3/DAY**	
	RATE OF SCREENING QUANTITY	**0.015**	**M^3/1000M^3**	
	DAILY SCREENING QUANTITY	**0.075**	**M3/DAY**	

5	**GRIT SEPERATOR**

	NO. OF GRIT UNITS	2		(1W+1SB)
	PEAK FLOW	0.145	CUM/S	
	FLOW IN EACH UNIT	0.145	CUM/S	
	COMPUTATION OF SETTLING VELOCITY:			
	GRIT PARTICLE SIZE	0.150	MM	
	SPECIFIC GRAVITY OF PARTICLE	2.65		
	HYDRAULIC RETENTION TIME	60.00	SEC	
	VOLUME OF THE GRIT CHAMBER	8.68	M^3	
	SURFACE OVERFLOW RATE (SOR)	959	CUM/SQM/D	ASSUMED
		0.011	CUM/SQM/SEC	
	AREA	13.03	M^2	
	SWD	0.70	M	
	PROPOSIMG A SQUARE CHANNEL OF SIZE	3.61		
	LENGTH OF GRIT SEPERATOR	3.65	M	
	WIDTH OF GRIT SEPERATOR	3.65	M	
	CRITICAL DISPLACEMENT VELOCITY (VC)	[8K/F(SS-1)GD]^A0.5		
	WHERE,			
	K	0.040		
	F	0.03		
	SS	2.65		
	D	0.00015	M	
	VC	0.097	M/SEC	
	HORIZONTAL VELOCITY OF FLOW VH SHOULD BE KEPT LESS THAN THE CRITICAL DISPLACEMENT VELOCITY VC			
	SWD	0.70	M	

	VH	**0.06**	**M/SEC**	**<VC , HENCE SAFE**
	HRT AT PEAK FLOW	**64.46**	**SEC**	**> 60, HENCE SAFE**
PROVIDE THE DIMENSION OF GRIT SEPARATOR AS 3.65 M X 3.65 M X 0.7 M SWD + 0.5 M FREEBOARD				
6	**APPROACH CHANNEL FOR PARSHALL PLUME**			
	LOWER VALUE OF FLOW IN MLD	**1**	**MLD**	**SIZING DONE AS PER CPHEEO MANUAL APPENDIX A - 5-9**
	HIGHER VALUE OF FLOWIN MLD	**12.5**	**MLD**	
	LOWER VALUE OF FLOW IN LPS	**12**	**LPS**	
	HIGHER VALUE OF FLOW IN LPS	**145**	**LPS**	**ASSUMED FROM 0.885 TO 0.99**
	THROAT WIDTH (W) IN M, FROM TABLE	**0.38**	**M**	
	MOUTH WIDTH (D)IN M,FROM TABLE	**0.83**	**M**	
	LIQUID DEPTH IN M AT LOW FLOW	**0.06**	**M**	
	LIQUID DEPTH IN M AT HIGH FLOW	**0.30**	**M**	
	VELOCITY AT MOUTH IN LOW FLOW IN M/S	**0.25**	**M/SEC**	
	VELOCITY AT MOUTH IN HIGH FLOW IN M/S	**0.57**	**M/SEC**	
	APPROACH CHANNEL WIDTH, M	**0.83**	**M**	
	APPROACH CHANNEL, LIQUID DEPTH, M	**0.30**	**M**	
	APPROACH CHANNEL, LENGTH, M	**3.00**	**M**	
	FREE BOARD	**0.7**	**M**	

	TOTAL DEPTH			
	PROVIDE THE DIMENSION OF APPROACH CHANNEL FOR PARS HALL PLUME AS 0.38MX0.83MX3M SWD + 0.7 M FREEBOART			
7	**EQUALIZATION TANK**			
	AVERAGE DESIGN FLOW	208.33	CUM/HR	
	HYDRAULIC RETENTION TIME	3.0	HOURS	
	VOLUME OF THE TANK	625.00	CUM	
	ASSUMED DEPTH OF LIQUID COLUMN (SWD)	4.0	M	
	AREA REQUIRED FOR THE EQUALIZATION TANK	156.25	SQ.M	
	NO. OF TANKS PROPOSED	1		
	AREA REQUIRED FOR EACH EQUALIZATION TANK	156.25	SQ.M	
		14.11		
	PROPOSE A CIRCULAR TANK			
	DIAMETER OF THETANK	14.11	M	
	SAY	14.50	M	
	ACTUAL CAPACITY PROVIDED	660.19	CUM	

CHECK FOR CAPACITY

MAXIMUM PEAK HOURS = 2 HOURS 2HRS PEAK FLOW = 2X520.83 =1041.66

HAS 2HRS AVERAGE CAPACITY = 2X208.33 =416.66

REQUIRED STORAGE = 625.00 M^3

ACTUAL STORAGE PROVIDED = 660.19>625 M^3 HENCE OK

PROVIDE THE DIMENSION OF EQUALIZATION TANK DIAMETER AS 14.5 M $ X 4 M SWD + 0.5 M FREEBOARD

7.1	**MIXING EQUIPMENT**

	NO . OF TANKS	1.00		
	CAPACITY OF TANK	660.2	CUM	
	MIXING RATE	0.60	CUM/HR	
	CAPACITY OF MIXER	396.1	CUM/HR	
	MIXING RATE	0.004	KW/M^3	
	CAPACITY OF MIXER	2.64	KW	
		3.54	HP	
	SAY	4.00	HP	
PROVIDE THE MIXING EQUIPMENT OF SIZE 4 HP OF MIXING CAPACITY 0.6CUM/HR				
7.2	**SEWAGE PUMP PUMPING TO MBBR**			
	NO. OF PUMPS	3		(2W+1S)
	TYPE OF PUMPS - SUBMERSIBLE SEWAGE TRANSFER /HORIZONTAL CENTRIFUGAL- NON CLOG)			
	AVERAGE FLOW	5000.00	CUM/DAY	
	PEAK DESIGN FLOW	12500.00	CUM/DAY	
	NUMBER OF WORKING HOURS	20	HRS	
	FLOW CAPACITY OF EACH PUMP REQUIRED	312.50	CUM/HR	
	PROPOSED PUMPS 2NUMBERS (1W + 1SB), FLOW PER PUMP	312.50	CUM/HR	
		86.81	LPS	
		0.087	CUM/SEC	
	HEAD REQUIRED	10.00	M	
	EFFICIENCY	50	%	
	HP REQUIRED FOR PUMP	22.71	HP	(Q*H*9.81*0.75)/0.5
	PROVIDE PUMPS OF CAPACITY	25	HP	

PROVIDE 3NOS OF SUBMERSIBLE NC-SH HORIZONTAL CENTRIFUGAL PUMPS OF 25HP WITH A DISCHARGE OF 312.50CUM/HR				
8	**MOVING BED BIO REACTOR (MBBR)**			
	AVERAGE DESIGN FLOW	5000.00	CUM/DAY	
	NO.OF STREAMS	1.00		
	BOD OF INCOMING SEWAGE	250.00	MG/L	
	TSS OF INCOMING SEWAGE	400.00	MG/L	
	BOD REQUIRED AFTER TREATMENT	10	MG/L	
	BOD TO BE REMOVED	240	MG/L	
	NO. OF TANKS PROPOSED	2		
	PROCESS CALCULATION			
	BOD LOADING RATE	3.50	KG/CUM/DAY	4-7 KG/CUM/DAY AS PER PAGE 955, M&E
	QUANTITY OF BOD REMOVED PER DAY	1200.00	KG/DAY	
	VOLUME OF REACTOR REQUIRED	342.857	CUM	
	VOLUME OF MEDIA REQUIRED	40.00	%	
	MEDIA VOLUME REQUIRED	137.14	CUM	
	VOLUME OF TANK REQUIRED	479.997 SAY 480.00	CUM	
	CONSIDERING 1 STREAMS, 2 TANKS			
	VOLUME OF EACH TANK	240.00	CUM	

	Assumed liquid Depth (SWD)	4.00	m	
	Area of each tank	60.00		
	Propose a Circular Tank			
	Diameter of theTank	8.80	m	
	Say	9.00	m	
	Actual Capacity Provided	254.34	Cum	
Provide the Dimension of Moving Bed Bio Reactor (MBBR) Dia as 9 m $ x 4 m SWD + 0.5 m Freeboard				
Provide inter connection pipe = 200mm Dia DI K9				
9	**AIR BLOWERS**			
9.1	**For MBBR Tank**			
	Assumed BOD reduction in the MBBR tank	95%	Percent	
	Incoming BOD of Raw sewage	250.00	mg/L	
	BOD to be reduced	237.50 say 240	mg/L	
	BOD Load	1200.0	kg/day	
	Oxygen required to remove BOD load	1.2	kg/kg of BOD	
	Oxygen required	1440.0	kg/day	
	Weight of O2 in 1kg of air	0.232		Standard
	Density of Air	1.201		Standard
	Oxygen Transfer Efficiency	0.170		15 to 30 % for fine bubble diffuser

	OXYGEN REQUIRED PER DAY	29133.94	CUM/DAY	
		1213.91	CUM/HR	
	AIR REQUIRED	**1213.91**	**CUM/HR**	
	SAFETY FACTOR	25.00	%	
		303.48	CUM/HR	
	ADD 20% FOR ANOXIC EQUALISATION TANK , SLUDGE TANK ETC	242.78	CUM/HR	
	ACTUAL AIR REQUIREMENT	**1760.18**	**CUM/HR**	
	NO.OF BLOWERS WORKING	1.00		
	AIR REQUIRED PER BLOWER	1760.18	CUM/HR	
	1CUM/HR	0.59	CFM	
	AIR REQUIRED IN CFM	1038.50	CFM	
	PRESSURE	8.82	PSI	(0.6KG/SQCM)
	VOLUMETRIC EFFICIENCY	0.65	%	
	POWER REQUIREMENT FOR BLOWER	61.44	HP	(0.00436*CFM* PSI)/EFF
		45.83	KW	
	SAY	50.00	KW	
PROVIDE 3NOS (2W+1S) OF AIR BLOWERS OF 25KW WITH A DISCHARGE OF !800CUM/HR				
10	**SECONDARY CLARIFIER**			
	NO.OF STREAM	1	NOS	
	NO.OF TANKS	1	NOS	
	AVERAGE FLOW	208	CUM/HR	
	RETENTION PERIOD	2.5	HRS	
	VOLUME OF TANK REQUIRED	520.8	CUM	
	VOLUME OF EACH TANK	520.8	CUM	
	ASSUMED DEPTH	3.5	M	

	AREA OF EACH TANK	148.81	SQM	
	PROPOSE A CIRCULAR TANK			
	DIAMETER OF THETANK	13.77	M	
	SAY	14.00	M	
	ACTUAL CAPACITY PROVIDED	538.51	CUM	
PROVIDE THE DIMENSION OF 1NO SECONDARY CLARIFIER DIA AS 14 M $ X 3.5 M SWD + 0.5 M FREEBOARD				
INFLUENT PIPE				
	VELOCITY OF AVERAGE FLOW	1.0	M/SEC	
	AREA	0.145	SQM	
	INNER DIA OF FEED PIPE	0.43	M	
	SAY	450.00	MM	
11	**SLUDGE SUMP**			
	SLUDGE GENERATED			
	AVERAGE FLOW	5000.00	CUM/DAY	
	TSS	400.00	MG/L	
	BOD	250.00	MG/L	
	ASSUMED TSS SLUDGE	30	%	
	ASSUMED BOD SLUDGE	35	%	
	SLUGDE GENERATED - TSS	600.00	KG/DAY	(AVERAGE FLOW X 30% OF TSS)
	SLUGDE GENERATED - BOD	437.50	KG/DAY	(AVERAGE FLOW X 35% OF BOD)
	TOTAL SLUDGE	1037.50	KG/DAY	
	% OF SLUDGE WITH 1.02SPECIFIC GRAVITY	1.00	%	

	Sludge Volume per Day	101.72	cum/day	(Total Sludge x 10%)/1.02
		4.24	cum/hr	
	Sludge Sump			
	Assumed Hydraulic Retention time	5.00	hr	
	Volume of Tank	421.20	cum	
	Assumed Side Water Depth	2.00	m	
	Area of the tank	10.60	sqm	
	Propose a Circular Tank			
	Diameter of theTank	3.67	m	
	Say	3.75	m	
	Actual Capacity Provided	22.88	Cum	
Provide the Dimension of 1No Total Sludge Dia as 3.75m $ x 2 m SWD + 0.5 m Freeboard				
12	**THICKENER FEED PUMP**			
	General			
A	Application	Sludge Transfer to Thickener		
B	Specific Gravity	1.03		**(1W+1SB)**
C	Type	Non Clog Submersible		
D	Quantity	2.00	(1W+1S)	
	Design Data			
A	Pump Working Hours	10.00	hrs	**(3 to 4 stages)**
B	Capacity of pump required	10.17	Cum/hr	
		0.00283	Cum/Sec	
C	Head required	15.00	m	

D	MAX SOLID SIZE PERMISSIBLE	40.00	MM	
E	EFFICIENCY	50	%	
F	HP REQUIRED FOR PUMP	1.109	HP	
G	RECOMMENDED SIZE	1.250	HP	
H	BKW AT DUTY POINT	0.933	KW	
	MATERIAL OF CONSTRUCTION	20.00		
A	CASING	2% NI - CI		
B	IMPELLER SEMI OPEN	CF-8M		
C	ROTOR SHAFT	SS-410		
D	FASTENERS IN LIQUID	SS-410		
E	MOTOR HOUSING	CI IS 210 GR. FG 260		
	MOTORS :	20.00		
A	TYPE	SUBMERSIBLE		
B	RPM	1450		
C	FREQUENCY	50 ± 3% HZ		
D	VOLTAGE	415 + 6% - 10%		
E	INSULATION	CLASS - F		
F	ENCLOSURE	IP - 68		
F	QUANTITY	1 NO OF EACH PUMP		
G	KW	1.000		
	RECOMMENDED DELIVERY LINE	100.00	MM	
PROVIDE 2NOS (1W+1S) OF THICKENER FEED PUMP OF 1.25HP WITH A DISCHARGE OF 10.5CUM/HR				

13	**SLUDGE THICKENER (GRAVITY TYPE)**			
	NO OF UNITS	1.00		
	TOTAL SLUDGE	1037.50	KG/DAY	
	SOLIDS LOADING RATE	40.00	KG/SQM/DAY	
	THICKENING AREA REQUIRED	25.94	SQM	TOTAL SLUDGE/SLR
	SURFACE LOADING RATE	12	CUM/SQM/DAY	
	SLUDGE VOLUME PER DAY/SLR	8.48	M^3	
	MAX AREA TAKEN	25.94	SQM	
	AREA OF DISTRIBUTION CHAMBER	10.00	%	
	TOTAL AREA REQUIRED	28.53	SQM	
	PROPOSE A CIRCULAR TANK			
	DIAMETER OF THE TANK	6.03	M	
	SAY	6.20	M	
	THICKENER AREA AVAILABLE	30.18	SQM	
	SIDE WATER DEPTH (SWD)	3.00	M	
	ACTUAL VOLUME PROVIDED	90.53	CUM	
	THICKENED SLUDGE CONSISTENCY	3.00	%	
	THICKENED SLUDGE VOLUME	31.13	CUM/DAY	3% OF TOTAL SLUDGE
PROVIDE THE DIMENSION OF 1NO SLUDGE THICKENER (GRAVITY TYPE) DIA AS 6.2 M $ X 3 M SWD + 0.5 M FREEBOARD				

THICKENED SLUDGE PUMP				
	INLET PIPE DIAMETER			
	FLOW	10.1716	CUM/HR	
		0.0028	CUM/SEC	
	VELOCITY	1.00	M/SEC	
	PIPE AREA REQUIRED	0.0028	SQM	
	PIPE DIA	0.0600	M	
	SAY	100	MM	
	THICKENER MECHANISM			
	TYPE	CENTRAL DRIVE TYPE		
	MATERIAL OF CONSTRUCTION			
A	SECTIONS	MS SECTIONS AS PER IS - 226		
B	WALKWAY	5MM CHEQUERED PLATES		
14	**FILTER PRESS / CENTRIFUGE FEED PUMP**			
	TYPE	SCREW PUMP		
	NO. OF PUMPS	2	NOS	(1W+1S)
	NO OF WORKING PUMP	1	NOS	
	VOLUME TO BE PUMPED	31.13	CUM/DAY	
	CENTRIFUGE WORKING HOURS	8.00	HRS	
	CAPACITY REQUIRED IN PUMP	3.89	CUM/HR	
	CAPACITY PROVIDED	4.00	CUM/HR	
		0.0011	CUM/SEC	
	HEAD	15.00	M	
	EFFICIENCY	50	%	

	HP REQUIRED FOR PUMP	0.444	HP	
	SAY	1.0	HP	
	LOAD	0.746	KW	
	RECOMMENDED DELIVERY PIPE	150	MM	
PROVIDE 2NOS (1W+1S) OF CENTRIFUGE/FILTER PRESS FEED PUM OF 1.0HP WITH A DISCHARGE OF 4.0CUM/HR				
15	**SLUDGE CENTRIFUGE**			
	SLUDGE FLOW RATE TO CENTRIFUGE			
	NO OF CENTRIFUGES	2.00	(1W + 1S)	
	CAPACITY OF CENTRIFUGE	0.84	CUM/HR	
	POLY ELECTROLYTE DOSING FOR CENTRIFUGE & THICKENER	10.00	%	
A	**DOSING TANKS**			
	SLUDGE VOLUME	1037.50	KG/DAY	
	DOSE	2.00	KG/1000KG	
	QUANTITY OF POLY ELECTROLYTE	2.08	KG/DAY	
	CONCENTRATION	0.10		
	VOLUME OF TANKS @ 24HR	2.08	CUM	
		2080.00	LITRES	
	VOLUME	86.67	LIT/HR	
	VOLUME REQUIRED FOR 8HRS	0.69	CUM	
	LIQUID DEPTH OF TANK	1.50	M	
	AREA REQUIRED	0.46	SQM	
	PROPOSE A SQUARE TANK			
	LENGTH = BREADTH	0.68	M	

	SAY	0.75	M	
PROVIDE THE DIMENSIONS OF DOSING TANKS AS 0.75 M X 0.75 M X 1.5 M SWD + 0.5 M FREEBOARD				
B	**DOSING PUMPS**			
	NO OF DOSING PUMPS	2.00	(1W + 1S)	
	REQUIRED CAPACITY OF DOSING PUMPS	86.67	LIT/HR	
	PROVIDED VOLUME OF TANK	0.84	CUM	
	VELOCITY GRADIENT	300.00	S^A-1	
	CONSTANT AT 200CC WATER TEMPERATURE	0.001139		
16	**CHLORINE CONTACT TANK (CCT)**			
	TYPE	SQUARE		
	HYDRAULIC RETENTION TIME	30.00	MINUTES	
	AVERAGE FLOW	208.33	CUM/HR	
	VOLUME OF THE TANK	104.17	CUM	
	ASSUMED LIQUID DEPTH	3.00	M	
	AREA OF THE TANK	34.72	SQ.M	
	PROPOSE A SQUARE TANK			
	LENGTH = BREADTH	5.89	M	
	SAY	6.00	M	
PROVIDE THE DIMENSIONS OF SLUDGE FLOW RATE TO CENTRIFUGE AS 6 M X 6 M X 3 M SWD + 0.5 M FREEBOARD				
17	**GAS CHLORINATOR**			
	DOSING RATE			
	CHLORINE MIXING			

	AVERAGE FLOW	5000.00	CUM/DAY	
	CHLORINE DOSING RATE	2	MG/L	
	CAPACITY OF GAS CHLORINATOR REQUIRED	0.42	KG/HR	SAY 0.5KG/HR
	NO OF DOSING PUMPS	2	(1W+1S)	
	TYPE	VACUUM FEED TYPE		
		FLOW PROPORTIONAL DOSAGE		
	DAILY REQUIREMENT	10.00	KG	
	MONTHLY REQUIREMENT	300.00	KG	
18	**PRESSURE SAND FILTER**			
	AVERAGE FLOW	5000.00	CUM/DAY	
	FILTER OPERATING HOURS	20.00	HRS	
	OPERATING FLOW	250.00	CUM/HR	
	FILTER LOADING RATE	12.00	CUM/HR/SQ.M	
	AREA OF THE FILTER REQUIRED	20.83	SQ.M	
	NO.OF FILTERS	3.00		
	AREA OF EACH FILTER	6.94	SQ.M	
	DIAMETER OF THE FILTER REQUIRED	3.00	M	
	HEIGH OF THE FILTER	2.50	M	
	OPERATING PRESSURE	3.50	BAR	
	TEST PRESSURE	5.25	BAR	
	FILTER MEDIA	SAND &ANTRACITE (DUAL MEDIA)		
PROVIDE THE DIMENSION OF 3NOS OF PRESSURE SAND FILTER AS 3 M XDIAMETRE WITH 2.5M SHELL HEIGHT				
19	**ACTIVATED CARBON FILTER**			
	AVERAGE FLOW	5000.00	CUM/DAY	
	FILTER OPERATING HOURS	20.00	HRS	

	OPERATING FLOW	250.00	CUM/HR	
	FILTER LOADING RATE	10.00	CUM/HR/SQ.M	
	AREA OF THE FILTER REQUIRED	25.00	SQ.M	
	NO.OF FILTERS	3.00		
	AREA OF EACH FILTER	8.33	SQ.M	
	DIAMETER OF THE FILTER REQUIRED	3.00	M	
	HEIGHT OF THE FILTER	2.50	M	
	OPERATING PRESSURE	3.50	BAR	
	TEST PRESSURE	5.25	BAR	
	FILTER MEDIA	ACTIVATED CARBON		
PROVIDE THE DIMENSION OF 3NOS OF ACTIVATED CARBON FILTER AS 3 M X DIAMETRE WITH 2.5 M SHELL HEIGHT				
20	**FILTER FEED PUMPS**			
	PROVIDE FILTER FEED PUMPS OF CAPACITY	250.00	CUM/HR	
	CAPACITY OF PUMP REQUIRED	69.44	LPS	
		0.0694	CUM/SEC	
	HEAD	30.00	M	
	EFFICIENCY	50	%	
	HP REQUIRED FOR PUMP	55.556	HP	(Q*H*9.81*0.75)/0.5
	SAY	60.0	HP	
	POWER REQUIREMENT FOR THE PUMP	44.76	KW	
PROVIDE 2NOS (1W+1S) OF FILTER FEED PUMP OF 56HP WITH A DISCHARGE OF 250CUM/HR				
21	**TREATED WATER TANK**			

	HYDRAULIC RETENTION TIME (HRT)	60.00	MINUTES	
	AVERAGE FLOW	208.33	CUM/HR	
	VOLUME OF THE TANK	208.33	CUM	
	ASSUMED LIQUID DEPTH	3.00	M	
	AREA OF THE TANK	69.44	SQ.M	
	NO . OF TANKS	2.00	NOS	
	AREA OF SINGLE TANK	34.72		
	PROPOSE A SQUARE TANK			
	LENGTH = BREADTH	5.89	M	
	SAY	6.00	M	
PROVIDE FILTER FEED PUMPS OF		**CAPACITY AS 6M X 6 M X 3M SWD + 0.5 M FREEBOARD**		
22	**EFFLUENT CHANNEL**			
	PEAK FLOW	0.145	CUM/SEC	
	AVERAGE FLOW	0.06	CUM/SEC	
	VELOCITY	1.00	M/SEC	
	AREA AT PEAK FLOW	0.14	SQ.M	
	AREA AT AVERAGE FLOW	0.06	SQ.M	
	ASSUME WIDTH OF CHANNEL	0.60	M	
	DEPTH OF CHANNEL REQUIRED	0.24	M	
	FREE BOARD	0.50	M	
	TOTAL DEPTH	0.74		
	SAY	1.00	M	
	PROVIDE EFFLUENT CHANNEL FOR ULTIMATE CAPACITY	**PROVIDE 0.6 X 1.0M CHANNEL**		
23	**CHECK FOR HYDRUALIC SLOPE**			

A	HYDRUALIC RADIUS AT PEAK FLOW, R	0.13	M	AREA/WETTED PERIMETER
	VELOCITY	1.00	M/SEC	
	MANNINGS CO-EFFICIENT, N	0.013		
	MANNINGS FORMULA	V = 1/N*R^A2/3*S^A1/2		
	HENCE SLOPE, S	0.0025	M	
	HENCE FALL IN 50M	0.13	M	
24	**DESIGN OF CENTRATE SUMP**			
	CENTRATE VOLUME	101.72-7.78= 93.94	M^3	
	SWD	2.5	M	
	AREA	37.57	M^2	
	HRT	12	HRS	
PROVIDE CENTRATE SUMP OF DIMENSION AS 5M X 4M X 2.5M SWD + 0.5 M FREEBOARD				

Chapter 6

CO-TREATMENT OF FEACAL SLUDGE AND SEPTAGE WITH SEWAGE

In Kerala, and specifically in Pandalam Municipality, latrines connected to septic tanks and pit latrines predominate in urban households. When these septic tanks/pits were full, they were desludged and the faecal Sludge was disposed-off unsafely in water bodies, or on vacant lands. Co-treatment is a process where Sewage Treatment Plant (STP), in addition to treating the domestic sewage transported through sewers, also treats feacal sludge and septage (FSS) emptied from various Onsite Sanitation Systems (OSS) in the Municipality. The need for this facility has arisen to ensure an efficient and appropriate co-treatment of feacal sludge septage (FSS) with sewage, so that the functionality of existing STP is not compromised. Setting up of a dedicated feacal sludge treatment plant (FSTP) is a time-consuming affair due to issues such as land identification, clearances and tendering process. Further, in case of co treatment, the existing facilities, site infrastructure and human resource of the STP will be used for co-treatment and thus can eliminate the problem of engaging a new O&M operator and additional cost related to site infrastructure. Co-treatment will provide access to improved sanitation to households, low income settlements, commercial and institutional establishments of the targeted areas where sewer connections are not feasible or it may take some time to provide the designed service. Thus, the co-treatment method will restrict the indiscriminate discharge of highly contaminated feacal sludge into holy rivers and surrounding environment of the city. Coexistence of Sewerage system with FSSM or until the city is fully covered with sewerage system, in both ways; FSSM through co-treatment is a viable solution. The proposed facility is designed based on the expected fecal sludge quantity generated in the non sewer areas i.e. 40KLD of FSS. From the planning perspective, FSS should be disposed into STPs in the off season of the Sabarimala pilgrims. During this period the off season sewerage flow reduced considerably and the smooth running of the STP to be managed by Co-treatment of feacal sludge and septage with sewage. Additional land for co treatment in the STP premise will be used for erecting Co treatment facility. Land for the development of the scheme should be arranged by the local body administration and necessary social awareness as well as environment assessment is also need to be organized.

Design Population	66520
Sludge deposit coefficient	100 liters/person/year
Peak design flow	(66520*100*1.5)/250= 39.9 KLD= 40 KLD

CHAPTER 7

OPERATION & MAINTENANCETENTATIVE COST

O & M Charge for STP (10 years including centage and GST)	Rs 10,97,50,746 crores
O & M Charge for Sewer network and allied works (10 years including centage and GST)	Rs 13,07,14,997 crores
Total	Rs 24,04,65,743 crores

Chapter 8
CONCLUSION

It is quite evident that lack of a scientifically built sewerage system in the area causes poor sanitation, pollution of water bodies, unhygienic environment and much more difficulties as well as threats to the society. The septic tank, pit latrine and other means of existing practice is to be replaced with a better sanitation system for the houses in the area. A well- planned sewerage network is essential in the municipal town. The extent of area covered is 4.5 square kilo meters having a population of 7125 (as per census 2011). The projected population including floating population in the year 2054 is 33480 and as the trend of population growth of Pandalam Municipality shows decreasing, state average growth from the present load can be used for the next 30 years. Considering the per capita water usage as 150lpcd, UFW and non-domestic consumption, total water usage is calculated as 5.7 MLD. Taking 80% of water consumption as sewerage produced, the total sewerage load is arrived as 5 MLD. The project includes laying of sewerage network of 22452 m, pumping main of 7991 m. The domestic sewage is collected by gravity through various underground pipes of diameter 200 mm to 450 mm HDPE PN10 and collected in 3 collection wells. The network area of the project will cover an area of 4.5 km^2 in Pandalam Municipality and the benefitted population is 33480. In this project sewer network of 22452m of 200 mm, 250mm, 315mm, 400 mm and 450 mm HDPE PN 10 pipe and man holes of diameters 1200mm,1500mm,1890mm,2400 mm and 2700 mm of 1279, 87, 75, 21 and 37 numbers and 7991m of pumping main are included. Coexistence of Sewerage system with FSSM or until the city is fully covered with sewerage system, in both ways; FSSM through co-treatment is a viable solution. The proposed facility is designed based on the expected fecal sludge quantity generated in the non-sewer areas i.e. 40KLD of FSS. From the planning perspective, FSS should be disposed into STPs in the off season of the Sabarimala pilgrims. During this period the off season sewerage flow reduced considerably and the smooth running of the STP to be managed by Co-treatment of feacal sludge and septage with sewage. Additional land for co treatment in the STP premise will be used for erecting Co treatment facility. Land for the development of the scheme should be arranged by the local body administration and necessary social awareness as well as environment assessment is also need to be organized. The total cost of project comes to Rs 128.00 crores.

On completion of the proposed work approximately 1000 numbers of sewer connections to the households can be provided and thereby revenue in terms of centage of water charge can be realized. The one time connection charge will also boost the revenue of KWA.

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
Rainfall/Runoff ..... NO
RDII ..... NO
Snowmelt ..... NO
Groundwater ..... NO
Flow Routing ..... YES
Ponding Allowed ..... NO
Water Quality ..... NO
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 10/29/2021 00:00:00
Ending Date 10/29/2021 23:59:00
Antecedent Dry Days 0
Report Time Step 00:15:00
Routing Time Step ..... 30 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.0015 m

********** Volume Volume
hectare-
Flow Routing Continuity m 10^6 ltr
********** --------- ---------
Dry Weather Inflow 0.633 6.33
Wet Weather Inflow 0 0
Groundwater Inflow 0 0
RDII Inflow 0 0
External Inflow 0 0
External Outflow 0.626 6.259

Flooding	Loss	.....	0.003	0.027	
Evaporation	Loss	.....	0	0	
Exfiltration	Loss	.....	0	0	
Initial	Stored	Volume	....	0.001	0.008
Final	Stored	Volume	.....	0.006	0.056
Continuity	Error	(%)	.....	-0.064	

****
Highest Continuity Errors
****

Node	n3375	-28.41%
Node	n3374	-24.08%
Node	n3376	-23.83%
Node	n6402	-20.18%
Node	n3373	-18.71%

****
Time-
Step Critical Elements
****

Link	p24	-98.14%
Link	p1811	-1.66%

****
Routing Time Step Summary
****

Minimum	Time	Step	:	0.71	sec	
Average	Time	Step	:	1.81	sec	
Maximum	Time	Step	:	3.08	sec	
Percent	in	Steady	State	:	0	
Average	Iterations	per	Step	:	2	
Percent	Not	Converging	:	0		
Time	Step	Frequencies	:			
30	-	13.228	sec	:	0	%
13.228	-	5.833	sec	:	0	%
5.833	-	2.572	sec	:	0.15	%
2.572	-	1.134	sec	:	99.85	%
1.134	-	0.5	sec	:	0	%

Node	Type	Average Depth Meters	Maximum Depth Meters	Max HGL Meters	Time of Max Occurrence Days hr:min		Reported Max Depth Meters
n5	JUNCTION	0.16	0.21	10.82	0	20:00	0.21
n71	JUNCTION	0.05	0.07	9.83	0	19:15	0.07
n72	JUNCTION	0.05	0.06	9.77	0	07:30	0.06
n73	JUNCTION	0.05	0.06	9.69	0	07:13	0.06
n74	JUNCTION	0.07	0.1	9.52	0	19:56	0.1
n75	JUNCTION	0.06	0.08	9.41	0	07:19	0.08
n76	JUNCTION	0.06	0.08	9.32	0	07:54	0.08
n77	JUNCTION	0.07	0.09	9.14	0	19:31	0.09
n78	JUNCTION	0.08	0.1	9.04	0	07:19	0.1
n79	JUNCTION	0.07	0.1	8.95	0	07:42	0.1
n80	JUNCTION	0.08	0.11	8.82	0	07:25	0.11
n81	JUNCTION	0.09	0.12	8.72	0	19:26	0.12
n82	JUNCTION	0.11	0.15	8.65	0	19:26	0.15
n83	JUNCTION	0.11	0.15	8.6	0	19:22	0.15
n84	JUNCTION	0.1	0.14	8.53	0	07:34	0.14
n85	JUNCTION	0.11	0.16	8.45	0	07:35	0.16
n86	JUNCTION	0.1	0.14	8.37	0	07:44	0.14
n87	JUNCTION	0.11	0.15	8.25	0	19:11	0.15
n88	JUNCTION	0.12	0.16	8.06	0	07:21	0.16
n89	JUNCTION	0.12	0.16	7.93	0	07:22	0.16
n91	JUNCTION	0.1	0.14	10.99	0	07:08	0.14
n92	JUNCTION	0.1	0.14	10.88	0	19:08	0.14
n93	JUNCTION	0.13	0.18	10.65	0	08:00	0.18
n94	JUNCTION	0.14	0.19	10.52	0	08:00	0.19
n95	JUNCTION	0.15	0.2	10.43	0	20:00	0.2
n96	JUNCTION	0.15	0.2	10.35	0	20:00	0.2
n97	JUNCTION	0.15	0.2	10.27	0	20:00	0.2
n98	JUNCTION	0.15	0.2	10.19	0	20:00	0.2
n99	JUNCTION	0.14	0.19	10.1	0	20:00	0.19
n100	JUNCTION	0.14	0.19	9.99	0	20:00	0.19
n101	JUNCTION	0.13	0.18	9.88	0	20:00	0.18
n102	JUNCTION	0.14	0.18	9.74	0	20:00	0.18
n103	JUNCTION	0.14	0.2	9.59	0	08:00	0.2
n104	JUNCTION	0.15	0.21	9.49	0	08:00	0.21
n105	JUNCTION	0.14	0.19	9.39	0	08:00	0.19
n106	JUNCTION	0.18	0.25	9.1	0	08:00	0.25
n107	JUNCTION	0.15	0.21	9.03	0	08:00	0.21
n108	JUNCTION	0.14	0.19	8.94	0	20:00	0.19
n109	JUNCTION	0.15	0.21	8.79	0	08:00	0.21
n110	JUNCTION	0.16	0.22	8.71	0	08:00	0.22
n111	JUNCTION	0.16	0.22	8.62	0	20:00	0.22
n112	JUNCTION	0.16	0.22	8.54	0	20:00	0.22
n113	JUNCTION	0.14	0.19	8.44	0	20:00	0.19
n114	JUNCTION	0.14	0.19	8.19	0	20:00	0.19
n115	JUNCTION	0.12	0.16	8.04	0	20:00	0.16
n116	JUNCTION	0.17	0.25	7.85	0	08:00	0.25
n117	JUNCTION	0.05	0.06	10.46	0	08:00	0.06
n118	JUNCTION	0.1	0.13	10.63	0	08:00	0.13
n119	JUNCTION	0.09	0.12	10.72	0	08:00	0.12
n120	JUNCTION	0.09	0.12	10.82	0	08:00	0.12
n121	JUNCTION	0.09	0.12	10.92	0	08:00	0.12
n122	JUNCTION	0.08	0.1	11.09	0	08:00	0.1
n123	JUNCTION	0.05	0.07	11.57	0	08:00	0.07
n125	JUNCTION	0.08	0.1	8.1	0	08:00	0.1
n126	JUNCTION	0.07	0.09	8.29	0	08:00	0.09
n127	JUNCTION	0.06	0.08	8.49	0	08:00	0.08
n128	JUNCTION	0.07	0.1	8.6	0	08:00	0.1
n129	JUNCTION	0.06	0.07	9.82	0	08:00	0.07
n130	JUNCTION	0.05	0.07	9.94	0	20:00	0.07
n165	JUNCTION	0.06	0.08	9.26	0	07:23	0.08
n205	JUNCTION	0.05	0.06	12.88	0	20:00	0.06
n210	JUNCTION	0.01	0.01	12.85	0	00:00	0.01
n218	JUNCTION	0.01	0.01	12.36	0	00:00	0.01

n219	JUNCTION	0.01	0.02	10.57	0	00:00	0.01	n313	JUNCTION	0.03	0.03	9.69	0	07:59	0.03
n220	JUNCTION	0.01	0.02	10.31	0	00:00	0.01	n314	JUNCTION	0.02	0.02	12.77	0	00:00	0.02
n221	JUNCTION	0.01	0.02	10.12	0	00:00	0.02	n315	JUNCTION	0.02	0.02	12.62	0	00:00	0.02
n223	JUNCTION	0.01	0.02	9.97	0	00:00	0.02	n316	JUNCTION	0.03	0.03	12.43	0	07:59	0.03
n224	JUNCTION	0.02	0.02	9.57	0	20:00	0.02	n317	JUNCTION	0.03	0.03	12.33	0	20:00	0.03
n225	JUNCTION	0.02	0.02	9.29	0	20:00	0.02	n318	JUNCTION	0.03	0.04	12.24	0	08:00	0.04
n226	JUNCTION	0.02	0.03	9.17	0	08:00	0.03	n319	JUNCTION	0.03	0.03	12.08	0	20:00	0.03
n286	JUNCTION	0.01	0.02	11.67	0	00:00	0.01	n320	JUNCTION	0.03	0.04	11.54	0	08:00	0.04
n287	JUNCTION	0.01	0.02	10.75	0	00:00	0.01	n639	JUNCTION	0.02	0.02	11.32	0	00:01	0.02
n288	JUNCTION	0.01	0.02	10.27	0	00:00	0.01	n640	JUNCTION	0.02	0.02	11.34	0	00:01	0.02
n289	JUNCTION	0.01	0.02	9.99	0	00:00	0.02	n641	JUNCTION	0.01	0.02	11.42	0	00:00	0.01
n290	JUNCTION	0.01	0.02	9.82	0	00:00	0.02	n642	JUNCTION	0.01	0.02	11.61	0	00:00	0.01
n291	JUNCTION	0.02	0.02	9.62	0	00:00	0.02	n643	JUNCTION	0.01	0.02	11.67	0	00:00	0.01
n292	JUNCTION	0.02	0.02	9.52	0	00:00	0.02	n644	JUNCTION	0.02	0.03	10.07	0	19:46	0.03
n293	JUNCTION	0.02	0.02	9.42	0	00:01	0.02	n646	JUNCTION	0.01	0.01	11.01	0	00:00	0.01
n294	JUNCTION	0.01	0.02	9.32	0	00:00	0.01	n647	JUNCTION	0.01	0.02	12.07	0	00:00	0.01
n295	JUNCTION	0.03	0.04	8.44	0	20:00	0.04	n648	JUNCTION	0.01	0.02	12.8	0	00:00	0.01
n297	JUNCTION	0.03	0.03	8.53	0	20:00	0.03	n649	JUNCTION	0.02	0.02	12.88	0	00:00	0.02
n298	JUNCTION	0.03	0.03	8.61	0	08:00	0.03	n650	JUNCTION	0.01	0.02	13.09	0	00:00	0.02
n299	JUNCTION	0.03	0.04	8.69	0	08:00	0.04	n651	JUNCTION	0.01	0.02	13.47	0	00:00	0.02
n300	JUNCTION	0.03	0.03	8.76	0	20:00	0.03	n652	JUNCTION	0.01	0.02	13.76	0	00:01	0.02
n301	JUNCTION	0.03	0.04	8.94	0	20:00	0.04	n653	JUNCTION	0.01	0.02	14.27	0	00:01	0.02
n302	JUNCTION	0.03	0.03	9.03	0	20:00	0.03	n654	JUNCTION	0.01	0.02	15.42	0	00:00	0.01
n304	JUNCTION	0.03	0.03	9.14	0	20:00	0.03	n655	JUNCTION	0.01	0.02	15.52	0	00:00	0.01
n305	JUNCTION	0.03	0.03	9.22	0	20:00	0.03	n656	JUNCTION	0.01	0.02	15.68	0	00:00	0.01
n306	JUNCTION	0.03	0.03	9.29	0	20:00	0.03	n657	JUNCTION	0.01	0.02	15.89	0	00:00	0.01
n307	JUNCTION	0.03	0.04	9.33	0	08:00	0.04	n658	JUNCTION	0.03	0.04	11.94	0	08:00	0.04
n308	JUNCTION	0.03	0.03	9.43	0	08:00	0.03	n659	JUNCTION	0.01	0.02	12.76	0	00:00	0.01
n309	JUNCTION	0.03	0.03	9.48	0	20:00	0.03	n660	JUNCTION	0.01	0.02	12.9	0	00:00	0.02
n310	JUNCTION	0.03	0.03	9.53	0	08:00	0.03	n661	JUNCTION	0.01	0.02	13.15	0	00:00	0.02
n311	JUNCTION	0.03	0.03	9.6	0	20:00	0.03	n662	JUNCTION	0.01	0.02	13.35	0	00:00	0.01
n312	JUNCTION	0.03	0.03	9.63	0	08:00	0.03	n663	JUNCTION	0.01	0.02	13.55	0	00:00	0.01

n664	JUNCTION	0.01	0.02	13.66	0	00:00	0.01	n795	JUNCTION	0.02	0.02	10.72	0	08:00	0.02
n665	JUNCTION	0.01	0.01	13.92	0	00:00	0.01	n796	JUNCTION	0.02	0.02	10.5	0	20:00	0.02
n666	JUNCTION	0.01	0.01	12.61	0	00:00	0.01	n797	JUNCTION	0.02	0.02	10.47	0	20:00	0.02
n667	JUNCTION	0.01	0.01	11.52	0	00:00	0.01	n798	JUNCTION	0.02	0.02	10.42	0	20:00	0.02
n668	JUNCTION	0.01	0.01	10.53	0	00:00	0.01	n799	JUNCTION	0.02	0.02	10.31	0	20:00	0.02
n670	JUNCTION	0.02	0.02	9.72	0	08:00	0.02	n800	JUNCTION	0.02	0.03	10.2	0	08:00	0.03
n676	JUNCTION	0.02	0.02	10.43	0	19:59	0.02	n801	JUNCTION	0.02	0.02	10.17	0	20:00	0.02
n687	JUNCTION	0.02	0.02	8.32	0	08:00	0.02	n802	JUNCTION	0.03	0.03	10.11	0	08:00	0.03
n688	JUNCTION	0.01	0.02	11.79	0	00:00	0.01	n804	JUNCTION	0.02	0.02	10.27	0	08:00	0.02
n689	JUNCTION	0.01	0.02	11.63	0	00:00	0.02	n805	JUNCTION	0.02	0.02	10.37	0	20:00	0.02
n690	JUNCTION	0.01	0.02	11.52	0	00:00	0.01	n806	JUNCTION	0.02	0.02	10.44	0	08:00	0.02
n691	JUNCTION	0.01	0.01	11.31	0	00:00	0.01	n807	JUNCTION	0.02	0.02	10.58	0	20:00	0.02
n692	JUNCTION	0.11	0.13	8.33	0	08:00	0.13	n810	JUNCTION	0.02	0.02	10.62	0	08:00	0.02
n693	JUNCTION	0.02	0.02	11.42	0	08:00	0.02	n811	JUNCTION	0.02	0.02	10.64	0	00:02	0.02
n719	JUNCTION	0.02	0.02	8.07	0	08:00	0.02	n812	JUNCTION	0.02	0.02	10.71	0	00:00	0.02
n721	JUNCTION	0.01	0.02	11.88	0	00:00	0.01	n813	JUNCTION	0.02	0.02	10.79	0	00:00	0.02
n722	JUNCTION	0.01	0.02	12.02	0	00:00	0.01	n814	JUNCTION	0.01	0.02	10.88	0	00:00	0.02
n723	JUNCTION	0.01	0.02	12.57	0	00:00	0.01	n815	JUNCTION	0.01	0.02	10.92	0	00:01	0.02
n724	JUNCTION	0.01	0.02	10.72	0	00:00	0.01	n816	JUNCTION	0.01	0.02	10.98	0	00:00	0.01
n725	JUNCTION	0.01	0.02	10.17	0	00:00	0.01	n817	JUNCTION	0.01	0.02	11.08	0	00:00	0.01
n726	JUNCTION	0.01	0.02	10.04	0	00:00	0.01	n818	JUNCTION	0.01	0.02	11.17	0	00:00	0.01
n727	JUNCTION	0.01	0.02	9.96	0	00:00	0.01	n822	JUNCTION	0.02	0.02	10.17	0	08:00	0.02
n728	JUNCTION	0.01	0.01	9.61	0	00:00	0.01	n823	JUNCTION	0.02	0.02	10.24	0	08:00	0.02
n750	JUNCTION	0.07	0.09	11.77	0	08:00	0.09	n825	JUNCTION	0.02	0.02	8.25	0	08:00	0.02
n785	JUNCTION	0.02	0.02	11.68	0	00:01	0.02	n826	JUNCTION	0.02	0.02	8.33	0	08:00	0.02
n786	JUNCTION	0.02	0.02	11.66	0	00:00	0.02	n827	JUNCTION	0.02	0.02	8.57	0	20:00	0.02
n789	JUNCTION	0.02	0.02	11.59	0	00:00	0.02	n828	JUNCTION	0.02	0.02	8.7	0	08:00	0.02
n790	JUNCTION	0.02	0.02	11.45	0	00:01	0.02	n829	JUNCTION	0.02	0.02	8.91	0	08:00	0.02
n791	JUNCTION	0.02	0.02	11.34	0	07:55	0.02	n830	JUNCTION	0.02	0.02	9.13	0	20:00	0.02
n792	JUNCTION	0.02	0.02	11.2	0	08:00	0.02	n832	JUNCTION	0.03	0.03	8.05	0	20:00	0.03
n793	JUNCTION	0.02	0.02	11.08	0	19:57	0.02	n833	JUNCTION	0.03	0.04	8.17	0	20:00	0.04
n794	JUNCTION	0.02	0.02	10.78	0	07:58	0.02	n834	JUNCTION	0.03	0.04	8.22	0	20:00	0.04

n837	JUNCTION	0.03	0.04	7.98	0	20:00	0.04	n893	JUNCTION	0.03	0.04	8.27	0	20:00	0.04
n838	JUNCTION	0.03	0.04	8	0	20:00	0.04	n894	JUNCTION	0.03	0.03	8.23	0	08:00	0.03
n842	JUNCTION	0.03	0.04	7.76	0	08:00	0.04	n895	JUNCTION	0.03	0.03	7.95	0	08:00	0.03
n843	JUNCTION	0.03	0.04	7.8	0	08:00	0.04	n898	JUNCTION	0.02	0.02	9.06	0	08:00	0.02
n844	JUNCTION	0.03	0.03	7.92	0	08:00	0.03	n899	JUNCTION	0.02	0.03	8.96	0	08:00	0.03
n847	JUNCTION	0.03	0.04	7.63	0	08:00	0.04	n900	JUNCTION	0.02	0.03	8.93	0	20:00	0.03
n848	JUNCTION	0.03	0.04	7.69	0	08:00	0.04	n902	JUNCTION	0.03	0.03	8.88	0	08:00	0.03
n849	JUNCTION	0.03	0.04	7.35	0	20:00	0.04	n903	JUNCTION	0.03	0.03	8.82	0	20:00	0.03
n850	JUNCTION	0.03	0.04	7.44	0	20:00	0.04	n904	JUNCTION	0.03	0.03	8.73	0	08:00	0.03
n851	JUNCTION	0.03	0.04	7.53	0	20:00	0.04	n905	JUNCTION	0.03	0.03	8.62	0	20:00	0.03
n853	JUNCTION	0.03	0.04	7.59	0	08:00	0.04	n906	JUNCTION	0.02	0.03	6.57	0	20:00	0.03
n856	JUNCTION	0.03	0.04	7.25	0	08:00	0.04	n907	JUNCTION	0.02	0.03	6.44	0	20:00	0.03
n858	JUNCTION	0.03	0.04	7.3	0	08:00	0.04	n908	JUNCTION	0.02	0.03	6.28	0	20:00	0.03
n861	JUNCTION	0.03	0.04	7.14	0	08:00	0.04	n909	JUNCTION	0.02	0.02	7.07	0	08:00	0.02
n862	JUNCTION	0.03	0.04	7.21	0	08:00	0.04	n910	JUNCTION	0.02	0.03	6.93	0	20:00	0.03
n866	JUNCTION	0.03	0.04	6.93	0	08:00	0.04	n911	JUNCTION	0.02	0.03	6.82	0	20:00	0.03
n867	JUNCTION	0.03	0.04	6.96	0	20:00	0.04	n912	JUNCTION	0.02	0.02	6.72	0	20:00	0.02
n868	JUNCTION	0.03	0.04	7.01	0	08:00	0.04	n917	JUNCTION	0.02	0.02	7.34	0	08:00	0.02
n870	JUNCTION	0.03	0.03	6.82	0	08:00	0.03	n918	JUNCTION	0.02	0.02	7.22	0	08:00	0.02
n874	JUNCTION	0.03	0.04	6.61	0	20:00	0.04	n922	JUNCTION	0.02	0.02	7.54	0	20:00	0.02
n876	JUNCTION	0.03	0.03	6.8	0	20:00	0.03	n923	JUNCTION	0.02	0.02	7.47	0	08:00	0.02
n877	JUNCTION	0.03	0.04	6.64	0	07:55	0.04	n924	JUNCTION	0.02	0.02	7.84	0	08:00	0.02
n879	JUNCTION	0.03	0.03	6.98	0	08:00	0.03	n925	JUNCTION	0.02	0.02	7.78	0	08:00	0.02
n880	JUNCTION	0.03	0.03	6.88	0	20:00	0.03	n927	JUNCTION	0.02	0.02	7.67	0	20:00	0.02
n881	JUNCTION	0.02	0.03	7.15	0	20:00	0.03	n930	JUNCTION	0.02	0.02	7.99	0	00:03	0.02
n885	JUNCTION	0.03	0.03	7.83	0	08:00	0.03	n932	JUNCTION	0.02	0.02	7.87	0	08:00	0.02
n886	JUNCTION	0.03	0.03	7.66	0	08:00	0.03	n1037	JUNCTION	0.01	0.02	9.17	0	00:00	0.01
n887	JUNCTION	0.03	0.03	7.45	0	08:00	0.03	n1040	JUNCTION	0.01	0.02	8.92	0	00:01	0.02
n888	JUNCTION	0.03	0.03	7.39	0	20:00	0.03	n1041	JUNCTION	0.01	0.02	8.62	0	00:00	0.01
n889	JUNCTION	0.03	0.03	7.32	0	08:00	0.03	n1042	JUNCTION	0.02	0.02	8.02	0	00:02	0.02
n891	JUNCTION	0.03	0.03	8.51	0	08:00	0.03	n1043	JUNCTION	0.01	0.02	9.22	0	00:00	0.02
n892	JUNCTION	0.02	0.03	8.38	0	08:00	0.03	n1044	JUNCTION	0.01	0.02	9.29	0	00:00	0.01

n1045	JUNCTION	0.01	0.02	9.37	0	00:00	0.01	n1090	JUNCTION	0.02	0.02	9.63	0	08:00	0.02
n1046	JUNCTION	0.01	0.02	9.45	0	00:00	0.01	n1091	JUNCTION	0.02	0.02	9.77	0	08:00	0.02
n1048	JUNCTION	0.01	0.01	9.11	0	00:00	0.01	n1092	JUNCTION	0.02	0.02	9.97	0	20:00	0.02
n1049	JUNCTION	0.01	0.02	9.59	0	00:00	0.02	n1100	JUNCTION	0.02	0.02	9.59	0	08:00	0.02
n1050	JUNCTION	0.02	0.02	9.77	0	00:02	0.02	n1101	JUNCTION	0.02	0.02	9.5	0	20:00	0.02
n1051	JUNCTION	0.01	0.02	10.59	0	00:01	0.02	n1102	JUNCTION	0.02	0.02	9.54	0	20:00	0.02
n1052	JUNCTION	0.01	0.02	10.92	0	00:00	0.01	n1106	JUNCTION	0.02	0.02	8.92	0	20:00	0.02
n1053	JUNCTION	0.01	0.02	11.17	0	00:00	0.02	n1107	JUNCTION	0.02	0.03	9.03	0	08:00	0.03
n1054	JUNCTION	0.01	0.02	11.27	0	00:00	0.01	n1108	JUNCTION	0.02	0.03	9.09	0	08:00	0.03
n1057	JUNCTION	0.01	0.02	11.41	0	00:00	0.01	n1110	JUNCTION	0.02	0.02	9.12	0	08:00	0.02
n1059	JUNCTION	0.01	0.02	11.54	0	00:00	0.01	n1112	JUNCTION	0.02	0.03	9.17	0	08:00	0.03
n1060	JUNCTION	0.01	0.02	11.42	0	00:00	0.01	n1113	JUNCTION	0.02	0.02	9.42	0	20:00	0.02
n1061	JUNCTION	0.01	0.02	11.37	0	00:00	0.01	n1126	JUNCTION	0.01	0.02	11.56	0	00:00	0.01
n1062	JUNCTION	0.01	0.02	11.12	0	00:00	0.02	n1127	JUNCTION	0.01	0.02	11.43	0	00:00	0.01
n1064	JUNCTION	0.01	0.02	11.67	0	00:00	0.01	n1128	JUNCTION	0.01	0.02	11.32	0	00:00	0.01
n1065	JUNCTION	0.01	0.02	11.16	0	00:00	0.01	n1131	JUNCTION	0.02	0.02	11.13	0	00:00	0.02
n1066	JUNCTION	0.01	0.02	10.84	0	00:00	0.01	n1132	JUNCTION	0.02	0.02	10.98	0	00:02	0.02
n1067	JUNCTION	0.01	0.02	10.69	0	00:00	0.01	n1133	JUNCTION	0.02	0.02	10.89	0	00:02	0.02
n1068	JUNCTION	0.01	0.02	10.21	0	00:00	0.01	n1135	JUNCTION	0.02	0.02	10.86	0	08:00	0.02
n1069	JUNCTION	0.01	0.01	9.95	0	00:00	0.01	n1137	JUNCTION	0.02	0.02	10.81	0	08:00	0.02
n1070	JUNCTION	0.01	0.01	9.35	0	00:00	0.01	n1138	JUNCTION	0.02	0.02	10.78	0	08:00	0.02
n1071	JUNCTION	0.02	0.02	10.88	0	00:02	0.02	n1139	JUNCTION	0.02	0.02	10.74	0	08:00	0.02
n1072	JUNCTION	0.02	0.02	10.94	0	00:01	0.02	n1140	JUNCTION	0.02	0.02	10.67	0	08:00	0.02
n1073	JUNCTION	0.02	0.02	10.98	0	00:01	0.02	n1141	JUNCTION	0.02	0.02	10.57	0	08:00	0.02
n1075	JUNCTION	0.02	0.02	10.7	0	19:57	0.02	n1143	JUNCTION	0.01	0.02	11.17	0	00:01	0.02
n1076	JUNCTION	0.02	0.02	10.77	0	00:03	0.02	n1150	JUNCTION	0.02	0.03	10.08	0	08:00	0.03
n1077	JUNCTION	0.02	0.02	10.82	0	00:02	0.02	n1151	JUNCTION	0.03	0.03	10	0	08:00	0.03
n1081	JUNCTION	0.02	0.02	10.04	0	20:00	0.02	n1152	JUNCTION	0.03	0.03	9.93	0	20:00	0.03
n1082	JUNCTION	0.02	0.02	10.13	0	08:00	0.02	n1153	JUNCTION	0.03	0.03	9.86	0	08:00	0.03
n1083	JUNCTION	0.02	0.02	10.26	0	20:00	0.02	n1154	JUNCTION	0.03	0.03	9.81	0	20:00	0.03
n1084	JUNCTION	0.02	0.02	10.37	0	20:00	0.02	n1155	JUNCTION	0.03	0.03	9.68	0	08:00	0.03
n1085	JUNCTION	0.02	0.02	10.39	0	20:00	0.02	n1156	JUNCTION	0.03	0.03	9.6	0	08:00	0.03

n1157	JUNCTION	0.03	0.03	9.52	0	08:00	0.03	n1239	JUNCTION	0.03	0.03	6.7	0	20:00	0.03
n1158	JUNCTION	0.03	0.03	9.43	0	20:00	0.03	n1241	JUNCTION	0.03	0.03	6.6	0	20:00	0.03
n1159	JUNCTION	0.03	0.03	9.17	0	08:00	0.03	n1242	JUNCTION	0.03	0.04	6.57	0	20:00	0.04
n1161	JUNCTION	0.03	0.03	9.1	0	08:00	0.03	n1243	JUNCTION	0.03	0.03	6.48	0	08:00	0.03
n1162	JUNCTION	0.02	0.03	8.97	0	08:00	0.03	n1245	JUNCTION	0.04	0.05	6.38	0	20:00	0.05
n1163	JUNCTION	0.07	0.08	8.86	0	20:00	0.08	n1247	JUNCTION	0.08	0.09	6.79	0	20:00	0.09
n1164	JUNCTION	0.03	0.03	8.85	0	20:00	0.03	n1248	JUNCTION	0.03	0.03	6.78	0	20:00	0.03
n1166	JUNCTION	0.03	0.03	8.8	0	20:00	0.03	n1250	JUNCTION	0.03	0.03	6.83	0	20:00	0.03
n1168	JUNCTION	0.03	0.03	8.74	0	20:00	0.03	n1252	JUNCTION	0.03	0.03	6.93	0	08:00	0.03
n1169	JUNCTION	0.03	0.03	8.61	0	08:00	0.03	n1253	JUNCTION	0.03	0.03	6.88	0	20:00	0.03
n1170	JUNCTION	0.03	0.03	8.52	0	08:00	0.03	n1255	JUNCTION	0.03	0.04	7.02	0	20:00	0.04
n1171	JUNCTION	0.03	0.03	8.42	0	08:00	0.03	n1256	JUNCTION	0.03	0.03	6.98	0	08:00	0.03
n1172	JUNCTION	0.03	0.03	8.33	0	08:00	0.03	n1258	JUNCTION	0.03	0.03	7.28	0	08:00	0.03
n1173	JUNCTION	0.03	0.04	8.25	0	08:00	0.04	n1259	JUNCTION	0.03	0.03	7.18	0	08:00	0.03
n1174	JUNCTION	0.04	0.04	6.45	0	08:00	0.04	n1260	JUNCTION	0.03	0.03	7.05	0	20:00	0.03
n1181	JUNCTION	0.01	0.02	11.18	0	00:00	0.01	n1262	JUNCTION	0.03	0.03	7.43	0	08:00	0.03
n1182	JUNCTION	0.01	0.02	10.99	0	00:00	0.01	n1263	JUNCTION	0.03	0.03	7.35	0	08:00	0.03
n1183	JUNCTION	0.01	0.02	10.67	0	00:00	0.01	n1264	JUNCTION	0.02	0.03	7.65	0	08:00	0.03
n1184	JUNCTION	0.01	0.02	9.95	0	00:00	0.01	n1265	JUNCTION	0.03	0.03	7.58	0	20:00	0.03
n1185	JUNCTION	0.01	0.02	9.68	0	00:01	0.02	n1266	JUNCTION	0.03	0.03	7.51	0	20:00	0.03
n1186	JUNCTION	0.01	0.01	9.5	0	00:00	0.01	n1268	JUNCTION	0.02	0.03	8.08	0	08:00	0.03
n1197	JUNCTION	0.01	0.02	10.55	0	00:00	0.01	n1269	JUNCTION	0.02	0.03	7.92	0	08:00	0.03
n1200	JUNCTION	0.01	0.02	10.42	0	00:00	0.01	n1270	JUNCTION	0.03	0.03	7.78	0	08:00	0.03
n1201	JUNCTION	0.01	0.02	10.31	0	00:00	0.01	n1271	JUNCTION	0.03	0.03	7.71	0	20:00	0.03
n1204	JUNCTION	0.01	0.02	11.23	0	00:00	0.02	n1273	JUNCTION	0.02	0.03	8.73	0	08:00	0.03
n1205	JUNCTION	0.01	0.02	11.84	0	00:00	0.02	n1274	JUNCTION	0.02	0.03	8.61	0	20:00	0.03
n1214	JUNCTION	0.01	0.02	12.08	0	00:00	0.01	n1275	JUNCTION	0.02	0.03	8.52	0	20:00	0.03
n1215	JUNCTION	0.01	0.02	11.88	0	00:00	0.01	n1276	JUNCTION	0.02	0.03	8.48	0	08:00	0.03
n1231	JUNCTION	0.04	0.05	6.25	0	08:00	0.05	n1277	JUNCTION	0.02	0.03	8.38	0	08:00	0.03
n1233	JUNCTION	0.04	0.04	6.21	0	08:00	0.04	n1278	JUNCTION	0.02	0.03	8.18	0	08:00	0.03
n1234	JUNCTION	0.03	0.04	6.06	0	08:00	0.04	n1280	JUNCTION	0.02	0.02	8.87	0	20:00	0.02
n1235	JUNCTION	0.03	0.04	6.31	0	08:00	0.04	n1281	JUNCTION	0.02	0.03	8.78	0	20:00	0.03

n1283	JUNCTION	0.02	0.02	9.17	0	20:00	0.02	n1350	JUNCTION	0.02	0.02	7.92	0	08:00	0.02
n1284	JUNCTION	0.02	0.02	9.07	0	20:00	0.02	n1352	JUNCTION	0.02	0.02	7.62	0	08:00	0.02
n1285	JUNCTION	0.02	0.02	8.94	0	08:00	0.02	n1353	JUNCTION	0.02	0.02	7.72	0	08:00	0.02
n1288	JUNCTION	0.02	0.02	9.49	0	20:00	0.02	n1355	JUNCTION	0.02	0.02	7.32	0	20:00	0.02
n1289	JUNCTION	0.02	0.02	9.37	0	08:00	0.02	n1356	JUNCTION	0.02	0.02	7.52	0	20:00	0.02
n1290	JUNCTION	0.02	0.02	9.27	0	20:00	0.02	n1357	JUNCTION	0.02	0.02	7.12	0	08:00	0.02
n1292	JUNCTION	0.02	0.02	7.87	0	20:00	0.02	n1359	JUNCTION	0.02	0.02	6.72	0	08:00	0.02
n1296	JUNCTION	0.02	0.02	7.93	0	20:00	0.02	n1360	JUNCTION	0.02	0.02	6.77	0	08:00	0.02
n1301	JUNCTION	0.02	0.02	8.01	0	20:00	0.02	n1361	JUNCTION	0.02	0.02	7.02	0	08:00	0.02
n1304	JUNCTION	0.02	0.02	8.39	0	20:00	0.02	n1362	JUNCTION	0.02	0.02	6.52	0	20:00	0.02
n1305	JUNCTION	0.02	0.02	8.17	0	08:00	0.02	n1363	JUNCTION	0.02	0.02	6.62	0	08:00	0.02
n1306	JUNCTION	0.02	0.02	8.12	0	19:59	0.02	n1364	JUNCTION	0.02	0.02	6.32	0	08:00	0.02
n1313	JUNCTION	0.02	0.02	8.5	0	19:59	0.02	n1365	JUNCTION	0.02	0.02	6.42	0	08:00	0.02
n1314	JUNCTION	0.02	0.02	8.92	0	00:03	0.02	n1366	JUNCTION	0.02	0.03	6.23	0	20:00	0.03
n1317	JUNCTION	0.02	0.02	8.86	0	19:59	0.02	n1367	JUNCTION	0.03	0.03	6.03	0	20:00	0.03
n1318	JUNCTION	0.02	0.02	8.74	0	07:58	0.02	n1369	JUNCTION	0.02	0.02	8.42	0	08:00	0.02
n1319	JUNCTION	0.02	0.02	8.67	0	19:58	0.02	n1370	JUNCTION	0.02	0.02	8.52	0	20:00	0.02
n1320	JUNCTION	0.02	0.02	8.62	0	19:59	0.02	n1371	JUNCTION	0.02	0.02	10.02	0	20:00	0.02
n1328	JUNCTION	0.02	0.02	9.07	0	00:02	0.02	n1372	JUNCTION	0.02	0.02	9.92	0	08:00	0.02
n1330	JUNCTION	0.02	0.02	9	0	00:03	0.02	n1373	JUNCTION	0.02	0.02	9.72	0	08:00	0.02
n1331	JUNCTION	0.02	0.02	9.19	0	00:01	0.02	n1375	JUNCTION	0.02	0.02	9.52	0	08:00	0.02
n1332	JUNCTION	0.02	0.02	9.12	0	00:01	0.02	n1378	JUNCTION	0.02	0.02	9.02	0	20:00	0.02
n1334	JUNCTION	0.01	0.02	9.41	0	00:00	0.01	n1380	JUNCTION	0.02	0.02	8.72	0	20:00	0.02
n1335	JUNCTION	0.01	0.02	9.29	0	00:00	0.01	n1381	JUNCTION	0.02	0.02	10.22	0	08:00	0.02
n1336	JUNCTION	0.01	0.02	9.24	0	00:00	0.01	n1382	JUNCTION	0.02	0.02	10.12	0	08:00	0.02
n1338	JUNCTION	0.01	0.02	9.22	0	00:00	0.01	n1385	JUNCTION	0.02	0.02	10.52	0	20:00	0.02
n1339	JUNCTION	0.01	0.02	9.31	0	00:00	0.01	n1387	JUNCTION	0.02	0.02	11.12	0	00:02	0.02
n1344	JUNCTION	0.01	0.02	8.62	0	00:00	0.02	n1388	JUNCTION	0.02	0.02	10.94	0	00:03	0.02
n1345	JUNCTION	0.02	0.02	8.72	0	00:04	0.02	n1389	JUNCTION	0.02	0.02	10.88	0	00:03	0.02
n1346	JUNCTION	0.02	0.02	8.89	0	00:03	0.02	n1390	JUNCTION	0.02	0.02	10.82	0	00:04	0.02
n1347	JUNCTION	0.02	0.02	9.02	0	00:02	0.02	n1391	JUNCTION	0.02	0.02	10.72	0	20:00	0.02
n1348	JUNCTION	0.02	0.02	9.12	0	00:01	0.02	n1393	JUNCTION	0.01	0.02	11.72	0	00:00	0.01

n1394	JUNCTION	0.01	0.02	11.52	0	00:00	0.01	n1440	JUNCTION	0.01	0.02	18.31	0	00:00	0.01
n1396	JUNCTION	0.01	0.02	11.62	0	00:00	0.01	n1441	JUNCTION	0.01	0.02	18.54	0	00:00	0.01
n1399	JUNCTION	0.01	0.02	11.82	0	00:00	0.01	n1444	JUNCTION	0.01	0.02	9.42	0	00:00	0.01
n1400	JUNCTION	0.02	0.02	10.82	0	08:00	0.02	n1445	JUNCTION	0.01	0.02	9.62	0	00:00	0.02
n1402	JUNCTION	0.02	0.02	11.32	0	20:00	0.02	n1446	JUNCTION	0.01	0.02	9.72	0	00:00	0.02
n1403	JUNCTION	0.02	0.02	11.22	0	08:00	0.02	n1447	JUNCTION	0.01	0.02	9.92	0	00:00	0.01
n1404	JUNCTION	0.02	0.03	11.13	0	08:00	0.03	n1448	JUNCTION	0.01	0.02	10.02	0	00:00	0.01
n1405	JUNCTION	0.02	0.02	11.02	0	20:00	0.02	n1449	JUNCTION	0.01	0.02	10.12	0	00:00	0.01
n1406	JUNCTION	0.02	0.02	10.92	0	20:00	0.02	n1451	JUNCTION	0.01	0.02	9.52	0	00:00	0.01
n1408	JUNCTION	0.02	0.02	13.76	0	00:00	0.02	n1453	JUNCTION	0.01	0.02	9.64	0	00:00	0.02
n1409	JUNCTION	0.02	0.02	13.57	0	08:00	0.02	n1455	JUNCTION	0.01	0.02	9.71	0	00:00	0.02
n1410	JUNCTION	0.02	0.02	13.43	0	08:00	0.02	n1458	JUNCTION	0.01	0.02	9.86	0	00:00	0.01
n1411	JUNCTION	0.02	0.02	13.28	0	08:00	0.02	n1460	JUNCTION	0.01	0.02	9.93	0	00:00	0.01
n1412	JUNCTION	0.01	0.02	12.96	0	08:00	0.02	n1462	JUNCTION	0.01	0.02	10.18	0	00:00	0.01
n1414	JUNCTION	0.01	0.02	17.08	0	19:59	0.02	n1464	JUNCTION	0.01	0.02	10.36	0	19:44	0.02
n1416	JUNCTION	0.02	0.02	16.69	0	19:59	0.02	n1465	JUNCTION	0.02	0.02	10.47	0	07:44	0.02
n1417	JUNCTION	0.02	0.02	16.21	0	07:58	0.02	n1467	JUNCTION	0.02	0.02	10.55	0	19:43	0.02
n1419	JUNCTION	0.02	0.02	15.67	0	08:00	0.02	n1469	JUNCTION	0.02	0.02	10.78	0	07:42	0.02
n1420	JUNCTION	0.02	0.02	15.15	0	07:58	0.02	n1472	JUNCTION	0.01	0.02	11.09	0	07:42	0.02
n1421	JUNCTION	0.02	0.02	14.84	0	19:59	0.02	n1473	JUNCTION	0.02	0.02	11.7	0	00:00	0.02
n1422	JUNCTION	0.02	0.02	14.58	0	20:00	0.02	n1475	JUNCTION	0.02	0.02	11.75	0	19:40	0.02
n1423	JUNCTION	0.02	0.02	13.98	0	20:00	0.02	n1476	JUNCTION	0.02	0.02	11.9	0	00:03	0.02
n1425	JUNCTION	0.02	0.02	18.32	0	00:02	0.02	n1477	JUNCTION	0.02	0.02	11.97	0	00:02	0.02
n1426	JUNCTION	0.02	0.02	18.26	0	00:03	0.02	n1478	JUNCTION	0.02	0.02	12.03	0	00:00	0.02
n1427	JUNCTION	0.01	0.02	18.17	0	00:00	0.02	n1479	JUNCTION	0.02	0.02	12.1	0	00:01	0.02
n1428	JUNCTION	0.01	0.02	17.54	0	00:00	0.02	n1480	JUNCTION	0.01	0.02	12.28	0	00:00	0.02
n1431	JUNCTION	0.01	0.02	18.88	0	00:00	0.01	n1482	JUNCTION	0.01	0.02	12.95	0	00:00	0.01
n1435	JUNCTION	0.01	0.02	18.77	0	00:00	0.01	n1483	JUNCTION	0.01	0.02	13.22	0	00:00	0.01
n1436	JUNCTION	0.01	0.02	18.83	0	00:00	0.01	n1484	JUNCTION	0.01	0.02	13.59	0	00:00	0.01
n1437	JUNCTION	0.01	0.02	17.56	0	00:00	0.01	n1486	JUNCTION	0.01	0.02	14.2	0	00:00	0.01
n1438	JUNCTION	0.01	0.02	17.69	0	00:01	0.02	n1489	JUNCTION	0.01	0.02	14.34	0	00:00	0.01
n1439	JUNCTION	0.01	0.02	17.94	0	00:01	0.01	n1491	JUNCTION	0.01	0.02	14.23	0	00:00	0.01

n1493	JUNCTION	0.01	0.02	14.26	0	00:01	0.02	n1529	JUNCTION	0.02	0.02	12.79	0	00:02	0.02
n1494	JUNCTION	0.01	0.02	14.62	0	00:00	0.01	n1530	JUNCTION	0.02	0.02	12.67	0	19:58	0.02
n1495	JUNCTION	0.01	0.02	15.11	0	00:00	0.01	n1531	JUNCTION	0.02	0.02	12.6	0	07:58	0.02
n1496	JUNCTION	0.01	0.02	15.55	0	00:00	0.01	n1533	JUNCTION	0.02	0.03	7.23	0	20:00	0.03
n1497	JUNCTION	0.01	0.02	15.67	0	00:00	0.01	n1534	JUNCTION	0.03	0.04	7.39	0	20:00	0.04
n1498	JUNCTION	0.01	0.02	15.36	0	00:00	0.01	n1537	JUNCTION	0.01	0.02	15.27	0	00:00	0.01
n1499	JUNCTION	0.01	0.02	15.32	0	00:00	0.01	n1538	JUNCTION	0.01	0.02	14.96	0	00:00	0.01
n1501	JUNCTION	0.01	0.02	13.89	0	00:00	0.01	n1539	JUNCTION	0.01	0.02	13.58	0	00:00	0.01
n1503	JUNCTION	0.01	0.02	12.75	0	00:00	0.01	n1540	JUNCTION	0.01	0.02	12.29	0	00:01	0.01
n1504	JUNCTION	0.01	0.02	12.02	0	00:00	0.02	n1541	JUNCTION	0.01	0.02	11.22	0	00:01	0.01
n1505	JUNCTION	0.02	0.02	11.82	0	00:01	0.02	n1542	JUNCTION	0.02	0.02	10.89	0	00:02	0.02
n1506	JUNCTION	0.01	0.02	11.64	0	00:01	0.02	n1543	JUNCTION	0.01	0.02	10.86	0	00:00	0.02
n1507	JUNCTION	0.02	0.02	10.97	0	00:02	0.02	n1544	JUNCTION	0.01	0.02	10.65	0	00:00	0.02
n1509	JUNCTION	0.02	0.02	10.57	0	00:02	0.02	n1545	JUNCTION	0.01	0.01	10.1	0	00:00	0.01
n1510	JUNCTION	0.01	0.02	9.98	0	00:00	0.01	n1547	JUNCTION	0.03	0.04	8.29	0	08:00	0.04
n1511	JUNCTION	0.02	0.02	10.08	0	00:00	0.02	n1549	JUNCTION	0.01	0.01	10.29	0	00:00	0.01
n1512	JUNCTION	0.08	0.08	10.08	0	07:54	0.08	n1551	JUNCTION	0.01	0.02	10.6	0	00:01	0.02
n1513	JUNCTION	0.01	0.02	10.16	0	00:00	0.01	n1552	JUNCTION	0.01	0.02	10.98	0	00:00	0.02
n1514	JUNCTION	0.01	0.02	10.26	0	00:00	0.01	n1553	JUNCTION	0.01	0.02	11.49	0	00:00	0.02
n1515	JUNCTION	0.01	0.02	10.36	0	00:00	0.01	n1554	JUNCTION	0.02	0.02	11.53	0	00:00	0.02
n1516	JUNCTION	0.01	0.02	10.56	0	00:00	0.01	n1556	JUNCTION	0.01	0.02	11.69	0	00:00	0.01
n1517	JUNCTION	0.01	0.02	12.53	0	00:00	0.02	n1558	JUNCTION	0.01	0.02	11.82	0	00:00	0.01
n1518	JUNCTION	0.01	0.02	11.82	0	07:59	0.02	n1559	JUNCTION	0.06	0.06	11.82	0	07:53	0.06
n1519	JUNCTION	0.02	0.02	11.12	0	20:00	0.02	n1560	JUNCTION	0.01	0.02	12.06	0	00:00	0.01
n1520	JUNCTION	0.02	0.02	10.95	0	07:55	0.02	n1561	JUNCTION	0.01	0.02	12.31	0	00:00	0.01
n1521	JUNCTION	0.02	0.02	10.61	0	07:56	0.02	n1562	JUNCTION	0.01	0.02	12.15	0	00:00	0.01
n1522	JUNCTION	0.02	0.02	10.23	0	08:00	0.02	n1563	JUNCTION	0.01	0.02	12.1	0	00:00	0.01
n1523	JUNCTION	0.02	0.02	10.08	0	07:53	0.02	n1618	JUNCTION	0.01	0.01	11.8	0	00:00	0.01
n1524	JUNCTION	0.01	0.01	9.66	0	07:55	0.01	n1619	JUNCTION	0.02	0.02	10.47	0	07:59	0.02
n1526	JUNCTION	0.01	0.02	13.65	0	00:00	0.02	n1620	JUNCTION	0.03	0.03	8.43	0	08:00	0.03
n1527	JUNCTION	0.02	0.02	13.07	0	00:01	0.02	n1621	JUNCTION	0.03	0.03	8.33	0	08:00	0.03
n1528	JUNCTION	0.02	0.02	12.98	0	00:02	0.02	n1622	JUNCTION	0.03	0.03	8.03	0	08:00	0.03

n1623	JUNCTION	0.02	0.02	7.62	0	08:00	0.02	n1661	JUNCTION	0.02	0.02	9.39	0	08:00	0.02
n1625	JUNCTION	0.02	0.03	9.33	0	08:00	0.03	n1662	JUNCTION	0.02	0.02	9.32	0	08:00	0.02
n1626	JUNCTION	0.03	0.03	9.23	0	08:00	0.03	n1663	JUNCTION	0.02	0.02	9.51	0	20:00	0.02
n1627	JUNCTION	0.03	0.03	8.93	0	08:00	0.03	n1664	JUNCTION	0.02	0.02	9.47	0	08:00	0.02
n1628	JUNCTION	0.02	0.03	8.73	0	20:00	0.03	n1665	JUNCTION	0.02	0.03	9.43	0	08:00	0.03
n1629	JUNCTION	0.03	0.03	8.63	0	20:00	0.03	n1666	JUNCTION	0.02	0.02	9.67	0	08:00	0.02
n1630	JUNCTION	0.03	0.03	8.53	0	20:00	0.03	n1667	JUNCTION	0.02	0.02	9.56	0	08:00	0.02
n1631	JUNCTION	0.02	0.03	9.43	0	08:00	0.03	n1668	JUNCTION	0.02	0.02	9.87	0	08:00	0.02
n1632	JUNCTION	0.03	0.03	11.14	0	08:00	0.03	n1669	JUNCTION	0.02	0.02	10.21	0	08:00	0.02
n1633	JUNCTION	0.03	0.03	11.01	0	20:00	0.03	n1670	JUNCTION	0.02	0.02	10.14	0	20:00	0.02
n1634	JUNCTION	0.02	0.03	10.89	0	08:00	0.03	n1671	JUNCTION	0.02	0.02	10.02	0	20:00	0.02
n1637	JUNCTION	0.02	0.03	10.73	0	08:00	0.03	n1672	JUNCTION	0.02	0.02	10.45	0	00:03	0.02
n1638	JUNCTION	0.02	0.03	10.63	0	08:00	0.03	n1673	JUNCTION	0.11	0.11	10.36	0	20:00	0.11
n1639	JUNCTION	0.03	0.03	10.48	0	20:00	0.03	n1674	JUNCTION	0.02	0.02	10.36	0	20:00	0.02
n1640	JUNCTION	0.03	0.03	10.33	0	20:00	0.03	n1675	JUNCTION	0.01	0.02	8.62	0	00:00	0.01
n1641	JUNCTION	0.03	0.03	10.13	0	20:00	0.03	n1678	JUNCTION	0.01	0.02	9.02	0	00:00	0.01
n1642	JUNCTION	0.03	0.03	9.98	0	08:00	0.03	n1681	JUNCTION	0.01	0.02	9.42	0	00:00	0.01
n1643	JUNCTION	0.03	0.03	9.78	0	08:00	0.03	n1682	JUNCTION	0.01	0.02	9.62	0	00:00	0.01
n1644	JUNCTION	0.03	0.03	9.68	0	20:00	0.03	n1683	JUNCTION	0.01	0.02	9.81	0	00:00	0.01
n1645	JUNCTION	0.02	0.03	9.58	0	20:00	0.03	n1685	JUNCTION	0.01	0.02	11.97	0	00:00	0.01
n1648	JUNCTION	0.03	0.03	11.33	0	20:00	0.03	n1686	JUNCTION	0.01	0.02	12.32	0	00:00	0.02
n1649	JUNCTION	0.02	0.03	11.41	0	08:00	0.03	n1687	JUNCTION	0.01	0.02	12.52	0	00:00	0.02
n1650	JUNCTION	0.02	0.03	11.55	0	20:00	0.03	n1688	JUNCTION	0.01	0.02	12.74	0	00:00	0.02
n1651	JUNCTION	0.02	0.03	12.24	0	08:00	0.03	n1690	JUNCTION	0.01	0.02	12.92	0	00:00	0.01
n1652	JUNCTION	0.02	0.03	12.18	0	20:00	0.03	n1691	JUNCTION	0.01	0.02	12.86	0	00:00	0.01
n1653	JUNCTION	0.02	0.03	12.03	0	08:00	0.03	n1722	JUNCTION	0.03	0.03	9.74	0	07:59	0.03
n1654	JUNCTION	0.02	0.03	11.85	0	08:00	0.03	n1723	JUNCTION	0.02	0.03	9.82	0	19:57	0.03
n1655	JUNCTION	0.02	0.03	11.72	0	08:00	0.03	n1724	JUNCTION	0.02	0.03	9.94	0	07:54	0.03
n1656	JUNCTION	0.02	0.03	9.18	0	08:00	0.03	n1726	JUNCTION	0.02	0.02	10.88	0	19:42	0.02
n1657	JUNCTION	0.02	0.02	9.1	0	08:00	0.02	n1727	JUNCTION	0.88	0.97	10.88	0	07:42	0.97
n1659	JUNCTION	0.02	0.03	12.34	0	08:00	0.03	n1728	JUNCTION	0.79	0.88	10.88	0	19:40	0.88
n1660	JUNCTION	0.02	0.02	9.25	0	08:00	0.02	n1729	JUNCTION	0.68	0.77	10.88	0	07:39	0.77

n1730	JUNCTION	0.58	0.67	10.88	0	19:38	0.67	n1799	JUNCTION	0.02	0.02	11.83	0	07:58	0.02
n1731	JUNCTION	0.47	0.55	10.88	0	07:36	0.55	n1800	JUNCTION	0.02	0.02	12.42	0	07:59	0.02
n1732	JUNCTION	0.37	0.44	10.88	0	19:36	0.44	n1801	JUNCTION	0.02	0.02	12.52	0	00:03	0.02
n1733	JUNCTION	0.25	0.3	10.88	0	19:35	0.3	n1802	JUNCTION	0.02	0.02	12.6	0	00:03	0.02
n1734	JUNCTION	0.17	0.21	10.88	0	19:35	0.21	n1804	JUNCTION	0.02	0.02	12.82	0	00:02	0.02
n1735	JUNCTION	0.11	0.13	10.88	0	19:37	0.13	n1805	JUNCTION	0.02	0.02	12.96	0	00:01	0.02
n1736	JUNCTION	0.07	0.08	10.88	0	19:34	0.08	n1806	JUNCTION	0.01	0.02	13.13	0	00:00	0.02
n1738	JUNCTION	0.02	0.02	10.9	0	20:00	0.02	n1807	JUNCTION	0.01	0.02	13.28	0	00:00	0.01
n1739	JUNCTION	0.02	0.03	11.02	0	08:00	0.03	n1808	JUNCTION	0.01	0.02	13.4	0	00:00	0.01
n1740	JUNCTION	0.02	0.02	11.1	0	07:59	0.02	n1809	JUNCTION	0.01	0.02	13.62	0	00:00	0.01
n1741	JUNCTION	0.02	0.03	11.22	0	08:00	0.03	n1810	JUNCTION	0.01	0.02	13.51	0	00:00	0.01
n1742	JUNCTION	0.02	0.02	11.42	0	08:00	0.02	n1811	JUNCTION	0.01	0.02	13.37	0	00:00	0.01
n1743	JUNCTION	0.02	0.02	11.72	0	07:59	0.02	n1812	JUNCTION	0.01	0.02	13.25	0	00:00	0.01
n1744	JUNCTION	0.02	0.02	12	0	07:58	0.02	n1813	JUNCTION	0.01	0.02	13	0	00:00	0.02
n1745	JUNCTION	0.01	0.02	12.68	0	19:57	0.02	n1814	JUNCTION	0.01	0.02	12.88	0	00:00	0.02
n1746	JUNCTION	0.01	0.02	13.5	0	19:58	0.02	n1815	JUNCTION	0.09	0.09	12.51	0	20:00	0.09
n1747	JUNCTION	0.01	0.02	13.89	0	07:58	0.02	n1816	JUNCTION	0.02	0.02	12.51	0	00:00	0.02
n1748	JUNCTION	0.01	0.02	14.17	0	07:57	0.02	n1817	JUNCTION	0.02	0.02	12.36	0	20:00	0.02
n1750	JUNCTION	0.01	0.01	14.88	0	00:00	0.01	n1818	JUNCTION	0.02	0.02	11.52	0	08:00	0.02
n1751	JUNCTION	0.01	0.01	16.06	0	00:00	0.01	n1819	JUNCTION	0.02	0.02	11.02	0	08:00	0.02
n1752	JUNCTION	0.01	0.01	17.12	0	00:00	0.01	n1820	JUNCTION	0.02	0.02	10.52	0	08:00	0.02
n1754	JUNCTION	0.01	0.02	11.92	0	00:00	0.01	n1822	JUNCTION	0.01	0.02	13.25	0	00:00	0.01
n1755	JUNCTION	0.01	0.02	12.08	0	00:00	0.02	n1823	JUNCTION	0.01	0.02	13.33	0	00:00	0.01
n1756	JUNCTION	0.01	0.02	12.3	0	00:00	0.01	n1824	JUNCTION	0.01	0.02	13.44	0	00:00	0.01
n1757	JUNCTION	0.01	0.02	12.12	0	00:00	0.01	n1825	JUNCTION	0.01	0.02	13.52	0	00:00	0.01
n1758	JUNCTION	0.01	0.02	10.27	0	00:00	0.02	n1828	JUNCTION	0.01	0.02	11.92	0	00:00	0.01
n1759	JUNCTION	0.01	0.02	10.34	0	00:00	0.02	n1830	JUNCTION	0.01	0.02	12.02	0	00:00	0.01
n1760	JUNCTION	0.01	0.02	10.52	0	00:00	0.01	n1831	JUNCTION	0.01	0.02	12.12	0	00:00	0.01
n1761	JUNCTION	0.01	0.02	10.88	0	00:00	0.01	n1832	JUNCTION	0.01	0.02	12.32	0	00:00	0.01
n1762	JUNCTION	0.01	0.02	10.95	0	00:00	0.01	n1837	JUNCTION	0.02	0.03	8.23	0	20:00	0.03
n1764	JUNCTION	0.02	0.03	13.76	0	00:00	0.02	n1838	JUNCTION	0.02	0.03	8.13	0	20:00	0.03
n1766	JUNCTION	0.01	0.02	14.2	0	00:00	0.01	n1839	JUNCTION	0.02	0.03	8.04	0	08:00	0.03

n1840	JUNCTION	0.02	0.02	7.82	0	08:00	0.02	n1910	JUNCTION	0.03	0.03	8.83	0	08:00	0.03
n1841	JUNCTION	0.03	0.03	7.53	0	20:00	0.03	n1911	JUNCTION	0.02	0.03	8.73	0	08:00	0.03
n1843	JUNCTION	0.03	0.04	8.39	0	08:00	0.04	n1912	JUNCTION	0.03	0.03	8.59	0	08:00	0.03
n1850	JUNCTION	0.01	0.02	8.12	0	08:00	0.02	n1916	JUNCTION	0.02	0.02	9.12	0	08:00	0.02
n1853	JUNCTION	0.02	0.02	8.52	0	08:00	0.02	n1918	JUNCTION	0.02	0.02	9.42	0	08:00	0.02
n1858	JUNCTION	0.01	0.01	14.19	0	00:00	0.01	n1920	JUNCTION	0.02	0.02	9.62	0	20:00	0.02
n1859	JUNCTION	0.01	0.01	12.79	0	00:00	0.01	n1923	JUNCTION	0.02	0.03	9.83	0	20:00	0.03
n1860	JUNCTION	0.01	0.02	12.32	0	00:00	0.01	n1925	JUNCTION	0.02	0.03	10.43	0	20:00	0.03
n1863	JUNCTION	0.02	0.02	11.8	0	00:01	0.02	n1926	JUNCTION	0.02	0.03	10.33	0	20:00	0.03
n1866	JUNCTION	0.01	0.02	11.52	0	00:00	0.01	n1927	JUNCTION	0.02	0.03	10.23	0	20:00	0.03
n1867	JUNCTION	0.01	0.02	11	0	00:00	0.02	n1928	JUNCTION	0.02	0.03	10.03	0	20:00	0.03
n1868	JUNCTION	0.01	0.02	10.83	0	00:00	0.02	n1929	JUNCTION	0.02	0.03	9.93	0	08:00	0.03
n1869	JUNCTION	0.02	0.02	10.59	0	00:01	0.02	n1931	JUNCTION	0.02	0.02	10.72	0	08:00	0.02
n1870	JUNCTION	0.02	0.02	10.43	0	19:56	0.02	n1932	JUNCTION	0.02	0.02	10.62	0	08:00	0.02
n1871	JUNCTION	0.13	0.14	10.39	0	20:00	0.14	n1933	JUNCTION	0.1	0.12	5.02	0	08:00	0.12
n1872	JUNCTION	0.02	0.02	10.39	0	08:00	0.02	n1935	JUNCTION	0.09	0.1	4.9	0	08:00	0.1
n1873	JUNCTION	0.01	0.02	10.22	0	00:00	0.02	n1936	JUNCTION	0.09	0.1	4.7	0	08:00	0.1
n1875	JUNCTION	0.02	0.02	9.51	0	08:00	0.02	n1939	JUNCTION	0.09	0.1	4.5	0	20:00	0.1
n1878	JUNCTION	0.02	0.02	9.27	0	20:00	0.02	n1942	JUNCTION	0.05	0.06	4.26	0	20:00	0.06
n1879	JUNCTION	0.02	0.02	9.11	0	20:00	0.02	n1944	JUNCTION	0.03	0.03	5.93	0	08:00	0.03
n1880	JUNCTION	0.02	0.02	8.93	0	20:00	0.02	n1946	JUNCTION	0.03	0.04	5.64	0	08:00	0.04
n1881	JUNCTION	0.02	0.02	8.82	0	08:00	0.02	n1947	JUNCTION	0.02	0.03	5.53	0	20:00	0.03
n1882	JUNCTION	0.02	0.02	8.79	0	20:00	0.02	n1951	JUNCTION	0.09	0.11	5.11	0	08:00	0.11
n1883	JUNCTION	0.01	0.02	10.07	0	00:00	0.01	n1952	JUNCTION	0.08	0.1	5.3	0	08:00	0.1
n1885	JUNCTION	0.01	0.02	10.66	0	00:00	0.01	n1953	JUNCTION	0.08	0.09	5.59	0	08:00	0.09
n1886	JUNCTION	0.26	0.54	11.19	0	23:58	0.54	n1954	JUNCTION	0.1	0.12	5.72	0	08:00	0.12
n1903	JUNCTION	0.02	0.03	8.28	0	20:00	0.03	n1955	JUNCTION	0.1	0.12	5.82	0	08:00	0.12
n1904	JUNCTION	0.03	0.03	8.13	0	08:00	0.03	n1956	JUNCTION	0.1	0.12	5.92	0	08:00	0.12
n1905	JUNCTION	0.11	0.13	8.13	0	08:00	0.13	n1958	JUNCTION	0.08	0.1	6.1	0	20:00	0.1
n1906	JUNCTION	0.02	0.03	8.53	0	20:00	0.03	n1959	JUNCTION	0.1	0.12	6.22	0	20:00	0.12
n1907	JUNCTION	0.02	0.03	8.43	0	20:00	0.03	n1960	JUNCTION	0.1	0.11	6.41	0	08:00	0.11
n1909	JUNCTION	0.02	0.02	8.92	0	08:00	0.02	n1961	JUNCTION	0.1	0.12	6.52	0	08:00	0.12

n1962	JUNCTION	0.09	0.11	6.61	0	20:00	0.11	n2013	JUNCTION	0.12	0.15	5.2	0	20:00	0.15
n1963	JUNCTION	0.1	0.11	6.71	0	20:00	0.11	n2015	JUNCTION	0.12	0.16	5.26	0	20:00	0.16
n1965	JUNCTION	0.1	0.12	6.82	0	08:00	0.12	n2016	JUNCTION	0.13	0.16	5.31	0	20:00	0.16
n1966	JUNCTION	0.09	0.1	7	0	08:00	0.1	n2017	JUNCTION	0.11	0.14	5.4	0	08:00	0.14
n1967	JUNCTION	0.11	0.13	7.13	0	08:00	0.13	n2018	JUNCTION	0.12	0.15	5.47	0	08:00	0.15
n1968	JUNCTION	0.11	0.13	7.23	0	20:00	0.13	n2019	JUNCTION	0.11	0.14	5.57	0	08:00	0.14
n1969	JUNCTION	0.11	0.13	7.33	0	20:00	0.13	n2020	JUNCTION	0.11	0.14	5.66	0	08:00	0.14
n1970	JUNCTION	0.1	0.12	7.42	0	20:00	0.12	n2021	JUNCTION	0.11	0.14	5.74	0	08:00	0.14
7.4	JUNCTION	0.11	0.13	7.53	0	08:00	0.13	n2026	JUNCTION	0.08	0.1	5.9	0	08:00	0.1
n1974	JUNCTION	0.11	0.13	7.63	0	20:00	0.13	n2028	JUNCTION	0.12	0.14	5.99	0	20:00	0.14
n1975	JUNCTION	0.11	0.13	7.73	0	08:00	0.13	n2029	JUNCTION	0.09	0.11	6.29	0	08:00	0.11
n1977	JUNCTION	0.09	0.1	7.9	0	20:00	0.1	n2030	JUNCTION	0.11	0.14	6.39	0	08:00	0.14
n1978	JUNCTION	0.1	0.12	8.02	0	08:00	0.12	n2031	JUNCTION	0.01	0.01	6.51	0	00:00	0.01
8.3	JUNCTION	0.09	0.11	5.81	0	07:02	0.11	n2032	JUNCTION	0.01	0.02	6.92	0	00:00	0.01
n1982	JUNCTION	0.09	0.11	6.01	0	19:01	0.11	n2033	JUNCTION	0.01	0.02	7.12	0	00:00	0.01
n1983	JUNCTION	0.1	0.12	6.12	0	07:01	0.12	n2034	JUNCTION	0.01	0.02	7.33	0	00:00	0.01
n1986	JUNCTION	0.09	0.1	6.3	0	07:01	0.1	n2044	JUNCTION	0.01	0.02	18.76	0	00:00	0.01
n1987	JUNCTION	0.08	0.1	6.6	0	07:01	0.1	n2045	JUNCTION	0.01	0.02	18.68	0	00:00	0.01
n1988	JUNCTION	0.1	0.12	6.82	0	07:01	0.12	n2046	JUNCTION	0.01	0.02	18.56	0	00:00	0.02
n1989	JUNCTION	0.09	0.11	7.01	0	06:23	0.11	n2047	JUNCTION	0.01	0.02	18.52	0	00:00	0.02
n1992	JUNCTION	0.1	0.12	7.12	0	06:23	0.12	n2049	JUNCTION	0.02	0.02	9.99	0	08:00	0.02
n1993	JUNCTION	0.1	0.12	7.32	0	06:23	0.12	n2050	JUNCTION	0.02	0.02	10.15	0	20:00	0.02
n1997	JUNCTION	0.1	0.13	4.13	0	08:00	0.13	n2052	JUNCTION	0.02	0.02	10.32	0	20:00	0.02
n1999	JUNCTION	0.1	0.13	4.25	0	08:00	0.13	n2053	JUNCTION	0.02	0.02	10.43	0	08:00	0.02
n2000	JUNCTION	0.11	0.14	4.34	0	08:00	0.14	n2054	JUNCTION	0.02	0.02	10.92	0	08:00	0.02
n2001	JUNCTION	0.1	0.13	4.56	0	20:00	0.13	n2055	JUNCTION	0.02	0.02	11.19	0	08:00	0.02
n2004	JUNCTION	0.11	0.14	4.66	0	08:00	0.14	n2056	JUNCTION	0.01	0.02	11.68	0	08:00	0.02
n2005	JUNCTION	0.12	0.15	4.74	0	08:00	0.15	n2057	JUNCTION	0.01	0.02	12.08	0	00:00	0.02
n2008	JUNCTION	0.11	0.14	4.85	0	08:00	0.14	n2058	JUNCTION	0.01	0.02	12.43	0	00:00	0.02
n2009	JUNCTION	0.11	0.14	4.94	0	20:00	0.14	n2059	JUNCTION	0.01	0.02	12.83	0	00:00	0.02
n2010	JUNCTION	0.11	0.14	5.02	0	20:00	0.14	n2060	JUNCTION	0.01	0.02	12.86	0	00:00	0.02
n2011	JUNCTION	0.11	0.14	5.14	0	08:00	0.14	n2063	JUNCTION	0.03	0.04	11.89	0	08:00	0.04

n2064	JUNCTION	0.03	0.04	11.79	0	20:00	0.04	n2378	JUNCTION	0.01	0.02	12.21	0	00:00	0.01
n2065	JUNCTION	0.03	0.04	11.67	0	08:00	0.04	n3148	JUNCTION	0.04	0.06	10.24	0	08:00	0.06
n2066	JUNCTION	0.02	0.02	11.43	0	19:59	0.02	n3150	JUNCTION	0.03	0.03	10.25	0	08:00	0.03
n2067	JUNCTION	0.06	0.07	10.07	0	08:00	0.07	n3153	JUNCTION	0.03	0.03	11.38	0	20:00	0.03
n2155	JUNCTION	0.02	0.02	10.49	0	07:59	0.02	n3156	JUNCTION	0.02	0.03	11.92	0	08:00	0.03
n2156	JUNCTION	0.02	0.02	10.66	0	07:58	0.02	n3158	JUNCTION	0.03	0.03	11.98	0	20:00	0.03
n2173	JUNCTION	0.01	0.02	16.13	0	00:01	0.02	n3159	JUNCTION	0.03	0.03	12.05	0	08:00	0.03
n2174	JUNCTION	0.01	0.02	16.81	0	00:00	0.01	n3160	JUNCTION	0.02	0.03	12.2	0	20:00	0.03
n2175	JUNCTION	0.01	0.01	18.92	0	00:00	0.01	n3161	JUNCTION	0.02	0.03	12.38	0	20:00	0.03
n2176	JUNCTION	0.01	0.01	20.19	0	00:00	0.01	n3162	JUNCTION	0.02	0.03	12.5	0	20:00	0.03
n2177	JUNCTION	0.01	0.01	21.49	0	00:00	0.01	n3163	JUNCTION	0.02	0.03	12.6	0	08:00	0.03
n2178	JUNCTION	0.02	0.02	14.58	0	08:00	0.02	n3165	JUNCTION	0.02	0.03	12.69	0	20:00	0.03
n2179	JUNCTION	0.01	0.01	14.99	0	00:00	0.01	n3166	JUNCTION	0.02	0.03	12.92	0	08:00	0.03
n2180	JUNCTION	0.01	0.01	14.04	0	00:00	0.01	n3167	JUNCTION	0.02	0.02	13.14	0	08:00	0.02
n2181	JUNCTION	0.01	0.02	13.07	0	00:01	0.02	n3168	JUNCTION	0.02	0.02	13.35	0	20:00	0.02
n2182	JUNCTION	0.01	0.02	12.91	0	19:55	0.02	n3169	JUNCTION	0.02	0.03	13.68	0	20:00	0.03
n2183	JUNCTION	0.01	0.02	12.66	0	07:59	0.02	n3170	JUNCTION	0.02	0.02	14.63	0	08:00	0.02
n2184	JUNCTION	0.01	0.02	12.27	0	19:58	0.02	n3172	JUNCTION	0.02	0.02	14.77	0	20:00	0.02
n2185	JUNCTION	0.01	0.02	12.03	0	07:58	0.02	n3173	JUNCTION	0.01	0.02	14.88	0	00:00	0.01
n2186	JUNCTION	0.01	0.02	11.6	0	19:59	0.02	n3174	JUNCTION	0.01	0.02	15.22	0	00:00	0.01
n2187	JUNCTION	0.01	0.01	11.31	0	08:00	0.01	n3175	JUNCTION	0.01	0.02	15.46	0	00:00	0.01
n2189	JUNCTION	0.17	0.23	8.28	0	20:00	0.23	n3176	JUNCTION	0.01	0.02	15.78	0	00:00	0.01
n2190	JUNCTION	0.01	0.02	17.25	0	00:00	0.01	n3191	JUNCTION	0.01	0.01	21.01	0	00:00	0.01
n2191	JUNCTION	0.06	0.06	17.25	0	07:58	0.06	n3192	JUNCTION	0.01	0.01	22.21	0	00:00	0.01
n2192	JUNCTION	0.01	0.02	17.34	0	00:00	0.01	n3199	JUNCTION	0.01	0.02	17.65	0	00:00	0.01
n2193	JUNCTION	0.01	0.02	17.46	0	00:00	0.01	n3219	JUNCTION	0.02	0.02	12.51	0	20:00	0.02
n2194	JUNCTION	0.01	0.02	17.29	0	00:00	0.01	n3220	JUNCTION	0.02	0.02	12.87	0	08:00	0.02
n2196	JUNCTION	0.01	0.02	16.07	0	00:00	0.01	n3221	JUNCTION	0.02	0.02	13.12	0	08:00	0.02
n2201	JUNCTION	0.09	0.09	12.74	0	07:35	0.09	n3222	JUNCTION	0.02	0.02	13.47	0	20:00	0.02
n2202	JUNCTION	0.02	0.02	12.74	0	07:36	0.02	n3223	JUNCTION	0.02	0.02	13.89	0	20:00	0.02
n2203	JUNCTION	0.02	0.02	12.76	0	19:37	0.02	n3224	JUNCTION	0.02	0.02	14.2	0	20:00	0.02
n2251	JUNCTION	0.05	0.06	10.06	0	08:00	0.06	n3225	JUNCTION	0.02	0.02	14.29	0	08:00	0.02

n3226	JUNCTION	0.02	0.02	14.34	0	08:00	0.02	n3284	JUNCTION	0.02	0.02	12.82	0	19:50	0.02
n3227	JUNCTION	0.02	0.02	14.38	0	20:00	0.02	n3285	JUNCTION	0.02	0.02	12.72	0	07:50	0.02
n3228	JUNCTION	0.02	0.02	14.72	0	08:00	0.02	n3286	JUNCTION	0.02	0.03	11.43	0	08:00	0.03
n3229	JUNCTION	0.02	0.02	14.87	0	20:00	0.02	n3287	JUNCTION	0.02	0.02	11.52	0	19:57	0.02
n3230	JUNCTION	0.02	0.02	15.01	0	20:00	0.02	n3288	JUNCTION	0.02	0.02	11.62	0	07:57	0.02
n3231	JUNCTION	0.02	0.02	15.12	0	08:00	0.02	n3289	JUNCTION	0.02	0.02	11.67	0	19:54	0.02
n3232	JUNCTION	0.02	0.02	15.28	0	08:00	0.02	n3290	JUNCTION	0.02	0.02	11.82	0	19:54	0.02
n3233	JUNCTION	0.02	0.02	15.37	0	08:00	0.02	n3292	JUNCTION	0.02	0.02	11.87	0	07:53	0.02
n3234	JUNCTION	0.02	0.02	15.47	0	08:00	0.02	n3293	JUNCTION	0.01	0.02	11.92	0	00:00	0.01
n3235	JUNCTION	0.02	0.02	15.57	0	20:00	0.02	n3294	JUNCTION	0.01	0.02	12.8	0	00:00	0.01
n3236	JUNCTION	0.02	0.02	15.62	0	20:00	0.02	n3295	JUNCTION	0.02	0.02	12.9	0	19:57	0.02
n3257	JUNCTION	0.02	0.02	15.82	0	00:02	0.02	n3296	JUNCTION	0.01	0.02	13.49	0	19:54	0.02
n3259	JUNCTION	0.02	0.02	15.62	0	20:00	0.02	n3297	JUNCTION	0.01	0.02	13.81	0	00:00	0.02
n3260	JUNCTION	0.02	0.02	15.54	0	20:00	0.02	n3298	JUNCTION	0.01	0.02	14.21	0	00:01	0.02
n3261	JUNCTION	0.02	0.02	15.25	0	08:00	0.02	n3300	JUNCTION	0.01	0.01	14.7	0	00:00	0.01
n3262	JUNCTION	0.02	0.02	15.07	0	08:00	0.02	n3301	JUNCTION	0.01	0.02	15.3	0	00:00	0.01
n3263	JUNCTION	0.02	0.02	14.88	0	20:00	0.02	n3302	JUNCTION	0.01	0.02	15.78	0	00:00	0.01
n3264	JUNCTION	0.02	0.02	15.68	0	00:00	0.02	n3303	JUNCTION	0.01	0.02	16.42	0	00:00	0.01
n3265	JUNCTION	0.02	0.02	15.82	0	00:00	0.02	n3304	JUNCTION	0.01	0.02	17.27	0	00:00	0.01
n3266	JUNCTION	0.02	0.02	16.02	0	00:00	0.02	n3305	JUNCTION	0.01	0.02	18.06	0	00:00	0.01
n3267	JUNCTION	0.01	0.02	16.06	0	00:01	0.02	n3306	JUNCTION	0.01	0.01	12.49	0	00:00	0.01
n3268	JUNCTION	0.01	0.02	16.14	0	00:00	0.01	n3343	JUNCTION	0.02	0.03	11.51	0	20:00	0.03
n3269	JUNCTION	0.01	0.02	16.53	0	00:00	0.01	n3369	JUNCTION	0.07	0.09	8.79	0	08:00	0.09
n3271	JUNCTION	0.01	0.02	16.88	0	00:00	0.01	n3371	JUNCTION	0.01	0.01	11.03	0	00:00	0.01
n3272	JUNCTION	0.01	0.02	17.17	0	00:00	0.01	n3372	JUNCTION	0.68	1	12.02	0	15:33	1
n3273	JUNCTION	0.01	0.02	16.8	0	00:00	0.01	n3373	JUNCTION	0.52	0.83	12.02	0	16:09	0.83
n3275	JUNCTION	0.01	0.01	16.3	0	00:00	0.01	n3374	JUNCTION	0.42	0.71	12.02	0	15:54	0.71
n3278	JUNCTION	0.01	0.02	15.16	0	00:00	0.01	n3375	JUNCTION	0.21	0.42	12.02	0	15:39	0.42
n3279	JUNCTION	0.01	0.02	14.21	0	00:00	0.01	n3376	JUNCTION	0.08	0.17	12.02	0	15:54	0.17
n3281	JUNCTION	0.01	0.02	13.37	0	00:01	0.02	n3377	JUNCTION	0.01	0.02	12.18	0	00:00	0.01
n3282	JUNCTION	0.01	0.02	13.27	0	00:00	0.02	n3378	JUNCTION	0.01	0.02	12.44	0	00:00	0.01
n3283	JUNCTION	0.01	0.02	12.97	0	00:00	0.02	n3379	JUNCTION	0.04	0.05	18.39	0	07:59	0.05

n3381	JUNCTION	0.02	0.02	16.12	0	00:00	0.02	n3426	JUNCTION	0.02	0.03	10.68	0	20:00	0.03
n3382	JUNCTION	0.01	0.02	17.82	0	00:00	0.01	n3428	JUNCTION	0.03	0.03	10.58	0	08:00	0.03
n3383	JUNCTION	0.02	0.02	17.91	0	00:00	0.02	n3429	JUNCTION	0.03	0.03	10.53	0	20:00	0.03
n3384	JUNCTION	0.02	0.02	17.98	0	00:00	0.02	n3430	JUNCTION	0.02	0.02	10.42	0	20:00	0.02
n3385	JUNCTION	0.01	0.02	18.27	0	00:00	0.01	n3431	JUNCTION	0.07	0.1	8.2	0	08:00	0.1
n3387	JUNCTION	0.01	0.02	18.39	0	00:00	0.02	n3432	JUNCTION	0.02	0.02	12.02	0	20:00	0.02
n3388	JUNCTION	0.01	0.02	18.51	0	00:00	0.01	n3433	JUNCTION	0.02	0.02	12.12	0	20:00	0.02
n3389	JUNCTION	0.01	0.02	18.66	0	00:00	0.01	n3434	JUNCTION	0.02	0.02	12.22	0	20:00	0.02
n3390	JUNCTION	0.01	0.02	18.5	0	00:00	0.01	n3435	JUNCTION	0.02	0.02	12.32	0	08:00	0.02
n3392	JUNCTION	0.01	0.02	17.88	0	00:00	0.02	n3437	JUNCTION	0.02	0.02	12.47	0	08:00	0.02
n3400	JUNCTION	0.01	0.01	17.64	0	00:00	0.01	n3440	JUNCTION	0.02	0.02	12.62	0	08:00	0.02
n3401	JUNCTION	0.01	0.02	14.62	0	00:01	0.02	n3441	JUNCTION	0.02	0.02	12.72	0	20:00	0.02
n3405	JUNCTION	0.01	0.02	14.42	0	00:01	0.02	n3442	JUNCTION	0.01	0.02	15.14	0	00:00	0.01
n3407	JUNCTION	0.01	0.02	14.22	0	00:02	0.02	n3443	JUNCTION	0.01	0.02	15.21	0	00:00	0.02
n3408	JUNCTION	0.02	0.02	14.02	0	00:03	0.02	n3444	JUNCTION	0.01	0.02	15.27	0	00:00	0.01
n3409	JUNCTION	0.01	0.02	13.57	0	19:44	0.02	n3445	JUNCTION	0.01	0.02	15.36	0	00:00	0.01
n3410	JUNCTION	0.02	0.02	12.42	0	07:49	0.02	n3446	JUNCTION	0.09	0.09	15.35	0	08:00	0.09
n3411	JUNCTION	0.02	0.02	12.27	0	07:49	0.02	n3451	JUNCTION	0.01	0.02	20.49	0	00:00	0.01
n3412	JUNCTION	0.02	0.02	12.12	0	07:51	0.02	n3454	JUNCTION	0.01	0.01	19.15	0	00:00	0.01
n3413	JUNCTION	0.02	0.03	11.93	0	20:00	0.03	n3455	JUNCTION	0.01	0.02	18.25	0	00:00	0.01
n3414	JUNCTION	0.02	0.03	11.83	0	08:00	0.03	n3457	JUNCTION	0.02	0.02	12.92	0	00:03	0.02
n3415	JUNCTION	0.02	0.03	11.73	0	08:00	0.03	n3458	JUNCTION	0.02	0.02	13.02	0	00:02	0.02
n3416	JUNCTION	0.02	0.02	11.62	0	20:00	0.02	n3459	JUNCTION	0.01	0.01	16.26	0	00:01	0.01
n3417	JUNCTION	0.02	0.03	11.53	0	08:00	0.03	n3460	JUNCTION	0.01	0.02	16.59	0	00:01	0.02
n3418	JUNCTION	0.02	0.03	11.33	0	08:00	0.03	n3463	JUNCTION	0.01	0.02	17.23	0	00:01	0.01
n3419	JUNCTION	0.03	0.03	11.23	0	08:00	0.03	n3464	JUNCTION	0.01	0.02	17.43	0	00:01	0.01
n3420	JUNCTION	0.02	0.03	11.13	0	20:00	0.03	n3465	JUNCTION	0.01	0.02	18.03	0	00:00	0.01
n3421	JUNCTION	0.03	0.03	11.03	0	20:00	0.03	n3466	JUNCTION	0.01	0.02	18.46	0	00:00	0.01
n3422	JUNCTION	0.03	0.03	10.98	0	20:00	0.03	n3467	JUNCTION	0.01	0.02	18.8	0	00:00	0.01
n3423	JUNCTION	0.03	0.03	10.93	0	20:00	0.03	n3468	JUNCTION	0.01	0.02	19.67	0	00:00	0.01
n3424	JUNCTION	0.03	0.03	10.83	0	20:00	0.03	n3469	JUNCTION	0.01	0.02	20.26	0	00:00	0.01
n3425	JUNCTION	0.03	0.03	10.73	0	08:00	0.03	n3470	JUNCTION	0.01	0.02	21.01	0	00:00	0.01

n3473	JUNCTION	0.01	0.02	18.28	0	00:00	0.01	n3516	JUNCTION	0.01	0.02	13.93	0	00:00	0.01
n3476	JUNCTION	0.01	0.02	18.46	0	00:00	0.01	n3517	JUNCTION	0.01	0.02	14.17	0	00:00	0.01
n3477	JUNCTION	0.01	0.02	18.62	0	00:00	0.01	n3518	JUNCTION	0.01	0.02	14.21	0	00:00	0.01
n3478	JUNCTION	0.01	0.02	18.91	0	00:00	0.01	n3519	JUNCTION	0.01	0.02	14.24	0	00:00	0.01
n3479	JUNCTION	0.01	0.02	19.03	0	00:00	0.01	n3520	JUNCTION	0.03	0.03	10.48	0	08:00	0.03
n3482	JUNCTION	0.01	0.02	14.52	0	00:00	0.01	n3521	JUNCTION	0.02	0.03	10.64	0	08:00	0.03
n3483	JUNCTION	0.01	0.02	14.14	0	00:00	0.01	n3522	JUNCTION	0.03	0.03	10.76	0	08:00	0.03
n3484	JUNCTION	0.01	0.01	13.69	0	00:00	0.01	n3523	JUNCTION	0.03	0.03	10.88	0	20:00	0.03
n3485	JUNCTION	0.02	0.02	10.92	0	00:01	0.02	n3525	JUNCTION	0.03	0.04	10.95	0	20:00	0.04
n3486	JUNCTION	0.02	0.02	10.9	0	07:58	0.02	n3526	JUNCTION	0.03	0.03	11.03	0	20:00	0.03
n3487	JUNCTION	0.02	0.02	10.71	0	19:51	0.02	n3527	JUNCTION	0.03	0.03	11.13	0	20:00	0.03
n3488	JUNCTION	0.02	0.02	10.62	0	07:51	0.02	n3528	JUNCTION	0.03	0.03	11.24	0	08:00	0.03
n3489	JUNCTION	0.02	0.02	10.52	0	19:53	0.02	n3529	JUNCTION	0.02	0.02	12.32	0	00:00	0.02
n3490	JUNCTION	0.02	0.02	10.42	0	07:55	0.02	n3530	JUNCTION	0.02	0.02	12.21	0	00:01	0.02
n3494	JUNCTION	0.02	0.02	10.07	0	07:53	0.02	n3531	JUNCTION	0.02	0.02	12.16	0	00:02	0.02
n3496	JUNCTION	0.02	0.02	9.92	0	07:54	0.02	n3532	JUNCTION	0.02	0.02	12.02	0	00:03	0.02
n3497	JUNCTION	0.08	0.15	9.15	0	08:00	0.15	n3533	JUNCTION	0.02	0.02	11.9	0	00:04	0.02
n3499	JUNCTION	0.13	0.17	9.27	0	20:00	0.17	n3534	JUNCTION	0.02	0.02	11.82	0	20:00	0.02
n3500	JUNCTION	0.18	0.25	9.19	0	08:00	0.25	n3535	JUNCTION	0.02	0.02	11.7	0	20:00	0.02
n3501	JUNCTION	0.18	0.25	9.15	0	08:00	0.25	n3536	JUNCTION	0.01	0.02	11.56	0	00:00	0.02
n3502	JUNCTION	0.08	0.1	11.85	0	08:00	0.1	n3543	JUNCTION	0.01	0.02	12.75	0	00:00	0.01
n3503	JUNCTION	0.01	0.02	12.41	0	19:55	0.02	n3544	JUNCTION	0.01	0.02	12.64	0	00:00	0.01
n3504	JUNCTION	0.02	0.02	12.6	0	07:54	0.02	n3545	JUNCTION	0.01	0.02	12.57	0	00:00	0.01
n3506	JUNCTION	0.02	0.02	12.7	0	07:39	0.02	n3546	JUNCTION	0.01	0.02	12.47	0	00:00	0.02
n3508	JUNCTION	0.02	0.02	12.92	0	19:59	0.02	n3547	JUNCTION	0.01	0.02	12.39	0	00:00	0.02
n3509	JUNCTION	0.02	0.02	13	0	19:59	0.02	n3578	JUNCTION	0.01	0.02	12.35	0	00:00	0.01
n3510	JUNCTION	0.02	0.02	13.08	0	20:00	0.02	n3580	JUNCTION	0.01	0.02	12.47	0	00:00	0.01
n3511	JUNCTION	0.02	0.02	13.12	0	07:59	0.02	n3648	JUNCTION	0.04	0.04	11.64	0	07:58	0.04
n3512	JUNCTION	0.02	0.02	13.25	0	00:00	0.02	n3649	JUNCTION	0.03	0.04	11.94	0	07:08	0.04
n3513	JUNCTION	0.02	0.02	13.28	0	00:02	0.02	n3650	JUNCTION	0.03	0.04	12.24	0	07:25	0.04
n3514	JUNCTION	0.01	0.02	13.44	0	00:01	0.02	n3651	JUNCTION	0.04	0.05	12.25	0	19:24	0.05
n3515	JUNCTION	0.01	0.02	13.69	0	00:01	0.01	n3652	JUNCTION	0.02	0.02	12.53	0	07:07	0.02

n3653	JUNCTION	0.02	0.03	12.1	0	19:11	0.03	n3729	JUNCTION	0.01	0.02	16.52	0	00:00	0.02
n3654	JUNCTION	0.03	0.03	11.79	0	07:15	0.03	n3730	JUNCTION	0.02	0.02	16.16	0	00:02	0.02
n3655	JUNCTION	0.03	0.04	11.56	0	07:24	0.04	n3731	JUNCTION	0.02	0.02	16	0	00:01	0.02
n3656	JUNCTION	0.03	0.04	11.24	0	07:02	0.04	n3732	JUNCTION	0.06	0.08	8.93	0	20:00	0.08
n3657	JUNCTION	0.04	0.05	11.01	0	19:05	0.05	n3733	JUNCTION	0.06	0.08	9.08	0	20:00	0.08
n3658	JUNCTION	0.04	0.05	10.83	0	19:05	0.05	n3734	JUNCTION	0.05	0.07	9.31	0	08:00	0.07
n3659	JUNCTION	0.96	1	11.91	0	02:21	1	n3735	JUNCTION	0.06	0.08	9.48	0	20:00	0.08
n3662	JUNCTION	0.06	0.08	9.67	0	20:00	0.08	n3736	JUNCTION	0.06	0.07	9.71	0	20:00	0.07
n3663	JUNCTION	0.06	0.08	9.46	0	20:00	0.08	n3738	JUNCTION	0.03	0.04	11.24	0	07:59	0.04
n3701	JUNCTION	0.08	0.13	10.83	0	08:00	0.13	n3739	JUNCTION	0.04	0.05	11.35	0	19:59	0.05
n3702	JUNCTION	0.08	0.1	10.94	0	08:00	0.1	n3740	JUNCTION	0.04	0.05	11.43	0	07:59	0.05
n3703	JUNCTION	0.08	0.1	11.11	0	08:00	0.1	n3741	JUNCTION	0.04	0.04	11.54	0	07:59	0.04
n3704	JUNCTION	0.07	0.1	11.3	0	08:00	0.1	n3742	JUNCTION	0.03	0.04	11.64	0	07:59	0.04
n3705	JUNCTION	0.07	0.09	11.54	0	08:00	0.09	n3743	JUNCTION	0.03	0.03	11.78	0	20:00	0.03
n3706	JUNCTION	0.18	0.25	8.35	0	20:00	0.25	n3744	JUNCTION	0.02	0.03	12.03	0	20:00	0.03
n3707	JUNCTION	0.07	0.09	12.02	0	08:00	0.09	n3745	JUNCTION	0.02	0.02	15.67	0	20:00	0.02
n3708	JUNCTION	0.07	0.08	12.22	0	20:00	0.08	n3746	JUNCTION	0.02	0.02	15.77	0	08:00	0.02
n3710	JUNCTION	0.05	0.06	10.66	0	19:03	0.06	n3747	JUNCTION	0.02	0.02	15.9	0	20:00	0.02
n3711	JUNCTION	0.05	0.06	10.46	0	19:05	0.06	n3748	JUNCTION	0.02	0.02	15.97	0	00:01	0.02
n3712	JUNCTION	0.05	0.07	10.32	0	07:06	0.07	n3749	JUNCTION	0.01	0.02	17.7	0	00:00	0.01
n3713	JUNCTION	0.05	0.07	10.17	0	07:06	0.07	n3750	JUNCTION	0.06	0.08	12.53	0	20:00	0.08
n3714	JUNCTION	0.06	0.08	9.88	0	08:00	0.08	n3752	JUNCTION	0.04	0.05	11.25	0	19:34	0.05
n3715	JUNCTION	0.01	0.01	17.07	0	00:00	0.01	n3753	JUNCTION	0.01	0.01	13.66	0	00:00	0.01
n3717	JUNCTION	0.01	0.01	16.6	0	00:00	0.01	n3754	JUNCTION	0.01	0.01	14.86	0	00:01	0.01
n3720	JUNCTION	0.01	0.02	13.57	0	00:01	0.01	n3755	JUNCTION	0.01	0.02	15.32	0	00:01	0.01
n3721	JUNCTION	0.01	0.02	12.25	0	00:01	0.01	n3756	JUNCTION	0.01	0.02	15.79	0	00:00	0.01
n3722	JUNCTION	0.01	0.02	12.04	0	00:01	0.01	n3757	JUNCTION	0.01	0.02	15.99	0	00:00	0.01
n3723	JUNCTION	0.01	0.01	11.24	0	00:00	0.01	n3758	JUNCTION	0.01	0.02	17.04	0	00:00	0.01
n3725	JUNCTION	0.01	0.02	17.61	0	00:00	0.01	n3759	JUNCTION	0.01	0.02	17.78	0	00:00	0.01
n3726	JUNCTION	0.01	0.02	17.45	0	00:00	0.01	n3760	JUNCTION	0.01	0.02	18.24	0	00:00	0.01
n3727	JUNCTION	0.01	0.02	17.15	0	00:00	0.01	n3761	JUNCTION	0.01	0.02	18.46	0	00:00	0.01
n3728	JUNCTION	0.01	0.02	16.65	0	00:01	0.02	n3762	JUNCTION	0.01	0.02	18.36	0	00:00	0.01

n3764	JUNCTION	0.01	0.01	18.03	0	00:00	0.01	n4949	JUNCTION	0.09	0.09	11.79	0	08:00	0.09
n4730	JUNCTION	0.02	0.03	10.4	0	07:07	0.03	n4950	JUNCTION	0.02	0.02	11.94	0	07:59	0.02
n4914	JUNCTION	0.03	0.04	10.46	0	08:00	0.04	n4952	JUNCTION	0.12	0.12	12.14	0	07:59	0.12
n4915	JUNCTION	0.03	0.03	10.53	0	20:00	0.03	n4953	JUNCTION	0.07	0.08	12.14	0	19:58	0.08
n4917	JUNCTION	0.03	0.04	10.66	0	08:00	0.04	n4955	JUNCTION	0.02	0.02	12.14	0	07:57	0.02
n4918	JUNCTION	0.03	0.03	10.62	0	20:00	0.03	n4956	JUNCTION	0.02	0.02	12.1	0	19:56	0.02
n4919	JUNCTION	0.03	0.03	10.77	0	20:00	0.03	n4957	JUNCTION	0.02	0.02	12.01	0	07:59	0.02
n4920	JUNCTION	0.03	0.03	10.87	0	20:00	0.03	n4958	JUNCTION	0.02	0.02	12.14	0	19:58	0.02
n4921	JUNCTION	0.03	0.03	10.95	0	20:00	0.03	n4959	JUNCTION	0.11	0.12	12.15	0	19:58	0.12
n4922	JUNCTION	0.03	0.03	11.32	0	20:00	0.03	n4960	JUNCTION	0.01	0.02	13.5	0	19:56	0.02
n4923	JUNCTION	0.03	0.03	11.23	0	08:00	0.03	n4962	JUNCTION	0.01	0.02	13.17	0	07:59	0.02
n4924	JUNCTION	0.03	0.03	11.15	0	20:00	0.03	n4964	JUNCTION	0.02	0.02	12.38	0	07:59	0.02
n4925	JUNCTION	0.03	0.03	11.03	0	20:00	0.03	n4966	JUNCTION	0.02	0.02	12.23	0	07:57	0.02
n4926	JUNCTION	0.02	0.03	10.13	0	08:00	0.03	n4968	JUNCTION	0.01	0.02	13.73	0	07:55	0.02
n4927	JUNCTION	0.02	0.03	10.01	0	20:00	0.03	n4969	JUNCTION	0.02	0.02	13.96	0	19:57	0.02
n4929	JUNCTION	0.02	0.03	10.93	0	08:00	0.03	n4970	JUNCTION	0.01	0.02	14.55	0	00:01	0.02
n4930	JUNCTION	0.02	0.03	10.83	0	20:00	0.03	n4971	JUNCTION	0.01	0.02	15.19	0	00:00	0.01
n4931	JUNCTION	0.02	0.03	10.78	0	20:00	0.03	n4972	JUNCTION	0.01	0.02	15.33	0	00:01	0.02
n4932	JUNCTION	0.02	0.03	10.65	0	08:00	0.03	n4973	JUNCTION	0.01	0.02	15.54	0	00:00	0.01
n4933	JUNCTION	0.02	0.03	10.53	0	08:00	0.03	n4974	JUNCTION	0.01	0.02	15.73	0	00:00	0.01
n4934	JUNCTION	0.02	0.03	10.38	0	20:00	0.03	n4975	JUNCTION	0.01	0.02	16.14	0	00:00	0.01
n4935	JUNCTION	0.02	0.03	10.28	0	08:00	0.03	n4976	JUNCTION	0.01	0.02	16.44	0	00:00	0.01
n4936	JUNCTION	0.02	0.03	11.03	0	20:00	0.03	n4977	JUNCTION	0.01	0.02	16.79	0	00:00	0.01
n4937	JUNCTION	0.02	0.03	10.98	0	20:00	0.03	n5019	JUNCTION	0.02	0.02	17	0	19:58	0.02
n4938	JUNCTION	0.02	0.02	11.17	0	08:00	0.02	n5020	JUNCTION	0.02	0.02	16.38	0	07:59	0.02
n4939	JUNCTION	0.02	0.02	11.32	0	08:00	0.02	n5021	JUNCTION	0.02	0.02	16.07	0	20:00	0.02
n4940	JUNCTION	0.02	0.03	11.23	0	08:00	0.03	n5022	JUNCTION	0.02	0.02	15.52	0	07:49	0.02
n4941	JUNCTION	0.02	0.02	11.42	0	08:00	0.02	n5023	JUNCTION	0.02	0.02	15.21	0	07:56	0.02
n4942	JUNCTION	0.02	0.02	11.67	0	08:00	0.02	n5024	JUNCTION	0.02	0.02	13.75	0	07:51	0.02
n4943	JUNCTION	0.02	0.02	11.6	0	08:00	0.02	n5025	JUNCTION	0.02	0.02	13.58	0	07:59	0.02
n4945	JUNCTION	0.02	0.02	11.53	0	20:00	0.02	n5026	JUNCTION	0.02	0.02	12.27	0	07:51	0.02
n4946	JUNCTION	0.02	0.02	11.79	0	20:00	0.02	n5027	JUNCTION	0.02	0.02	11.87	0	07:52	0.02

n5028	JUNCTION	0.03	0.03	11.78	0	20:00	0.03	n6339	JUNCTION	0.07	0.09	8.69	0	08:00	0.09
n5029	JUNCTION	0.01	0.02	18.16	0	00:00	0.02	n6340	JUNCTION	0.02	0.02	9.82	0	08:00	0.02
n5030	JUNCTION	0.01	0.02	18.12	0	00:00	0.02	n6341	JUNCTION	0.02	0.02	10.02	0	08:00	0.02
n5031	JUNCTION	0.01	0.02	18.02	0	00:00	0.01	n6342	JUNCTION	0.02	0.03	10.13	0	08:00	0.03
n5032	JUNCTION	0.02	0.02	17.58	0	00:00	0.02	n6343	JUNCTION	0.02	0.03	10.25	0	08:00	0.03
n5033	JUNCTION	0.02	0.02	17.51	0	00:00	0.02	n6344	JUNCTION	0.02	0.02	10.42	0	08:00	0.02
n5035	JUNCTION	0.02	0.02	17.44	0	07:59	0.02	n6345	JUNCTION	0.02	0.02	10.55	0	08:00	0.02
n5036	JUNCTION	0.02	0.02	17.39	0	19:56	0.02	n6346	JUNCTION	0.02	0.02	10.77	0	08:00	0.02
n5038	JUNCTION	0.02	0.02	17.32	0	07:55	0.02	n6347	JUNCTION	0.02	0.02	11.02	0	08:00	0.02
n5039	JUNCTION	0.02	0.02	17.28	0	07:58	0.02	n6348	JUNCTION	0.02	0.02	11.16	0	08:00	0.02
n5041	JUNCTION	0.02	0.02	17.23	0	07:57	0.02	n6349	JUNCTION	0.02	0.02	11.26	0	08:00	0.02
n5042	JUNCTION	0.02	0.02	17.2	0	07:55	0.02	n6350	JUNCTION	0.02	0.02	11.29	0	08:00	0.02
n5043	JUNCTION	0.02	0.02	17.12	0	08:00	0.02	n6351	JUNCTION	0.02	0.02	11.38	0	08:00	0.02
n5055	JUNCTION	0.26	0.54	14.03	0	23:58	0.54	n6352	JUNCTION	0.02	0.02	10.97	0	00:00	0.02
n5255	JUNCTION	0.01	0.01	19.51	0	00:00	0.01	n6355	JUNCTION	0.02	0.02	11.37	0	00:02	0.02
n5258	JUNCTION	0.02	0.03	11.74	0	08:00	0.03	n6357	JUNCTION	0.02	0.02	11.12	0	08:00	0.02
n5259	JUNCTION	0.03	0.03	11.55	0	20:00	0.03	n6361	JUNCTION	0.02	0.02	11.57	0	00:02	0.02
n5260	JUNCTION	0.02	0.03	11.46	0	20:00	0.03	n6363	JUNCTION	0.01	0.02	12.45	0	00:00	0.01
n5261	JUNCTION	0.02	0.03	11.63	0	08:00	0.03	n6364	JUNCTION	0.01	0.02	12.32	0	00:00	0.01
n6312	JUNCTION	0.04	0.04	11.39	0	06:05	0.04	n6365	JUNCTION	0.01	0.02	12.22	0	00:00	0.01
n6313	JUNCTION	0.01	0.02	12.2	0	00:00	0.01	n6366	JUNCTION	0.01	0.02	12.02	0	00:00	0.01
n6315	JUNCTION	0.01	0.02	12.16	0	00:00	0.01	n6368	JUNCTION	0.01	0.02	11.92	0	00:00	0.01
n6316	JUNCTION	0.01	0.02	12.03	0	00:00	0.01	n6370	JUNCTION	0.01	0.02	11.82	0	00:01	0.02
n6318	JUNCTION	0.06	0.08	11.38	0	08:00	0.08	n6374	JUNCTION	0.01	0.02	12.13	0	00:00	0.01
n6322	JUNCTION	0.02	0.03	11.73	0	08:00	0.03	n6375	JUNCTION	0.01	0.02	12.46	0	00:00	0.01
n6323	JUNCTION	0.02	0.03	11.83	0	20:00	0.03	n6387	JUNCTION	0.01	0.02	11.39	0	00:00	0.02
n6333	JUNCTION	0.21	0.29	7.81	0	08:00	0.29	n6401	JUNCTION	0.15	0.18	11.38	0	08:00	0.18
n6334	JUNCTION	0.19	0.26	7.74	0	08:00	0.26	n6402	JUNCTION	0.24	0.28	11.38	0	08:00	0.28
n6335	JUNCTION	0.17	0.23	7.63	0	08:00	0.23	n6403	JUNCTION	0.34	0.38	11.38	0	08:00	0.38
n6336	JUNCTION	0.17	0.23	7.48	0	08:00	0.23	n7236	JUNCTION	0.12	0.16	9.28	0	08:00	0.16
n6337	JUNCTION	0.12	0.16	7.26	0	08:00	0.16	n7237	JUNCTION	0.01	0.01	12.65	0	00:00	0.01
n6338	JUNCTION	0.09	0.12	6.62	0	08:00	0.12	n7238	JUNCTION	0.01	0.02	13.12	0	00:02	0.02

n7239	JUNCTION	0.01	0.02	14.78	0	00:01	0.01	n7998	JUNCTION	0.02	0.03	9.83	0	08:00	0.03
n7240	JUNCTION	0.01	0.02	15.3	0	00:00	0.01	n7999	JUNCTION	0.03	0.03	9.86	0	20:00	0.03
n7241	JUNCTION	0.01	0.02	15.87	0	00:00	0.01	n8001	JUNCTION	0.05	0.06	9.86	0	20:00	0.06
n7242	JUNCTION	0.01	0.02	16.11	0	00:00	0.01	n8002	JUNCTION	0.02	0.02	10.06	0	08:00	0.02
n7248	JUNCTION	0.01	0.02	15.02	0	00:00	0.01	n8003	JUNCTION	0.02	0.02	10.15	0	20:00	0.02
n7249	JUNCTION	0.01	0.01	16.28	0	00:00	0.01	n8004	JUNCTION	0.02	0.02	10.46	0	20:00	0.02
n7250	JUNCTION	0.01	0.02	17.44	0	00:00	0.01	n8006	JUNCTION	0.06	0.06	10.47	0	20:00	0.06
n7404	JUNCTION	0.1	0.12	6.62	0	08:00	0.12	n8007	JUNCTION	0.05	0.05	10.47	0	08:00	0.05
n7405	JUNCTION	0.11	0.14	7.82	0	08:00	0.14	n8009	JUNCTION	0.02	0.02	10.48	0	08:00	0.02
n7406	JUNCTION	0.11	0.13	7.53	0	08:00	0.13	n8011	JUNCTION	0.04	0.05	10.49	0	08:00	0.05
n7407	JUNCTION	0.11	0.13	7.18	0	08:00	0.13	n8013	JUNCTION	0.02	0.02	10.85	0	20:00	0.02
n7408	JUNCTION	0.12	0.15	6.95	0	08:00	0.15	n8014	JUNCTION	0.02	0.02	11.02	0	20:00	0.02
n7409	JUNCTION	0.11	0.14	6.83	0	08:00	0.14	n8015	JUNCTION	0.02	0.02	11.27	0	08:00	0.02
n7410	JUNCTION	0.11	0.14	8.09	0	08:00	0.14	n8016	JUNCTION	0.02	0.02	11.53	0	08:00	0.02
n7411	JUNCTION	0.12	0.15	7.95	0	08:00	0.15	n8017	JUNCTION	0.02	0.02	11.76	0	20:00	0.02
n7413	JUNCTION	0.12	0.15	8.47	0	08:00	0.15	n8018	JUNCTION	0.02	0.02	11.85	0	20:00	0.02
n7415	JUNCTION	0.11	0.13	9.43	0	20:00	0.13	n8019	JUNCTION	0.02	0.02	12.28	0	08:00	0.02
n7417	JUNCTION	0.11	0.13	9.78	0	08:00	0.13	n8020	JUNCTION	0.02	0.02	12.79	0	20:00	0.02
n7418	JUNCTION	0.11	0.13	10.28	0	08:00	0.13	n8021	JUNCTION	0.02	0.02	13.25	0	08:00	0.02
n7419	JUNCTION	0.11	0.13	10	0	08:00	0.13	n8022	JUNCTION	0.02	0.02	13.38	0	20:00	0.02
n7422	JUNCTION	0.1	0.12	10.62	0	07:02	0.12	n8024	JUNCTION	0.02	0.02	13.51	0	08:00	0.02
n7423	JUNCTION	0.13	0.16	10.46	0	20:00	0.16	n8025	JUNCTION	0.02	0.02	13.91	0	08:00	0.02
n7424	JUNCTION	0.11	0.14	10.39	0	20:00	0.14	n8026	JUNCTION	0.02	0.02	14.13	0	00:03	0.02
n7425	JUNCTION	0.09	0.11	10.36	0	07:10	0.11	n8028	JUNCTION	0.02	0.02	14.24	0	00:02	0.02
n7427	JUNCTION	0.07	0.08	12.16	0	07:10	0.08	n8029	JUNCTION	0.01	0.02	14.8	0	00:02	0.02
n7428	JUNCTION	0.11	0.13	10.92	0	08:00	0.13	n8030	JUNCTION	0.01	0.02	15.94	0	00:02	0.02
n7991	JUNCTION	0.02	0.02	9.22	0	20:00	0.02	n8031	JUNCTION	0.01	0.02	17.06	0	00:01	0.02
n7992	JUNCTION	0.03	0.03	9.33	0	08:00	0.03	n8032	JUNCTION	0.01	0.02	17.63	0	00:00	0.01
n7994	JUNCTION	0.02	0.03	9.38	0	08:00	0.03	n8034	JUNCTION	0.01	0.02	18.05	0	00:00	0.01
n7995	JUNCTION	0.02	0.03	9.43	0	20:00	0.03	n8035	JUNCTION	0.01	0.02	18.27	0	00:00	0.01
n7996	JUNCTION	0.02	0.03	9.53	0	20:00	0.03	n8036	JUNCTION	0.01	0.02	18.72	0	00:00	0.01
n7997	JUNCTION	0.02	0.03	9.63	0	20:00	0.03	n8037	JUNCTION	0.01	0.02	18.86	0	00:00	0.01

n8038	JUNCTION	0.01	0.02	18.9	0	00:00	0.01	n8161	JUNCTION	0.01	0.02	11.92	0	00:00	0.02
n8061	JUNCTION	0.02	0.02	9.91	0	19:53	0.02	n8162	JUNCTION	0.02	0.02	12.22	0	00:01	0.02
n8062	JUNCTION	0.02	0.02	10.09	0	07:51	0.02	n8163	JUNCTION	0.01	0.02	12.82	0	00:00	0.02
n8063	JUNCTION	0.02	0.02	10.2	0	07:52	0.02	n8164	JUNCTION	0.01	0.02	12.97	0	00:00	0.01
n8065	JUNCTION	0.02	0.02	10.4	0	19:56	0.02	n8165	JUNCTION	0.01	0.02	13.42	0	00:00	0.01
n8066	JUNCTION	0.06	0.06	10.4	0	19:52	0.06	n8166	JUNCTION	0.01	0.02	14.13	0	00:00	0.01
n8067	JUNCTION	0.02	0.02	10.45	0	07:50	0.02	n8172	JUNCTION	0.12	0.14	8.59	0	08:00	0.14
n8068	JUNCTION	0.02	0.02	10.53	0	19:58	0.02	n8173	JUNCTION	0.01	0.01	12.05	0	20:00	0.01
n8069	JUNCTION	0.02	0.02	10.63	0	00:00	0.02	n8174	JUNCTION	0.02	0.02	12.52	0	20:00	0.02
n8070	JUNCTION	0.01	0.02	10.71	0	00:00	0.02	n8177	JUNCTION	0.02	0.02	12.56	0	08:00	0.02
n8072	JUNCTION	0.01	0.02	10.83	0	00:00	0.02	n8178	JUNCTION	0.02	0.02	13.69	0	20:00	0.02
n8074	JUNCTION	0.01	0.02	10.94	0	00:01	0.02	n8179	JUNCTION	0.02	0.02	13.8	0	20:00	0.02
n8075	JUNCTION	0.01	0.02	11.1	0	00:00	0.01	n8180	JUNCTION	0.02	0.02	13.92	0	20:00	0.02
n8076	JUNCTION	0.01	0.01	11.88	0	00:00	0.01	n8181	JUNCTION	0.02	0.02	14	0	08:00	0.02
n8077	JUNCTION	0.01	0.01	13.2	0	00:00	0.01	n8182	JUNCTION	0.02	0.02	14.12	0	08:00	0.02
n8078	JUNCTION	0.01	0.01	13.8	0	00:00	0.01	n8184	JUNCTION	0.02	0.02	14.2	0	20:00	0.02
n8103	JUNCTION	0.01	0.02	16.34	0	00:00	0.01	n8186	JUNCTION	0.02	0.02	14.25	0	00:03	0.02
n8105	JUNCTION	0.01	0.02	16.43	0	00:00	0.01	n8187	JUNCTION	0.02	0.02	14.37	0	00:03	0.02
n8106	JUNCTION	0.01	0.02	16.81	0	00:00	0.01	n8188	JUNCTION	0.02	0.02	14.54	0	00:02	0.02
n8108	JUNCTION	0.02	0.02	10.92	0	00:04	0.02	n8190	JUNCTION	0.02	0.02	14.62	0	00:01	0.02
n8109	JUNCTION	0.01	0.01	12.88	0	00:00	0.01	n8191	JUNCTION	0.01	0.01	11.4	0	00:00	0.01
n8110	JUNCTION	0.01	0.02	13.77	0	00:01	0.02	n8192	JUNCTION	0.02	0.02	11.93	0	19:59	0.02
n8111	JUNCTION	0.01	0.02	15.33	0	00:00	0.01	n8193	JUNCTION	0.02	0.02	12.61	0	08:00	0.02
n8112	JUNCTION	0.01	0.02	15.66	0	00:00	0.01	n8194	JUNCTION	0.01	0.02	13.56	0	19:59	0.02
n8114	JUNCTION	0.01	0.02	15.82	0	00:00	0.01	n8195	JUNCTION	0.01	0.02	14.48	0	19:59	0.02
n8116	JUNCTION	0.01	0.02	17.17	0	00:00	0.01	n8196	JUNCTION	0.01	0.02	14.74	0	00:00	0.02
n8136	JUNCTION	0.01	0.02	18.21	0	00:00	0.01	n8199	JUNCTION	0.01	0.02	18.14	0	00:00	0.01
n8137	JUNCTION	0.01	0.02	18.12	0	00:00	0.01	n8200	JUNCTION	0.01	0.02	18.2	0	00:00	0.01
n8156	JUNCTION	0.03	0.04	10.39	0	08:00	0.04	n8201	JUNCTION	0.32	0.83	19.01	0	16:38	0.83
n8157	JUNCTION	0.02	0.02	10.48	0	20:00	0.02	n8202	JUNCTION	0.46	1	19.01	0	16:38	1
n8158	JUNCTION	0.02	0.02	10.72	0	08:00	0.02	n8203	JUNCTION	0.01	0.01	18.03	0	00:00	0.01
n8160	JUNCTION	0.02	0.02	11.22	0	00:01	0.02	n8236	JUNCTION	0.01	0.01	17.58	0	00:00	0.01

n8237	JUNCTION	0.01	0.02	16.66	0	00:00	0.01	n11744	JUNCTION	0.02	0.02	18.42	0	00:01	0.02
n8238	JUNCTION	0.01	0.02	16.13	0	00:00	0.01	n11746	JUNCTION	0.01	0.01	19.73	0	00:00	0.01
n8240	JUNCTION	0.01	0.02	16.42	0	00:00	0.01	n11767	JUNCTION	0.11	0.13	9.17	0	08:00	0.13
n8241	JUNCTION	0.01	0.02	16.68	0	00:00	0.01	n11888	JUNCTION	0.02	0.02	9.83	0	00:04	0.02
n8242	JUNCTION	0.01	0.02	16.84	0	00:00	0.01	n11889	JUNCTION	0.01	0.02	10.77	0	00:00	0.01
n8243	JUNCTION	0.01	0.02	16.92	0	00:00	0.02	n11890	JUNCTION	0.02	0.02	11.02	0	00:03	0.02
n8244	JUNCTION	0.01	0.02	17	0	00:00	0.01	n11891	JUNCTION	0.02	0.02	11.17	0	00:02	0.02
n8245	JUNCTION	0.01	0.02	17.11	0	00:00	0.01	n11892	JUNCTION	0.01	0.02	11.28	0	00:00	0.02
n8246	JUNCTION	0.02	0.02	17.22	0	00:02	0.02	n11894	JUNCTION	0.02	0.02	11.22	0	00:01	0.02
n8247	JUNCTION	0.01	0.02	17.32	0	00:00	0.02	n11895	JUNCTION	0.01	0.02	11.34	0	00:00	0.02
n8248	JUNCTION	0.02	0.02	17.42	0	00:01	0.02	n11897	JUNCTION	0.01	0.02	11.47	0	00:00	0.02
n8249	JUNCTION	0.01	0.02	17.52	0	00:00	0.02	n11898	JUNCTION	0.01	0.02	11.56	0	00:00	0.01
n8251	JUNCTION	0.01	0.02	17.87	0	00:00	0.01	n11901	JUNCTION	0.01	0.02	11.63	0	00:00	0.01
n8254	JUNCTION	0.01	0.02	17.97	0	00:00	0.01	n11935	JUNCTION	0.06	0.08	9.48	0	07:17	0.08
n8672	JUNCTION	0.06	0.07	9.17	0	08:00	0.07	n13755	JUNCTION	0.02	0.03	6.64	0	08:00	0.03
n8674	JUNCTION	0.01	0.02	17.5	0	00:00	0.02	n13772	JUNCTION	0.1	0.13	8.95	0	08:00	0.13
n8675	JUNCTION	0.01	0.02	17.4	0	00:00	0.01	n1	JUNCTION	0.02	0.02	8.62	0	08:00	0.02
n8676	JUNCTION	0.01	0.02	16.64	0	00:00	0.01	n2	JUNCTION	0.05	0.06	9.85	0	19:44	0.06
n8677	JUNCTION	0.01	0.02	16.17	0	00:00	0.01	n3	JUNCTION	0.05	0.06	9.9	0	07:15	0.06
n8678	JUNCTION	0.01	0.02	15.43	0	00:01	0.02	n4	JUNCTION	0.03	0.04	10.05	0	07:15	0.04
n8679	JUNCTION	0.01	0.02	15.02	0	00:01	0.02	n6	JUNCTION	0.04	0.04	10.14	0	07:15	0.04
n8680	JUNCTION	0.01	0.02	14.57	0	07:58	0.02	n7	JUNCTION	0.03	0.03	10.29	0	07:12	0.03
n8681	JUNCTION	0.02	0.02	14.25	0	07:59	0.02	n8	JUNCTION	0.03	0.03	10.38	0	07:11	0.03
n8682	JUNCTION	0.02	0.02	14.04	0	19:59	0.02	n9	JUNCTION	0.02	0.03	10.48	0	19:08	0.03
n8683	JUNCTION	0.02	0.02	13.58	0	08:00	0.02	n10	JUNCTION	0.14	0.19	10.77	0	08:00	0.19
n8684	JUNCTION	0.02	0.02	13.23	0	20:00	0.02	n11	JUNCTION	0.05	0.06	10.76	0	19:59	0.06
n8685	JUNCTION	0.02	0.02	12.86	0	20:00	0.02	n12	JUNCTION	0.05	0.06	10.9	0	20:00	0.06
n8686	JUNCTION	0.02	0.02	12.72	0	20:00	0.02	n13	JUNCTION	0.05	0.06	11.07	0	08:00	0.06
n8687	JUNCTION	0.02	0.02	12.52	0	20:00	0.02	n14	JUNCTION	0.04	0.06	11.26	0	20:00	0.06
n8688	JUNCTION	0.02	0.02	12.28	0	08:00	0.02	n15	JUNCTION	0.04	0.05	11.5	0	08:00	0.05
n8689	JUNCTION	0.01	0.02	12.18	0	00:00	0.02	n16	JUNCTION	0.04	0.05	11.73	0	08:00	0.05
n8716	JUNCTION	0.01	0.02	17.71	0	00:00	0.01	n17	JUNCTION	0.04	0.05	11.8	0	19:59	0.05

n18	JUNCTION	0.03	0.04	11.97	0	07:27	0.04	n1980	STORAGE	0	0	5.5	0	10:36	0
n19	JUNCTION	0.03	0.03	12.17	0	07:26	0.03	n3751	STORAGE	0	0	10.9	0	00:00	0
n20	JUNCTION	0.02	0.02	12.48	0	07:16	0.02	n1287	STORAGE	0	0	7.7	0	00:00	0
n21	JUNCTION	0.02	0.02	12.22	0	07:16	0.02	897	STORAGE	0	0	6.2	0	00:00	0
n22	JUNCTION	0.04	0.05	11.3	0	08:00	0.05	n90	STORAGE	0	0	7.58	0	20:00	0
n23	JUNCTION	0.04	0.05	11.65	0	08:00	0.05	n124	STORAGE	0	0	7.89	0	00:00	0
n24	JUNCTION	0.04	0.04	11.94	0	20:00	0.04	n8673	STORAGE	0	0.01	8.61	0	09:00	0.01
n25	JUNCTION	0.03	0.04	12.24	0	20:00	0.04	n4928	STORAGE	0	0	9.85	0	00:00	0
n26	JUNCTION	0.05	0.06	12.26	0	08:00	0.06	n1658	STORAGE	0	0	8.99	0	00:00	0
n27	JUNCTION	0.02	0.02	12.53	0	07:08	0.02	n7426	STORAGE	0	0	10	0	00:00	0
n28	JUNCTION	0.02	0.03	12.1	0	07:11	0.03								
n29	JUNCTION	0.03	0.03	11.79	0	07:11	0.03								
n30	JUNCTION	0.03	0.04	11.56	0	07:24	0.04								
n31	JUNCTION	0.03	0.04	11.24	0	19:02	0.04								
n32	JUNCTION	0.04	0.05	11.01	0	19:05	0.05								
n33	JUNCTION	0.04	0.05	10.83	0	07:05	0.05								
n34	JUNCTION	0.05	0.06	10.66	0	07:03	0.06								
n35	JUNCTION	0.05	0.06	10.46	0	07:05	0.06								
n36	JUNCTION	0.05	0.07	10.32	0	07:06	0.07								
n37	JUNCTION	0.05	0.07	10.17	0	19:06	0.07								
n38	JUNCTION	0.05	0.07	10.07	0	19:06	0.07								
n39	JUNCTION	0.06	0.07	9.87	0	07:06	0.07								
n40	JUNCTION	0.06	0.08	9.67	0	19:13	0.08								
n41	JUNCTION	0.06	0.07	9.45	0	19:06	0.07								
n42	JUNCTION	0.06	0.08	9.18	0	07:12	0.08								
n43	JUNCTION	0.06	0.07	8.83	0	20:00	0.07								
n44	JUNCTION	0.05	0.06	11.05	0	08:00	0.06								
n45	JUNCTION	0.03	0.03	10.28	0	20:00	0.03								
n1943	OUTFALL	0	0	3	0	00:00	0								
w1	OUTFALL	0	0	5	0	00:00	0								
w2	OUTFALL	0	0	5	0	00:00	0								
n1996	STORAGE	0	0.01	3.91	0	09:14	0.01								