IMPROVEMENT OF LIQUID WASTE DISPOSAL SYSTEMS AT LA AND ENVIRONS IN ACCRA, GHANA

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Abstract. The study was to assess the provision of water and sewerage in the La Dadekotopon area in Accra, by carrying out a survey on the existing infrastructural facilities in order to ascertain the design that would substantially meet the needs of the people. This became necessary with regard to the consideration of the proposed Ghana Trade Fair development project which would raise the standards of the area to a higher cosmopolitan status. This with regard to the expectant industries and hotel accommodations of international reputes in all aspects in an area which used to be an average classification in economic terms. The research centered on the needs of the people as they may not benefit directly due to the nature of businesses that would spring up. Any amount of monies that would be accrued from property rates, etc. might not be realized by the indigenes directly and as such focus on the provision of sustainable basic needs such as water and sewerage systems could be a satisfactory reward to the community. In this regard the study considered the needs of the people in La Dadekotopon area in the design considerations to determine the parameters that can suffice their needs when the project gets completed. The study waded into existing systems in and around the La Dadekotopon area and their state of performance over the years. Conclusions were based on the consideration of the area as a whole with mixed levels of economic classifications in an area which is now on the verge of receiving a facelift due to the advancement of businesses of international reputes with a few 5-Star hotels; any meaningful and sustainable infrastructural inputs would not be feasible without such considerations in the new Ghana Trade Fair development project.
Keywords: *sustainability, running costs, operation and maintenance, economic classifications*

Introduction

La Dadekotopon area in Accra which used to be dominated by residential houses for dwellers and some few hotels has recently it has been taken up with businesses and offices. The existing Trade Fair which was managed by the Ghana Trade Fair Authority was halted and being pulled down for reconstruction of a modern business city. The Trade fair enclave before it was pulled down for the proposed new developmental activities was not used for trade fair activities only but offices and business ventures on a lower scale due to the global economic level placement of Ghana until recently. Ghana has been elevated to the medium level country and has been on several occasions rated as the fastest growing country in the world due to the discovery of oil and the rate investors are trooping in to start businesses with the Ghanaian government and business partners. Presently the area is well developed with infrastructural facilities in terms of good road network, availability of potable water, drainage and adequate electricity mains supply (Ministry of Local Government and Rural Development, 2010). Considering the area which is now receiving a facelift due to the advancement of businesses and a few 5-Star hotels, any meaningful and sustainable infrastructural installations would not be feasible without considering the new Ghana Trade Fair

project under consideration. This is because the infrastructural needs of the new project would enhance the developmental expectation for the whole La Dadekotopon area. This assertion took into consideration the running cost of the installations with regard to return on investments and O&M cost which are the main problems experienced in Ghana with the life cycle of all installations (Public Work Department, 2003).

There are existing infrastructural sewerage and water storage systems in the vicinity of the trade fair enclave. They include a dysfunctional central sewerage system (even though was being used) and adjoining sewer lines, overhead water reservoir, raw water storage and borehole installation with treatment facilities. The La Dadekotopon area township is a coastal area and as such borehole water is very saline hence avoidance of usage of the existing treatment plant for such long time rendered the facility impossible or better still would be cheaper to construct a new one than to be rehabilitated. The times and seasons used for the design also has rendered the facility unserviceable due to the cosmopolitan facelift that the La Dadekotopon area area has chalked presently and not might have foreseen since the early 1960s (UNICEF, 2016). The existing infrastructural system with regard to domestic water was for the existing facility which can be considered as undersized with regard to the new system. This means there would be the need for a completely new facility taking into consideration the acceptable standardizations to date. The new Ghana Trade Fair Development project comprises of a number of hotels, retail malls, conventional halls, water parks, warehousing, recreational grounds and various blocks of offices all to be designed with acceptable international standards for a full MEP infrastructural availability as detailed in this paper (Omani, 2021).

Infrastructural development of the Ghana Trade Fair enclave and LA Dadekotopon area

As explained in the introduction above, for any meaningful and sustainable infrastructural provision in the La Dadekotopon area vicinity to strive the new development of the Ghana Trade Fair project should be intertwined with the consideration of the needs of the whole community. This would help to facilitate an effective O&M as a result of expectant ROI. This is due to the multiplicity of facilities considered under the new development as shows in *Table 1* which would produce an economic boom never experienced in the country. Such a boom would not only benefit the La Dadekotopon community but the entire nation. In a meeting with consultants and stake holders of the La Dadekotopon community and the Ghana Trade Fair Development project on provision of infrastructural facilities such as sewage treatment, potable water, etc. it was concluded that the introduction of such facilities in the big picture, would benefit the community very much. The community should be improved in totality with the new development as a befitting reward to the land owners; the only way they could be satisfied as any monetary reward could wither away with an unimaginable speed of consumption. This is due to the depreciation of the currency with higher costs of project experienced in the sub region on yearly basis. This conclusion was based on antecedents of projects in the sub region; a project that could be budgeted successfully at a certain amount could be doubled in a matter of a year.

Table 1. *Data used to calculate water demand*.

Parcel name	Primary use	Building space (m^2)	Effective office space (m^2)	Population (frequency)	Water demand (litres)

A1	Retail Mall and Cinema	39,403	26,269	2,627	105,075
A2.1	Convention Hall – Major Exhibitions	27,506	18,337	1,834	73,349
A2.2	Convention Hall – Major Exhibition Pavilions	17,015	11,343	1,134	45,373
A2.3	Convention Hall – Parking	6,719	4,479	448	17,917
A3	Parking	7,650	5,100	510	20,400
A4	Office Space/Tech/Storage	3,600	2,400	240	9,600
A5	Storage	3,600	2,400	240	9,600
A6	Office Space/Tech/Storage	3,600	2,400	240	9,600
A7	Office Space/Tech/Storage	3,150	2,100	210	8,400
A8	Parking	7,172	4,781	478	19,125
A9	Office Space/Tech/Storage	4,725	3,150	315	12,600
A10	Hotel (220 keys) / Parking Below	11,475	7,650	191.25	19,125
B1	Technology Hub/Offices/Parking Below	4,950	3,300	330	13,200
B2	Technology Hub/Offices/Parking Below	4,950	3,300	330	13,200
B3	Cultural Centre Pavilion				
B4	“Made in Ghana” Market Pavilion	14,480	9,653	965	38,613
B5	Round Pavilion (F&B “Oasis”)				
B6	Office for GTFCL/Office Space	13,706	9,137	914	36,549
B7	Site Infrastructure Facilities/Maintenance Yard/Fire	2,925	1,950	195	7,800
C1	Hotel (150 keys) / Parking Below	3,825	2,550	63.75	6,375
C2	Office Arcade	3,705	2,470	247	9,880
C3	Office Arcade	4,539	3,026	303	12,104
C4	Parking	7,341	4,894	489	19,576
	Grand Total	196,036	130,691	12,304	504,463

Source: Joy Online Official Portal (2019).

The Mechanical and Plumbing infrastructural facilities to be installed at the Ghana Trade Fair Development project were as summarized; (1) sewage treatment facility; (2) external cold water supply and distribution; (3) fire hydrant installation and accessories; (4) waste water treatment system; and (5) storm water drainage.

Mechanical and plumbing services

Potable water: GWCL potable water

A survey carried out in 2019 showed that there were a number of GWCL water mains in the area; i.e., a 150mm diameter HDPE mains which has been laid directly in front of the Ghana Trade Fair Development area and a two 250mm diameter HDPE line along the main Accra-Tema road and the other side of the Giffard road to Burma Camp. These lines were all functional with adequate water pressure which could be relied on for effective distribution of potable water for the works expected in the redevelopment project making recycling of water from the treatment plants for domestic usage unnecessary. The cost of installation of a second degree treatment facility for liquid waste from the central station would be unnecessary as it would be expensive to operate and would not be meet an appreciable cost benefit analysis. It was agreed however to be incorporated within the development of each property instead as it would be more cost-effective for the management of the various properties that would spring up.

Potable water: Cold water installation proposal for the New Ghana Trade Fair Development

The cold water storage and distribution system proposed shall comprise of a water station with a three-in-one type underground concrete water reservoir, each tapped separately. The main purpose for this was to allow for easier maintainability, i.e. two on duty with one standby for maintenance purposes such as periodic cleaning of the tanks, servicing of control valves, foot valves, etc. The sources of water for the underground water reservoir comprised of GWCL potable water for two of the tanks whilst the third shall be from treated raw water. The water from the three storage reservoirs shall be pumped directly to the various properties through a network of distribution lines. These lines would enable the developers to access the water into their properties to be incorporated in their designs by storing adequately the capacity needed according to their scope of services expected. The main reason for the separation of the two sources of water was predominantly to allow for periodic monitoring of water quality for quick repair works or replacement of possible mal-functioning of equipment. There shall be draw-off points at vantage points to enable periodic sampling of water to be tested and analyzed. This would ensure that water for the entire facility meets the standards as per the World Health Organization (WHO). (Water monitoring, filtration and dosing system are used for the treatment system proposed for the facility).

Raw-water and reverse osmosis treatment facility

Raw water shall be pumped from a number of boreholes that would be made available through geophysical survey activities. Water from the boreholes shall be pumped into raw water reservoirs which shall be installed at the water station. Reinforced plastic type water reservoir such as Polytank type or equal and approved shall be used for harvesting the raw water. The raw water shall be channeled through reverse osmosis treatment processes with all components from an approved water treatment specialist which shall be responsible for the required water quality tests and analysis, etc. This will ensure that the water available to the property owners would attain a good water treatment installation quality as required by WHO. The treated water shall be pumped into the surface water reservoir as described in the ’Potable water: Cold water installation proposal for the New Ghana Trade Fair Development’ above. The reason for the separation of the treated raw water from the GWCL is to facilitate effective water treatment processes. This is because the GWCL water reservoir

is deemed to meet the WHO standards for potable water quality which might not require a reverse osmosis plant. Individual developers in this regard can incorporate a simpler system as described in the 'Water monitoring, filtration and dosing system' to complete their installations which could be more effective especially in monitoring and analyzing their own water management facility. In specifying the treatment plant suitable for the raw water treatment facility, samples of the water from each borehole shall be sent to the Water Research Institute (WRI) for water quality tests; the results would determine the treatment process to be adopted to acquire the results to the WHO standards.

Water station

The water station shall comprise of a three-in-one type underground concrete water reservoir as stated earlier and shall comprise the following; (1) since the pressure in the GWCL lines available is adequate, connections shall be effected directly into the underground concrete water reservoir as described above; and (2) treated water reservoir capacities shall be determined by the population expected at full load patronization of the entire facility. This is determined by the following storage data with allowance for up to 24hour interruption of mains water supply.

From the data in *Table 2*, the total floor area of office space for the whole facility apart from hotels is 148,254m². (This is derived from data from Adjaye Associates with an approximate of a third of the total space for circulation areas) An approximate area of 10m²/person (Fred and Roger, 2009) is allowed for the computation which worked out to be 14,826 persons. Applying a consumption rate of 40litres (Fred and Roger, 2009) of water per person per day for office and 100litres for residential, works out to an approximate water capacity of 600m³ per day. Each chamber of the three-in-one concrete reservoir shall be 200m³. A low lift package unit booster pump set of adequate number of standby duplicate pumps with pressure switches and control panel shall be connected to serve the various properties from which they would incorporate in their individual designs. For effective running cost, the pumps shall be solar powered with an electrically operated standby pumps to support.

***Table 2**. Loading units for various sanitary appliances.*

Building purpose	Storage/person/24 hours
WC cistern	2
Hand basins	1.5 to 3 (depending on application)
Washing machine	3
Bath (20mm diameter tap)	10
Bath (25mm diameter tap)	22
Shower	3
Sink (12mm diameter tap)	3
Sink (20mm diameter tap)	5
Dish washer	3

Source: Fred and Roger, 2009.

Water monitoring, filtration and dosing system

The cold water shall be channeled through package cold water filtration and dosing system, ISO 9001 compliant; Member of Water Quality Association, WQA, BBB Mark of Integrity, PWQA Member of Pacific Water Quality Association, to produce water quality to meet the WHO requirements before connecting to the distribution pipes to the

various properties. The treatment processes shall comprise of the following features; (1) goulds/xylem booster feed pump; (2) zeolite filter media for removal of particles and sediments; (3) reverse osmosis system with anti scalant dosing unit, filter bag housing, fibergrass membrane housing 450 PSI, Vertical multi stage stainless steel booster pump, clean-in-place ports, permeate sample ports, with S150 or S200 computer control panel, feed solenoid valve and feed low pressure switch; (4) calcite filter for mineralization or pH neutralization; and (5) UV system for water disinfection to point of use.

Water distribution

The data on the various buildings as in *Table 3* below was used to determine the capacity of potable water required for the various structures. Having determined the total water demand for the entire area which would be stored as per in 'Water station', the distribution to the various areas would be done by the booster pumps with pressure switches as stated earlier. The pumps shall be fed from the water reservoirs to the various properties by automation with level switches and control valves. The pump start-up pressure switches shall trigger when pressure drops in the lines according to the setup in the system with control panels, etc. all to be installed at the water station. The property owners would then have to tap from the main distribution lines into their properties. This would be made feasible with the pipe sizes that would be determined according to the demand per each property using the flow rate against the demand and loading unit's formula; also applying the Reynolds Number as well as the determination of friction factors in the materials adopted for transportation of fluids, etc., as stated by Fred and Roger (2009). This formula was used to size the pumps taking into consideration the friction losses to determine the pump head.

***Table 3**. Water storage capacities culled.*

Building purpose	Storage/person/24 hours
Department store with canteen	45 litres
Department store without canteen	40 litres
Dwellings	90 litres
Hotel	135 litres
Medical accomodation	115 litres
Office with canteen	45 litres
Office without canteen	40 litres
Public toilets	15 litres
Restaurants	15 litres (per meal)

Source: Fred and Roger (2009).

Fire hydrants

By law, the Ghana National Fire Service (GNFS) shall be responsible for all approvals concerning fire-fighting installations especially within the Ghana Trade Fair Development enclave. With regard to infrastructural works there shall be several Fire hydrants to BS specifications which shall consist of the Wet/Pillar type fire hydrants installed at various positions which would allow for easy infilling of water into fire tenders in times of firefighting. In addition to the wet type fire hydrants there shall be fire hydrant accessories box installed preferably by each hydrant with inscription "FIRE HYDRANT ACCESSORIES".

The fire-fighting connections to all structures in the area shall take their source of water from the Ghana Water Company Limited, (GWCL) cold water main lines. This is due to the fact that each developer shall have their own internal fire-fighting installations to the National Fire Protection Association, (NFPA) requirements as per the type of development they intend to construct. The other reason also is with respect to the fact that the requirements differ from each other. The individual developer however shall be permitted to adopt the system which shall operate as permitted by the NFPA specifications and/or to international standards subject to the approval by the Ghana National Fire Service (GNFS) as required by law. Fire-fighting accessories in multi-storey car parks, etc. shall be equipped with foam tank and ancillary which would be connected to the main firefighting system.

Sewage systems

Existing wastewater treatment system

The sewerage disposal for the existing Ghana International Trade Fair is central sewerage system where all black water from the various buildings are channeled into a Trickling Filter system comprising of a large open concrete tank with pumping stations for the various stages of treatment processes. The system is however damaged and greatly causes inconvenience to passersby. As a result, the system needs to be replaced as it is still being used in its dysfunctional condition. The type of sewerage system used at the Labone Estates area which is an adjoining suburb to La Dadekotopon was Activated Sludge which was also in a state of disrepair. The maintenance of the facility was managed by Public Works Department (PWD). Burma Camp was also facing similar situation as the existing Trickling System needed complete replacement. The maintenance of the facility was managed by Public Works Department (PWD). The initially designed and constructed sewage treatment system for the Accra Mall was affected by the Spintex Road development and had to be relocated to an area which was not initially demarcated for such purpose. Investigations made on the new system which was an activated sludge type showed that it had been facing frequent breakdowns especially when the facility is heavily patronized during festivities.

The facility comprised of a holding tank from which the pre-treated effluent is pumped into an activated sludge chamber where the biological oxygen demand (BOD) is attained for discharge into the main drain. From the total area capacity of 20,000m² a total staff population can be estimated at 2000. The sewerage generated from 2000 estimated at 10gallons/person/day works out to 90m³/day. For a total of 18,000 revelers and shoppers daily, the total volume of wastewater usage at 4gallons/person/day works out to $90m^3 + 72m^3 = 162m^3$ at peak season which includes Boxing Day, etc. The Package Plant system installed at the Labadi Beach Hotel was functional and managed by the hotel technical staff. The Kofi Annan Peace Keeping area was equipped with a Package Plant comprising of the bioreactor system of several units in the ground combined with phosphate removal of pathogens. This facility was functioning and recommended for the new works. The maintenance was carried out by the installers who signed an after-installation maintenance contract with the client.

Materials and Method

Observations

The systems as narrated above were existing liquid wastewater treatment facilities in immediate surrounding areas to the Trade Fair Development project vicinity. In designing the new system, a cue had been taken from the occurrences and operational difficulties they undergo to create an-environ for an effective completion and functionality in an acceptable manner. It was also observed that the systems that were maintained by the privately owned properties were functional. The others maintained by the Public Works Department (PWD) were all broken down and in various states of disrepair. This would however be overcome on this project as the main component that enables the facility to run successfully, which is "Operation and Maintenance" (O&M) would not be compromised. Items such as grease interceptors, individual sewerage systems from the developers and other installations which would be required from the various developers would be vetted to ascertain their effectiveness before approvals are given. In this regard the problems identified from the liquid waste disposal systems with the immediate surrounding areas would not be evident on the new development.

Results and Discussion

Design consideration for the new system

The sewer system proposed for the new Ghana Trade Fair Development project shall be in two folds; i.e. the soil water from water closets and urinal systems; the second fold is the waste water from baths, showers, wash hand basins, etc. The separation of the foul sewerage system from waste water from wash hand basins and showers is purposely to reduce the volumes of wastes and render the treatment plants more efficient. Also to connect the waste water into the main sewerage systems, there shall be the introduction of grease traps adequately sized to overcome the possibility of waxing of oil/grease in the sewer lines in order to create free flowing of wastewater in the sewer lines. Developers would be advised to take this into consideration within their properties as any consideration other than this would have a negative effect on the main central sewerage system. The location of the new sewerage treatment plant is at the Service Yard area which happened to be the lowest terrain. The Chezy's formula and the Crimp and Bruges Formula were applied in arriving at a most effective design of the sewerage system in the determination of the inlets and outflow levels. These were used to determine the flows in the pipelines with approximate number of sanitary appliances with the demand at peak loads. They were considered with their corresponding simultaneous demand units, etc.

Design flow rates

From an estimated daily employee and staff population of 15,000 persons as determined in *Table 1*, the Typical wastewater flow rates from commercial sources (USA EPA) (*Table 1* and *Table 2*) gives an average wastewater delivery of between 8-15 gallons/person/day. Taking an average of 10 gallons/person/day, the wastewater expected is approximately 675m³/day for employee and staff population. An estimation of 60,000 revelers and shoppers per day is made based on Accra Mall's experience. Applying the same consumption of 4gallons/person/day the total capacity generated by revelers and shoppers is 1080m³/day. The total capacity expected for the new Ghana Trade Fair Development project can be estimated at 1,600m³/day.

To facilitate an effective and successful sewage treatment process for the new Ghana Trade Fair Development project, a policy shall be advocated to allow each developer to treat their own wastewater before connecting into the main central sewer. This means that the wastewater from each property shall meet the GSA/EPA requirements to be disposed of into public drains. However, the treated effluent shall undergo a secondary treatment to ascertain an effective treated water quality in case of failure from the internal treatment facilities from the property owners. In this regard the capacity of the main sewerage system requires a scaling down of the wastewater delivery. This is scaled down to half of the total capacity generated which works out to 800m³/day. The central sewer lines for all waste water shall be directed into the sewage treatment plant as described above. All kitchen waste waters would be equipped with a grease trap adequately sized to the rate of discharge of kitchen wastewater in each property to allow for free flow from oil wax. Degreasing shall be made possible with prefabricated concrete/GRP grease traps before connecting into the external wastewater disposal network. Wastewater capacities shall be determined according to the flow and loading unit specifications of each sanitary appliance, kitchen and laundry equipment as per *Table 4*.

Table 4. *Flow rate for various sanitary appliances.*

Building purpose	Storage/person/24 hours
WC cistern	0.11
Hand basins	0.15
Hand basins (spray type)	0.03
Bath (20mm diameter tap)	0.30
Bath (25mm diameter tap)	0.60
Shower	0.11
Sink (12mm diameter tap)	0.19
Sink (20mm diameter tap)	0.30
Sink (25mm diameter tap)	0.40

Source: Fred and Roger (2009).

Biological sewage treatment plant for 800m^3/day

The proposed project is to provide a centralized sewerage treatment plant for the new Ghana Trade Fair Development to meet the GSA/EPA requirements. The facility is designed for a maximum hydraulic load of 800m^3/day (In the 'Design flow rates' for details). As all liquid waste shall be treated to the desired effluent acceptable by the Ghana Standards Authority (GSA) and EPA, the secondary treatment would be adequate to forestall possible failures from developers and property owners during operation of the facilities as mentioned earlier. The wastewater treatment plant will comprise of biological wastewater treatment based on pre-treatment in the form of a settling tank with screen/grease separated for the hotel and other grease generated wastewater, the Biokube Bioreactor 600 units (in ground) combined with phosphate removal unit as optional unit (*Table 5* to *Table 7*). The post treatment (tertiary treatment) is in the form of ultra-violet radiation for removal of pathogens. There will be geo-tube bag unit for sludge treatment. Treated effluent and sludge will then be reused for horticulture purposes within the enclave. In addition to the above, periodic maintenance shall be proposed to the facility management to overcome the experiences of the surrounding areas with their sewage plants in states of disrepair as described in 'Design flow rates'.

Table 5*. Inlet design criteria: Incoming wastewater is assumed to be standard domestic waste water only.*

Inlet design criteria	Frequency
Average water flow (m^3/day)	800
BOD_5 (mg/l)	300
COD (mg/l)	600
pH (e.g. 6-8)	6-8
TSS (mg/l)	350
Phosphate (mg/l)	15
Nitrate-Nitrogen (mg/l)	20
Faecal coliform (cfu/100ml)	200
Total coliform (cfu/100ml)	800

Table 6*. Outlet demand: based on the water inlet characteristics.*

Outlet demands	Frequency
BOD_5 (mg/l)	25
COD (mg/l)	125
pH (e.g. 6-8)	6-8
TSS (mg/l)	50
Turbidity (NTU)	<75
Ammonia-Nitrogen (mg/l)	1
Phosphate (mg/l)	1.5
Nitrate-Nitrogen (mg/l)	<50
Faecal coliform (cfu/100ml)	10-100
Total coliform (cfu/100ml)	400

Table 7*. Type of plant and sludge treatment.*

Type of plant	New system
Preferred installation place	In ground
Sludge treatment	Polymer and geotube

Policy formulation with regard to individual liquid waste treatment systems

Individual developers shall be required to include in their designs their own liquid waste treatment systems to produce treated effluent that would be acceptable by the Ghana Standards Authority, (GSA) and Environmental Protection Authority (EPA) before transferring into the main central sewage system. They would also be encouraged to adopt a strategy to allow for recycling of treated wastewater to a large extent within their properties. This would improve the management of the liquid waste disposal system. It would also reduce the pressure on the overall liquid waste treatment system which will serve as a back-up to ensure that clean water is attained at all times. Wastewater from grease prone areas such as Kitchen and Laundry areas shall be treated with an adequately sized grease interceptor which shall receive approval from the authorities before transferring into the central sewage system as explained earlier. This will prevent oil from waxing in the sewer lines and create free flow of wastewater into the treatment systems.

Sewage treatment capacity for the La Dadekotopon community

The inclusion of the La Dadektopon community as determined by the stakeholders as described earlier in this report would incorporate the connection of the Ghana Trade Fair Development sewerage system into the main treatment facility across the back by-pass to the location of the existing malfunctioning and dilapidated treatment plant. This is purposely to aid the Operation and Maintenance (O&M) aspect of the treatment system which has been found to be the main albatross of the sewage treatment system in the sub-region (Wang et al., 2014). The existing systems as mentioned in 'Design flow rates' also gives detailed account of the facilities in the vicinity and surrounding areas where the ones managed by the government agencies were all broken down; some few requiring complete replacement.

The stakeholders came to conclude that the combination of the Trade Fair development and the La Dadekotopon community would be more economically viable for the whole township holistically. The population of the trade fair development which includes all the activities as in *Table 1* shows clearly that the capacity of 1600m³/day could satisfy the whole area taking into consideration the policy to be put in place where each developer is to include a sewage treatment system which would project the main sewage plant as a secondary treatment system. This because the population of the whole of La Dadekotopon is 183,528 with the following age distribution: 0-14 years 54,142; 15-64 years, 122,295; 65years and over, 7,091. The above statistical data is from Labone Express which gave a brief history on La Dadekotopon (Ghana Statistical Service, 2013). This consist of 10 electoral areas however the areas that would be capable of considering would be only a half of the total area.

The Burma Camp, Cantonments and Labone areas have their own facility even though not in good condition but can be replaced. This means the capacity of 1600m³/day could be sufficed with a safety factor of 20% which could be rounded to 2000m³/day. This means that with the 800 already pre-treated from the new development, the 1600m³/day could be sufficient to serve the rest of the community. The Trade Fair development project would be the beneficiary of the treated water as they could be channelled into landscape activities. The horticultural work has been found to be massive which would not be economically prudent to use any other medium for maintaining the plants. This would be made feasible with umps and agricultural drainage facilities designed to suit

Landscape maintenance

The treated effluent from the liquid waste treatment system would be channeled into landscape usage with pumps and agricultural drainage system as volumes of treated wastewater would be realized and would be of value. The volume of water to be realized from the sewerage system as described in 'Design flow rates' is approximately 800 m³ per day. The total volume of the 4No reinforced plastic reservoirs; i.e. Polytank type water reservoir works out to be 120m³. This means that there would be excess water overflowing which would be connected into the immediate landscape activities in the surrounding areas of the service yard. This would be flowing gravitationally depending on the landscape Architects details. The system would comprise of the underground agricultural drainage system with perforated piping and would be detailed to suit the Landscape Architect's designs. From the design as above, there would be enough water for landscape activities as the far and near horticultural works would be maintained by the automatic activation of the pump sets as shall be desired.

Conclusion

This paper has been necessary as it highlights the need for the formation of a project management team to incorporate all stakeholders as explained by Berman et al. (1999) who proposed that the strategic goals set by senior management will be determined by a need to protect and promote the interests of the stakeholders. The La Dadekotopon suburb of Accra which has been a community dwelling area with all categories of people majority unemployed and find it very difficult to lay hands on job opportunities would gain much when included in the stakholdership as explained. The PMBOK Guide emphasizes the importance of stakeholder relationships in projects of which "involvement may include final decision on whether or not a discovery is a best practice" (Kerzner, 2010). Kirsty and Smith (2012) also concluded that "principles of stakeholder relationship management guide how the organization formulates its corporate strategy and strategy in turn has some influence on financial performance". This in a long way would be in the interest of the project management team as it would enhance project performance and minimize financial risks. When all parties are satisfied in the project delivery, it helps to minimize or to avoid conflicts. There may be very minor disagreements for that matter especially when it comes to physical benefts which have been explained in this paper that the benefits in the inclusion of the community's interests in the provision of infrastructure would outweigh immediate monetary gains. It enhances the perforamance of their health environment positively and also good access to potable water, sewerage systems; a condition that all communities would crave for. Communication is the best tool for risk avoidance when planned well; its importance in project management cannot be overemphasized. "Even a well-scheduled and well funded project can fail in the hands of a hard-working team of experts due to lack of proper communication." (Freeman et al., 2010).

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Conflict of interest

The researcher engaged all parties involved in the study and can conclude that the information as per the report are authentic and without any conflict of interest.

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