

Inter-American Development Bank

Environmental and Social Analysis

Urban Upgrading and Revitalization Program



IVAN LAUGHLIN
HUMAN SETTLEMENT CONSULTANT AND PRACTITIONER
LAND SURVEYOR

P O Box 1112 (2B Alexandra Street, St. Clair), Port of Spain, Trinidad and Tobago, W. I
Tel: (868) 6286682, Fax: 628-4047, E mail – ivan.laughlin@gmail.com

TABLE OF CONTENTS

1. INTRODUCTION	5
1.1. PROJECT DESCRIPTION.....	5
1.1.1. Objectives	5
1.1.2. Urban Upgrading and Serviced-Sites.....	5
1.2. SCHEDULE OF DELIVERABLES	6
2. LEGAL, REGULATORY AND POLICY FRAMEWORK.....	10
2.1. NATIONAL SPATIAL DEVELOPMENT STRATEGY	10
2.2. TOWN AND COUNTRY PLANNING ACT – CHAPTER 35:01	10
2.3. HILLSIDE DEVELOPMENT POLICY 2010.....	10
2.4. MUNICIPALITY OF DIEGO MARTIN, LOCAL AREA ECONOMIC PROFILE.....	11
2.5. THE SANGRE GRANDE REGIONAL MUNICIPALITY DEVELOPMENT PLAN 2010-2020	12
2.6. State Land (Regularization of Tenure) Act Chapter 57:05.....	13
2.7. Guide to Developers and Applicants for Planning Permission	13
2.8. Environmental Management Act, 2000.....	13
3. FACTORY ROAD	15
3.1. LOCATION.....	15
3.2. DATA ANALYSIS.....	16
3.3. SITE RECONNAISSANCE	16
3.3.1. Land Usages.....	17
3.3.2. Environmental and Social Issues	18
3.4. Development Challenges and Potential Remedies.....	25
3.5. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS.....	26
4. SAHADEEN TRACE	28
4.1. LOCATION.....	28
4.2. DATA ANALYSIS.....	30
4.3. SITE RECONNAISSANCE	36
4.3.1. Land Usages.....	36
4.3.2. Environmental and Social Issues	37
4.4. Developmental Challenges and Potential Remedies.....	41
4.5. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS.....	42
5. BOIS BANDE – SETTLEMENT C	44

5.1. LOCATION	44
5.2. DATA ANALYSIS.....	45
5.3. SITE RECONNAISSANCE	52
5.3.1. Land Usages.....	52
5.3.2. Environmental and Social issues	53
5.3.3. Developmental Challenges and Potential Remedies.....	57
5.3.4. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS	57
6. POTENTIAL ADVERSE SOCIAL AND ENVIRONMENTAL IMPACTS OF THE THREE PROJECTS	59

LIST OF ABBREVIATIONS

CEC	Certificate of Environmental Clearance
CEPEP	Community-based Environmental Protection and Enhancement Programme
EMA	Environmental Management Authority
e TECK	Evolving TecKnologies and Enterprise Development Company Limited
IDB	Inter-American Development Bank
LSA	Land Settlement Agency
NIDCO	National Infrastructure Development Company Limited
T&TEC	Trinidad and Tobago Electricity Commission
TTPS	Trinidad and Tobago Police Service
WASA	Water and Sewerage Authority

1. INTRODUCTION

By Contract dated 11th June, 2019, the IDB employed Ivan Laughlin to undertake the consultancy services related to the **Urban Upgrading and Revitalization Program for Trinidad and Tobago – TT-L1156**.

1.1. PROJECT DESCRIPTION

The Government of Trinidad and Tobago (the Government) requested a Loan for an Urban Upgrading and Revitalization Program with an amount of US\$50 million. While the operation will finance a needed extension of informal settlement upgrading and affordable housing programs implemented under the recently concluded Neighbourhood Upgrading Program - NUP (2469/OC-TT), this new loan, the fourth successive IDB-financed operation, will prioritize upgrading in the main urbanized corridors and also contribute to the revitalization of urban centers, as part of a strategy to foster a pattern of more sustainable built development.

1.1.1. Objectives

The general objective is to improve the quality of life of low-income households and to increase the vitality of urban areas. The specific objectives include: (i) improve the habitability and land tenure security in informal settlements on State-owned lands; (ii) enhance housing conditions for low-income households; (iii) improve the use of urban public spaces; and (iv) strengthen the capacity of supply-side stakeholders to satisfy effective housing demand and urban development needs. The first program components is:

1.1.2. Urban Upgrading and Serviced-Sites

Consistent with the policy of successive governments over the last two decades facilitating the in-situ regularizing of informal settlements and creation of serviced plots on State lands, this Component will finance the regularization of squatter settlements on State-owned lands and the servicing of well-located greenfield sites, with a focus on the main urban corridors in both Trinidad and Tobago. This Component will be executed as a Multiple Works Program (MWP). Specific investments will include:

- i. construction or upgrading of resilient site infrastructure, including drainage systems, waste-water management systems, road and accessibility systems, streetlights, potable water supply, fire-hydrants and the construction or upgrading of social infrastructure, such as community centers and recreational facilities, when appropriate;
- ii. solid-waste management, including a circular economy approach to improve efficiency and reduce waste;
- iii. regularization of electricity supply, and
- iv. community engagement and skills development activities, inspired by existing human capital development programs. Infrastructure will be designed to cope with anticipated climate change effects and will be earthquake resistant. As in the NUP, resettlement and displacement will be avoided wherever possible in the design and execution of upgrading activities. Wherever feasible, Component 1 will also include tenure regularization activities, under the provisions of Act 25 of 1998 which facilitates a three-step (Certificate of Comfort, 30-year Statutory Lease and 199year Deed of Lease) incremental approach that is less vulnerable to gentrification than traditional titling. However, in the greater POS area, where the preconditions for tenure regularization are too onerous to achieve in the short-term, and where tenure insecurity is perceived to be low, tenure regularization is less likely to be pursued under this operation. The multiple works sample for this component will likely include sites in the highly urbanized East-West corridor including Sangre Grande which saw very significant population growth between the last two

censuses, Wallerfield, and Diego Martin which is home to some of the largest informal settlements. In all these cases, preconstruction activities are already advanced.

1.2. SCHEDULE OF DELIVERABLES

This Report is the second Deliverable, referred to as **Product 2** in the Terms of Reference (TOR). The Figure below provides an update on the timeline for completion of each component of the Program.

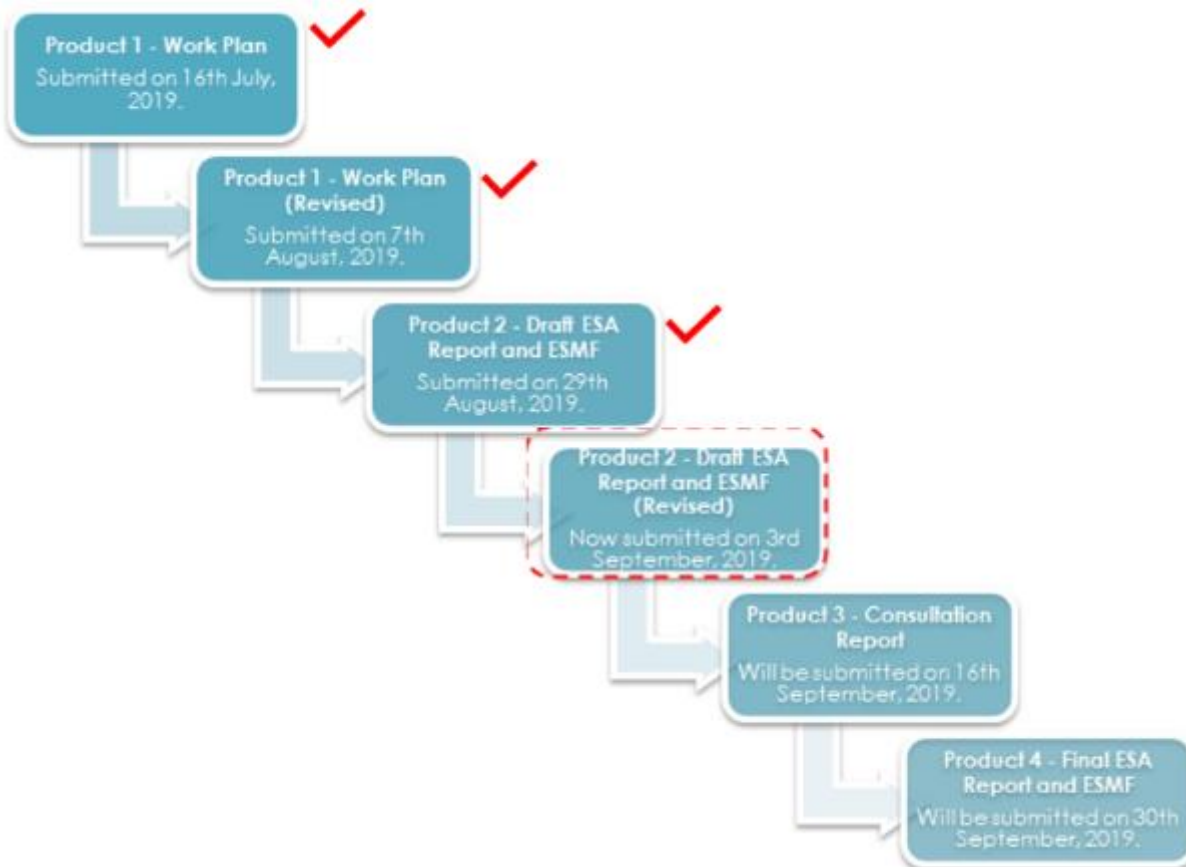


Figure 1. Timeline for Completion of Deliverables

As stated in the **Work Plan (Product 1 - Revised)**, the three (3) settlements proposed by the Ministry of Housing of Urban Development for the representative sample of Component 1 of the **Urban Upgrading and Revitalization Program** in Trinidad and Tobago are:

- Factory Road, Diego Martin;
- Sahadeen Trace, Vega de Oropouche, Sangre Grande;
- Bois Bande – Settlement C, Sangre Grande.



Figure 2. The Three Settlements, Trinidad



Figure 3. The Three Settlements, Trinidad

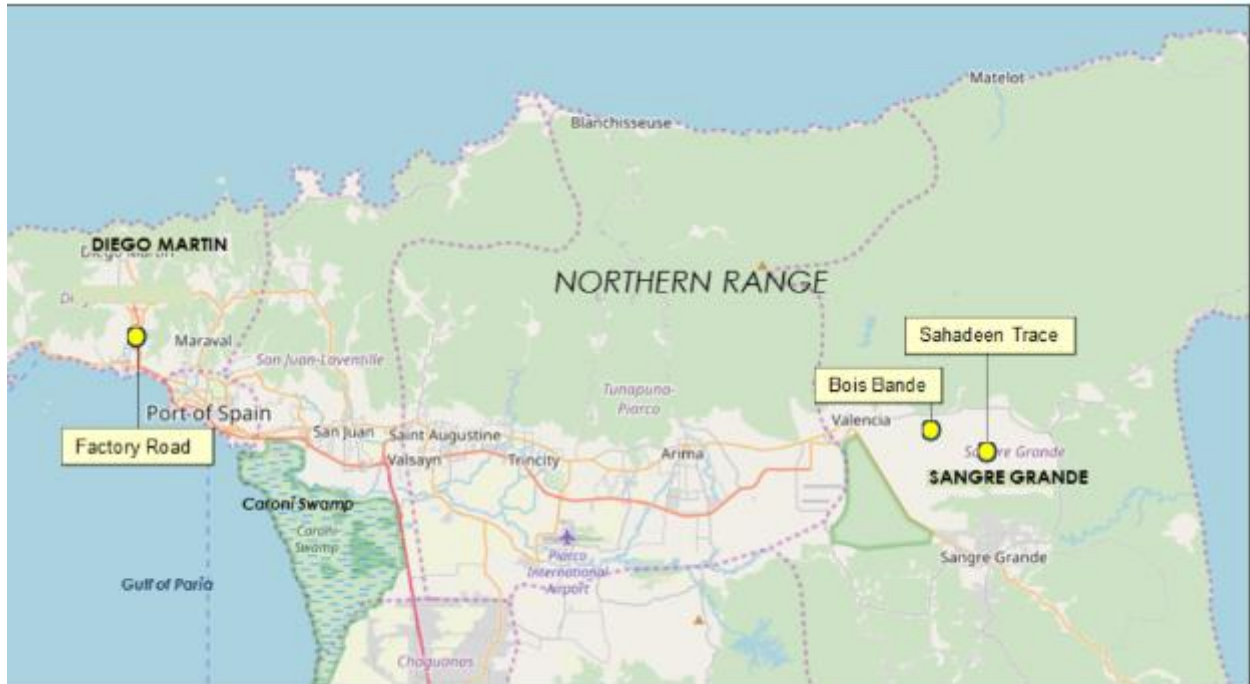


Figure 4. The Three Settlements, Trinidad

2. LEGAL, REGULATORY AND POLICY FRAMEWORK

The policies that were determined as relevant guides for this project are listed as follows:

- National Spatial Development Strategy for Trinidad and Tobago
- Town and Country Planning Act - Chapter 35:01
- Hillside Development Policy, 2010
- Diego Martin Local Area Economic Profile
- The Sangre Grande Regional Municipality Development Plan, 2010 - 2020
- State Land (Regularization of Tenure) Act - Chapter 57:05
- Guide to Developers and Applicants for Planning Permission
- Environmental Management Act – Chapter 35:05

2.1. NATIONAL SPATIAL DEVELOPMENT STRATEGY

The National Spatial Development Strategy (NSDS) represents the most recent national spatial planning policy document and provides the framework for decisions about the ways the national space will be used and developed over the decade (2013-2023) and beyond.

The NSDS adopts a spatial development strategy of “Harmonised Regional Development” which is designed to facilitate sustainable and equitable levels of economic prosperity and employment and diversification of the economy away from dependence on hydrocarbon-based sectors.

The NSDS includes policy measures to improve conditions for squatters. In particular, it has been recommended that “scheduled squatter sites, which are appropriately located, should be upgraded to ensure that residents have access to acceptable standards of basic infrastructure”. Also, suitable land should be allocated for the relocation of any squatter community currently in an inappropriate location. In that regard, the NSDS recommends that priority should be given to the use of land within defined settlement limits, over the use of Greenfield land, for the purpose of squatter relocation.

According to the NSDS, there is a need to promote more sustainable use of land within existing developed areas and restrict further urban expansion, especially on productive and potentially productive agricultural land.

2.2. TOWN AND COUNTRY PLANNING ACT – CHAPTER 35:01

This Act makes provision for the following:

- orderly and progressive development of land in both urban and rural areas and to preserve and improve the amenities thereof;
- for the grant of permission to develop land and for other powers of control over the use of land;
- to confer additional powers in respect of the acquisition and development of land for planning; and for purposes connected with the matters aforesaid.

2.3. HILLSIDE DEVELOPMENT POLICY 2010

The main objective of this policy is to conserve green hillsides, protect and if needed restore their natural value for the benefit of the environment, the tourist industry and quality of life. Some of the conditions of the hillside policy include, allocation of land usages to agriculture at various intensities for all areas occurring between the 91-213m contours with suitable gradients.

Development outside of the recommended policy that has been approved and built will be retained but not expanded. Unauthorized development outside the policy must be evaluated and a determination made as to whether it will be regularized in-situ or relocated. This will be guided by health, safety and environmental considerations.

Site-specific development standards, based on the guidelines of the policy above, will be designed and instituted through the development of Local Area Plans and the designation of individualized standards catering for the needs of that particular area.

2.4. MUNICIPALITY OF DIEGO MARTIN, LOCAL AREA ECONOMIC PROFILE



Figure 5. Location of the Diego Martin Regional Corporation

This Development Plan was devised by Kairi Consultants Limited for the Ministry of Rural Development and Local Government. The draft Micro and Small Enterprise (MSE) Policy for Trinidad and Tobago defines small enterprises as three (3) categories – mini-micro, micro and small businesses.

The Policy provides directives for the registration of MSEs with the Ministry of Labour and Small Enterprise Development (MOLSED); mechanisms for financing; and incentive regimes to encourage entrepreneurship and innovation. It also focuses on certain types of business development and support services such as mechanisms that promote the registration of support services; public-private partnerships, the establishment of standards.

The Policy also recognizes that MSEs and cooperatives can play a major role in social empowerment, poverty alleviation, and social transformation. To this end, one of the directives of the Policy is in the area of Social Empowerment and Inclusion which places emphasis on the participation of women, youth and the disabled in MSE development. The Policy calls for the creation of women's business mentoring networks and partnering of MOLSED with 'groups that address the particular needs of women entrepreneurs.' Such networks are seen as a means of 'measuring the performance of women entrepreneurs and provide a platform for the discussion on the trends, prospects and challenges encountered by women entrepreneurs in the business environment.'

Moreover, furthering youth enterprise development includes actions such as mainstreaming of youth in the IBIS (National Integrated Business Incubator System), FairShare, and other existing youth enterprise development programmes and collaborating with existing youth business stimulation programmes such as Youth Business Trinidad and Tobago (YBTT).

Given Trinidad and Tobago's drive toward a more sustainable economy, the MOLSED has developed the Green Enterprise Development Policy for Micro and Small Enterprises and

Cooperatives. One of the strategies recognizes and focuses on measures that would create green MSEs to facilitate and assist greening of specific industries, namely Agriculture, Construction, Creative Industries and Fashion, Energy, Tourism and Waste management. One of the key mechanisms proposed in the policy is the establishment of an Enterprise Investment Fund (EIF) managed by the MOLSED.

2.5. THE SANGRE GRANDE REGIONAL MUNICIPALITY DEVELOPMENT PLAN 2010-2020

Figure 6. Location of the Sangre Grande Regional Corporation



This Development Plan was devised by Kairi Consultants Limited on behalf of the Sangre Grande Regional Corporation. The Plan investigates how the Sangre Grande Region affects and is affected by the other municipalities. The plan aims to create a better quality of life socially by improving infrastructural services, fostering sustainable agriculture and increasing economic development. Through the Integrated Development Planning process the future development process is to support balanced growth across the different sub-regions of the Municipality.

The Sangre Grande Development Plan contains policies that would shape the spatial development of the Municipality. Some of these are pertinent to the **Urban Upgrading and Revitalization Program** in the Sahadeen and Bois Bande (Settlement C) Settlements. They are listed as follows:

- Continued residential development to support the potential for population growth within Valencia, Sangre Grande Proper, Greater Sangre Grande and Cumuto.
- Small resort/ecotourism development in the Northeast, East and Southern sections of the Municipality
- Development of agro and fish processing industries in the Greater Sangre Grande area.
- Upgrading of the town of Sangre Grande to act as the Municipal Centre.
- Upgrading and development of the open and green spaces within the Municipality

- Protecting key conservation areas.
- Upgrading and improving the social and physical infrastructure services throughout the Municipality.

2.6. State Land (Regularization of Tenure) Act Chapter 57:05

An Act to protect certain squatters from ejectment from State Land, to facilitate the acquisition of leasehold titles by both squatters and tenants in designated areas and to provide for the establishment of land settlement areas.

2.7. Guide to Developers and Applicants for Planning Permission

The Guide to Developers and Applicants for Planning Permission is an important step in the process of facilitating the physical planning, design and development of projects. The Guide to Developers is published to give information and advice to professionals and technicians in the field of development on the laws, regulations and requirements for all types of development. It is hoped that the use of this guide by applicants and prospective developers will expedite development and contribute to better project planning and design and to a general improvement of the physical environment.

2.8. Environmental Management Act, 2000

An act to repeat and re-enact the environmental management act 1995 and to validate all acts and things done thereunder. The Government of the Republic of Trinidad and Tobago is committed to developing a national strategy for sustainable development being the balance of economic growth with environmentally sound practices, in order to enhance the quality of life and meet the needs of the present and future generations.

THE SETTLEMENTS

3. FACTORY ROAD

3.1. LOCATION

The Factory Road Settlement is a squatter hillside development located in the Diego Martin Valley, an intensely urbanized region on the western periphery of Port of Spain (see **Figures 7 and 8**). The Settlement comprises approximately 38ha (94 acres) and consists of an estimated 291 households. The Diego Martin River is a key feature in north-western Trinidad. It runs along the centre of the Diego Martin Valley, through the Diamond Vale Settlement to the Gulf of Paria.

Factory Road is located on the hillside to the north and west of the e Teck Industrial Park. It should be noted that e Teck is a State Agency focused on the growth of businesses in the non-oil and gas sector. It provides innovative and sustainable real estate solutions to Park tenants, shareholders and the wider society.

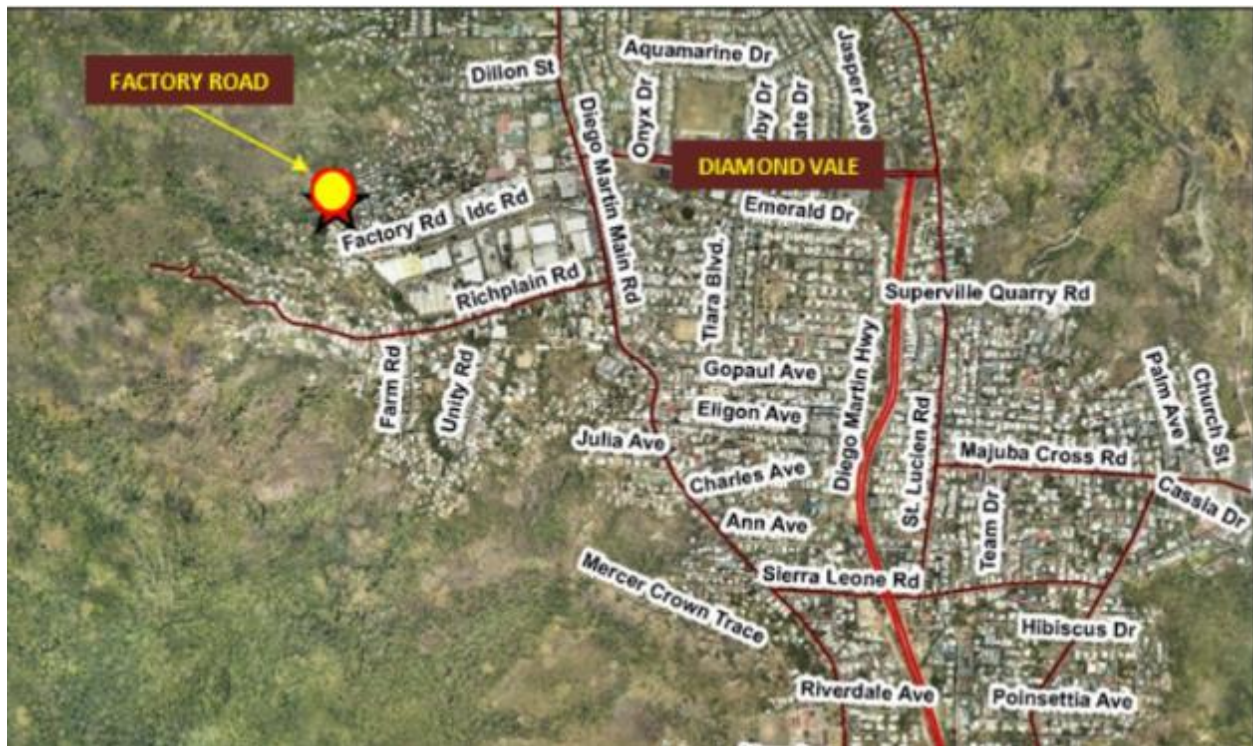


Figure 7. Factory Road, Diego Martin (Land Settlement Agency, 2019)

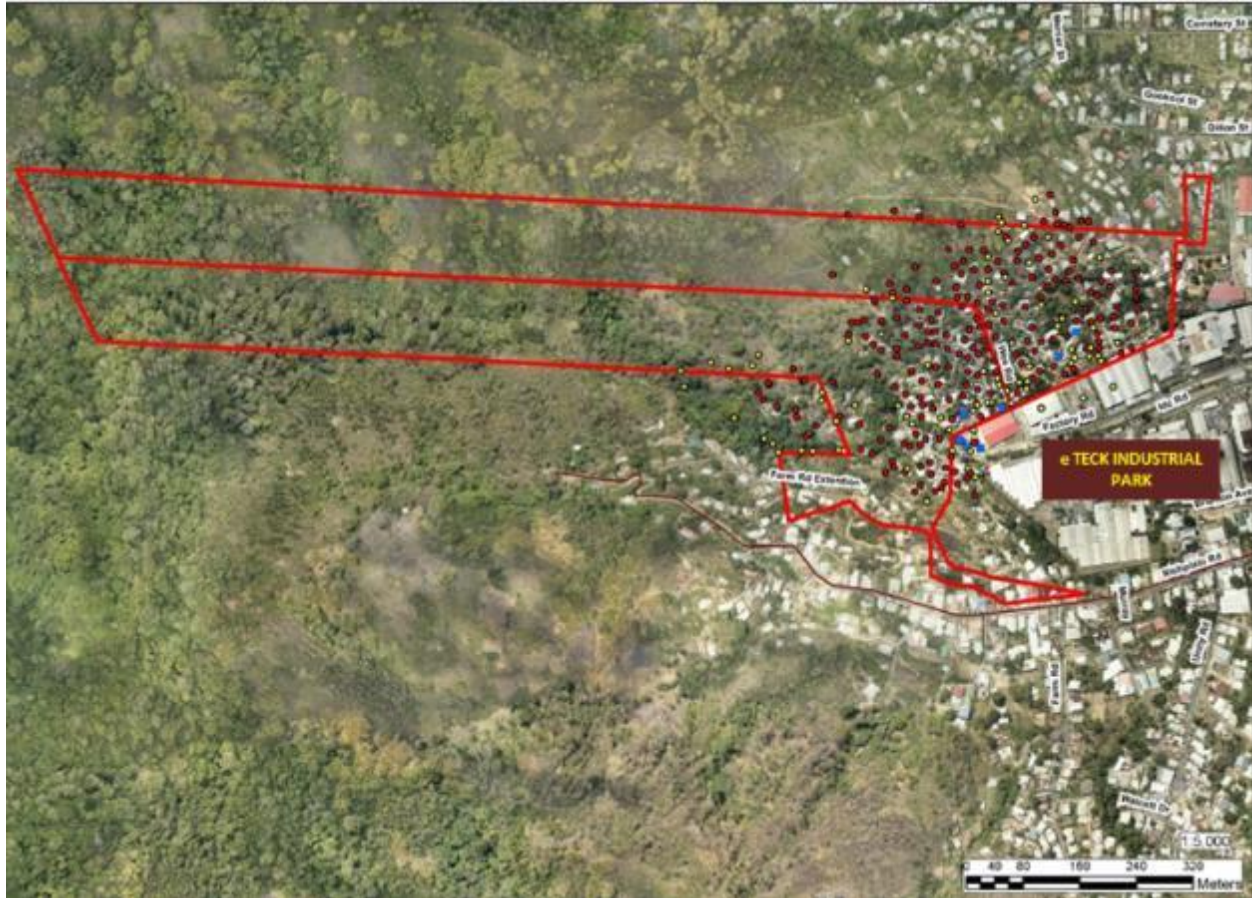


Figure 8. Factory Road, Diego Martin, Trinidad (Land Settlement Agency, 2019)

3.2. DATA ANALYSIS

The LSA is currently in the process of collecting socio-economic data from the Factory Road Settlement. As such, **no data analysis can be done at this time.**

3.3. SITE RECONNAISSANCE

On Wednesday 26th June, 2019 and Friday 26th July, 2019, site visits were done to determine the existing conditions of the site. Land usages, environmental issues and social issues were observed. From the Factory Road Settlement, the Diego Martin Valley is clearly visible. The Industrial Park and Northern Range can be seen in **Figure 9**.



Figure 9. View of the Diego Martin Valley from Factory Road

3.3.1. Land Usages

The main land usages observed in Factory Road are listed in **Figure 10** below.

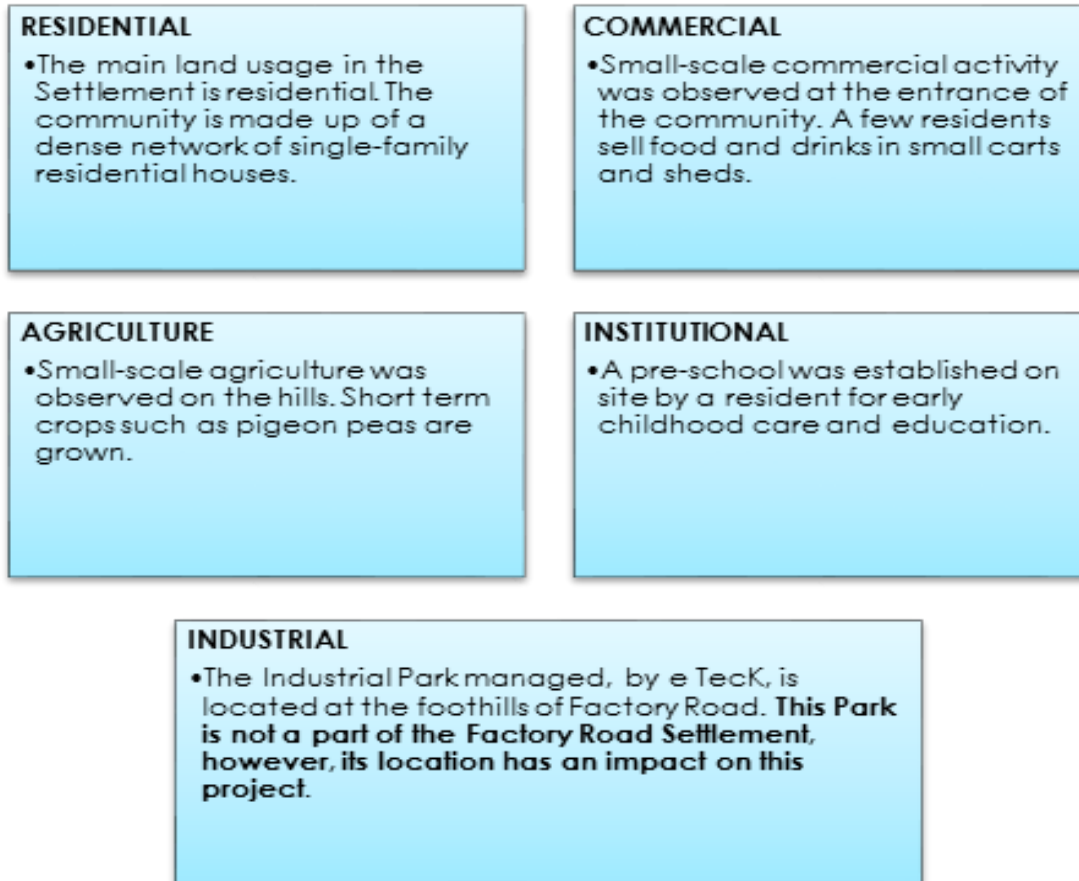


Figure 10. Main Land Usages at Factory Road

3.3.2. Environmental and Social Issues

The main environmental and social issues identified, are listed in the **Figure 11** below:



Figure 11. Main Environmental and Social Issues

A. Inadequate Access

Due to the steep topography, vehicular access is limited. As a result, the residents currently access their homes using narrow pathways and self-constructed concrete steps. As can be seen in **Figure 12**, the concrete steps are degraded and overgrown with vegetation. **Figure 13** shows concrete steps with a handrail only to the right.

Some of the pathways observed were also constructed in concrete and were accompanied by handrails (see **Figures 14** and **15**). The pathway in **Figure 14** was recently improved, as part of an infrastructural upgrading project. The pathway in **Figure 15** was designed to facilitate traction when walking.

Moreover, our investigation revealed that there were only two (2) named roads in the Settlement – Cemetery Street and Wee Road. Residents stated that all roads in the Settlement were cleared by hand and only portions of these roads were paved.



Figure 12. Concrete Steps, Factory Road



Figure 13. Concrete Steps, Factory Road



Figure 14. Recently Upgraded Pathway with Handrail, Factory Road



Figure 15. Pathway with Traction and Handrail, Factory Road

Signage indicative of the ongoing construction work was apparent throughout the Settlement (see **Figure 16**). I met with Mr. Romelle Pierre - representative of the LSA, and Mr. Darill de Silva - Community Leader of Factory Road, on site. They explained that the infrastructural work was being facilitated by the LSA in conjunction with the community. The project includes the establishment and improvement of access ways and box drains. All labour is generated by the community and the building materials are provided by the LSA. This collaboration indicates the willingness of the residents to improve their living conditions. Moreover, the construction signage prepared by the Community Leader, indicates the responsible way the project is being done.



Figure 16. Construction Signs, Factory Road, Diego Martin

As a separate project, residents indicated that assistance was received from the Diego Martin Regional Corporation for the road works in the form of provision of labour and self-help grants. Inadequate access in the Settlement can affect residents in the following ways:

- **Injury** – Due to the poor condition of some of the steps and pathways, getting to and from houses may be difficult. The use of broken steps or steps without handrails may result in injury (**Figures 12 and 13**).
- **Mobility of Residents** – As previously stated, vehicular access is limited as a result of the steep topography. Thus, this may restrict those residents who may be less mobile, ie. the injured, disabled or elderly.
- **Access of Services** – Water trucks and garbage trucks are unable to enter the Settlement. Moreover, in the event of an emergency, fire trucks and police vehicles would not be able to enter the upper regions of the community.

- **Perception of Remoteness** – Inability to access the Settlement may present the perception that the community is remote and isolated.

B. Inadequate Drainage

Drainage is also a concern. Although the drainage network is being gradually upgraded in the Settlement, the volume of runoff being produced does lead to flooding in the low-lying areas of Factory Road. Flooding may negatively impact the health of residents since it facilitates the proliferation of pests and diseases. Moreover, the Industrial Park may be affected as a result of flood related damage to equipment or loss of business days.

Moreover, inadequate drainage can lead to waterlogged soils which facilitates the destruction of house foundations and landslides in hilly areas.

C. Improper Waste Management

i. Solid Waste

As seen in **Figure 17**, the garbage skip to the entrance of the Settlement is surrounded by debris. In an interview with Mr. Marc-Nikeal Ramdass, Property Officer of the Factory Road Industrial Park, it was discovered that the garbage skip was established by e Teck for use by tenants of the Park. However, residents of the Settlement began utilizing the skip for waste disposal. Haphazard dumping of waste also occurs beyond the bin site.

As can be seen in **Figure 18**, there is garbage at the bottom of the concrete steps. These steps are used as a pedestrian entrance to the Settlement. Improper waste management can lead to the proliferation of pests and diseases in the Settlement which can negatively impact the health of residents. Pests include rats which spread *Leptospirosis* and mosquitoes which spread the *Dengue Fever*. Moreover, the presence of haphazardly placed garbage significantly decreases the aesthetics of the area.



Figure 17. Garbage Skip, Factory Road



Figure 18. Improper Garbage Disposal, Factory Road

ii. Sewage

It was identified that some residents utilize latrines for sewage disposal. Improper maintenance of these facilities can lead to contamination of runoff from the Settlement. This can negatively impact the health of Factory Road residents and residents of surrounding communities.

D. Poor Water Quality

The Settlement currently receives its water supply from a small spring on the hillside which can only be accessed via foot. A stream emanates from this spring and flows through the community and down to the Industrial Estate (see **Figure 19**). Investigations revealed that residents have established water connections from the spring to their homes using PVC pipes.



Nonetheless, residents indicated that the spring water is no longer safe for human consumption. Improper waste management practices coupled with the expansion of agricultural activities on the hillside may have compromised the water quality in the Settlement. Pesticides and herbicides are used by some residents for their crops. Thus, the water is largely utilized for the washing of clothes, household cleaning and crop irrigation. Many residents have started purchasing bottled water for drinking.

The residents also reported that WASA installed a poly-tubing connection from a main WASA line of Factory Road, however, the project was never commissioned.

Figure 19. Small spring on the hillside

E. Inadequate Social Infrastructure

Marsha's Montessori Pre-school was the only educational institution observed in the Settlement (see **Figure 20**). The School was closed at the time of the site visits and so no contact was made with the teacher (s). Mr. de Silva informed us that the School was established to accommodate working parents with young children. Facilities of this Pre-school should be inspected by the relevant authorities to ensure it is a suitable environment for young children.



Figure 20. Marsha's Montessori Pre-school, Factory Road

F. Crime

In an interview with the Property Officer of the e Teck Industrial Park, it was stated that criminality exists in the Factory Road Settlement. The Park has been negatively affected by a series of break-ins which has an impact on their business operations.

3.4. Development Challenges and Potential Remedies

The **Table** below lists the developmental challenges in the sites and some potential remedies

Table. Recommendations for Addressing Development Issues

Development Issues	Recommendations
Steep Gradient, Residential Growth and Regularization	The upper limit of the residential development should be physically established and maintained. In other words, the expansion of squatting should be eliminated. <u>A subdivision survey is strongly recommended to regularize the Settlement to provide opportunities for land ownership and to establish the upper limits of the Settlement.</u>
Inadequate Access	Careful extension of vehicular access should be done. This should be guided through a collaboration between the LSA, Regional Corporation, COSL and Forestry Division.
Inadequate Drainage	Detention Ponds should be established to prevent large volumes of runoff at the foothills of the Settlement. Without a method to control the rate of runoff, the Industrial Park may be negatively affected as a result of flooding.
Improper Waste Disposal	Garbage skips should be established for the Settlement and it should be regularly maintained by the Regional Corporation or smaller groups such as CEPEP. A community meeting should be hosted by the EMA to discuss the importance of proper solid waste disposal. Methods of proper sewage disposal should be guided by WASA.
Poor Water Supply	A formal water connection should be made by WASA to avoid community usage of the spring.
Criminality	<p>Regular patrols of the TTPS should be done throughout the Settlement to reduce instances of crime at the Industrial Park, e.g. theft.</p> <p>Training facilities should also be implemented by the Industrial Park to promote the educational advancement of unemployed youths in the Settlement.</p> <p>The existing pre-school in the Settlement should be established as a formal Early Childhood Care and Education Centre to promote the educational advancement of children. This process should be guided by the Ministry of Education.</p>

3.5. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS

In the regularization and the physical development process of the Settlements: *“Community viability is the prerequisite for the achievement of sustainable development”*

Accordingly, the strategy for achieving sustainability involves:

- Involvement – The community and the State Agencies
- Integration – Stakeholder engagement
- Incrementation – Bit by bit development based on prioritization of the physical, social and economic requirements.

The positive social and environmental impacts are listed as follows:

1. **Access (Vehicular and Pedestrian):** Improvement and expansion of these two forms of access will significantly facilitate the mobility of residents especially those that are disabled or elderly.
It will improve access of services such as water trucks, garbage trucks or emergency vehicles. An Incremental approach can be adopted for construction and upgrading of the existing access.
2. **Adequate drainage:** This will reduce the volume of runoff which leads to flooding in the low-lying areas of Factory Road. Health conditions will therefore improve as it can reduce the proliferation of pests and diseases.
3. **Waste Management:** Improvement of health with the reduction of garbage will result in a cleaner environment.
4. **Water quality:** Improving the quality of water will improve everyday living conditions for residents in this site.
5. **Social infrastructure:** Will improve the sense of community among the residents and therefore have a positive effect on the young ones.
6. **Regularization:** Subdivision of the parcellation thereby providing individual Survey Plans for each occupier will have a very important impact on the consolidation and viability of the Settlement. Always land ownership is a crucial ingredient in allowing "Squatters" becoming owners. In effect, this single factor is an extremely important component of the general objectives of the Urban Upgrading and revitalization programme being "to improve the quality of life of low-income households and to increase the vitality of urban areas"

On the basis of our analysis of the social survey, our field investigations and our meetings with the communities, the implementation activities we highlighted will have a positive impact on the day to day life of residents at all three sites. These factors will improve the quality of life of the residents, it will provide a sense of community and signal to the youth how viability can effectively take place.

4. SAHADEEN TRACE

4.1. LOCATION

The Sahadeen Trace Settlement is a long-standing community located in the north-eastern fringes of the town of Sangre Grande. The Settlement forms part of the Long Stretch Forest Reserve. The Sangre Grande Regional Corporation is located in north-eastern Trinidad. Sahadeen Trace branches off from the Toco Main Road in Vega de Oropouche and is located to the north of the Oropouche River. **Figure 21** and **Figure 22** show the location of the Sahadeen Trace Settlement.

Sahadeen Trace comprises an area of approximately 15 ha (37 acres) with an estimated 149 households.



Figure 21. Sahadeen Trace, Sangre Grande (Land Settlement Agency, 2019)



Figure 22. Sahadeen Trace, Sangre Grande (Land Settlement Agency, 2019)

4.2. DATA ANALYSIS

The following analysis was done using socio-economic data collected by the LSA. It is important to note that no gender data was made available for this Settlement. This information was requested from the LSA.

The data revealed that 328 residents participated in the survey. As seen in **Figure 23** below, 24% of households housed 3 persons; this was the most popular response. Sixteen (16%) housed 4 persons, 14% housed 5 persons, 12% housed 2 persons, 9% housed 6 persons, 7% housed 8 persons, 5% housed 1 person and 4% housed 7 persons. Three percent (3%) housed 9 persons, 3% housed 10 persons and another 3% housed 11 persons. **Figure 24** shows that 72% of houses in Sahadeen Trace were completed while 28% were not.

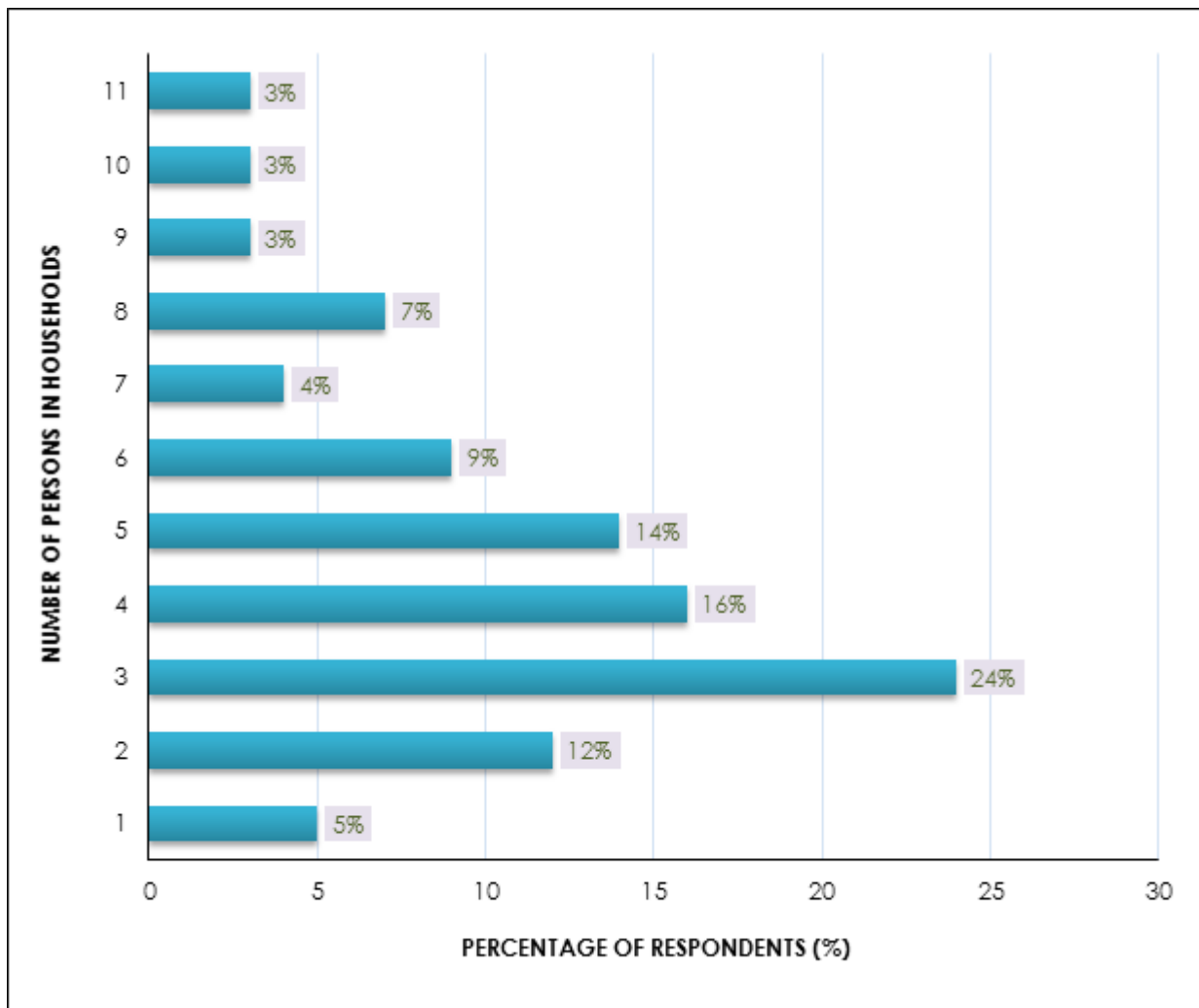


Figure 23. Bar Chart Showing Number of Persons in Household

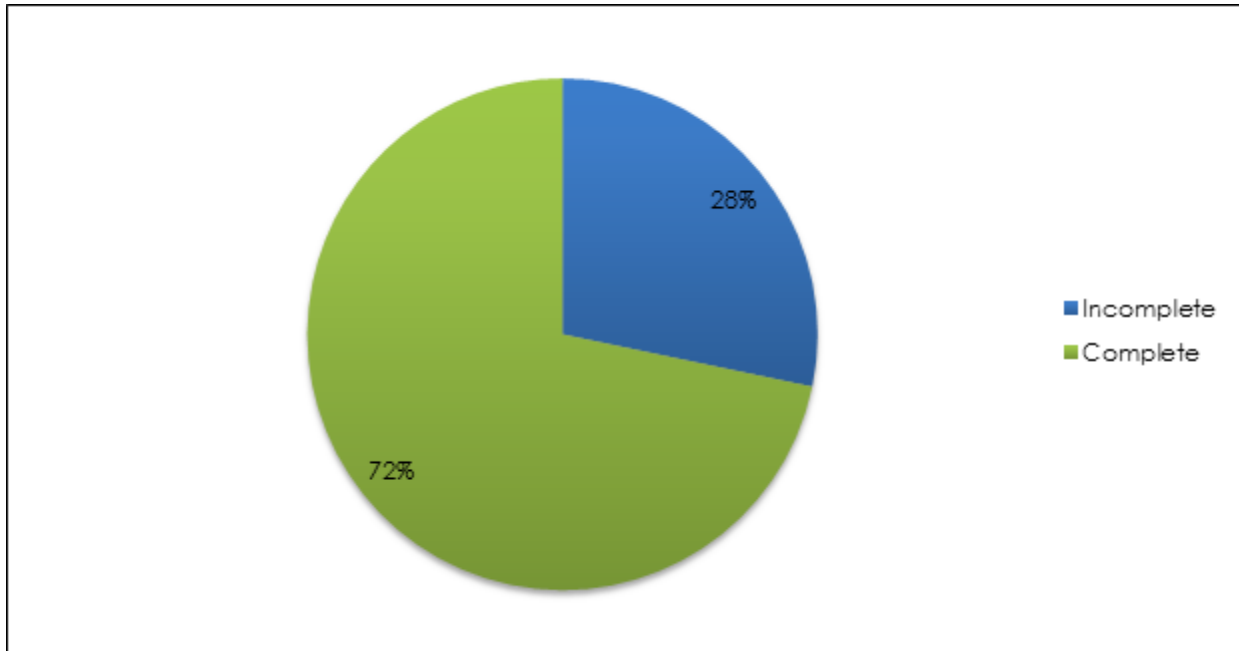


Figure 24. Pie Chart Showing Percentage of Completed Houses

The **Figure** below shows that 41% of residents lived in houses of sub-standard quality, 37% lived in houses of standard quality and 22% lived in shacks.

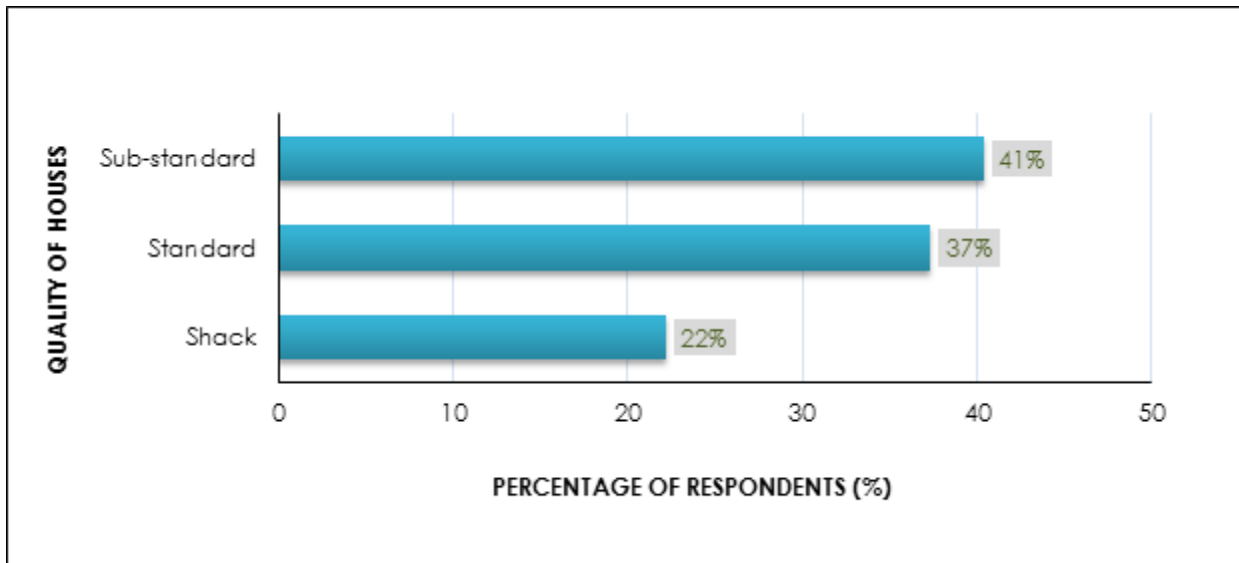


Figure 25. Bar Chart Showing Quality of Houses

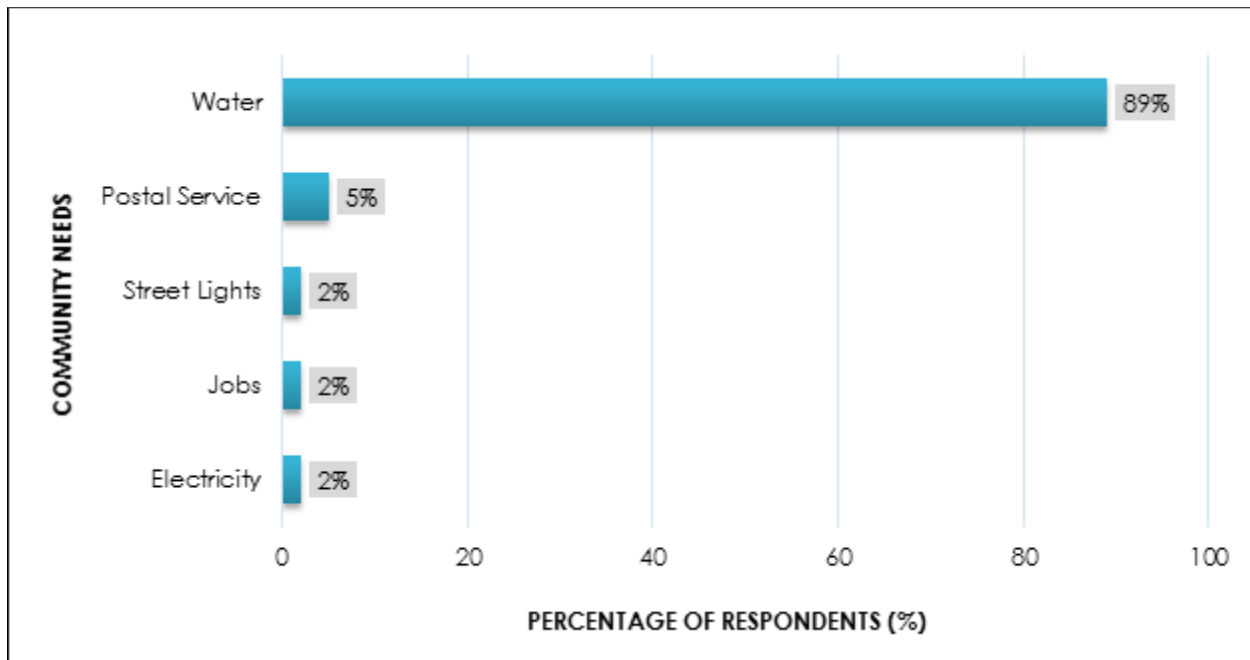


Figure 26. Bar Chart Showing Community Needs

Eighty-nine percent (89%) of respondents identified water as a major need (see **Figure 26**). Five percent (5%) of respondents stated that a postal service was needed, 2% stated that streetlights were needed, 2% stated that jobs were needed and 2% stated that electricity was needed.

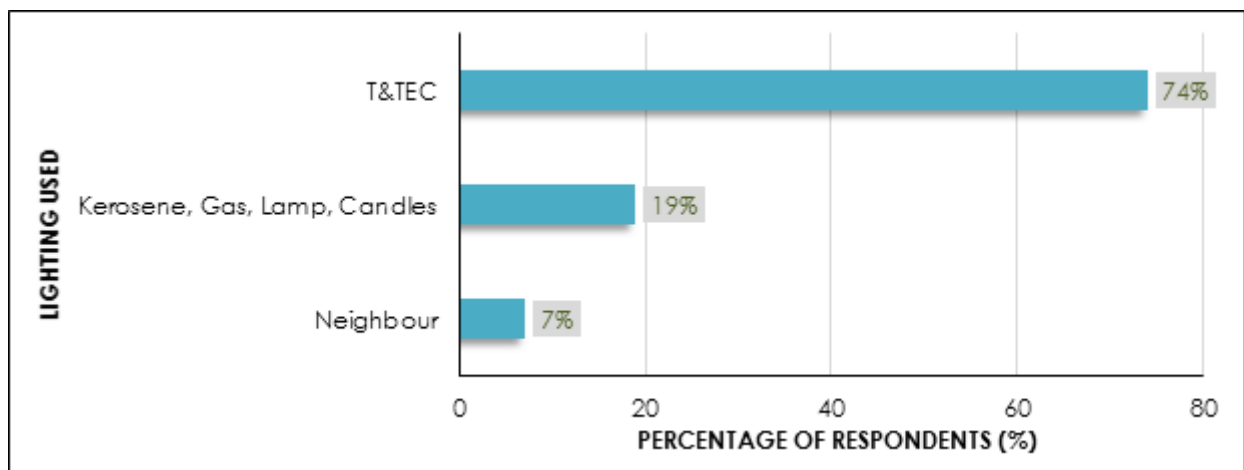


Figure 27. Bar Chart Showing Lighting Most Utilized

Seventy-four percent (74%) of residents obtained electricity from T&TEC, 19% utilized kerosene, gas, lamps and candles, and 7% obtained electricity from a neighbour (see **Figure 27**).

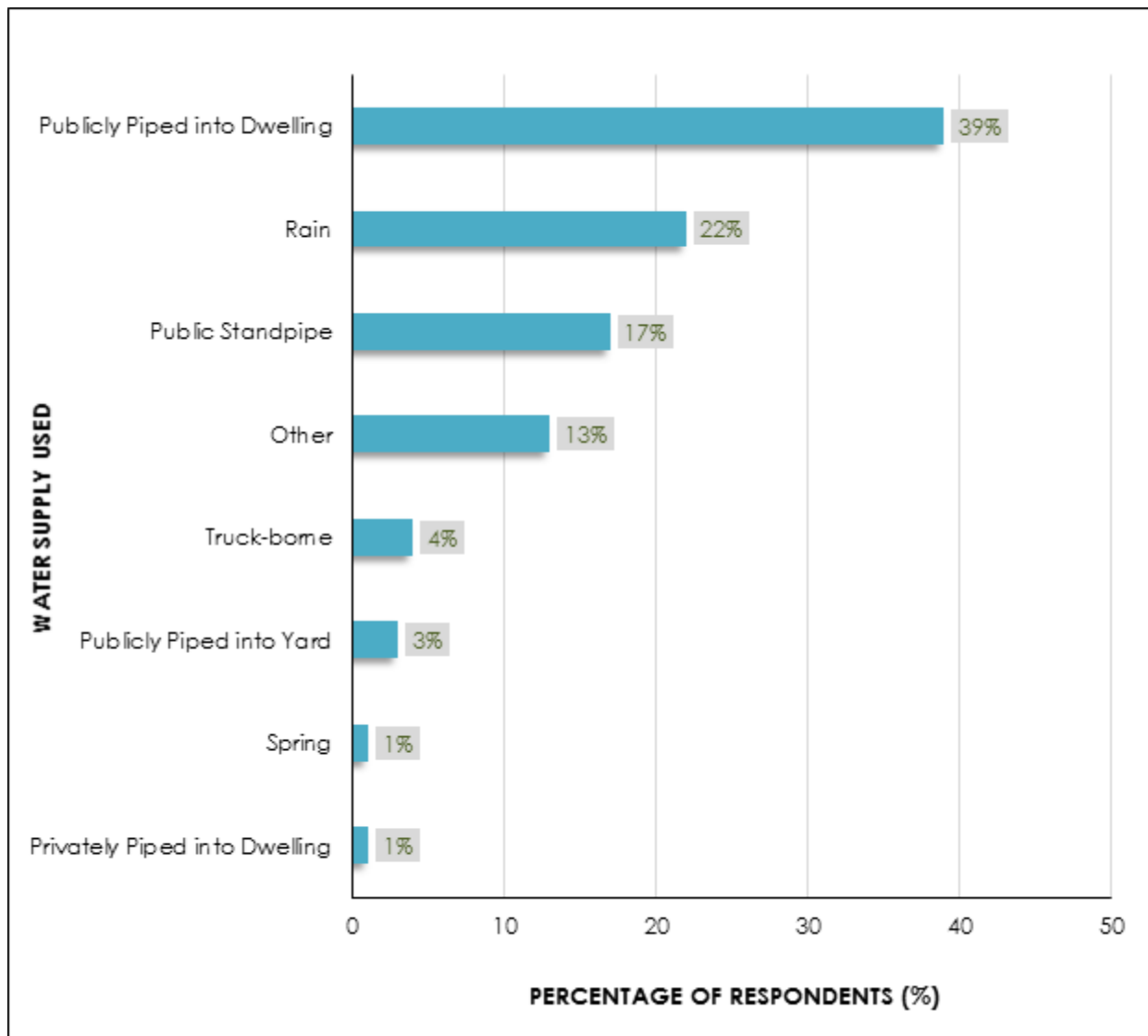


Figure 28. Bar Chart Showing Water Supply Most Utilized

As illustrated in **Figure 28** above, 39% of residents stated that water was publicly piped into their dwelling. Twenty-two percent (22%) utilized rainwater, 17% obtained water from a public standpipe and 4% obtained water from a water-truck. Three percent (3%) stated that water was publicly piped into their yard, 1% obtained water from a spring and 1% stated that water was privately piped into their dwelling.

As seen in the **Figure** below, the majority of residents stored water in tanks. Eighteen percent (18%) stored water in barrels and 4% stored water in buckets. Most residents receive a water supply from WASA. Moreover, many residents own water tanks for water storage.

Figure 29. Pie Chart Showing Type of Water Storage

More than half of residents utilized pit latrines while 40% utilized septic tanks and soakaways (see **Figure 30**). Six percent of residents (6%) utilized a water closet linked to a sewer and 1% had no toilet facility.

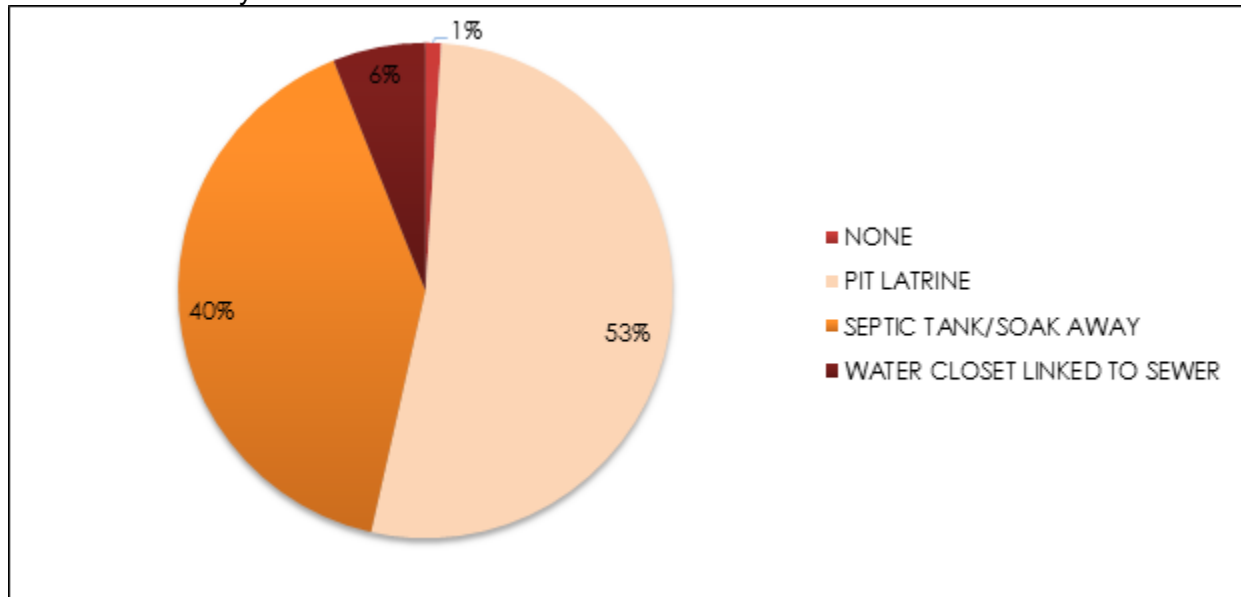


Figure 30. Pie Chart Showing Toilet Facilities

As shown in **Figure 31** below, the majority of residents placed their garbage outside their homes for collection by the Municipal garbage trucks. Five percent (5%) burned their garbage and 11% had other methods of disposal.

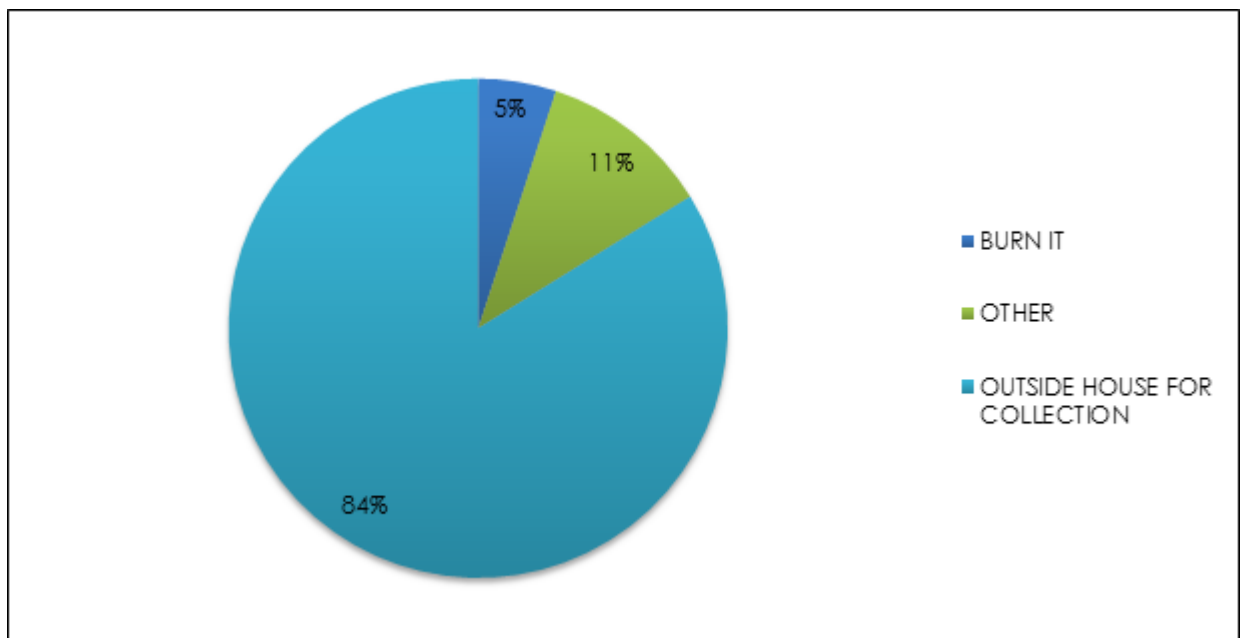


Figure 31. Pie Chart Showing Methods of Garbage Disposal

It was identified that 71% of residents used public transportation while 29% used private vehicles.

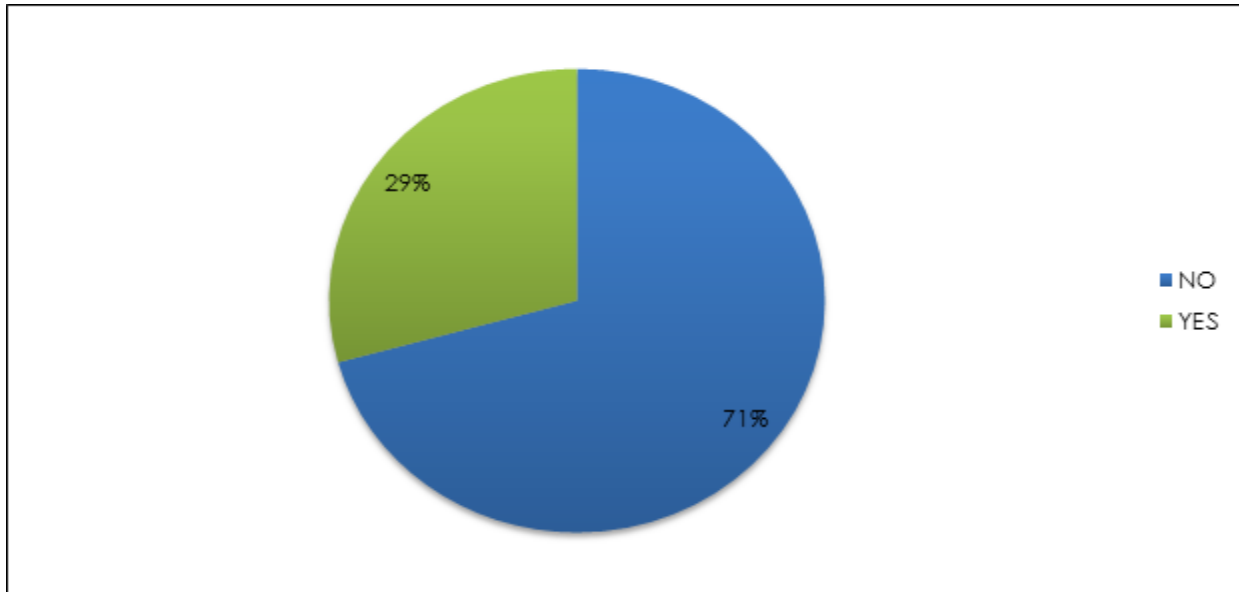


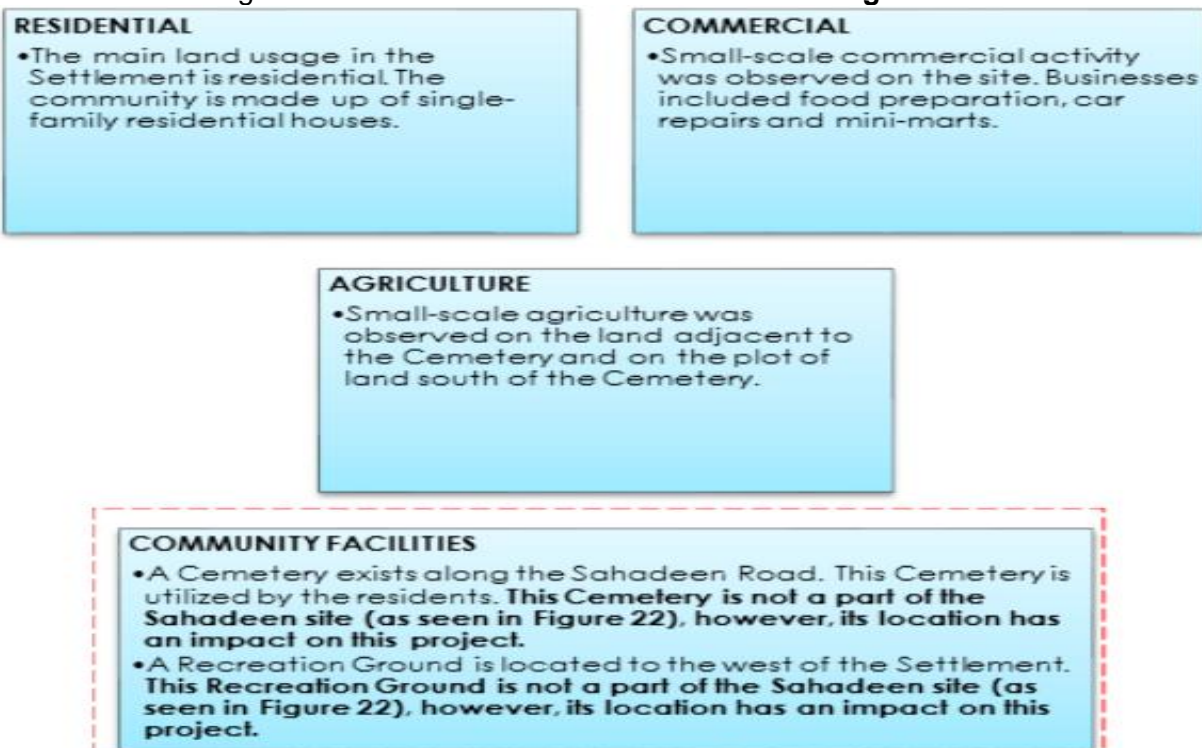
Figure 32. Pie Chart Showing Modes of Transportation

4.3. SITE RECONNAISSANCE

On Wednesday 26th June, 2019 and Friday 24th July, 2019, site visits were done to determine the existing conditions of the site. Land usages, environmental issues and social issues were observed. Unlike the Factory Road Settlement, Sahadeen Trace is flat and less densely populated.

4.3.1. Land Usages

The main land usages observed in Sahadeen Trace are listed in **Figure 33** below.



4.3.2. Environmental and Social Issues

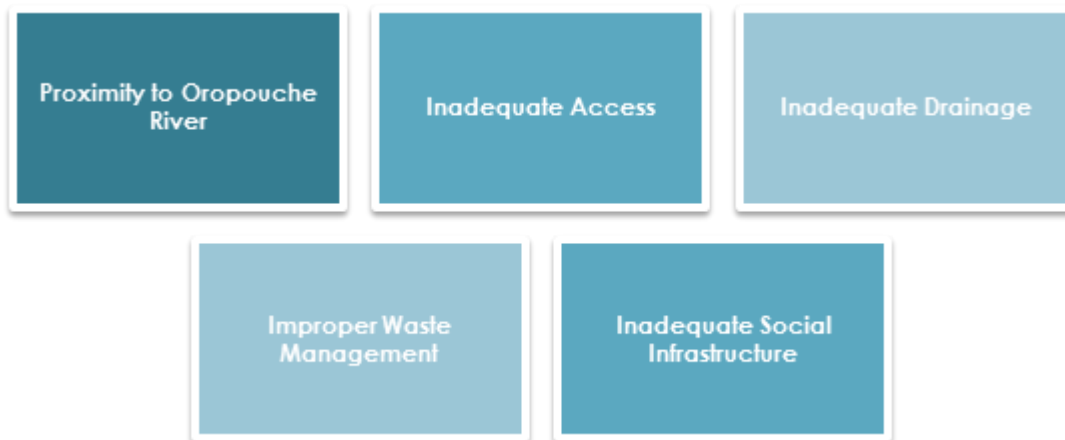


Figure 34. Main Environmental and Social Issues

A. Proximity to Oropouche River

As previously stated, Sahadeen Trace Settlement is located in north-eastern Trinidad, to the north of the Oropouche River. During periods of heavy rainfall, the volume of precipitation tends to exceed the maximum carrying capacity of the River channel which results in flooding. Climate change exacerbates these effects.

The north-eastern location of Sahadeen Trace further increases the vulnerability of the Settlement to the impacts of climate change. This region is more exposed to the effects of potential climate related disasters such as hurricanes.

B. Inadequate Access

The existing road network in the Sahadeen Settlement is a combination of earthen and paved roads. Residents expressed that many of the roads were cleared and financed by the community.

In the dry season, the earthen roads may contribute to a decline in air quality as a result of the dust generated from vehicular movement. This may impact on the health of those residents who may suffer with respiratory problems. Moreover, during periods of intense rainfall, earthen roads may become muddy. This can restrict the mobility of vehicles or affect travellers on foot. This is especially crucial in emergency situations.



Figure 35. Hammet Trace, Sahadeen Trace



Figure 36. Partly Paved Road, Recreation Ground, Sahadeen Trace

C. Inadequate Drainage

Residents stated that flooding occurred in the Settlement in 2018 as a result of intense rainfall and inadequate drainage. Moreover, inadequate drainage can impact crops and, in some cases, jeopardize the livelihood of those who use the crops to sustain their households. Crops that are located in poorly drained areas tend to form shallow rooting systems and are unable to obtain sufficient moisture for their growth. It also contributes to crop diseases which lessen the impact of crop fertiliser. The **Figure** below shows the puddles of water on an earthen road with no drainage.



Figure 37. Puddles on Earthen Road, Sahadeen Trace

D. Improper Waste Management

As previously stated, the majority of residents place their garbage outside their homes for collection by the Municipal garbage trucks. The remaining residents resort to alternative methods of garbage disposal, such as incineration. This can decrease air quality and affect those residents with respiratory illnesses.

Additionally, it was identified that the majority of residents use pit latrines for sewage disposal. Latrines may result in the infiltration of sewage into ground water sources and other water bodies which can affect water quality and water supply. Moreover, in cases of extreme precipitation events, latrines may become flooded. This can also result in the contamination of water sources.

Thus, improper sewage disposal can affect the environment and human life both directly and indirectly.

E. Inadequate Social Infrastructure

As can be seen in **Figure 38**, there is the Cemetery in the Settlement. The portion of land to the east of the Cemetery is supposedly an extension of the burial ground. Residents stated that this extension of land is also utilized for small-scale agriculture. The crops grown include bananas and vegetable crops.



Figure 38. Agriculture on Cemetery Land, Sahadeen Trace

4.4. Developmental Challenges and Potential Remedies

The **Table** below lists developmental challenges of the site and some potential remedies.

Table Recommendations for Addressing Development Issues

Development Issues	Recommendations
Proximity to Oropouche River	The Settlement may be at risk of flooding during periods of heavy rainfall. As such, it is important that an Early Warning System or Community-based Organization be established to address flooding.

Development Issues	Recommendations
Inadequate Access	Roads should be paved by the Regional Corporation. This should be guided through a collaboration between the LSA and the Regional Corporation.
Inadequate Drainage	Inadequate and poorly maintained drains have led to flooding during periods of heavy rainfall. Drains should be established and regularly cleaned by the Regional Corporation.
Improper Waste Management	Methods of proper garbage collection should be guided by the EMA or Regional Corporation.
Inadequate Social Infrastructure	A portion of land in the Settlement should be designated for agricultural purposes. This will keep the Cemetery free from unauthorized land usages.

Further to the recommendations listed above, a subdivision survey is strongly recommended to regularize the community and to generate opportunities for land ownership.

It should also be noted that there is a large man-made pond to the east of the Settlement. The pond appears to have been created as a result of quarrying and it collects water after rainfall. The pond should be carefully assessed to determine the possible impacts it may have on Sahadeen Trace.

Page Break

4.5. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS

In the regularization and the physical development process of the Settlements: *“Community viability is the prerequisite for the achievement of sustainable development”*

Accordingly, the strategy for achieving sustainability involves:

- Involvement – The community and the State Agencies
- Integration – Stakeholder engagement
- Incrementation – Bit by bit development based on prioritization of the physical, social and economic requirements.

The positive social and environmental impacts are listed as follows:

1. **Proximity of Oropouche River (Sahadeen Trace):** Adjustment of the outflow of Oropouche will have the effect of reducing the flooding in the community and thereby improving the quality of life.
2. **Access:** Improvement and expansion of the existing road system will improve access to and from the site especially during times of emergency. It will also improve the health of residents who suffer with respiratory problems.
3. **Adequate drainage:** Health conditions will therefore improve as it can reduce the proliferation of pests and diseases. The livelihood of those who use drops to sustain their households will be maintained. This will therefore improve the quality of life.

4. **Waste management:** Improvement of health with the reduction of garbage will result in a cleaner environment. Improved water quality and water supply will also improve health of residents and the environment.

5. **Regularization:** Subdivision of the parcellation thereby providing individual Survey Plans for each occupier will have a very important impact on the consolidation and viability of the Settlement. Always land ownership is a crucial ingredient in allowing “Squatters” becoming owners. In effect, this single factor is an extremely important component of the general objectives of the Urban Upgrading and revitalization programme being “to improve the quality of life of low-income households and to increase the vitality of urban areas”

On the basis of our analysis of the social survey, our field investigations and our meetings with the communities, the implementation activities we highlighted will have a positive impact on the day to day life of residents at all three sites. These factors will improve the quality of life of the residents, it will provide a sense of community and signal to the youth how viability can effectively take place.

5. BOIS BANDE – SETTLEMENT C

5.1. LOCATION

Bois Bande - Settlement C is located in the northern section of the town of Sangre Grande on the border of the Long Stretch Forest Reserve. This long-standing community is accessed via the Ojoe Road which emanates from the Eastern Main Road and gives access to Pine Settlement and Graham Settlement, both of which are sites previously regularized by the Land Settlement Agency (LSA). Bois Bande - Settlement C is relatively flat with some sections gently undulating. It comprises an area of approximately 12 ha (30 acres) with approximately 221 households within the settlement.

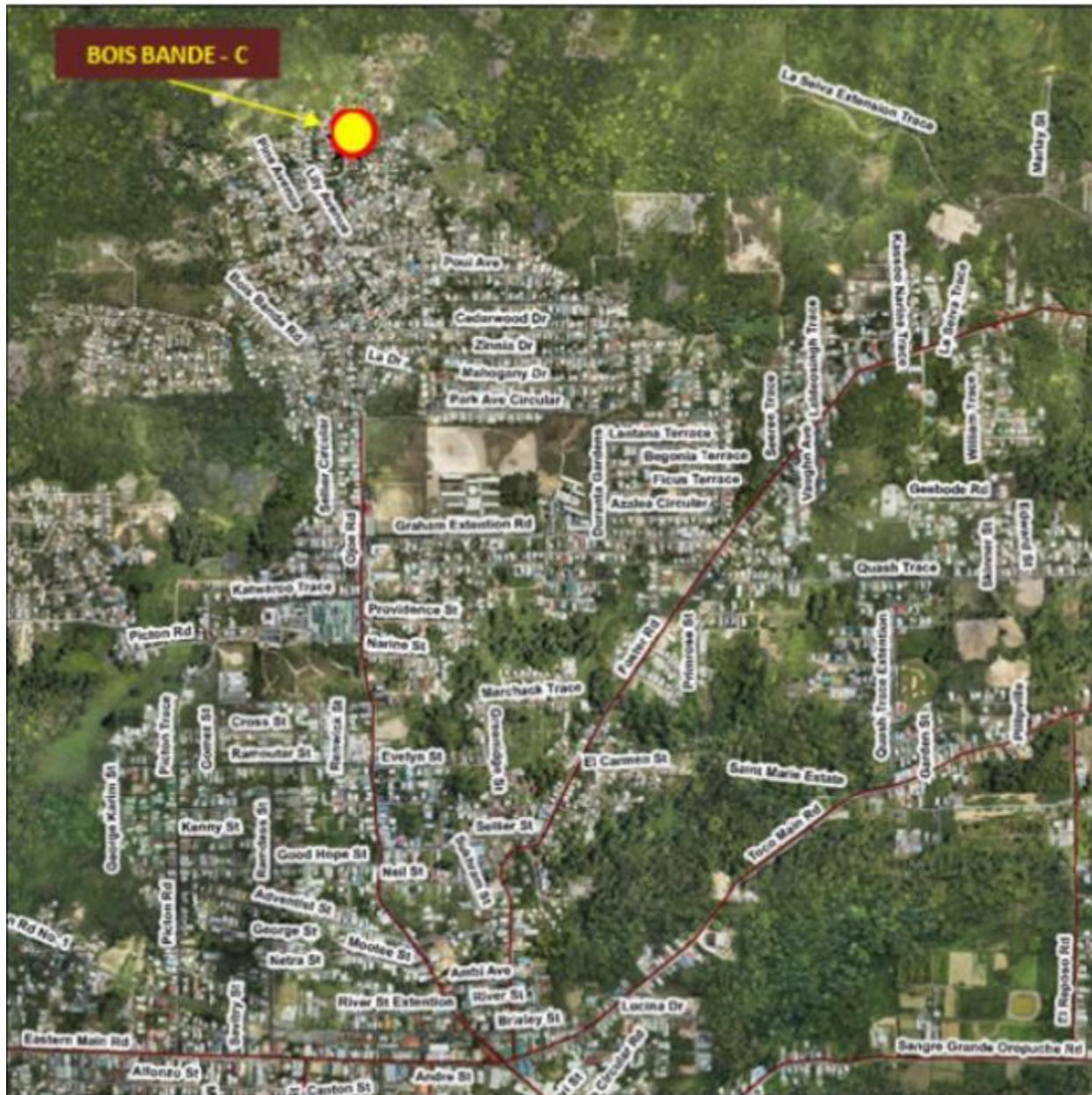


Figure 39. Bois Bande – Settlement C, Sangre Grande

Layout Plans were previously designed for the LSA for three (3) Bois Bande Settlements, namely, Settlements A, B and C (see **Figure 40**). Settlement C falls within the previous Layout Design. As seen in **Figure 39**, the extent of Bois Bande - Settlement C is outlined in red.

Thus far, observations indicate that the additional unauthorized development taking place to the north of Settlement C falls beyond the approved site. It is important to note that the section of land to the north of Settlement C falls within the route of the proposed Roadway to Manzanilla (see **Figure 41**).



Figure 39. Bois Bande – Settlement C, Sangre Grande

5.2. DATA ANALYSIS

The following analysis was done using socio-economic data collected by the LSA. The data was disaggregated by gender where available.

Figure 42 shows that there were more males than females in the Settlement.

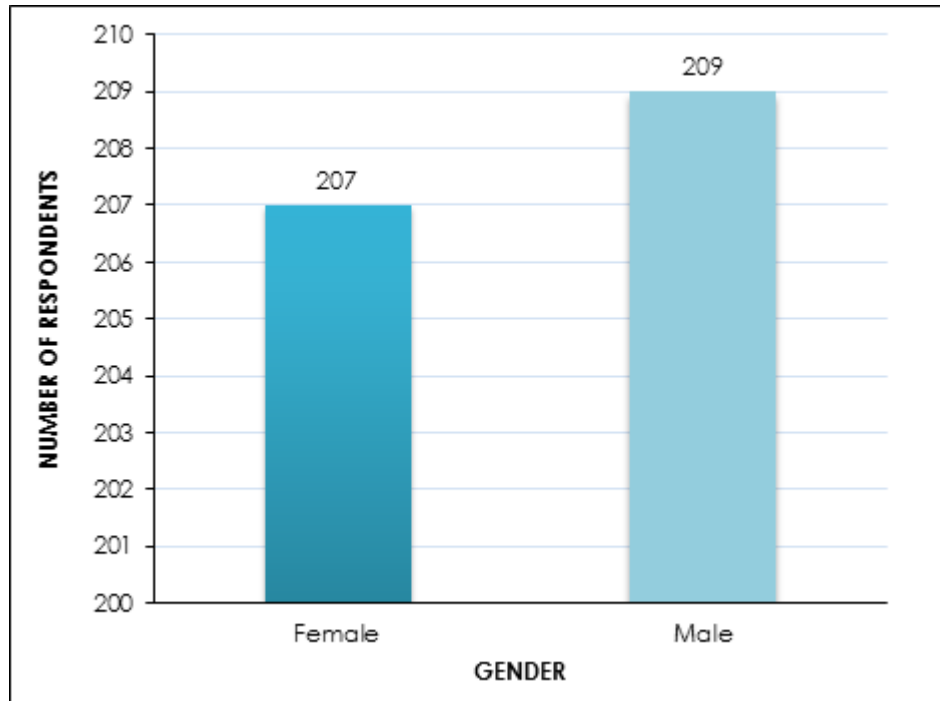


Figure 42. Bart Chart Showing Gender

As seen in **Figure 43**, it was identified that more residents had a secondary education than any other educational level. Of these residents, 104 were females and 99 were males. Only 2 women were at the post graduate level while no men were at the post graduate level.

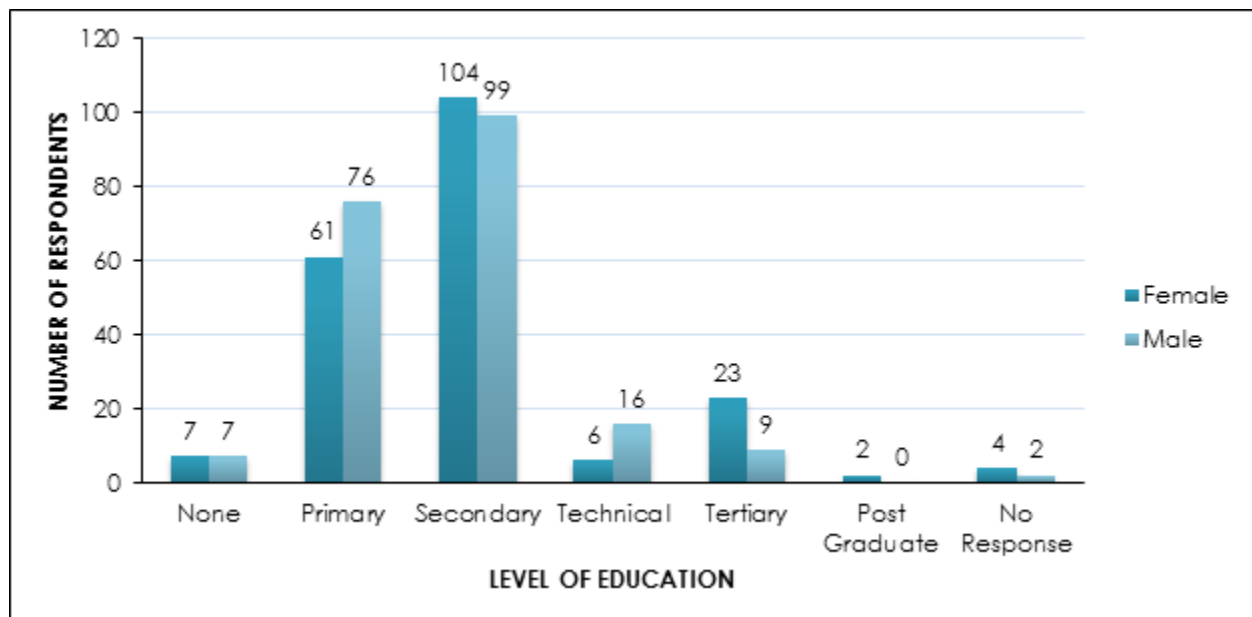


Figure 43. Bar Chart Showing Level of Education

It was identified that more females earned an income ranging from \$0 to \$1000 and \$1001 to \$2000 than males (see **Figure 44**).

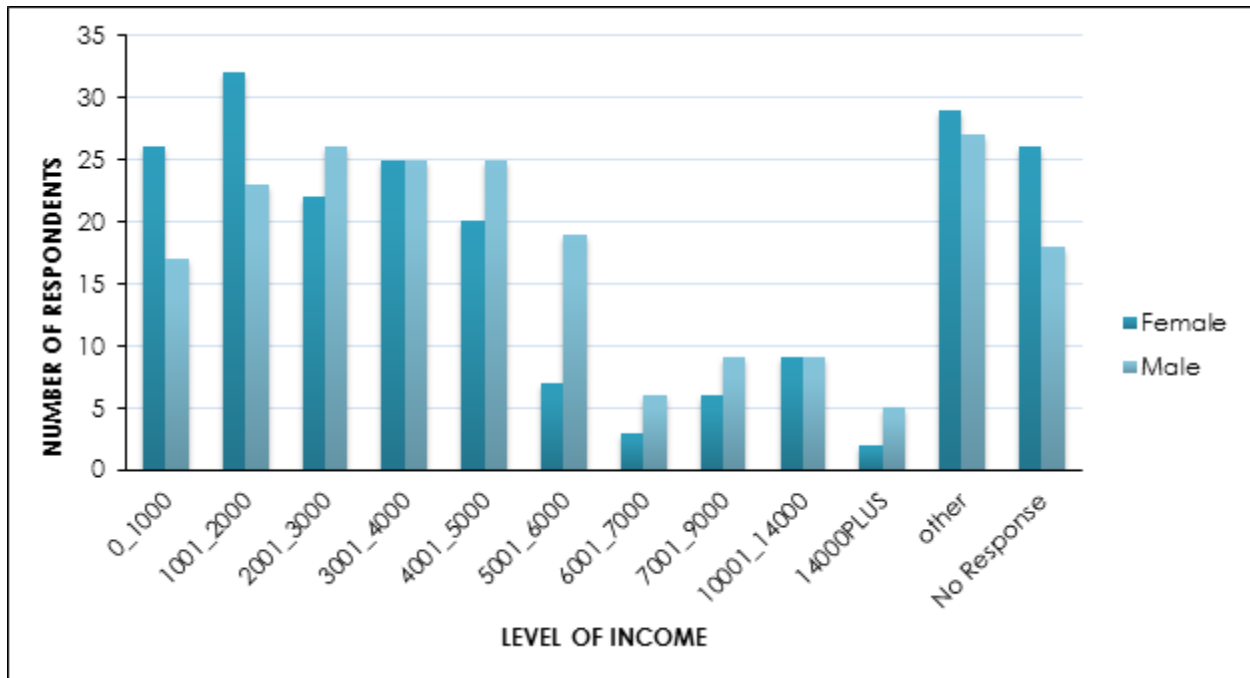
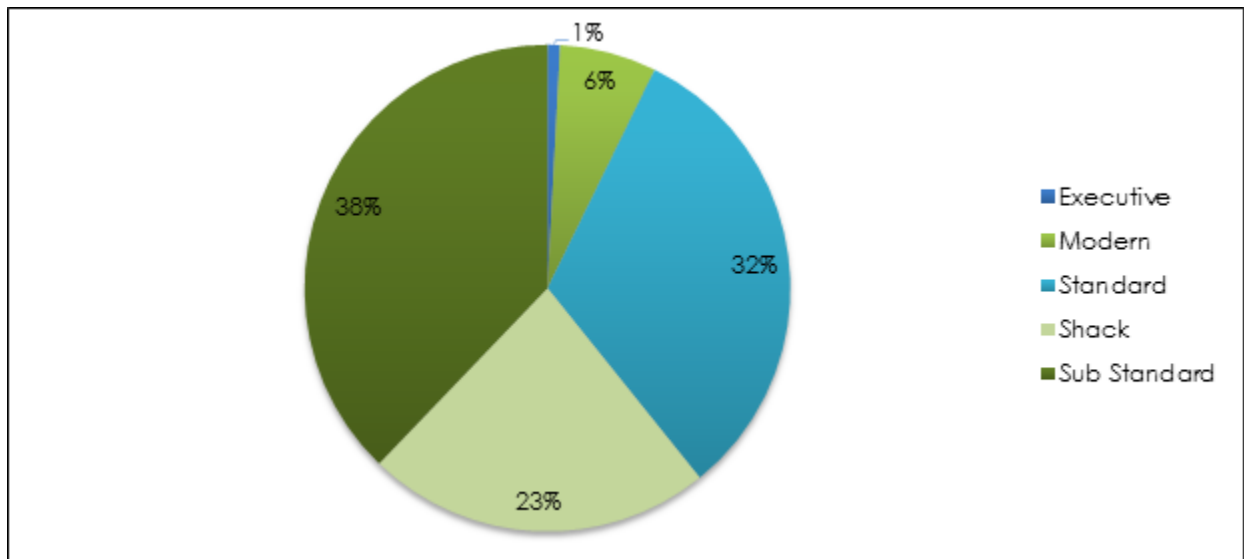


Figure 44. Bar Chart Showing Level of Income



As seen in **Figure 45**, 38% of residents lived in substandard houses, 32% lived in shacks, 23% lived in standard houses, 6% lived in modern houses and 1% lived in executive houses.

Figure 45. Pie Chart Showing Type of Housing

Thirty-eight percent (38%) of houses were in good condition while another 38% were in poor condition. Six percent (6%) were in very good condition and 18% were under construction.

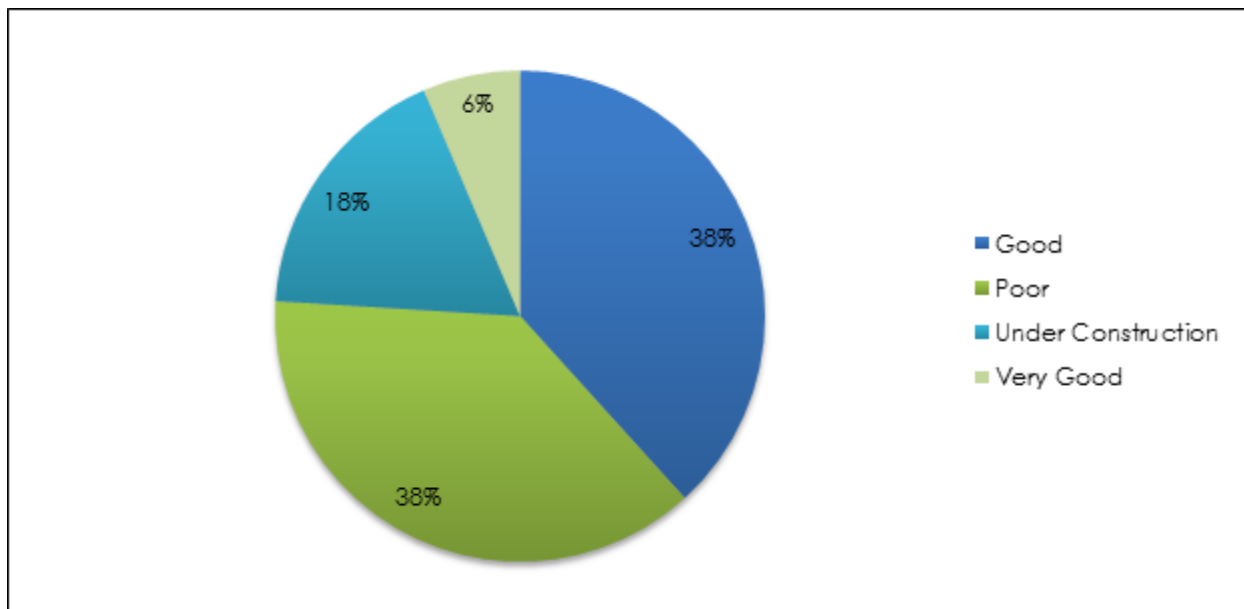
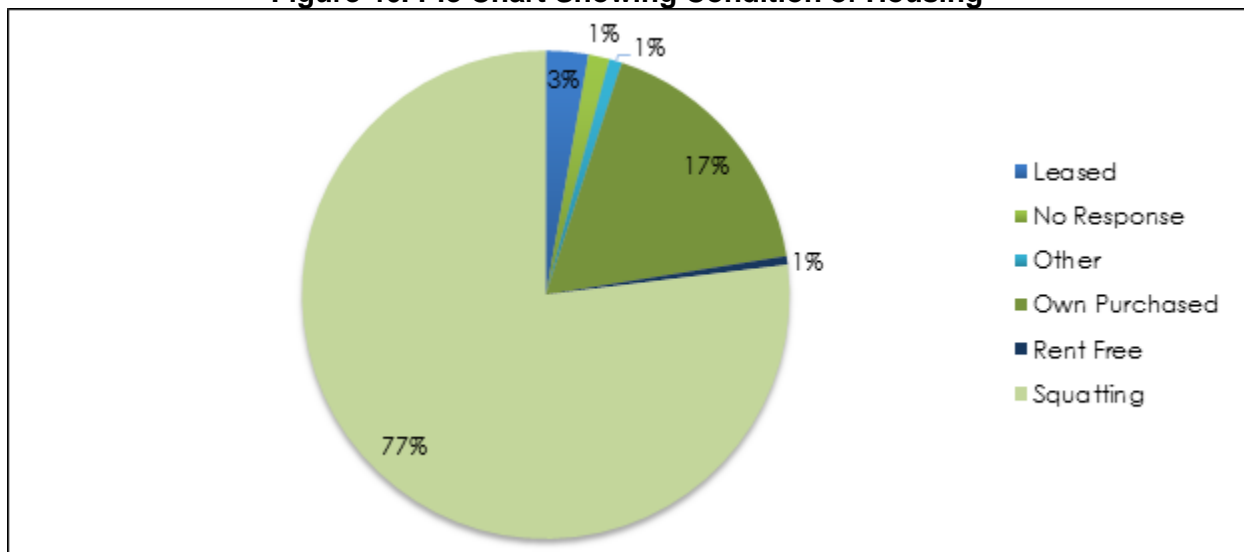
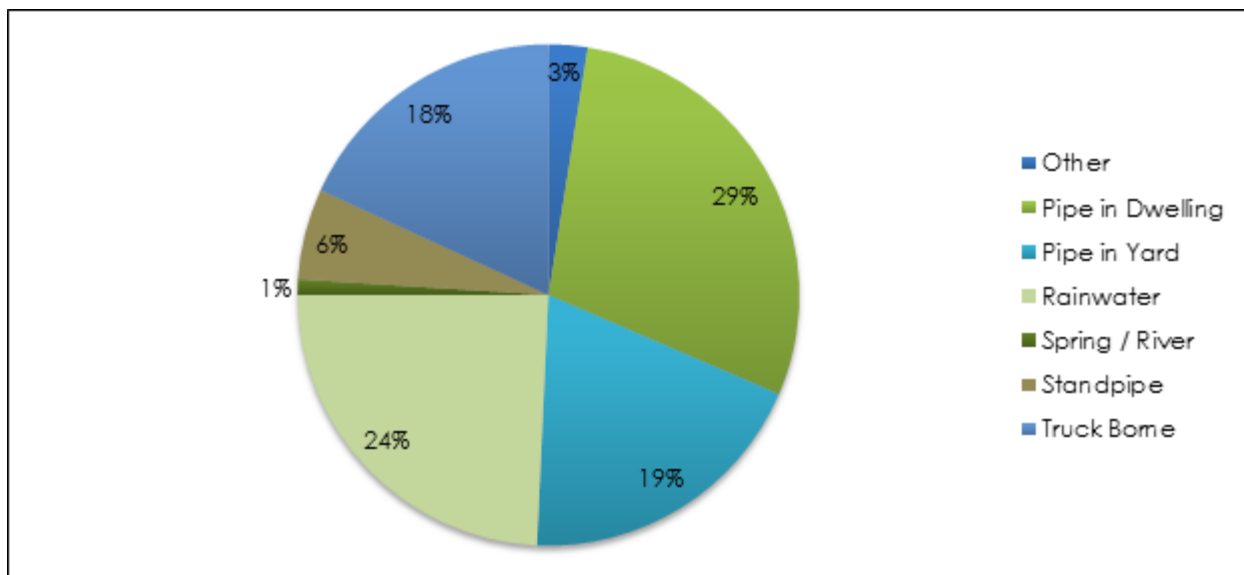


Figure 46. Pie Chart Showing Condition of Housing



It was identified that the majority of residents were squatting (see **Figure 47**). Seventeen percent (17%) owned / purchased their land, 3% leased their land, 1% lived rent free and 1% chose 'other' as a response. Only 1% chose not to respond.



As seen in the **Figure** above, 29% of residents had pipes in their dwelling, 24% had collected and utilized rainwater, 19% had pipes in their yards, 18% utilized truck-borne water, 6% utilized water from a standpipe and 1% utilized water from a spring / river. One percent (1%) chose 'other' as a response

Figure 47. Pie Chart Showing Tenure Status

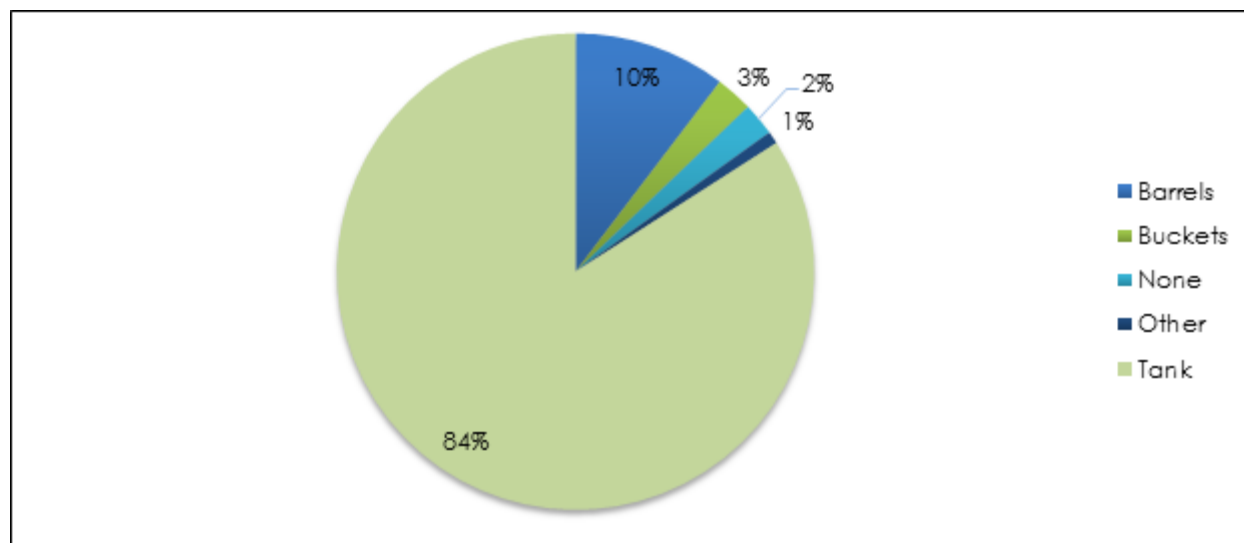


Figure 48. Pie Chart Showing Water Supply

More than half the residents stored water in water tanks, 10% stored water in barrels, 3% stored water in buckets and 1% had other methods of water storage (see **Figure 48**). Two percent (2%) of residents had no water storage.

As illustrated in **Figure 49**, the majority of residents formally obtained electricity from T&TEC. Ten percent (10%) used lamps / candles, 6% used generators and 6% obtained electricity from their neighbours. Three percent (3%) obtained electricity from other sources, 2% used solar power and 2% informally obtained electricity from T&TEC.

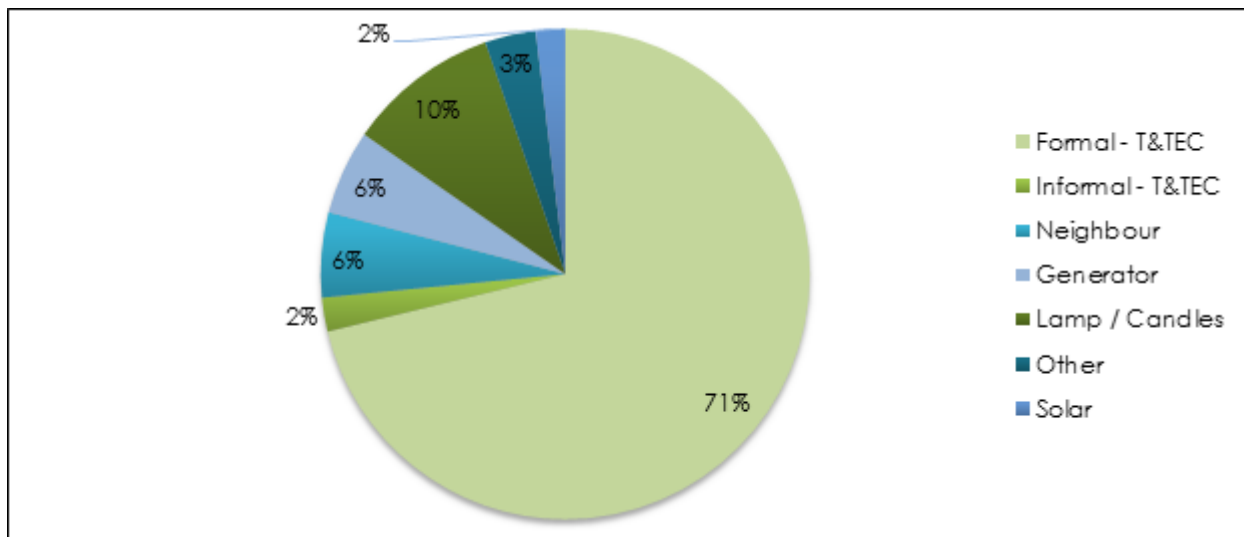


Figure 49. Pie Chart Showing Sources of Lighting

As can be seen in **Figure 50**, most residents had toilet facilities. Only 6% had no toilet facilities while 1% chose not to respond.

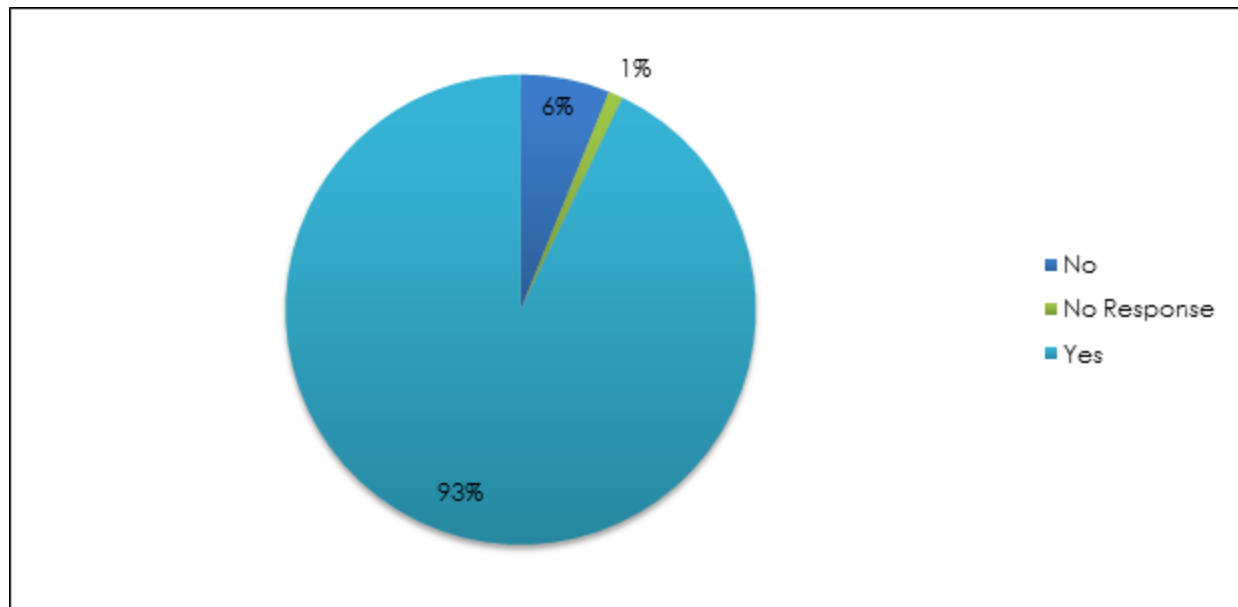


Figure 50. Pie Chart Showing Respondents with Toilet Facilities

Figure 51 shows that the majority of residents used water closets, 23% used latrines with pits and 3% used latrines without pits. One percent (1%) used other facilities.

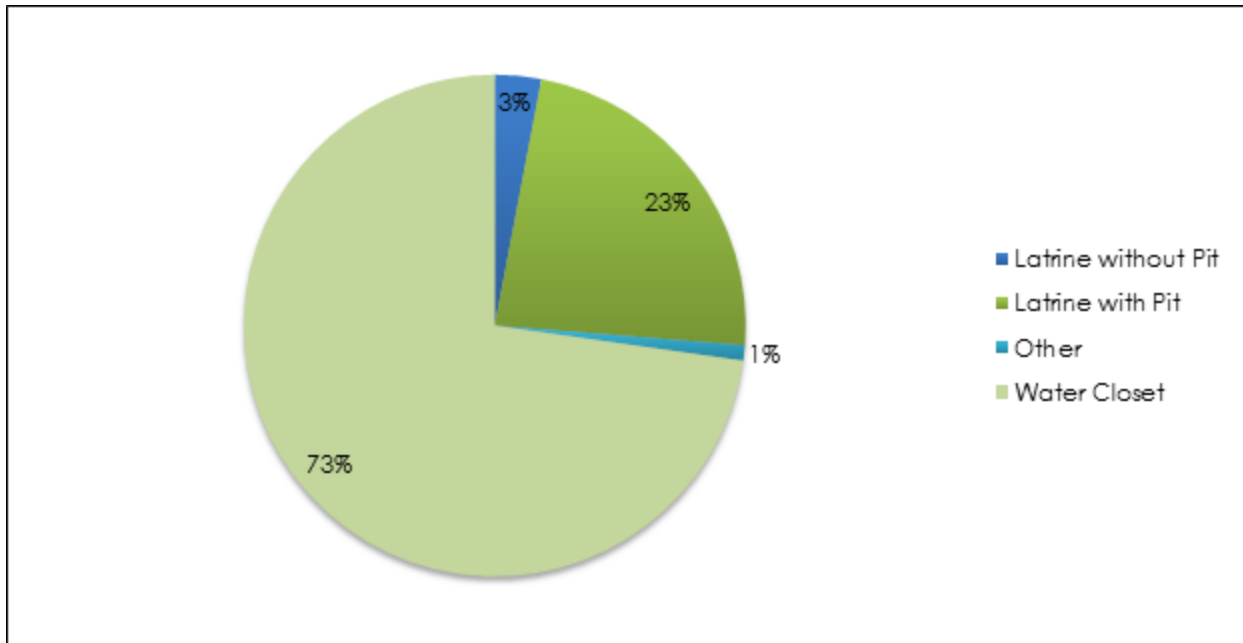


Figure 51. Pie Chart Showing Types of Toilet Facilities

The chart below shows the needs of the Settlement. More than half of the residents stated that streetlights were needed, 8% stated that standpipes were needed, 8% stated that youth employment was needed, 8% stated that utilities were needed and 9% stated that tenure security was needed.

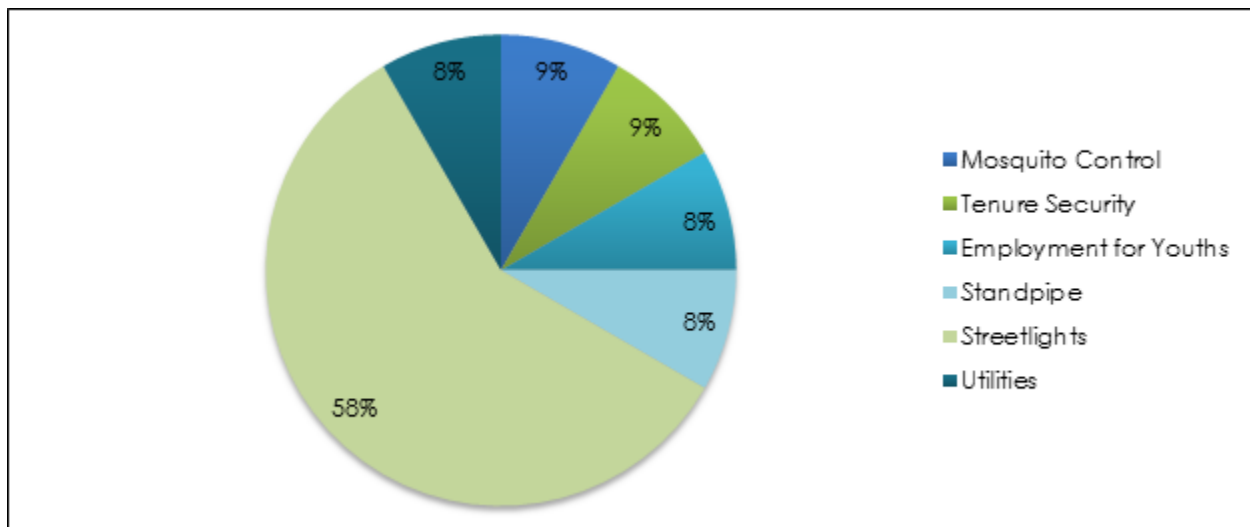


Figure 52. Pie Chart Showing Community Needs

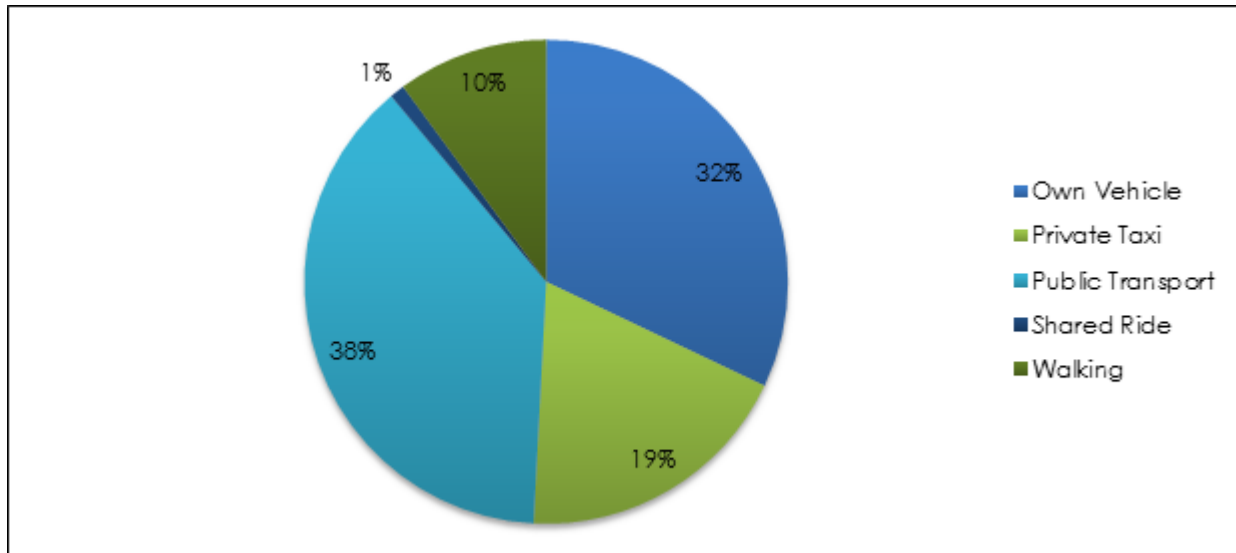


Figure 53. Pie Chart Showing Modes of Transportation

Thirty-eight percent (38%) of residents use public transportation, 32% own a vehicle, 19% own a private taxi, 10% walk and 1% share rides.

5.3. SITE RECONNAISSANCE

On Wednesday 26th June, 2019 and Friday 24th July, 2019, site visits were done to determine the existing conditions of the site. Land usages, environmental issues and social issues were observed. Similar to Sahadeen Trace, Bois Bande- Settlement C is flat and less densely populated than the Factory Road Settlement.

5.3.1. Land Usages

The main land usages observed in Bois Bande - Settlement C are listed in **Figure 54** below.

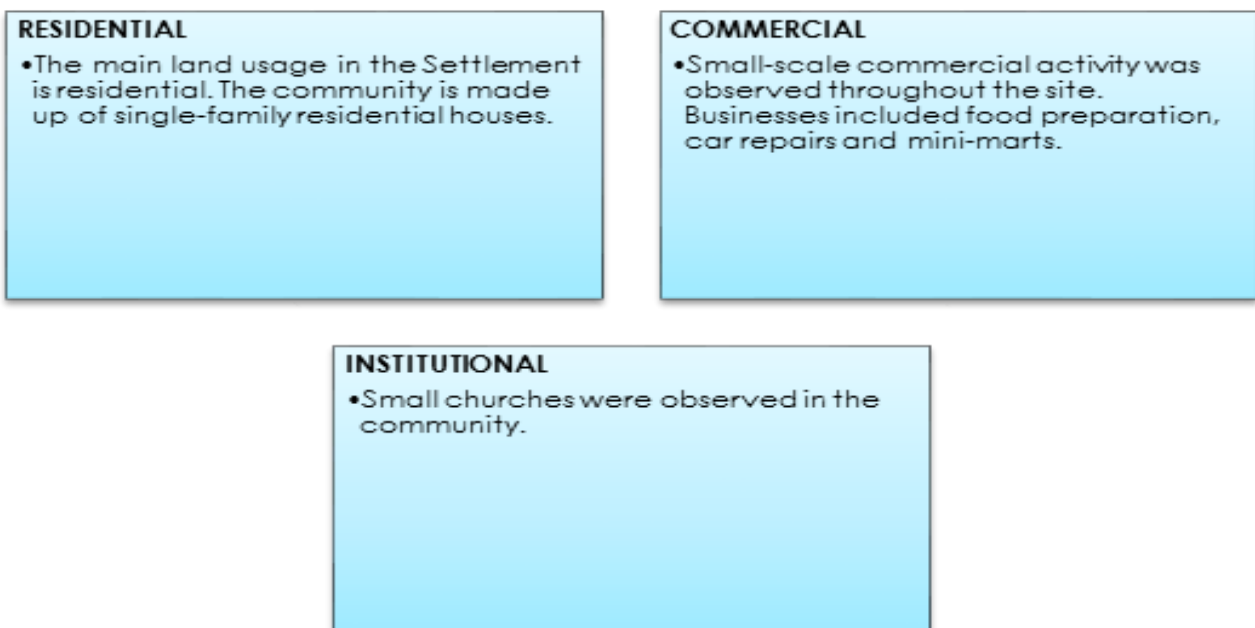


Figure 54. Main Land Usages at Bois Bande – Settlement C

5.3.2. Environmental and Social issues



Figure 57. Partly Paved Road, Bois Bande – Settlement C

A. Inadequate Access



The existing road network in Bois Bande - Settlement C is a combination of earthen and paved roads. Residents expressed that some of the roads were hand cleared and financed by the community. **Figure 56** shows a road that is partly paved to accommodate outfall drains and **Figure 57** shows a paved road at Rose Avenue with a poorly maintained box drain. The Settlement therefore has an incomplete and poorly maintained road system. This results in faster deterioration of roads which contributes to potholes. Additionally, when vehicles drive on the earthen section of the road it causes dust to rise which reduces air quality and increases respiratory problems amongst residents.



Figure 58. Partly Paved Road, Rose Avenue, Bois Bande – Settlement C

B. Inadequate Drainage

The topography of the Settlement is relatively flat. The existing drainage infrastructure which consists mostly of earthen drains, flows in two (2) directions – towards Pine Settlement on the south and the Proposed Highway to the north.

Due to inadequate drainage infrastructure and maintenance, flooding occurs after heavy rainfall. **Figure 59** shows an existing drain on Rose Avenue where the drainage channel appears to be under vegetation. This can hamper the flow of water through the channels. It therefore contributes to stagnant water from improper outfall which has the potential to foster pests. Consequently, potential health problems, such as gastrointestinal disorders and the *Dengue Fever*, may arise as a result of the presence of flies and mosquitoes.



Figure 59. Drain under Vegetation, Rose Avenue, Bois Bande – Settlement C

C. Inadequate Water Supply

It was observed that some roads in the Settlement did not have pipe-borne water. For instance, at Marigold Drive, residents explained that during the dry season, the Sangre Grande Regional Corporation supplies them with truck-borne water. This water is stored in a communal tank. During the raining season, however, residents collect and utilize rainwater. As seen in **Figure 48** only 29% of residents had pipes within their dwellings whilst the majority used other means for obtaining water in addition to the community tank seen in **Figure 60**. While this water is usable for any needs of the residents, it may not be enough to support the entire Settlement.



Figure 60. Communal Water Tank, Marigold Drive, Bois Bande – Settlement C

D. Improper Waste Management

Although the majority of Bois Bande residents utilize water closets, some residents utilize latrines with and without pits (see **Figure 52**). As previously stated, latrines may result in the infiltration of sewage into water sources which can affect water quality. Moreover, in cases of extreme precipitation events, latrines may become flooded. This can also result in the contamination of water sources.

Therefore, waste disposal needs to be carefully assessed in terms of the density of the overall area and the capability of the soil to allow for percolation.

E. Inadequate Social Services

As previously mentioned, small churches or religious centres were observed in the Settlement. There was no evidence of day-care centres

F. Proposed Roadway

There are some environmental issues that may arise during the process of construction of the Proposed Roadway. Construction activities generate a lot of dust in the environment. Noise pollution is also a factor which may cause a decline in the bird population within close proximity to the Roadway. It can also be a nuisance to nearby residents. It has to be understood that the contractor has to take action to reduce environmental impacts. However, after the construction phase, positive factors arise. This includes easier access to and from the Settlement and its surroundings.

5.3.3. Developmental Challenges and Potential Remedies

The **Table** below lists some of the site developmental challenges and potential remedies.

Table Recommendations for Addressing Development Issues

Development Issues	Recommendations
Inadequate Access	Roads should be paved by the Regional Corporation. This should be guided through a collaboration between the LSA and the Regional Corporation.
Inadequate Drainage	Inadequate and poorly maintained drains have led to flooding during periods of heavy rainfall. Drains should be established and regularly cleaned by the Regional Corporation.
Inadequate Water Supply	The Settlement currently utilizes a communal water tank during the dry season. It may be necessary for the Regional Corporation to implement more water tanks in event of a lengthy dry season.
Improper Waste Management	Methods of proper waste disposal should be guided by the EMA.
Inadequate Social Services	No day care centres were present in the Settlement. It may be necessary for an Early Childhood Care and Education Centre to be established. This process should be guided by the Ministry of Education.
Expansion of Squatting	The limit of the residential development should be physically established and maintained. In other words, the expansion of squatting should be eliminated. <u>A subdivision survey is strongly recommended to regularize the Settlement and to provide opportunities for land ownership.</u>

5.3.4. POSITIVE SOCIAL AND ENVIRONMENTAL IMPACTS

In the regularization and the physical development process of the Settlements - *“Community viability is the prerequisite for the achievement of sustainable development”*

Accordingly, the strategy for achieving sustainability involves:

- Involvement - The community and the State Agencies

- Integration – Stakeholder engagement
- Incrementation – Bit by bit development based on prioritization of the physical, social and economic requirements.

The positive social and environmental impacts are listed as follows:

1. **Proximity of Oropouche River (Sahadeen Trace):** Adjustment of the outflow of Oropouche will have the effect of reducing the flooding in the community and thereby improving the quality of life.
2. **Access:** Improvement and expansion of the existing road system will improve access to and from the site especially during times of emergency. It will also improve the health of residents who suffer with respiratory problems.
3. **Adequate drainage:** Health conditions will therefore improve as it can reduce the proliferation of pests and diseases. The livelihood of those who use drops to sustain their households will be maintained. This will therefore improve the quality of life.
4. **Waste management:** Improvement of health with the reduction of garbage will result in a cleaner environment. Improved water quality and water supply will also improve health of residents and the environment.
5. **Regularization:** Subdivision of the parcellation thereby providing individual Survey Plans for each occupier will have a very important impact on the consolidation and viability of the Settlement. Always land ownership is a crucial ingredient in allowing “Squatters” becoming owners. In effect, this single factor is an extremely important component of the general objectives of the Urban Upgrading and revitalization programme being “to improve the quality of life of low-income households and to increase the vitality of urban areas”

On the basis of our analysis of the social survey, our field investigations and our meetings with the communities, the implementation activities we highlighted will have a positive impact on the day to day life of residents at all three sites. These factors will improve the quality of life of the residents, it will provide a sense of community and signal to the youth how viability can effectively take place.

6. POTENTIAL ADVERSE SOCIAL AND ENVIRONMENTAL IMPACTS OF THE THREE PROJECTS

The Table below summarized the Social and Environmental Impacts that are common to the three project sites.

	SOCIAL IMPACTS
	<i>Pre-construction and Design Phase</i>
1	Limited resident participation due to fear that the project will lead to eviction, displacement or new/higher taxes
2	Social tensions with new squatters with knowledge of the impending project who opportunistically occupy the project site
3	Social tensions among different groups within the community who may advance competing development agendas and priorities, and with some residents who may oppose the proposed development design e.g. because it reduces the size of the plot they currently occupy or places communal infrastructure (e.g. detention pond) close to their homes
	<i>Construction Phase</i>
4	Social tensions and obstruction of works caused by residents demands for use of local labor
5	Extortion and security threats to the contractor by persons who strongly oppose the project or who seek to illicitly profit off of it
6	Obstruction of works by opportunistic new squatters who may erect structures in the infrastructure Rights of Way or proposed open/public areas, or on lots identified for communal facilities
7	Impeding of civil works and lotification caused by an increase in unregulated home expansion and renovations, including boundary structures, garages etc.
8	Occupational health and safety risks for workers engaged in construction
9	Safety/accident risks for residents, especially young children, associated with increased vehicular traffic, heavy equipment operation, and building materials storage on the site
10	A few households may be required to adjust their plot boundaries or relocate within the site in order to implement a rational and sustainable land use plan for the site, which can be resisted by those squatters affected.
11	Unforeseen delays to the works, in the form of adverse weather or unforeseen environmental factors, which can lead to social dissent.
	<i>Post-Construction and Operation Phase</i>
12	Social tensions between existing residents and new squatters attracted to the site by the improved living conditions, and who occupy vacant sites, public areas and plots identified for communal facilities

	SOCIAL IMPACTS
	ENVIRONMENTAL IMPACTS
	<i>Pre-construction and Design Phase</i>
	None identified (limited or no impact as these activities will not directly affect the communities during these phases)
	<i>Construction Phase</i>
13	Flooding and land slippage risks caused by surface water diversion due to earthworks and associated loss of vegetation
14	Failure of the Contractor to implement key mitigation measures to reduce the effects of excessive storm water runoff that can lead to flooding or contamination through siltation of the downstream water course.
15	Impaired ambient air quality due to high levels of dust and gaseous particles from construction activities and equipment
16	Environmental risks which can lead to health concerns among the squatters during the works. These can be excessive dust, mud, noise.
17	Vibration and Noise pollution caused by earthworks and construction equipment
18	Exacerbated flooding in low lying parts of the site as well as downstream of the site, due to higher rates of stormwater runoff due to paving of roads and drains
19	Health and safety risks for residents and workers associated with improper handling of construction waste
20	Surface water contamination as a result of sediment run off from exposed soils
	<i>Post-Construction and Operation Phase</i>
21	Compromised functioning of built infrastructure due to inadequate maintenance e.g. brush encroaching on drains may lead to stagnant water and flooding
22	Health and drowning risks associated with ponding of water in inadequately secured detention/retention ponds and deep drains
23	Flooding or land slippage risks for neighbors due to indiscriminate or poorly designed on-plot drainage associated with increased potable water supply to homes
24	Soil instability caused by Clearing and Grubbing of the site which can lead to land slippage and potential structural issues to homes that occupy the site.