

TRINUYANA INVESTMENTS INC.



PROJECT SUMMARY

(Mixed-Use Development- Housing & Commercial Retail)

Executive Summary

While Guyana's offshore oil and gas industry rapidly grows, infrastructure will have to be developed onshore to support the activities in the industry. One of the critical areas for development is housing and commercial retail sector. Most of the current housing and commercial retail facilities can be characterised as traditional establishments with only a small number of business-oriented properties of international standard located in the vicinity of Ogle on the East Coast of Demerara.

The proposed USD 120M mixed-use development project was envisaged by Trinuyana Investments Inc. based on the massive development in Guyana with increasing demand for high quality and well-priced housing accommodation and commercial retails facilities for the growing number of expatriates and young Guyanese professionals. The architecture of the building was designed and engineered using green and smart engineering technology in keeping with the Low Carbon Development Strategy (LCDS) along with Leadership in Energy and Environmental Design (LEED) and fulfilling the sustainable development goal (SDG) 11 sustainable cities and communities.

Plot "JAI" a portion of Plantation Ogle and Plantation Goedverwagting located on the East Coast Demerara will be developed for Housing and Commercial Retail which include Townhouses, Offices, Supermarket and Shopping Plaza on a transported plot of land spanning 16.5 acres.

Site Layout

GOOGLE MAP IMAGE



Google Map Image showing area for proposed project development (Red Outline)



Site Plan



Internal Features of the Housing Development



- Running Track
- Communal Pool

- Tennis Court
- Rooftop Patio

- Outdoor Patio
- Gym



- Communal Pool

- Tennis Court

- Outdoor Patio and Backyard Area

- Running Track

External Features of the Mixed Use Development

Project Development

The site preparation, mobilization and construction will be managed by a project manager and project team along with an independent consultant to ensure compliance with all construction and environmental requirements. All materials will be sourced locally, regionally and internationally including but not limited to aggregates, structural and nominal steel, glass, finishing materials all of which fulfilling international standards. As with most developmental projects, there are four stages required for the successful implementation of the project.

- Design phase.
- Pre-construction phase
- Construction phase
- Operation phase

Design Phase

The design phase for the Mixed-Use Development Project aimed to balance cost with sustainable development and ensuring human health and the environment are not compromised during construction and operation. The design was done according to internal standards and best practice utilizing the best available technology and technique, smart and green engineering and leadership in energy and environmental design approaches. An important step in this process was also to acquire all the relevant regulatory approvals including but not limited to the NDC, CH&PA, EPA etc. The duration of this phase is slated for 3 months.

Pre-Construction Phase

This stage will cover the site development activities, such as excavating any soft spots in the subgrade and removing any small trees and vegetation from the plot. At this point, all external reinforced concrete drains will be built, and a bridge will provide access to the site so that the plot may be backfilled to the appropriate construction levels. To bring

the site up to design grade during these operations, over 100,000 cubic yards of white sand are anticipated to be needed. Sand trucks and a small wheel loader (bob cat) will therefore be frequently seen at the site during this time. This phase should take two months to complete.

Construction Phase

This phase will see the project's construction. Structural steel, mass and reinforced concrete, glass, and timber for interior finishes and furnishings will make up nearly all of the building. For all of the amenities in the mixed-use property, construction will begin concurrently on the substructure and continue with the superstructure. During this phase of the project, 150–200 construction workers are expected to work full-time. Following the completion of the superstructure, professionals specializing in electrical, plumbing, and air conditioning will start installing cables and pipes, and then proceed with external activities. This phase should take a full year to complete.

Operation Phase

The facilities under the mixed-use development will operate to international standards and best practices. The design life for the project is 100+ years.

Potential Environmental Impacts and Mitigation Measures

General Summary of Impacts and Mitigation Measures for Mixed-use Development

Mixed-use development, combining housing and commercial retail spaces, can have several cumulative impacts on the environment and local community. These impacts can include increased traffic congestion, air and noise pollution, strain on infrastructure such as water and sewage systems, and changes to the social fabric of the area. To address these impacts, various mitigation measures will be implemented as summarized.

Transportation and Traffic - Encouraging alternative modes of transportation such as walking, cycling, and public transit can reduce the number of vehicle trips. Designing streets with the development zone to prioritize pedestrian and cyclist safety, as well as providing adequate parking facilities, can also help manage traffic congestion.

Air Quality- Implementing green building practices, such as using energy-efficient materials and designs, will reduce the overall carbon footprint of the development, thus improving air quality. Additionally, planting trees and greenery can help absorb pollutants and improve air quality.

Noise Pollution- Soundproofing building materials and designing spaces with noise mitigation in mind will help reduce the impact of noise from both vehicular traffic and commercial activities on residents.

Infrastructure Strain- Ensuring that the development is connected to existing water and sewage systems and designing infrastructure to accommodate increased demand will help prevent strain on these systems.

Social Impacts- Mixed-use developments can lead to changes in the social fabric of an area, such as increased diversity and economic activity. To mitigate negative impacts, community engagement and consultation will help ensure that the development meets the needs and expectations of local residents.

Green Spaces- Incorporating green spaces and public amenities into the development will help mitigate the loss of natural habitats and provide residents with access to recreational areas.

Energy Efficiency- Incorporating energy-efficient technologies and renewable energy sources will reduce the overall energy consumption of the development, thus lowering its environmental impact.

Waste Management- Implementing effective waste management practices, such as recycling programs and composting facilities will reduce the amount of waste generated by the development.

Emergency Services- There will be an increased demand for emergency services such as fire and police. To mitigate this, coordination with local authorities to ensure adequate emergency response capacity, and design buildings to meet fire safety standards will be required.

Potential Impacts and Mitigation Measures During Construction & Operation of Mixed-use Development Facilities

Soil

Construction Impacts

The analysis of the soil samples has not identified the presence of hazardous substances (e.g. asbestos, heavy metals, petroleum hydrocarbons) for the boreholes done on the project sites and so this risk appears to be low. Consequently, as is always the case with any construction project there is the potential for hazardous or contaminative substances to be present that could pose an expose risk to persons near the exposed materials and the materials management strategy should reflect this. Notwithstanding the apparent general absence of contaminants from the sites, earthworks and site debris clearance activities can give rise to airborne dusts of particle sizes that can present a health hazard (PM10 and PM2.5) and such dust emission should be prevented by the adoption of adequate control measures. With respect to groundwater, there will be a need to dewater

excavations where these intrude below the groundwater table. The normal method is to pump the water to a sacrificial area and achieve loss by evaporation. This could lead to localised soil impacts if the groundwater is contaminated. The sampling of the shallow surface water (which is in likely continuity with the shallow groundwater) did not identify any chemical contaminants of concern.

Typical potential construction impacts that could occur include:

- **Use of machinery on site** – Accidental spills or leakage of fuel and oil from machinery and fuel storage on-site during the construction phase could impact the underlying soils and groundwater.
- **Earthworks** – Mobilisation of existing contamination in the soil and subsurface (if present) could migrate to impact underlying groundwater.
- **Piling** – Deep excavations and piling can create preferential pathways into groundwater for existing contamination, or spills and leakages to migrate through.
- **Dewatering** – Dewatering of excavations can mobilise existing pollution within groundwater.

Operational Impacts

In the operational phase the completed project will be (largely) composed of impermeable surfaces that reduce the potential for the completed to impact soils and groundwater.

Typical potential operational impacts that could occur include:

- **Storage and use of environmental hazardous materials** – Accidental spills or leakage from the storage, handling and use of materials could impact the underlying soils and groundwater especially when sub-surface or in-ground maintenance works are undertaken.
- **Drains and in-ground structures** – Failure to inspect and maintain (in good condition) in ground structures such as oil/water separators and drains can act as a potential long-term source of contamination impacting both soils and groundwater.

Mitigation Measures

Mitigation measures for soil during construction and operation focus on minimizing soil disturbance, preventing soil erosion, and maintaining soil quality.

1. **Soil Erosion Control:** Implement erosion control measures such as silt fences, sediment traps, and erosion control blankets to prevent soil erosion during construction. Vegetative cover and mulching can also help stabilize soil.
2. **Site Planning:** Plan construction activities to minimize soil disturbance. Avoid grading steep slopes and preserve existing vegetation where possible. Use construction techniques that minimize soil compaction, such as using lighter equipment or temporary roads.
3. **Erosion and Sediment Control Plans:** Implement erosion and sediment control plans that outline specific measures to prevent soil erosion and sedimentation. Regularly inspect and maintain these measures throughout construction.
4. **Stormwater Management:** Implement stormwater management practices to reduce runoff and prevent soil erosion. This can include using permeable surfaces, detention ponds, and vegetated swales to capture and treat stormwater.
5. **Soil Stabilization:** Utilize soil stabilization techniques such as revegetation, mulching, and erosion control blankets to stabilize exposed soil and prevent erosion.
6. **Construction Waste Management:** Manage construction waste to prevent soil contamination. This includes segregating and recycling waste materials, as well as disposing of hazardous materials in accordance with regulations.
7. **Soil Quality Restoration:** After construction, restore disturbed soils by adding organic matter, such as compost, to improve soil structure and fertility. Re-vegetate areas with native plants to stabilize soil and prevent erosion.
8. **Monitoring and Maintenance:** Regularly monitor soil conditions during construction and operation to identify any issues early. Implement maintenance practices, such as repairing erosion control measures and managing stormwater, to ensure long-term soil protection.

Surface and Ground Water

Construction Impacts

The construction phase of the project could have a notable impact on the surface water quality. Typical potential construction impacts that could occur include:

- **Soil compaction** – Compaction due to the use of heavy machinery reduces infiltration, increases runoff, and shortens the rainfall-runoff response.
- **Soil stripping and vegetation removal** – Soil stripping reduces soil moisture storage capacity and may increase runoff. Removal of vegetation reduces interception and evapotranspiration rates, increases runoff, and increases suspended solids entrained in runoff.
- **Use of machinery on site** – Accidental spills or leakage of fuel and oil from machinery and fuel storage on-site during the construction phase could impact the underlying groundwater and enter surface water watercourses/drains and waterbodies.
- **Earthworks** – Excavation and removal of the topsoil and shallow superficial deposits could reduce the rainfall-runoff response and alter groundwater levels.
- **Piling** – Deep excavations and piling can create preferential pathways into groundwater for existing contamination, or spills and leakages to migrate through.
- **Dewatering** – Dewatering of excavations can mobilise existing pollution within groundwater if discharged directly into surface water. Mobilisation of sediment, which could enter watercourses/drains and waterbodies.
- **Use of cement and concrete** – Leaching of cement / concrete into groundwater may result in a degradation in groundwater quality. Pollution from spills or leakage of concrete /cement leachates to surface water leading to a degradation of water quality.
- **Construction of impermeable surfaces** – Reduction in recharge to shallow superficial deposits and underlying bedrock aquifer thereby locally reducing groundwater levels. This will also increase runoff to surface water drains and may lead to flooding.
- **Construction of subsurface infrastructure** – Impede shallow groundwater flow that can cause groundwater mounding on the upgradient side and reducing groundwater levels on the downgradient side. Pollution from spills or leakage of concrete/cement

leachates to surface water. Implementation of appropriate environmental controls on the Site during the construction phase will eliminate the possibility of contaminated run-off leaving the site in the event of a spillage or contaminated stormwater issue.

Operational Impacts

In the operational phase, the completed project will convey treated surface and waste water to surrounding water bodies. Typical potential operational impacts that could occur include:

- **Impermeable surfaces** – Reduction in recharge to the underlying aquifer thereby locally reducing groundwater levels. This will also increase runoff to surface water drains and may lead to flooding.
- **Subsurface infrastructure** – Impede shallow groundwater flow that can cause groundwater mounding on the upgradient side and reducing groundwater levels on the downgradient side.
- **Discharge of treated effluent and surface water** – Direct discharge of treated effluent and run-off to water bodies provides a viable pathway for potential impacts.
- **Alteration of the existing drainage regime** – Alteration of the existing drainage regime may alter both the amount of runoff within the surface water catchment, and groundwater recharge, thereby altering the flow rates and volumes within the waterbodies within these catchments.
- **Vehicle movement** – Vehicle movement has the potential to result in accidental spills or leaks of fuel and oil which could impact the underlying groundwater and enter drains leading to surface watercourses and waterbodies.
- **Wastewater drainage** – Wastewater from leaking sewerage infrastructure has the potential to impact underlying groundwater and enter surface watercourse and waterbodies.

Mitigation Measures

Mitigation measures for surface and groundwater during construction and operation focus on preventing contamination, managing stormwater runoff, and preserving water quality.

1. **Sediment and Erosion Control:** Implement sediment and erosion control measures, such as silt fences, sediment traps, and erosion control blankets, to prevent sedimentation in surface water bodies. These measures help to maintain water quality by reducing the amount of sediment entering waterways.
2. **Stormwater Management:** Design and implement stormwater management systems to capture and treat runoff from the construction site. This can include using retention ponds, vegetated swales, and permeable surfaces to reduce the volume and improve the quality of stormwater runoff.
3. **Spill Prevention and Control:** Establish spill prevention and control measures to prevent accidental spills of hazardous materials. This can include proper storage and handling practices, as well as spill response procedures to minimize the impact on surface and groundwater.
4. **Groundwater Protection:** Implement measures to protect groundwater from contamination during construction and operation. This can include using impermeable liners for storage areas, implementing monitoring wells, and avoiding activities that could introduce contaminants to the groundwater.
5. **Waste Management:** Properly manage construction and operational waste to prevent contamination of surface and groundwater. This includes segregating and recycling waste materials, as well as disposing of hazardous materials in accordance with the Environmental Protection Agency's regulations.
6. **Vegetative Buffers:** Establish vegetative buffers along water bodies to filter runoff and reduce the transport of sediment and pollutants into surface water. Vegetation also helps stabilize banks and prevent erosion.

Noise

Construction Impacts

Estimated noise levels during the construction phase can be predicted at existing sensitive receptors in the surrounding study area using the noise propagation algorithms contained within BS5228-1. It has been assumed that all construction work will be undertaken during daytime hours (with possible exceptions during critical activities), construction activities will be seven days a week. Sound propagation has also been assumed across hard ground (acoustically reflective) and it was assumed there will be no screening from topographical features, buildings, or other structures. These potential noise nuisance issues will generally be of short duration but can have varying intensity and can be cumulative where several noise source activities are close together. Given the distances to neighbouring residential properties construction related noises are not likely to be a noticeable feature of the noise landscape within these communities during the construction phase, albeit this is a temporary phase.

Operational Impacts

Once operational there are several potential noise sources associated with the site that could be noticeable off-site. These include:

- diesel generator operation;
- Heating, Ventilation, and Air Conditioning (HVAC) systems;
- vehicles idling;
- reversing of delivery vehicles; and
- routine construction/maintenance activities.

With the exception of noises associated with the HVAC equipment, these potential noise sources are intermittent and of short-duration and unlikely to be noticeable above the baseline noise levels. The equipment related noises can be constant and more intrusive if not adequately mitigated.

Mitigation Measures

Mitigation measures for noise during construction and operation focus on reducing noise levels, minimizing the duration of noisy activities, and protecting sensitive receptors.

1. **Construction Planning:** Develop a construction plan that identifies noisy activities and schedules them during times when noise impacts will be minimized, such as during daytime hours and away from sensitive receptors (none present in close proximity to project site).
2. **Noise Barriers:** Install temporary noise barriers, such as walls or fences, around construction sites to reduce noise propagation to surrounding areas.
3. **Equipment Selection:** Use quieter construction equipment and machinery, such as electric or hybrid vehicles, and ensure that equipment is properly maintained to reduce noise emissions.
4. **Operational Practices:** Implement operational practices that reduce noise, such as avoiding unnecessary idling of equipment and using mufflers on equipment exhausts.
5. **Noise Monitoring:** Conduct regular noise monitoring to assess noise levels and ensure compliance with regulations and project-specific noise limits.
6. **Community Engagement:** Engage with the community to inform them about construction activities, potential noise impacts, and mitigation measures being implemented.
7. **Noise Insulation:** Install noise insulation measures in buildings near construction sites to reduce indoor noise levels.

Air Quality

Construction Impacts

During the site preparation and construction phase of development, emissions to atmosphere are mainly expected to be particulate matter created by movements of construction vehicles and machinery over unsurfaced ground creating dust and the engine exhaust emissions. Impacts could arise from:

- coarse and fine dust from construction activities including excavation, earthmoving, materials storage, and movement of construction vehicles; and
- construction plant, both mobile and stationary (*e.g.* cranes and generators), which emit a mixture of exhaust gases, in particular PM10. During construction of the proposed development dust emissions may arise from the following activities:
 - earth moving and major excavation works;
 - moving and stockpiling of materials;
 - movement of vehicles over unpaved or soiled surfaces causing re-suspension of dust particles;

Dust arising from the majority of construction activities tends to be of a coarse nature and unable to travel great distances when airborne. The ability of dust particles to remain suspended in the air depends on its shape, size and density. Coarse particles (>30µm), tend to be deposited within 100m of source¹. Finer particles, between 10-30µm, are generally deposited within 200 to 500m of source, while very fine particles (<10µm), which remain suspended for longer, can travel up to 1km from source. The greatest proportion of construction dust is made up of coarse particles, thus most dust emissions are deposited within 100m of source.

Operational Impacts

Operational air emissions from the facilities will be limited mainly to exhaust emissions from diesel generator sets, which for modern units and using low sulphur fuel should have a relatively small emissions footprint, especially as the hospital should mainly source its power from the grid (hence its energy related emissions will be a very small fraction of the emission profile of the power plant and remote from the site and local community the majority of the time). This use of generators periodically still has the potential to give rise to localised increases in the air pollutants that have been monitored for as part of the baseline activities, but the sources of these emissions will be localised, and the periods of emission limited. Given this, the potential for significant impacts in relation to operational air emission impacts is considered to be very low.

Mitigation Measures

Mitigation measures for air quality during construction and operation focus on reducing air pollutants, controlling dust, and minimizing emissions from construction activities.

1. **Dust Control:** Implement dust control measures, such as using water sprays, dust suppressants, and covering materials, to reduce dust emissions from construction sites.
2. **Emission Controls:** Use equipment with emission controls, such as particulate filters and catalytic converters, to reduce air pollutant emissions from construction equipment and vehicles.
3. **Vehicle Idling Reduction:** Implement policies to reduce vehicle idling, such as turning off engines when not in use, to reduce emissions of air pollutants.
4. **Site Layout and Planning:** Plan construction activities to minimize the generation of air pollutants, such as locating material storage areas away from sensitive receptors and using efficient construction methods.
5. **Regular Maintenance:** Ensure that construction equipment and vehicles are properly maintained to reduce emissions of air pollutants.
6. **Monitoring and Compliance:** Conduct regular air quality monitoring to assess the impact of construction activities on air quality and ensure compliance with regulations and project-specific air quality standards.
7. **Community Engagement:** Engage with the community to inform them about potential air quality impacts from construction activities and the measures being implemented to mitigate these impacts.

Waste and Materials Management

Construction Impacts

Construction activities can have significant impacts on the environment, particularly regarding waste generation and materials management.

1. **Waste Generation:** This project will generate waste, including solid waste, construction waste and wastewater.

2. **Water Usage:** Construction activities will require large amounts of water, both for mixing materials and for construction site management. This can strain local water resources, especially in areas already experiencing water scarcity.
3. **Pollution:** Improper handling and disposal of construction waste can lead to pollution of soil, water, and air. For example, hazardous materials such as paints, solvents, and asbestos can contaminate the environment if not managed correctly.
4. **Transportation Impact:** Transporting materials to and from the construction site can contribute to traffic congestion, air pollution, and greenhouse gas emissions.
5. **Health and Safety Risks:** Improper management of construction waste can pose health and safety risks to workers and nearby communities.

Operational Impacts

Operational impacts of waste and materials management in construction refer to the effects that the ongoing use and maintenance of a building or infrastructure have on the environment. These impacts are distinct from those during the construction phase. Here are some key aspects:

1. **Energy Consumption:** The operation of buildings accounts for a significant portion of global energy consumption. Heating, cooling, lighting, and powering electrical equipment all contribute to energy use. Efficient energy management practices, such as using energy-efficient appliances and lighting, can reduce these impacts.
2. **Water Usage:** Buildings consume large amounts of water for purposes such as sanitation, landscaping, and cooling systems. Water-efficient fixtures and systems, as well as recycling and reuse of water, can help mitigate this impact.
3. **Waste Generation:** Occupied buildings generate waste through day-to-day activities, such as packaging, food waste, and office materials. Waste management programs that encourage recycling and composting can reduce the amount of waste sent to landfills.

Mitigation Measures

To mitigate these impacts, construction projects can adopt sustainable practices such as:

- Implementing waste management plans to reduce, reuse, and recycle construction waste.
- Using sustainable building materials and practices to minimize resource consumption and environmental impact.
- Improving energy efficiency in construction activities and buildings.
- Protecting and restoring natural habitats affected by construction projects.
- Promoting sustainable transportation options for workers and materials.

Traffic and Transport

Construction Impacts

In terms of overall burden on the main arterial road network and associated infrastructure, therefore, the impact in terms of quantum of vehicle movements is considered to be minimal. The overall conclusion in terms of traffic impact in a volumetric sense the impact on the roads leading to the project site area will not be significant. Furthermore, the turning of vehicles into and from the project site would lead to minor congestion challenges on the primary roads.

Operational Impacts

During the Operational Phase when the mixed-use development facilities are fully functional, the traffic impact scenario will be very different. There will be very few heavy vehicles visiting the site and a new access road and visitor and staff parking areas will be provided. In this regard, the mixed-use facilities will have a positive impact on the traffic and parking situation.

Mitigation Measures

Mitigation measures for traffic and transport during construction and operation focus on reducing congestion, minimizing emissions, and improving safety.

1. **Traffic Management Plans:** Develop and implement traffic management plans to minimize disruptions and ensure the safe flow of traffic around construction site.
2. **Alternative Transportation:** Encourage the use of alternative transportation modes, such as public transportation, cycling, and walking, to reduce the number of vehicles on the road.
3. **Construction Logistics:** Plan construction activities to minimize the impact on traffic flow, such as scheduling deliveries during off-peak hours and using staging areas to reduce congestion.
4. **Emissions Reduction:** Use low-emission construction equipment and vehicles, such as electric or hybrid vehicles, to reduce emissions of air pollutants.
5. **Road Maintenance:** Maintain construction access roads to minimize dust and prevent potholes, which can contribute to traffic congestion and safety hazards.
6. **Traffic Calming Measures:** Implement traffic calming measures, such as speed bumps to reduce traffic speeds and improve safety around construction site.

Social Impact Assessment

The conclusion of the socio-economic impact assessment is that the project implementation will provide an overall significantly positive societal benefit in that the improved provision of housing and commercial retail facilities will be beneficial to the whole community and better managed and designed operational facility with better working conditions. There will, however, be short-term temporary construction related impacts that could affect traffic flows for example, but these can be readily mitigated to low impact status by effective traffic and transport management. Moreover, any negative construction related impacts will be offset by the construction employment and supply opportunities provided that the developers adhere to good industry labour and security management practices. This will also ensure the health and safety of the contracted

workers and local community. Under operations the local community will benefit from a new more advanced healthcare facility and services, which is positive.

Conclusion

The potential impacts for every project component have been evaluated. It is evident that all of the anticipated effects are minimal, with the exception of the short-term production of construction waste. Resettlement plans and their effects on indigenous people are also unrelated to the project, as its development does not entail the removal, resettlement, disturbance of any third parties, or interruption of any livelihoods. Because of this, the proposed project site is appropriate for Trinuyana Investments Inc.'s planned mixed-use development (housing and commercial retail).