**MINISTRY OF HEALTH**

# Project Summary

## Proposal for the Establishment of the New Amsterdam General Hospital Region #6

**October 2023**

# Executive Summary

The New Amsterdam General Hospital is proposed as a modern state of the art medical facility in Guyana and will offer general medical services inclusive of Ambulatory Outpatients clinical care, In-patient facilities, maternal and delivery services, surgical center, emergency medical services, nursing home and Rehabilitation care. The hospital will be located at Forte Canje, Berbice, Region 6, Guyana on transported lands developed by the Ministry of Health. The aim of the hospital project is to provide a wide range of high-quality hospital services to both nationals and foreigners in the areas of general medicine and specialized clinical care. The facility will house a 230 beds inpatient facility along with a surgical center with five specialized operating rooms, Intensive Care Unit, delivery suites and private rooms. There will be an ambulatory, emergency and walk in clinical centers that will be supported by a modern Emergency Medical Service (EMS) with equipped road and air ambulances. The clinical services will be support by a fully certified medical laboratory, licensed pharmacy, imaging and x-ray unit, kitchen, laundry and housekeeping services.

The facility will be a four-storey main building and an annex facility which will serve as a recover, nursing home and rehabilitation center. The lower floors of the main building will be dedicated to the ambulatory and walk-in clinics, diagnostic and administrative activities while the second floor will house the surgical, Obstetrics and Gynecology centers along with the recovery and ICU. A second building will house a nursing home and rehabilitation center and will serve especially the Diasporas and persons from other jurisdiction who wish to participate in the medical tourism industry. The Hospital will be sited in a manner that provides for adequate access and egress, good natural air flow and mitigation factors to eliminate any nuisance to the surrounding communities or the environment. The location is ideally situated within a populated part of Region 6, with access to both Georgetown via the Berbice Harbor Bridge, and to the rest of Regions by the developing network of roads and bridges.

**Project Description**

The New Amsterdam General Hospital is proposed as a modern state of the art private medical facility as defined by the Health Facilities Act (2007) of Guyana. The facility was conceived as an upgrade to the exiting New Amsterdam Regional Hospital. The Region has rapidly developed over the past 25 years with several new housing and commercial investments alongside agricultural advancements.

The population approximates that of Region 6 and the demand for quality health services have outstripped the current public health capacities that exist at New Amsterdam Regional Hospital and the other Primary care facilities. As such, many persons bypass the facilities in the region and seek medical care at Georgetown Public Hospital Corporation or at private hospital in the City.

A rapid feasibility assessment indicates that a wide range of services are needed in the region and with the advances in the Oil and Gas sector the especially shore based development the need for the range of quality health services are expanding.

The New Amsterdam General Hospital will be offer services in the following areas:

1. Accident and Emergency (A &E) Services along with an Emergency Medical Services (EMS) departments including ambulance and evacuation services.
2. General in-patient facilities with private rooms and wards for neonatal and pediatric, maternity, women (surgical and Medical), Male (surgical and Medical) and Intensive Care Unit.
3. Surgical Center inclusive of five (5) specialized operating rooms, induction and recovery area, preparation and sterilization unit.
4. General Out Patient Department and Walk in Clinics.
5. Specialize Clinics and Ambulatory Center.
6. Delivery and birthing suites along with Neonatal Intensive Care Unit.
7. Dialysis Center.

8. Podiaologe and Diabetic Foot Care Center.
9. Chemotherapy and radiation center.
10. Medical imaging department
11. Medical Laboratory - Clinical testing and diagnostic services
12. Pharmacy - Medicines, medical equipment and medical supplies.
13. Kitchen - Dietary and Nutrition services.
14. Laundry - Linen and Bedding services.
15. Administrative and Accountant Departments.
16. Recreation and Rehabilitation Unit.

**Existing Baseline Information**

The baseline studies conducted focused on the soil type and the re-enforcement needed to erect a multi storied building on the coastal plane. The site was prepared based on the results which indicated alluvial sedimentary soil on a heavy clay base. Piling was done to provide a stable foundation for the super structure. There are no assessed flora or fauna that will be affected since the land was already cleared of natural vegetation for the previous land use. No significant animal species are known to inhabit the area so no encroachment on natural habitat is anticipated. Socially, the facility as described above will provide essential health care for a wide cross section of the population. The facility will also provide 200 jobs during the development phases and will employ close to 260 persons during full operations.

**Proposed Design**


New Amsterdam General Hospital will actively recruit professional health staff from within Guyana and the wider Guyanese Diasporas across the Caribbean, North America and Europe. A Recruitment Unit will be established within the HR Department to actively facilities smooth process of hiring all needed staff.

**Medical Professionals**

1. Medical Consultants (Chief of Services with specialist administrative training)- 11
2. Medical Specialist (Area experts with post graduate specialist training) - 18
3. General Medical Doctor (Registered Medical Practitioners) - 28
4. Administrative Nurse (Licensed Nurse administrators) - 6
5. Management Nurse (Licensed Degree in Nursing)- 12
6. General surgical and Medical Nurse (Registered Nurse) - 24
7. Midwives (Registered Midwife)- 14
8. Nursing Assistants (Registered Nursing Assistant) - 48
9. Patient Care Assistant (basic PCA certificate) - 48

10. Medical Technologist(Bachelors Degree) - 8
11. Medical Laboratory Assistant and Laboratory Aids (MLT Certificate)- 18
12. Pharmacist (Bachelors Degree) - 6
13. Pharmacy Assistants (PA/PT Certificate)- 12
14. Radiologist(Bachelors Degree) - 6
15. Imaging technicians (Certificate) - 12
16. Physiotherapist/Rehabilitation (Bachelors Degree) - 8
17. Biomedical Technician (Bachelors Degree) - 4

**Administrative**

1. Health Administrator (Public Administrator master's degree) - 2
2. Managers (Bachelor’s Degree) - 8
3. Accountants(Bachelor’s Degree) - 6
4. Engineers (Bachelor’s Degree) - 35. Technicians (certificates) - 12
5. Clerical (Associate degree/Diploma/certificates) - 12
6. Drivers/mechanic - 14
7. Plumbers - 3
8. Electricians - 3
9. Gardeners - 4
10. Cleaners/Maids - 20
11. Painters - 2
12. Mortician - 1
13. Porters - 20

The New Amsterdam General Hospital physical infrastructure during will include five multi-story structures built to specifications of the Building Codes as set out by the Guyana National Bureau of Standards (GNBS). The facility will be constructed along the SMART hospital principals outlined in the Pan American Health Organization (PAHO) Smart Hospital Toolkit as a SMART (safe and green) health facility. The construction is guided by standards defined in A Practical Guide for Hospital Administrators, Health Disaster Coordinators, health facility designers, engineers and maintenance staff to achieve Smart Health Facilities by conserving resources, cutting costs, increasing efficiency in operations and reducing carbon emissions.

**Project Development Stages**

The site development and construction are under the direct supervision of a project manager and administrative team. The project is supervised by an independent consultant to ensure compliance with all construction and environmental guidance. All materials will be sourced internationally (Steel, glass, finishing materials) and from local producers (sand, stone, cement, wood and paints) and meets international standards for health facility construction. The hospital construction will use mainly local building material including sand, stone along with imported steel super structure, dry wall metal paneling and glass.

Estimated Quantities - Two Buildings, access way, parking lot, bridges, fencing and landscaping

1. Sand - 480 metric tons Stone - 200 metric tons
2. Aggregate Steel - 64 Metric tons
3. Cement - 6,400 bags (42 Kg each) Glass Panels - 16,000 sq Meters
4. Electric wiring and fixture - 0.5 metric tons
5. Pipes and plumbing - 0.6 metric tons
6. Paints, sealants and resins - 22,000 L

7. Wood/frames ceilings and floors - 36,000 sq. Meters

The general hospital will utilize utilities services (water, electricity, telephone and internet) from national sources. General waste disposal will be provided by local waste management services with assurance for safe and approved final disposal a n d sanitary land fill sites. Medical and hazardous waste will be handled by the Georgetown Public Hospital Corporation Hydroclave Services under an agreement for collection removal, sanitization and final safe disposal. A stand-by electricity generator will be installed in accordance with all safety, efficiency and clean energy requirement under the SMART hospital protocols.

**Project Duration**

1. Land Preparation - 6 months
2. Construction - 18 months
3. Equipment installation - 3 months
4. Staffing - 3 months
5. Protocol development - 3 months
6. Operations - 1 months

**Waste Generation During Construction & Operation**

1. Construction waste
2. General packaging (degradable)
3. Plastic waste
4. Kitchen Organic
5. Sharps (needles, lancets etc.)
6. Infectious waste (biological samples and infectious materials)
7. Pharmaceutical (expired medicines, Cytotoxic substances)

8. Radiological waste (radioactive materials)
9. Chemical waste cleaners, disinfectants pesticides and sanitizers

**Potential Environmental Impacts and Mitigation Measures**

This health care facility is not estimated to have any adverse effects on the physical environment since it is being established in an area that already housed several buildings. The developer selected a SMART hospital model to ensure that the facility in additional to being safe and resilient is also environmentally friendly. The facility will comply with the Hospital Safety Index used across the Americas to help ensure that new or existing health facilities are built or retrofitted in such a way that they are resilient to the effects of natural and manmade hazards.
A feasibility study of the Air Ambulance services will be conducted in collaboration with the GCAA. Some areas to be examined will include noise generation, fuel storage and contingences plan**.** Additionally, SGH Inc. will implement the Green Checklist and other accompanying tools to support the Safe Hospitals Initiative and will guide health officials and hospital administrators in achieving smart health care facilities. Consultations were held with the relevant state agencies including the Central Housing and Planning Authority, the Guyana Lands and Surveys department, the Guyana Fire Services, the Regional Democratic Council, Region 6 and the New Amsterdam Town Council. Meetings were held with the Boardroom of the current New Amsterdam General Hospital.

## Soil, Geology and Land Contamination

***Construction Impacts***

The area of greatest concern, with respect to soils, was the potential disturbance of contaminated soils during the construction phase activities. The analysis of the samples has not identified the presence of hazardous substances (*e.g.* asbestos, heavy metals, petroleum hydrocarbons) at any of the sampled sites and so this risk appears to be low. Notwithstanding this, it is worth noting that any sampling exercise (and especially manual sampling) is only going to provide a limited sample set that may not be representative of the whole Site. It is possible, for example, that there could be areas of concern present in discrete pockets within near surface materials that could be exposed during the initial Site works. 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.

• **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.

• **Fires –** Contamination of soils through accidental fires, as well as contamination from firefighting activities (during emergency conditions).

• **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.

• **Demolition works –** Demolition works, and the removal of existing in-ground structures has the potential to produce sediment and expose previous unknown contamination, which could impact soils and 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.
- **Fires –** Contamination of soils through accidental fires, as well as contamination from firefighting activities (during emergency conditions).

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

<table>
<tr><td>Impact</td><td colspan="6">Construction soils, geology, and land contamination</td></tr>
<tr><td colspan="2">Pre-Mitigation</td><td>Mitigation Required</td><td colspan="2">Post-Mitigation</td><td>Mitigation</td></tr>
<tr><td>Likelihood</td><td>Likely</td><td rowspan="3">Yes</td><td>Magnitude</td><td>Low</td><td rowspan="3">Engineering design<br>Watching brief<br>MMP<br>Piling method statement<br>Dewatering method statement<br>EMP<br>ESMS<br>CEMP</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>Consequence</td><td>Mild</td></tr>
<tr><td>Initial Impact</td><td>Moderate Adverse</td><td>Residual Impact</td><td>Low Adverse</td></tr>
</table>

### During Operation

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<tr><td colspan="2">Pre-Mitigation</td><td>Mitigation Required</td><td colspan="2">Post-Mitigation</td><td>Mitigation</td></tr>
<tr><td>Magnitude</td><td>Low</td><td rowspan="3">Yes</td><td>Magnitude</td><td>Low</td><td rowspan="3">Engineering design<br>Inspection and maintenance schedules<br>EMP<br>ESMS</td></tr>
<tr><td>Sensitivity</td><td>Medium</td><td>Sensitivity</td><td>Mild</td></tr>
<tr><td>Initial Impact</td><td>Moderate/ Low Adverse</td><td>Residual Impact</td><td>Low Adverse</td></tr>
</table>

## Surface and Ground Water

***Construction Impacts***

The construction phase of the Project could have a notable impact on the surface water quality of the main receptor (the River Canje) as there will be a requirement to manage, treat and discharge certain volumes of water from certain construction activities *e.g.* dewatering and piling. 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.

• **Storage and use of environmental hazardous materials –** Accidental spills or leakage from the storage, handling and use of materials could impact the underlying groundwater and enter surface water watercourses/drains and waterbodies.

• **Earthworks –** Mobilisation of existing contamination in the soil and subsurface (if present) could migrate to impact underlying groundwater and enter surface watercourses. 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.

• **Demolition works –** Demolition works, and the removal of existing in-ground structures has the potential to produce sediment, which could be entrained and enter surface 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 sewage and surface water run-off to River Canje. 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 the River Canje 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 or 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.

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

| Impact | Construction impacts on surface water systems | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Medium | Yes | Magnitude | Low | ESMS<br>CEMP |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Moderate Adverse | | Residual Impact | Minor Adverse | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational impacts on surface water systems | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | High | Yes | Magnitude | Low | Engineering design<br>Inspection and maintenance schedules<br>ESMS<br>OSEMP |
| Sensitivity | Medium | | Sensitivity | Low | |
| Initial Impact | Major Adverse | | Residual Impact | Neutral | |

## Noise

***Construction Impacts***

It is inevitable with any major development that there will be some noise, particularly during the site clearance and construction phase when heavy plant and machinery is engaged. Typically, however, noise disruption due to construction is a localised phenomenon, temporary in nature by definition and only people living or working within a few tens of metres of the site boundary are likely to be impacted by construction noise. 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 (Bsi, 2014). 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 likely to be a noticeable feature of the noise landscape within these communities during the construction phase, albeit this is a temporary phase. Whilst on first examination it seems that there could be significant noise impacts during the construction phase, it should be borne in mind that the baseline noise levels at the receptor locations are already very high (as indicated by the baseline monitoring) and the additional noise sources from the construction activities are (to a large extent) masked by the prevailing background noise levels. In other words, the apparent impact will be significantly lessened. The impact in an otherwise quiet baseline environment could be significant but given the prevailing noisy baseline conditions the impact of the temporary construction works is likely to be moderate. The nearest property of a sensitive nature that could be impacted is the Dharm Shala building (convalescent home) that is less than 100m from the site boundary. However, this property is effectively underneath Canje Bridge and close to Gafoors and the Canje River off-loading terminals. It consequently experiences constant and very close noise from the bridge and periodic noise from the aggregate terminals. These are likely to be much more impactful than any construction related noise from the site development.

***Operational Impacts***

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

- ambulance sirens;
- 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.

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

| Impact | Construction noise emissions | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Medium | Yes | Magnitude | Low | ESMS<br>CESMP<br>SEP |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Moderate Adverse | | Residual Impact | Low Adverse | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational noise emissions | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Low | Yes | Magnitude | Low | ESMS<br>OESMP<br>Inspection and maintenance schedules<br>SEP |
| Sensitivity | Medium | | Sensitivity | Low | |
| Initial Impact | Moderate Adverse | | Residual Impact | Neutral | |

## 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:

• demolition of existing structures;

• 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;

• windblown dust emissions from stockpiles and soiled surfaces; and

• fitting out and finishing activities such as cutting and grinding of stone or bricks.

Disruption due to construction is typically a localised phenomenon and is temporary in nature.

In general, only people living or working within 100 metres of construction activities are likely to be impacted by nuisance dust. Dust arising from the majority of construction activities tends to be of a coarse nature and unable to travel great distances when airborne. One aspect of the construction phase that could give rise to significant dust emissions if not properly managed is the Concrete Batching Plant as this involves the storage and blending of large volumes of fine aggregate and cement powder. If the conveyance and dust control systems are not working effectively, large clouds of fine dust will be emitted from the process and can readily drift substantial distances onto neighbouring properties causing both a nuisance and a health hazard. If the plant is modern and well operated this impact risk can be mitigated by well-sealed conveyance systems, extraction, sheeting of raw material stockpiles, water suppression systems and process control systems. In the case of the concrete batching plant, the neighbouring activities are industrial rather than residential so less sensitive, but there could still be human health risks on-site and off-site especially for fugitive cement powder emissions.

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.

Only a small proportion of dust generated by construction activities would be of a fine nature (PM10), but that is the proportion that can enter the human respiratory system and result in adverse health effects. The nearest residential properties are within the 1km distance that such dusts may be expected to travel, but are north of the site on the other side of the Canje River and upwind of the predominant prevailing wind direction. Nonetheless, impact scenarios are still possible for these properties and similarly those that lie approximately 350m south of the site. The other potential air pollutants measured (SOx, NOx) are well below concentrations that would be considered harmful to health and the temporary use of plant and machinery associated with the construction works do not have the potential to significantly alter the conditions from those observed. Localised traffic congestion caused by construction vehicles could lead to short term temporary increases in such parameters, however, the construction management programme will seek to ensure smooth traffic flows and avoid congestion as this will impact upon the programme so must be avoided. This in turn should help to minimise any short-term local effects caused by traffic congestion. The greatest potential for stationary vehicles (which is when the potential for exhaust emissions to deteriorate air quality is the highest) will be within the construction zone and working areas rather than on the approaches to the project area close to receptors. The vehicles are unlikely to travel through residential areas as there are none along the main highways leading to the site, other than the properties fronting the main road.

***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. Another potential source of air emissions associated with the new facility will be the waste steriliser unit. The management team at Georgetown Public Hospital reported that they had received odour complaints associated with the emissions from their hydroclave (steriliser) unit and cautioned that a similar situation could arise on the new site depending on the design and management of the unit. There are, however, a few differentiating factors that make this less likely. Firstly, the steriliser unit at the NAHC facility will be a newer unit and design and thus less likely to have nuisance emissions. Finally, the Georgetown hospital is in an urban area with close residential neighbours (the NAHC site has no close residential neighbours). Finally the Georgetown Hospital receives wastes from multiple MoH and private medical facilities and these sometimes accumulate at the unit, which could also lead to odour issues. This would not be the case at the NAHC facility as the unit there is only for the use of the facility itself. Nonetheless, under abnormal operating conditions potentially odorous emission may be possible.

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

| Impact | Construction Phase Air Emissions | | | | | |
|---|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Medium | Yes | Magnitude | Low | ESMS<br>CEMP<br>DMP |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Moderate Adverse | | Residual Impact | Minor Adverse | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational Phase Air Emissions | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Low | Yes | Magnitude | Low | ESMS |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Minor Adverse | | Residual Impact | Neutral | |

# Climate and Climate Change

### *Construction Impacts*

| Requirement | Description |
|---|---|
| **Construction power demands** | During construction, the initial requirement will be 130 kW (150 kVA) during the day and during night max. 30 kW. |
| **Container deliveries** | Four hundred containers expected. All delivered by ship. Equipment to be shipped from UK, EU and other third-party countries. |
| **Traffic predictions** | Maximum of 20 HGV journeys per hour during the construction phase (this is considered the worst case). |
| **Construction Phase Personnel** | Earthworks and Preliminary works – 42 personnel<br>Substructure – 125 personnel<br>Superstructure – 250 personnel<br>Finishes and MEP – 320 personnel |
| **Water supply** | Estimated at 30 $m^3$ per day and 8.3 litres per second |
| **Wastewater** | Estimated at 30 $m^3$ per day |
| **Diesel back-up** | As backup to the public network, a diesel generator of capacity 100 kW during daytime construction operations. |
| **Notes:**<br>Conversion from MVA to kW using a 0.85 Power Factor (PF), where 1 MVA = 850 kW. | |

### *Operational Impacts*

| Requirement | Description |
|---|---|
| **Anticipated peak power demand** | The estimated peak load of the hospital is 3.0 MVA (2,550 kW), but the expected diversified load is 2.1 MVA (1,785 kW). The estimated average power demand during daytime operation is 1.9 MVA (1,615 kWh). the estimated average power demand at night is 1.5 MVA (1,275 kWh) *i.e.* reduced operation conditions for Heating, Ventilating, and Air Conditioning (HVAC).<br>A similar sized VAMED project within Trinidad & Tobago (approximately 16,400 $m^2$) used in March 2022 of 1500 KVA (1,275,000 kWh) and in April 2022 of 1100 KVA (935,000 kWh). |

| Requirement | Description |
|---|---|
| **Back-up generators** | Two (diesel) generators with a capacity of 1.25 MVA (1,062 kWh) each are required to meet the diversified demand of 2.1 MVA (1,785 kWh). |
| **Water usage** | Estimated at 230 $m^3$ day. |
| **Sewage generation** | Estimated at 260 $m^3$ day. |
| **Bed sizes** | 230 bed design capacity. |
| **Building Management System (BMS)** | The Building Management System BMS records and logs the electricity demand, water consumption and operating hours of the main consumers, *e.g.* generators, ventilation systems.<br>Specific GHG monitoring is not provided within the system. |
| **Refrigerants** | Documentation provided states R410A. Refrigerant volumes of chiller coolants not stated. Emission factors for R410A are IPCC AR4's (2007) –2,088 GWP and IPCC AR5 (2014) 1,924 GWP (relative to CO2). |
| **Notes:**<br>Conversion from MVA to kW using a 0.85 Power Factor (PF), where 1 MVA = 850 kW. | |

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment with respect to climate change resilience and GHG emissions is summarised below.

| Impact | Construction climate and climate change | | | | | |
|---|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation | |
| Magnitude | High | Yes | Magnitude | High | Design<br>FRA<br>Drainage Strategy<br>ESMS<br>CEMP | |
| Sensitivity | Medium | | Sensitivity | Medium | | |
| Initial Impact | Adverse | | Residual Impact | Adverse | | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational climate and climate change | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | High | Yes | Magnitude | High | ESMS |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Adverse | | Residual Impact | Adverse | |

# Waste and Materials Management

### *Construction Impacts*

| Waste Type | Relative Volume | Likely Fate |
|---|---|---|
| Redundant construction materials. | Small to moderate | Return to supplier, re-use for other purposes, sale, or disposal. |
| Wastepaper, plastic, cardboard, and wood. | Small to moderate | Off-site recycling where schemes are available and disposal via contracted waste management firm. |
| Grubbed out former foundations and slabs and excavated soil. | Large (over 21,000m$^3$) | On-site reuse and re-profiling. Off-site disposal or reuse for materials that cannot be managed on-site effectively.<br>Preference will be given to materials reclamation and reuse rather than direct landfill disposal. |
| Collected perched groundwater and rainwater. | Small | Discharge to site surface or drainage system under controlled (consented) conditions if suitable or treatment and off-site disposal. |
| Trade effluent from vehicle wheel washing. | Small | Discharge to drain or ground under controlled conditions (possibly with sediment trap) to be agreed with NDIA. |
| Waste oils, chemicals, and potentially hazardous materials. | Small | Removal to licensed treatment and disposal facilities via contracted waste management firms. |
| Scrap metal and redundant plant and equipment. | Small | Off-site recycling via scrap metal merchant. |
| Vegetation from site stripping and landscape maintenance. | Small | Off-site composting if available or landfill disposal. |
| Sanitary wastewater. | Small | Discharge to surface water after treatment. |
| **Key:** | | |
| Waste Type | Relative Volume | Likely Fate |
| Small = tens of tonnes, Moderate = hundreds of tonnes, Large = thousands of tonnes | | |

### *Operational Impacts*

According to the WHO (WHO, 2018) the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste with the remaining 15% considered hazardous (*i.e.* a material that may be infectious, toxic, or radioactive). High-income countries generate on average up to 0.5 kg of hazardous waste per hospital bed per day; while low income countries generate on average 0.2 kg. However, health-care waste is often not separated into hazardous or non-hazardous wastes in low-income countries making the real quantity of hazardous waste much higher. Categories of waste could include:

• **Infectious waste –** waste contaminated with blood and other bodily fluids (*e.g.* from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (*e.g.* waste from autopsies and infected animals from laboratories), or waste from patients with infections (*e.g.* swabs, bandages and disposable medical devices);

• **Pathological waste –** human tissues, organs or fluids, body parts;

• **Sharps waste –** syringes, needles, disposable scalpels and blades, *etc.*;

• **Chemical waste –** for example solvents and reagents used for laboratory preparations, disinfectants, sterilants and heavy metals contained in medical devices (*e.g.* mercury in broken thermometers) and batteries;

• **Pharmaceutical waste –** expired, unused and contaminated drugs and vaccines;

• **Cytotoxic waste –** waste containing substances with genotoxic properties (*i.e.* highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites;

• **Radioactive waste –** such as products contaminated by radionuclides including radioactive diagnostic material or radiotherapeutic materials; and

• **Non-hazardous or general waste –** waste that does not pose any particular biological, chemical, radioactive or physical hazard.

| Waste Type | Relative Volume | Likely Fate |
| --- | --- | --- |
| Healthcare waste (*e.g.* dressings, contaminated PPE, needles and sharps, human body parts, chemical substances, expired drugs or medicines, and nappies). | Medium | No on-site waste incineration is proposed, but the existing medical waste incinerator will continue to operate and provide a regional waste disposal resource.<br>Biologically contaminated medical waste generated at the new NAHC facility will be treated in a steam sterilizer with an integrated shredder. The end product is like municipal waste and shall then be fed into standard urban waste systems for landfill disposal (the standard disposal mechanism in Guyana). |
| Sanitary wastewater (discharge to sewer). | Medium | Discharge to surface water after on-site treatment. |
| Vegetation from landscaping and maintenance. | Small | On-site or off-site composting if available. |
| Waste oils, chemicals, and potentially hazardous materials associated with maintenance activities. | Small | Removal to licensed treatment and disposal facilities via contracted waste management firms. |
| Scrap metal and redundant plant and equipment. | Small | Off-site recycling and/or recovery/reuse (where facilities are available) |
| Office wastes (*e.g.* food, plastic bottles, packaging materials, paper, other plastics, rope, glass, printer cartridges, photocopier materials, batteries, fluorescent lamps *etc.*). | Small | Removal to licensed treatment and disposal facilities via contracted waste management firms.<br>Recycling and/or recovery where local facilities are available. |
| **Key:**<br>Small = tens of tonnes, Moderate = hundreds of tonnes, Large = thousands of tonnes | | |

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

| Impact | Construction Waste Management | | | | | |
|---|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Medium | Yes | Magnitude | Medium | ESMS<br>CESMP<br>WMP |
| Sensitivity | High | | Sensitivity | Medium | |
| Initial Impact | Moderate Adverse | | Residual Impact | Moderate Adverse | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational Waste Management | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Negligible | Yes | Magnitude | Negligible | ESMS<br>WMP |
| Sensitivity | Medium | | Sensitivity | Medium | |
| Initial Impact | Neutral | | Residual Impact | Neutral | |

# 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 healthcare 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.

## Summary of Impact and Mitigation

### During Construction and Operation

**Social Impacts**

<table>
<tr><td>Impact</td><td colspan="5">Employment, Goods & Services, Occupational Health and Safety, Working Conditions, Community Health, Safety & Security, Infrastructure & Traffic.</td></tr>
<tr><td colspan="2">Pre-Mitigation</td><td>Mitigation Required</td><td colspan="2">Post-Mitigation</td><td>Mitigation</td></tr>
<tr><td>Magnitude</td><td>-</td><td rowspan="3">No</td><td>Magnitude</td><td>-</td><td rowspan="3">-</td></tr>
<tr><td>Sensitivity</td><td>-</td><td>Sensitivity</td><td>-</td></tr>
<tr><td>Initial Impact</td><td>Beneficial</td><td>Residual Impact</td><td>Beneficial</td></tr>
</table>

## Traffic and Transport

***Construction Impacts***

It is evident from the baseline assessment studies that traffic is already heavy in this area and that congestion is a potential issue, especially at school/college drop-off and collection times. The addition of heavy goods vehicles, site staff vehicles and other deliveries during the construction phase will both be impacted by this situation and impact on the situation. Detailed estimates of anticipated project related traffic movements were not available at the time of writing, but some reasonable estimates can be made. The most intensive period of heavy goods activity will be during the site preparation and earthworks stage when demolition materials and stripped soil and vegetation need to be removed from the site and sand and engineering aggregate needs to be brought into the site for level raising. Assuming a typical HGV can carry approximately 10m3 of material, the following estimates can be made:

• There is approximately 2000 m2 of relict building footprint, floor slabs, old septic tanks, etc on the site, which will all need to be grubbed out and removed – assuming these extend to at least 1m depth, this generates around 2000 m3 of material to be removed **(200 HGV movements)**.

• The site area is around 40,000 m2 that leaves 38,00 0m2 of vegetation strip. Assuming this is stripped to approximately 0.5 m depth to get to vegetation free soil, this equates to 19,000 m3 of material **(1900 HGV movements)**; and

• Thereafter, the site levels will need to be raised to create a stable construction platform, but this will also include the infilling of the existing ditches. Taking the general land raise first and assuming a 1m raise above the existing site level (and allowing for replacement of the 0.5m removed for the vegetation strip), this is 1.5 m x 40,000 which is 60,000m3. Regarding the ditches, there is approximately 900 m linear length of relict ditch. Assuming these are approximately 2m wide and 1m deep (below the water line), this equates to 1,80 0m3 of volume to be infilled. In total, therefore there could be approximately 62,000 m3 of infilling required **(6,200 HGV movements)**. From these assumptions, it can be concluded that there could be around 8,300 HGV movements associated with the site clearance and earthworks alone. That is 16,600 individual HGV journeys (either into or from the site). These will all take place during the early phase of the construction project, typically the first 3 months from site hand-over. Assuming a 6-day working week and daylight working hours only (12 hours), this would equate to 864 hours of site works (72 days x 12 hours per day). If the vehicles are evenly distributed throughout this period, this equates to an average HGV flow of around 20 vehicle journeys per hour. In terms of total burden on the local road network this equates to 870 vehicles of one form or another passing the site every hour. The addition of an additional 20 vehicle journeys per hour associated with the construction phase is the equivalent of around a 2% increase in vehicle movements. Within the boundaries of natural variability in traffic flows throughout any given day, this is an insignificant increase in traffic burden on the local road network. 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 and can be accommodated within the existing baseline traffic flows. The impact assessment must consider all affected roads, including the side roads and feeder roads in the area. As was observed during the baseline survey, there is very little traffic turning off the main highway into the side roads that feed the present National Psychiatric Hospital and Passport Office, *etc.* This will change significantly under the construction scenario as there will be on average 20 vehicles per hour either turning into the side roads or exiting from them, whereas now there may be less than 10 per hour doing so. Moreover, virtually all the vehicles using these side roads are cars, with barely enough room to pass each other on these narrow roads. The HGV's will take up the entire width of the carriageway and would not allow vehicles travelling in a counter direction to pass easily. Furthermore, most if not all the construction related traffic will be travelling from the Canje Bridge direction which means the vehicles will have to stop and wait on the main highway to turn right. Given the constant flow of traffic in the opposing direction, this could lead to significant congestion on the main highway. Similarly, when the vehicles exit the site, although they will be turning into rather than across the flow of traffic, other vehicles turning right will prevent this and they will prevent other vehicles from turning into the same road, again exacerbating congestion on the main highway. The overall conclusion in terms of traffic impact in a volumetric sense is thus that whilst the impact on the main highway capacity is minimal, the local impact on any of the side roads leading to the project site area will be significant and a major impact on the affected area and road users. Furthermore, the turning of vehicles into and from these side roads would lead to major congestion challenges on the main highway.

***Operational Impacts***

During the Operational Phase when the hospital has been handed over to the MoH, the traffic impact scenario will be very different. There will be very few heavy goods vehicles visiting the site and a new access road and visitor and staff parking areas will be provided. Moreover, the operational hospital will replace the existing hospital facilities on the other side of the main highway and will thus not result in a net increase in vehicles, but more a relocation of where the vehicles will terminate their journeys. Given that the new facility will have staff and visitor parking and set-down areas, this will negate the current practice of parking and double parking on the main highway verge. In this respect, the new hospital facilities will have a positive impact on the traffic and parking situation.

## Summary of Impact and Mitigation

### During Construction

The overall impact assessment is summarised below.

| Impact | Construction Related Traffic Impact | | | | | |
|---|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | High | Yes | Magnitude | Moderate | ESMS<br>CEMP<br>CTMP |
| Sensitivity | Medium | | Sensitivity | High | |
| Initial Impact | Major Adverse | | Residual Impact | Moderate Adverse | |

### During Operation

The overall impact assessment is summarised below.

| Impact | Operational Traffic Impact | | | | |
|---|---|---|---|---|---|
| Pre-Mitigation | | Mitigation Required | Post-Mitigation | | Mitigation |
| Magnitude | Low | Yes | Magnitude | Low | ESMS<br>OTMP |
| Sensitivity | Low | | Sensitivity | Low | |
| Initial Impact | Minor Adverse | | Residual Impact | Beneficial | |

## Conclusion

The potential impacts for each of the aspects of the project that have been assessed. It can be seen that except for short-term construction waste generation, all the predicted impacts (with the application of appropriate control and mitigation measures) are low. Furthermore, the project site and its development does not involve the relocation, resettlement or disturbance of any third-parties or the disruption of any livelihoods, so resettlement plans and impacts on indigenous communities have no bearing on the project. Similarly, a review of the national cultural heritage and archaeological sites database and consultation with experts has determined that the project site does not have significant potential archaeological merit. As such, the proposed project site is suitable for the proposed construction and operation of the New Amsterdam General Hospital.