**Annex 5. Street Sweeping and Cleaning of Public Spaces**

***Note: based on the Preinvestment Technical Design Study (in Spanish: Estudio de Diseño Técnico de Preinversión (EDTP)) the following information is presented as a reference.***

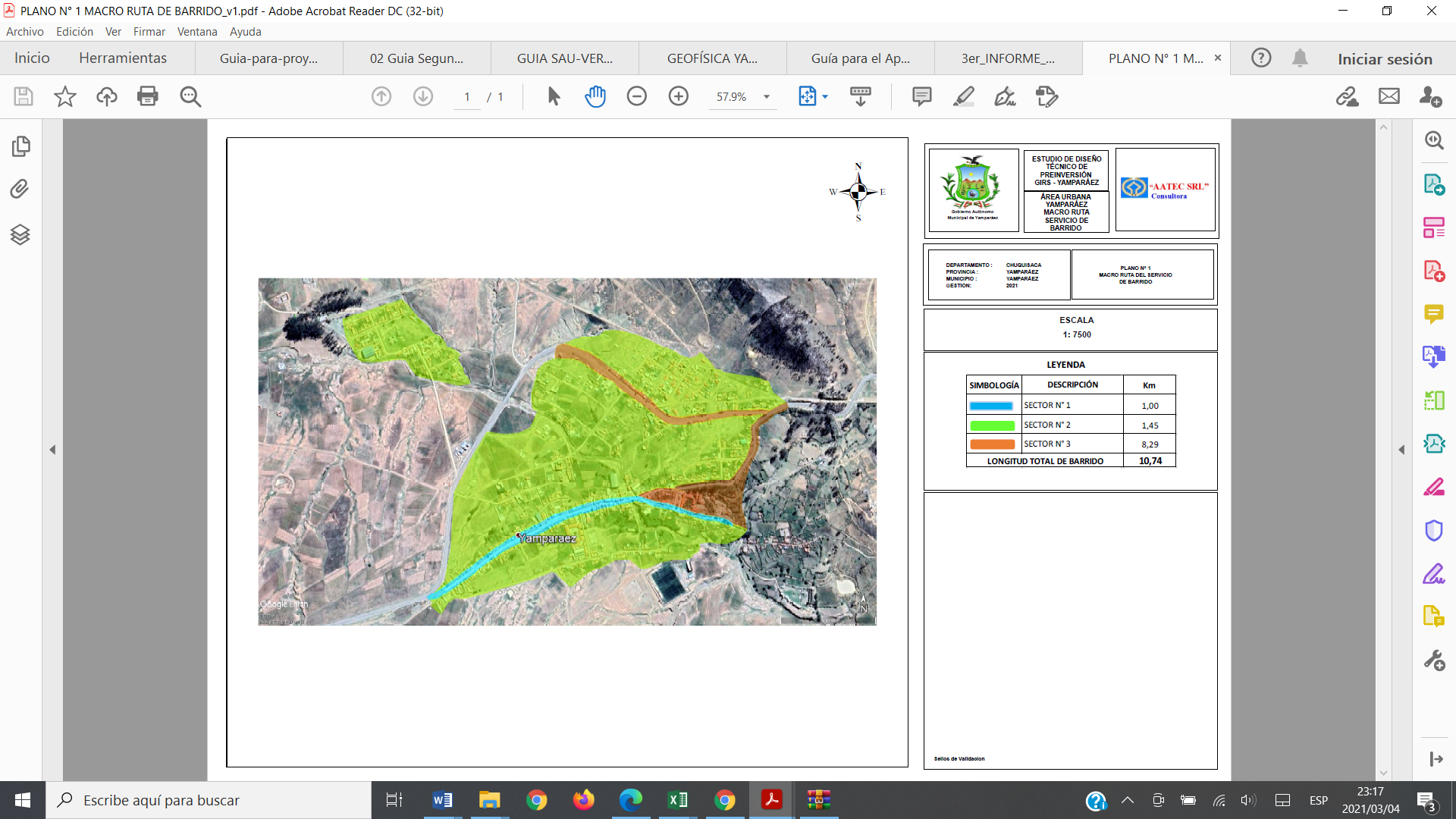
The term “Street Sweeping and Cleaning of Public Spaces” is applied to the action of manually cleaning or removing waste from public areas and roads (covering surface such as asphalt, rigid or flexible pavement, paving or similar). On the other hand, the term cleaning shall apply to the manual removal and collection of solid waste scattered on dirt or cobblestone roads.

This activity is determined to be implemented in the urban area of Yamparáez.

1. **Macro service routes**

The sectors for the provision of the service are identify as (Annex a):

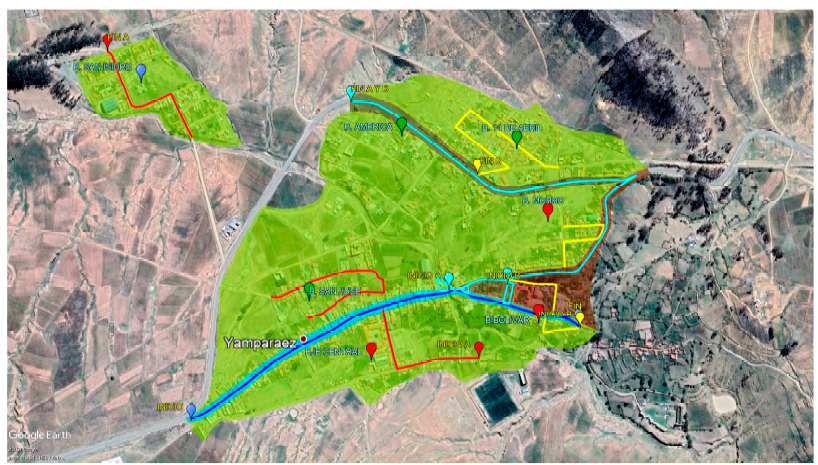
* Sector 1: Commercial and institutional sector,
* Sector 2: Residential sector with paved roads,
* Sector 3: Residential sector with unpaved roads.

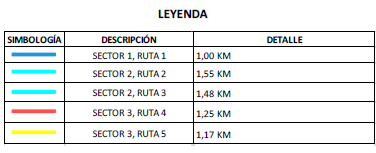


1. **Micro service routes**

For the design of micro routes, sweeping by teams will be applied. There will be 2 work fronts (2 people), one for each ditch and sidewalk of the road. The micro routes are continuous, i.e. streets without dead zones or overlapping with streets corresponding to other routes. Sweeping in closed roads is performed by one person, who must travel from the main road and along the ditch to the last house, returning along the opposite gutter until reaching the main road again, to continue the normal route.

The micro routes defined for the service of sweeping and cleaning of roads and public areas are (Annex b):





Sector 1 and 2 corresponds to paved roads and sector 3 corresponds to unpaved roads. In sector 1, there are homes, businesses and institutions. In sector 2, housing, health institutions and some economic activities are predominant, and in sector 3, housing is predominant.

* 1. **Distances to be traveled**

For each of these sectors, the respective length of roads has been determined:

|  |  |  |
| --- | --- | --- |
| **Sector** | **Length of road (km)** | **Type of pavement** |
| 1 | 1,00 | Rigid pavement |
| 2 | 1,45 | Rigid pavement |
| 3 | 8,29 | No pavement |

There are three squares in the urban area of Yamparáez, therefore, their location and surface area are:

|  |  |  |
| --- | --- | --- |
| **Square** | **Location** | **Superficie m2** |
| Square 1 | 19°11'21.44"S  65° 7'22.46"O | 746 |
| Square 2 | 19°11'21.63"S  65° 7'20.74"O | 219 |
| Square 3 | 19°11'22.07"S  65° 7'17.10"O | 957 |

Consequently, each person in charge of the service will travel the following lengths per work area:

|  |  |  |  |
| --- | --- | --- | --- |
| **Work area** | **Personnel 1 (km)** | **Personnel 2 (km)** | **Remarks** |
| Sector 1 | Route 1: 1,00 | Route 1: 1,00 | Each one occupies a working front, one per road ditch and sidewalk. |
| Sector 2 | Route 2: 1,55 | Route 3: 1,48 | The start of each route is different, one starts at the main square (A) (square 1), including square del Toro (square 2), and the other starts at square 3 (B), and at one point they join to continue towards their end. Each staff starts at different points, and advances together along the main road to its conclusion. |
| Sector 3 | Route 5: 1,17 | Route 4: 1,25 | Priority has been given to the most populated streets or spaces in sector 3, which does not have paved roads, so that cleaning can be done once a week. |
| **Total** | **3,72 km** | **3,73 km** |  |

* 1. **Frequency and schedules**

The method is manual, and the frequency corresponds to the number of times it is necessary and recommended to carry out the sweeping in each defined work sector.

|  |  |  |
| --- | --- | --- |
| **Sector** | **Frequencies** | **Characteristics** |
| Sector 1  Commercial and institutional | Inter daily - 2 times per week | Main road |
| Residential sector with paved roads | Inter daily - 2 times per week | Paved roads |
| Residential sector with unpaved roads | Inter daily - 1 times per week | Paved roads |
| Squares | Inter daily - 2 times per week | All squares in the urban area |
| Market | 5 times per week | External roads of the market |
| 1 time per month | Interior cleaning and disinfection |
| Storm drains | Regular cleaning carried out by sweeping the roads | |

The implementation will be gradual, starting once a week until reaching the optimal frequency described in the table.

For special services, the following is established:

|  |  |  |
| --- | --- | --- |
| **Service** | **Frequency** | **Characteristics** |
| Sweeping and cleaning coverage of the Coliseum | When activities take place | Sweeping the exterior and cleaning the interior if necessary |
| Cleaning of riverbanks | 3 times a year | Cleaning of riverbanks near populated areas |
| Sweeping and cleaning during patron saint festivities | When activities take place | Sweeping before, during, and after the event |
| Roadside cleaning | Once a month | May be increased as needed |

The working hours will be from 5:00 am to 8:00 am.

* 1. **Waste Generation Estimation**

Of the total waste generated, it is estimated that 5% corresponds to sweeping waste, meaning that the amount generated daily in the service area is calculated at 20.35 kg/day, equivalent to 0.12 m3/day.

* 1. **Staffing Requirements**

The number of street sweepers, considering a 10% safety factor, is two people to serve only the urban area. Implementation will be gradual over a period of 20 years according to the following schedule:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **5 years** | **10 years** | **15 years** | **20 years** |
| Personnel Count | 1 | 1 | 2 | 2 |

These same workers, according to the established schedule, will carry out the special services described as per the assigned shifts.

* 1. **Service Efficiency (km/person)**

The following efficiency values are adopted:

* Sector 1: 1.00 km/sweeper-day
* Sector 2: 1.52 km/sweeper-day
* Sector 3: 1.21 km/sweeper-day
  1. **Quantity and Type of Equipment and Tools**

The following defines the amount and type of equipment and tools required for street and public area cleaning services.

|  |  |
| --- | --- |
| **Details** | **Annual Quantity (Piece)** |
| 200-liter wheeled cart | 2 |
| Rake with handle | 2 |
| Broom | 2 |
| Safety cones | 2 |
| Street sweeping broom | 12 |
| Storm drain bar | 2 |
| Pickers | 12 |
| Shovels | 2 |
| Hoes and machetes for clearing | 2 |
| Pitchfork | 2 |
| Bags/Sacks | 100 |

Equipment provision is based on personnel numbers, which will gradually increase from one to two persons as it was mentioned above.

* 1. **Type of Clothing and Personal Protective Equipment**

Clothing, Personal Protective Equipment, and tools for sweeping and cleaning services are determined considering occupational health regulations for both dry and rainy seasons. The following quantities are established:

|  |  |  |
| --- | --- | --- |
| **Details** | **Unit** | **Annual Quantity** |
| Reflective Coverall/Apron | Pc. | 4 |
| Cold-weather Jacket | Pc. | 2 |
| Silicone Wool Gloves | Pc. | 12 |
| Long-sleeve Leather Gloves | Pc. | 4 |
| Anti-fog Safety Glasses | Pc. | 4 |
| Khaki Fabric Face Cover | Pc. | 6 |
| Leather Boots | Pc. | 2 |
| Hat or Cap | Pc. | 2 |
| Triple-layer Face Masks | Box | 12 |
| Rain Poncho | Pc. | 4 |
| Rubber Boots | Pc. | 4 |
| Lumbar Belt | Pc. | 2 |
| Khaki Fabric and Fleece Balaclava | Pc. | 4 |

As with tool provision, clothing and personal protective equipment are supplied according to personnel numbers over the project's lifespan, as outlined above.

* 1. **Street Sweeping and Waste Collection Schedule**

A schedule is determined for street sweeping, waste collection, and transportation over the project's 20-year lifespan.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sector** | **Frequency** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** |
| Commercial and Institutional Sector | Twice a week | ✔ |  | ✔ |  |  |
| Paved Residential Sector | Twice a week |  | ✔ |  | ✔ |  |
| Unpaved Residential Sector | Once a week |  |  |  |  | ✔ |
| Public Squares | Twice a week (urban area) |  | ✔ |  | ✔ |  |
| Market | Three times a week | ✔ |  | ✔ |  | ✔ |

To initiate service improvements, per the request of GAM Yamparáez, the frequency will start at once a week before gradually reaching the scheduled frequency over 20 years. The service will operate on Fridays.

Mud, sand, and aggregates on public roads are excluded, as per current solid waste regulations, which do not classify these materials as solid waste.