



**PPP PROJECT FOR THE CITY OF BELGRADE FOR THE PROVISION OF SERVICES
OF TREATMENT AND DISPOSAL OF
RESIDUAL MUNICIPAL SOLID WASTE**

TECHNICAL PROPOSAL – FORM T3 – SERVICES DELIVERY PLAN

**SUEZ Groupe SAS
and
I-ENVIRONMENT INVESTMENTS LIMITED**

July 13th, 2017

TECHNICAL PROPOSAL

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SERVICES DELIVERY PLANS

CITY OF BELGRADE
CITY ADMINISTRATION – SECRETARIAT FOR ENVIRONMENTAL PROTECTION

SERVICES DELIVERY PLAN 0
OVERALL SERVICES DELIVERY PLAN

Operating Scope and Procedures

Form T.3.2

0.1 OPERATING SCOPE & PROCEDURES

3.1 - Operating scope and procedures

The Bidder must submit an outline of how it intends to provide the Services in compliance with Schedule 2 (*Output Specifications*). This shall include the description of procedures and activities for operation of the Facilities and monitoring of environmental impacts using Form T.3.2.

1 OVERVIEW

The Facilities functional areas of operation will be managed in accordance with the Quality and Environmental System documentation and comply with the ISO 9001, ISO 14001 and OHSAS 18001 frameworks while productivity will be measured and monitored in line with the operational Key Performance Indicators (KPIs).

1.1 Operational standards experience

The O&M Contractor has been active in the waste business for more than 90 years and has built up an impressive experience in the operation of waste treatment plants including the Energy from Waste, landfilling, Incinerator Bottom Ash (“IBA”) treatment and APCR stabilization.

The design of the Facilities draws on experiences learned on other similar projects throughout the world. In a nutshell, the Facilities will be:

- Safe to operate;
- Optimal in terms of staff efficiency, consumption of consumables and environmental impact.
- Free from major design defects that might affect its smooth operation.

The O&M Contractor will operate with “tested and proven” standards to maintain during the life of the Project a seamless and most of all safe operation.

1.2 Experienced O&M Contractor

1.2.1 SUEZ, a professional and experienced partner

SUEZ treated nearly 41 million tons of waste in 2016. Through its waste collection activities, SUEZ served over 400 000 customers in services and industry and some 41 million people.

SUEZ Group is active in over 70 countries in both water and waste industry with a significant foothold in Europe, and has leading positions being number 1 in France and number 2 in Europe in the waste sector.

See here below some of SUEZ references of large -scale multi-activity contract in EfW, APCR treatment, IBA treatment, CDW treatment and landfilling similar to the Belgrade Project.

ROOSENDAL – The Netherlands

In operation since 2011

Grate incinerator with 2 lines

Capacity: 300,000 t/a

Energy export: 32MWe, 70,000 homes.



ZORBAU - Germany

In operation since 2005

Commercial waste, municipal solid waste

Capacity: 330,000 t/a

Processing lines: 2

Thermal performance: 2 x 54 MW

Steam production: 125 t/h at 40 bar and 400°C

Electricity production: 25 MW



Energy from Waste Plants

GRIMBERGEN – Belgium

IBA treatment VALOMAC

150,000-200,000 t/a

In operation since 2002

Produces: 51% gravel, 40% sand, 6% ferrous metal, 2% non-ferrous metal.

Aggregates are certified to be used as road underlay.

VALOMAC has developed an outlet using the aggregates to produce Valoblock® concrete blocks.



IBA Treatment Plants

VILLEPARISIS – France

Landfill in operation since 1977

A 43ha site providing:

Stabilization: 200,000 t/a

Soil decontamination plant: 200,000 tpa

Transfer station for asbestos waste



APCR Stabilization

ADP – France

CDW Treatment

Sorting and recovery of Common Industrial Waste: – 35, 000 t/a

CDW sorting and recovery – 100,000 t/a



CDW Treatment

2 DESCRIPTION OF THE OPERATIONS

2.1 Waste Acceptance

2.1.1 Opening Hours and Deliveries

The Site will be opened for deliveries throughout the year 24/7 in accordance with Schedule 25 (“*Waste Delivery Protocol*”). It is anticipated that Waste reception at the Site entrance will be based on the following sequence and procedures:

- Peak times during the 7:00 am to 2:00 pm delivery shift;
- Incoming Waste RMW and CDW: 70 vehicles per hour maximum, an average of 400 vehicles per day (510,000 t/a or 1,400 t/day for RMW and 200,000 t/a or 548 t/day for CDW);
- 200 RMW deliveries per day to the EfW Plant and the remaining deliveries to the CDW and Landfill.

2.1.2 Site Access and Circulation

As illustrated in **Figure 2.1.2** below, the main entrance and exit gatehouse is located at the south of the Site with two lanes for incoming traffic and two lanes for outgoing traffic to mitigate the waiting time before access on the weighbridge. The two radiation detection gates will ensure that any radioactive material mixed with RMW or CDW will be detected before entering the Site.

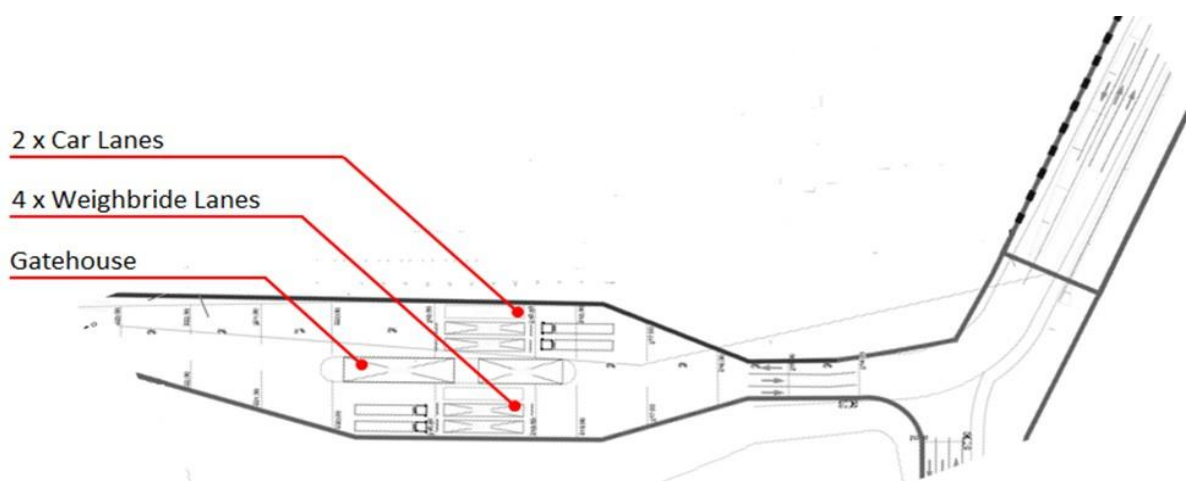


Figure 2.1.2 Site Access and Circulation

The design provides for the installation of a road access and a dedicated traffic light management which facilitates a safe and fluid flow at the entrance between:

- Road access for trucks going to the Bottom Ash Plant area, New Landfills Residues and Inert tipping areas;
- Road access for trucks going to the EfW Facility;
- Road access for trucks going to the CDW Facility;
- Road access for trucks going to the New Landfill Unprocessed area.

Within the EfW Facility area, the road access system facilitates a safe and fluid circulation at the entrance between:

- Trucks tipping RMW;
- Delivery Vehicles (reagents, etc.);
- Cars (Staff and Visitors).

The access to the EfW Facility and the New Landfills are both two lanes roads enable to provide a queuing space for Refuse Collection Vehicles before they reach their respective weighbridges to ensure efficient access to both sites without impacting the traffic onto the weighbridges.

2.1.2.1 Access arrangements

Only authorized vehicles will be allowed to enter the Site provided that delivery vehicles already registered will go directly to the weighbridges.

Delivery vehicles and other light vehicles not registered to enter the Site will park in a dedicated area located in front of the gatehouse.

Drivers will proceed to the gatehouse to sign in and obtain authorization for access to the Site.

Registration will follow a strict procedure and include the giving of any details on the waste being delivered, the area of collection, the name of the collector, truck registration etc.

Drivers will receive the site map and a set of rules to comply with and a health and safety induction including instructions and recommendations in respect of any required PPE.

Visitors will follow the same procedure as non-registered delivery vehicles and proceed to the gatehouse before going to the Visitor Car Park.

Staff and authorized City representatives will enter the Site and proceed directly to the Staff Car Park and be given access into the administrative and staff buildings area.

A traffic plan signboard will be located at the entrance, and traffic signs will be installed where needed on the site to identify clearly the various locations (see [Erreur ! Référence non valide pour un signet.2.1.2.1](#) as an example).



Figure 2.1.2.1 Sample Site Access Traffic Sign

When inspection indicate that a vehicle should be stopped before entering the Site with non-conforming waste, it will not be given access to the weighbridge and the driver shall be instructed to wait in the Quarantine Area. The driver will be instructed on how to exit the site and where to take the waste in agreement with the City.

2.1.2.2 Egress

All delivery vehicles that proceed to the Site will be systematically weighted at the entry and exit weighbridges to record their gross and tare weight in the weighing system. Vehicles coming from the administrative and staff buildings, as well as emergency vehicles will take the dedicated vehicle lane and make their way out.

2.1.2.3 Site circulation and traffic control

Traffic management and control is key for a smooth and safe operation procedure of the Site with the expected volume of traffic.

The traffic management for each Facility has been factored as follows:

- An optimal turnaround time;
- To the extent possible, a single direction traffic flow; traffic plan and procedures shall ensure a safe traffic movement around the Site and be based on risk assessments and will include, as a minimum: traffic lights, clear signage and road markings, staff at the entrance gatehouse for directing traffic and induction for new site users or visitors;
- Adequate space to accommodate manoeuvres of large articulated vehicles (long haul) providing flexibility for future changes in Waste delivery and collection vehicles;
- All data management at the weighbridges will be computer controlled to minimise delay;
- Use of clear signs and road markings which are similar in appearance (colour code) to those used on the public road network;
- Separate lanes to access designated tipping areas for each stream of waste (EfW, CDW, landfill, etc.) to segregate traffic flows;
- Separate car parks, away from operational areas.

2.1.2.4 Pedestrian circulation

Direct access to the administrative and staff buildings from both car parks at the EfW and New Landfill Unprocessed area will enable the circulation of pedestrian's safe from the Site traffic and operation. Access to other part of the Facilities will be through marked pedestrian walkways.

2.1.3 Weighbridges

The Site will be equipped with seven weighbridges located in pre-defined locations. All weighbridge activities will be recorded on the weighbridge software with the required data according to Schedule 25 (*Waste Delivery Protocol*) and made available on the WMIS for reporting purpose so both the O&M Contractor and the City are able to check and follow-up Waste deliveries on Site.

- 4 operated weighbridges (2 x in and 2 x out weighbridges), installed at the Site entrance will accommodate the expected incoming and outgoing traffic and reduce as much as possible queueing before the weighbridge. These weighbridges will be manually operated on a 24/7 basis in order to check the vehicles, control the traffic on site, provide assistance for incoming vehicles. In addition, CCTV installed in the Site entrance gatehouse will also help to visually inspect incoming Waste;
- 1 manually operated weighbridge will be installed at the CDW Facility to weight outgoing material produced from the CDW processing operations which will be transported and unloaded to the temporary storage CDW Offtake Area;

- 1 fully automated weighbridge, located at the APCr plant will be used to weight stabilized APCr material;
- 1 fully automated weighbridge, located at the IBA Plant, used to weigh IBA Aggregates prior transport of these material to the New Landfill.

Both fully automated weighbridges will be operated with a pass/badge system and/or by automatic recognition for these materials sent to the New Landfill Residues, APCr and IBAA being each a single type material. It is expected that all delivery trucks for these materials will be the ones owned by the O&M Contractor and will be pre-registered and assigned to either stabilized APCr or IBAA material on the weighbridge database.

2.1.4 From the weighbridges to the various disposal areas

2.1.4.1 Radioactive gate

After the weighing operations, all vehicles will go through one of the two radioactive detectors installed at the gatehouse. If the detector goes off, the vehicle will be directed to the Quarantine area, where an operator will follow a procedure for dealing with the vehicle.

This procedure will involve recording the truck registration, type of waste and area of collection, time and description of the event before contacting and discussing the matter with the City and follow the procedure set out in Schedule 25 ("*Waste Delivery Protocol*").

2.1.4.2 Traffic management lanes

Given the expected movements (70 vehicles per hour) specific traffic management parameters have been included in the design of the Facilities to avoid any bottle-neck within the boundaries of the Site or outside the Site. From the weighbridges, vehicles will enter the traffic management lanes as directed by the signage and traffic light system before being directed to the relevant area (see **Figure 2.1.4.2**).

Once in a traffic management lane, the vehicle will either wait or proceed pursuant to the traffic signals located alongside the road.

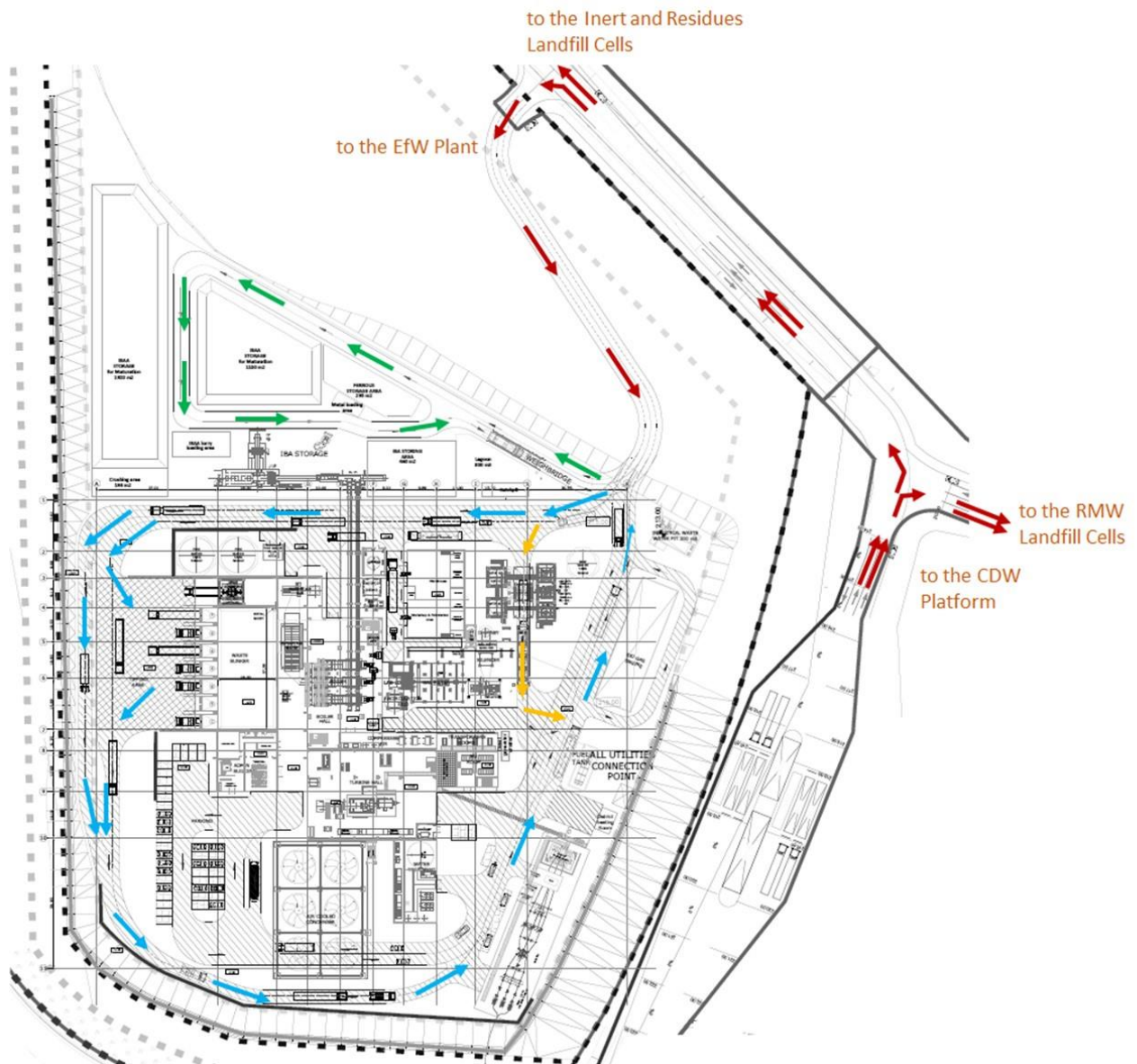


Figure 2.1.4.2 Site circulation and traffic control

2.2 Tipping Areas

2.2.1 Routing of vehicles to New Landfills

Based on the type of Waste and after the “vehicles sorting” during the weighing operations the relevant vehicle will either proceed to the RMW landfill tipping area or the inert landfill tipping area. Upon arrival to the tipping zone, the driver will be instructed to tip at the designated area by a Waste Controller and drive back towards the entrance gatehouse for the weighing out operation.

2.2.2 Routing of vehicles to CDW Platform

CDW loads will be sent to the CDW Facility following the relevant signage. Upon arrival to the CDW Facility area, CDW will be unloaded at the designated unloading area as indicated by a CDW Waste Controller and Operatives prior to drive back towards the entrance gatehouse for weighing out.

2.2.3 Routing of vehicles to the EfW tipping hall

The vehicles will proceed to the tipping hall by following the corresponding signs. The RMW Waste will go to the tipping hall equipped with seven bays.

A dedicated traffic light control system will indicate to the driver which bays are available for the tipping as shown as an example **Figure 3.2.3A**.

This traffic management will also be controlled from the control room.

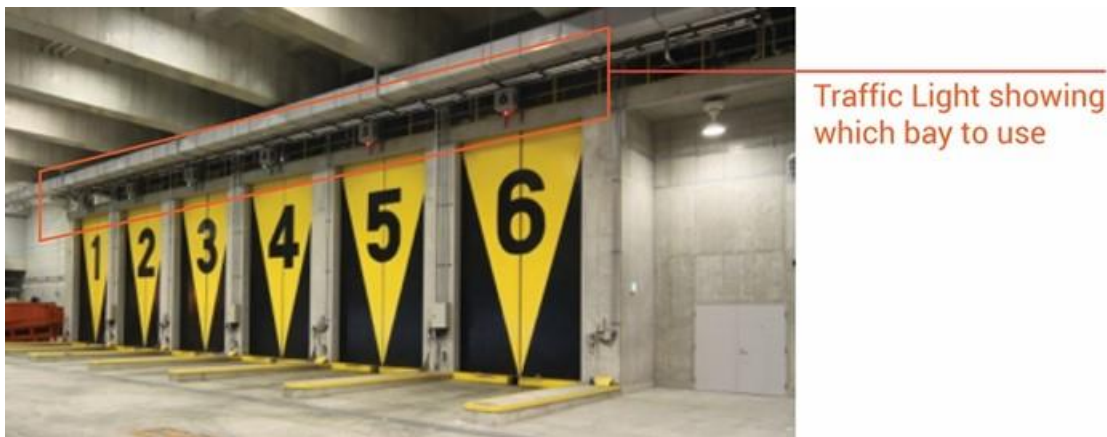


Figure 3.2.3A Example of tipping hall equipped with traffic light bay management

A vehicle will position itself to unload in the available bay (similarly to the unloading operation in Suez Zorbau EfW Plant shown in **Figure 2.2.3B** below), with the tipping hall being enclosed on a limited surface at the level of the unloading bays and the bunker.



Figure 4.2.3B Example of limited enclosed tipping hall unloading operations

Activities in the tipping hall will include:

- Allocation of tipping bays to incoming trucks
- Cleaning tipping bays and hall by a cleaner
- Communication with the bunker crane operator feeding the EfW Facility and if needed mobile plant operatives
- Waste inspections (see Section 2.2.4 below)
- Moving of unburnable and /or Bulky for landfilling.

After tipping, the vehicles will exit the facility in a single direction traffic flow as illustrated in **Figure 2.1.4.2** above. Traffic light systems will operate in the intersection areas to prevent from accidents.

2.2.4 Waste inspections

The O&M Contractor will conduct spot-checks on randomly selected incoming Waste.

At the EfW Facility, the controlled vehicle will be screened and be directed to unload in a dedicated area of the EfW Plant tipping hall. A loading shovel or equivalent will be used to spread out the waste and sort through the waste for visual inspection.

If the load contains Prohibited Waste, the operator shall segregate the Prohibited Waste, notify the City's representative, take photos and record the event in the Rejection Report which will be made available in the WMIS. The same protocol applies for Prohibited Waste identified during a visual inspection of Landfill or CDW operations where waste controllers will be permanently assigned during the daily receptions.

Prohibited Waste will then be reloaded into dedicated containers and stored in the non-conforming area / quarantine area for collection by or on behalf of the City in accordance with Schedule 25 ("*Waste Delivery Protocol*"). The remaining Waste will be cleared and tipped in the bunker.

The Waste will also be inspected to identify materials that, without being hazardous or prohibited are likely to be deleterious to the EfW process or any other process on Site and their equipment.

Should such item be identified (e.g. large pieces of concrete, tree root, hazardous waste or engine block) it will be immediately removed using appropriate mobile equipment.

On completion of tipping and on confirmation that the Waste complies with the Environmental Permit and the Output Specifications, the vehicle will be instructed to leave the Tipping Hall / other tipping area on site and will follow the dedicated vehicle route to the outgoing weighbridge.

2.3 Energy from Waste Treatment

2.3.1 Key parameters and design

- 340,000 tonnes/annum average at an average LCV of 8.5 MJ/kg;
- One combustion line;
- A steam turbine with air cooled condenser to generate electricity and steam export for CHP;
- Balance of plant comprising demineralization and fire protection.

2.3.2 Operating times

The Tipping Hall will operate 24 hours a day, seven days a week for the reception of waste.

2.3.3 Bunker management

The O&M Contractor will operate the bunker with a crane equipped with a grab of 12 m³ on a 24/7 basis. The activities of the crane will include:

- Mixing the Waste to homogenize the waste and the calorific value;
- Removing unburnable or Prohibited Waste (if any) and dispose at the side of the bunker;
- Feeding the combustion line.

Although the crane is capable to operate automatically, most of the time it will be operated on a manual or semi-automatic mode by a crane operator (as per example shown in **Figure 2.3.3**),



Figure 2.3.3 Example of bunker management operations

2.3.4 Incineration operation

2.3.4.1 Description

Waste from the bunker will be fed into the combustion line for incineration.

The incineration activities will include:

- Starting up and shutting down the line;
- Operating the line in an optimal way on a 24/7 basis;
- Operating the turbine;
- Monitoring and controlling the process parameters and the emissions;
- Reviewing the process elements;
- Management and accepting the consumables;
- Supervising the extraction and transport of the IBA by conveyors;
- Supervising the storage of the APCR.

2.3.4.2 Start-up and shut-down procedure

The O&M Contractor will draft and provide a detailed operation manual for start-up and shut-down of the installation. This manual will specify the time lapse for switching the installation onto the electric grid (or switching off) and for starting to process Waste (or stopping the operations).

2.3.4.3 Line operation

The Combustion Control System (“CCS”) will automate the combustion process so that it runs within the combustion diagram. The operator will only have to input the following parameters:

- The set-point for the desired steam flow rate;
- An estimate of the Net Calorific Value (“NCV”) of the Waste present on the grate for calorific value adjustment purposes.

Drawing from Suez’s extensive operating experience, the operators will be trained to optimize the combustion process by closely monitoring the parameters against the waste and flow rate that is being fed.

It is further anticipated that the O&M Contractor will undertake analyses on the Waste to check the NCV.

The NCV will be monitored at the control room as shown in **Figure 2.3.4.3**. The CCS will be equipped with the CNIM “fuzzy control system” reducing manual control and produce a more stable combustion control process.

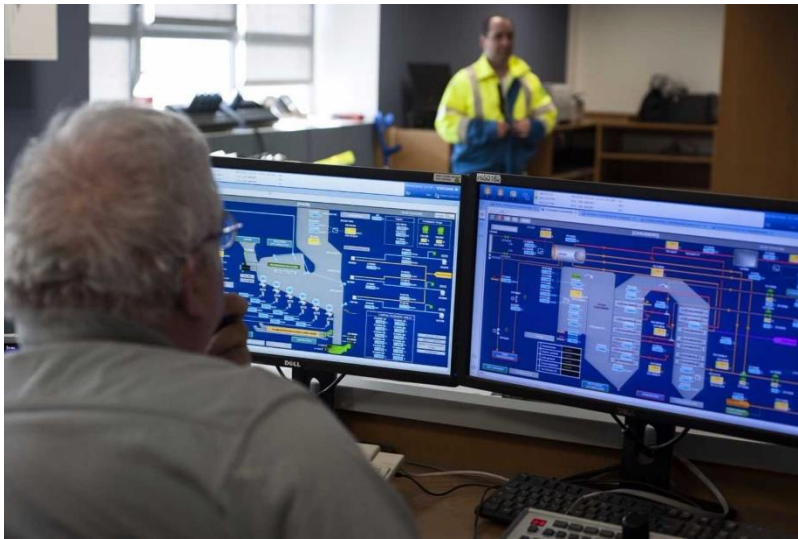


Figure 2.3.4.3 Control Room Combustion Control

2.3.4.4 Turbine operation

During normal operation, pressure control in the steam header will be managed by the turbine's pressure control valve. Should the turbine become unavailable, the steam will be directed to the Air Cooled Condenser ("ACC") via the turbine bypass system.

The steam produced by the heat recovery boiler shall be used in the steam turbine to produce electricity and steam export for CHP.

Connection to the EMS grid via a step-up transformer will allow for importing electricity for starting-up the EfW Facility as well as enable the export of electricity during operation.

Steam export will be made through a connection to Konjarnik heating Network. The turbine will be used in full condensing mode when there is no CHP use.

In the case of a disconnection from the electricity grid, the turbine and generator will be able to operate in 'island-mode' where the turbine management will change from pressure to speed control and the steam mass flow to the turbine will be reduced so only the parasitic load of the facility is generated.

The turbine bypass valve will open to control the pressure upstream of the turbine. Most of the live steam will be fed directly to the ACC.

In the unlikely event that the steam turbine's design steam capacity is exceeded, the turbine bypass system will be activated to reduce the pressure in the steam header.

The turbine bypass will also be active during the start-up and shut-down of the boiler in order to minimize water losses (short-time steam blow-off only).

2.3.4.5 Process analyses

The operation of the process will include the review of the following:

- The unburnt materials in the IBA and APCR ("TOC and "LOI" tests);
- Demineralised water used in the process to ensure the characteristics of the boiler water.

2.3.4.6 EfW controls and monitoring

The EfW Facility will be controlled and monitored on a continuous basis as follows:

- The Combustion Control System (CCS);
- The Continuous Emissions Monitoring System (CEMS).

The CCS will be used to achieve the largely automatic operation of the combustion systems (feeder ram, grate, primary and secondary air, pre-heaters, flue gas treatment etc.) based on a range of parameters. These parameters will be automatically monitored by the CCS. The set-point for the desired steam flow rate and the estimated NCV of the Waste on the grate (calorific value adjustment) will be manually input by the operator as described above.

The CCS will ensure that:

- The steam flow remains constant (preset by the operator).
- The flue gas flow rate remains constant (depending on the steam flow set point and the actual calorific value of the waste), which will also keep the combustion temperature within the permissible limits.
- The gas burn-out is efficient by maintaining the oxygen content within the permissible limits and simultaneously controlling the combustion temperature
- Waste is completely burned out before it reaches the end of the grate (the fire end position).

The primary purpose of the CEMS is to monitor and record the properties and concentration levels of contaminants present in the flue gases within the stack prior to release in the atmosphere. In addition, the CEMS will use the readings obtained to regulate Flue Gas Treatment ("FGT") reagent dosing and facility settings to ensure compliance with IPPC Consents.

2.3.4.7 Consumables management

The O&M Contractor will procure the reagents and auxiliary fuel required for the day-to-day operation of the EfW Facility that will be stored in the dedicated silos in accordance with the required procedure. The O&M Contractor will closely monitor and record the use of these consumables and plan ahead for their supply to prevent any consequent downtime of the lines.

2.3.4.8 EfW Plant maintenance

The EfW Facility will be equipped with a computerized maintenance management system ("CMMS") to assist the maintenance team in planning the maintenance schedules and recording any maintenance works, including past maintenance issues such as preventative maintenance discoveries, routine test failures, equipment histories and maintenance costs.

Routine maintenance will be executed via a system of 'work orders' based on priorities established by the Maintenance Team.

The CMMS will allow to make key maintenance actions such as the preventive maintenance schedule, the inventory of spare parts, work order, repairs record, details of works/purchase orders and provision of data reports.

The CMMS will reduce the likelihood of unplanned unavailability of the EfW Plant and maximize its availability to divert the Waste from landfill and meet/exceed diversion targets.

Operational monitoring and programmed maintenance of equipment, (especially the key components such as the turbine) will ensure that the maximum benefits are achieved from the generation and subsequent sale of electricity to generate additional income.

2.4 IBA Treatment Plant

The extraction of the IBA from the combustion line at the EfW Facility is made by a vibrating screen to take out the unburnt oversized bulky Waste, large size IBA not suitable for the IBA Treatment Plant process. These large size IBA materials will fall directly into a dedicated container that will be moved by a forklift and taken to a storage area prior to being sent directly to landfill.

The passing fraction through the screen is then conveyed directly to the IBA Treatment Plant through two enclosed line of conveyor belts, one being used as a stand-by conveyor belt to allow delivery of IBA in the event of repairs or maintenance to the main conveyor belt.

The conveyor arriving from the EfW Plant will feed through a continuous process the IBA ferrous metal extraction process.

The process for extracting ferrous metal and processing IBA is one with which the O&M Contractor is very familiar across Europe, currently operating 24 of this type of plants.

2.4.1 Description

The IBA extraction and treatment plant is designed to accommodate the expected 90,000 tons per annum of IBA produced from the EfW process, with the process described in **Figure 2.4.1** below.

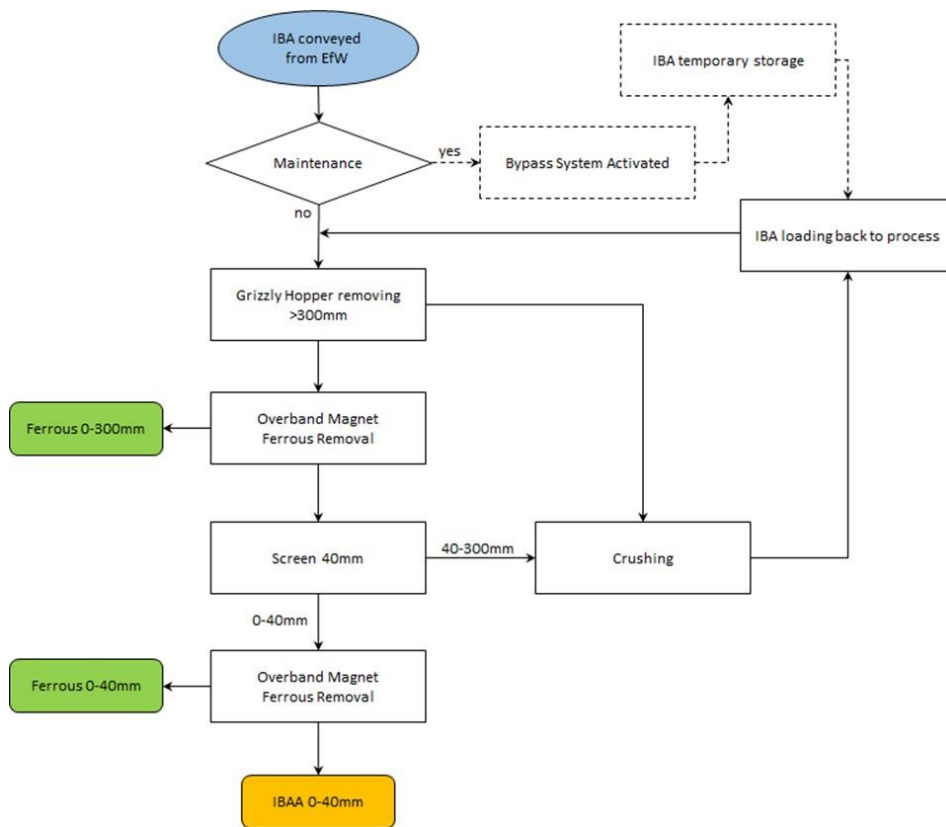


Figure 2.4.1 IBA Extraction and Treatment Plant Process

Ferrous Metals outputs will drop into bays that will be cleared by wheel loader and stored in the storage area.

The design of the EfW Facility provides for sufficient storage on site to have the required flexibility in case of delayed arrival of the collecting trucks depending on the commodity price of the ferrous metal.

A wheel loader will be used to load the trucks and the ferrous metal will be sold according to the Marketing Plan.

The aggregates fraction over 40mm will be segregated and crushed in a dedicated area prior to being loaded back to the processing plant in order to obtain an aggregate fraction less than 40mm in accordance with Schedule 2 (*"Output Specifications"*).

IBA aggregates will be transported to a maturation area. During the maturation phase, the aggregates will be stored for at least 12 (twelve) weeks in piles using a wheel loader (similar to **Figure 2.4.1C**).

Once the required maturation has been completed, the aggregates will then be loaded onto trucks (similar to **Figure 2.4.1B**) from the landfill fleet to be weighed to the dedicated automated IBA weighbridge for further transport to the landfill where it will be used as much as possible there as landfill cover material or road-layer, the remaining being disposed at the New Landfill Residues.



Figure 2.4.1B example of open trucks



Figure 2.4.1C example of wheel loader

2.4.2 IBA delivery by-pass system

With continuous delivery of IBA from the EfW Facility to the IBA Treatment Plant, a by-pass system will enable the transfer of IBA delivered from the EfW Plant conveyor into a temporary storage bay prior to re-loading at a later stage through a feeding hopper system. This by-pass system will be used during the regular maintenance and / or unplanned maintenance of the process equipment while minimizing any interruption in the continuous delivery of IBA produced by the EfW Plant.

The appropriate spare parts are included in the facility to allow any to address unplanned downtime.

2.5 APCR Stabilization

2.5.1 Description

SUEZ is very familiar with the process of APCR stabilization from its operations in France since 1992, with the stabilization and solidification solution.

Roughly 5 million tons of APCR have been stabilized using this process, which is recognized as a proven technology in Europe for the treatment of APCR prior to final landfilling.

The APCR which is made of the fly ashes and flue gas treatment residues arising from the EFW process will be stabilized in a mixer using cement, ground granulated blast furnace slag (“GGBS”) (or similar) and water. During the Testing and Commissioning of the EfW Facility, the mix composition will be accurately defined with the assistance of Suez’s experts to obtain the optimum quality of APCR.

Figure 2.5.1A shows an example of an APCR mixer at the SUEZ Jeandelaincourt site in north-eastern France.



Figure 2.5.1A APCR Mixer at SUEZ's Jeandelaincourt Site

The quantities of APCR are expected to be of approximately 13,600 tons/annum which will produce an estimated 32,600 tons/annum stabilized APCR produced.

The output from the mixer will look like a liquid (concrete) cement mix.

The cement and GGBS (or equivalent) will be delivered in bulk and stored into silos that will follow a strict procedure. **Figure 2.5.1B** shows silo injection at one of Suez's sites in France.



Figure 2.5.1B Cement and GGBS silo loading

The stabilization process is monitored from the control desk by a site operative or a chemist through an automatic control system as follows:

- the transfer and weighing of the ashes, water and various reagents;
- the sequence for introducing the various products;
- any possible adjustment of the dose of water according to the actual rheology of the mixture;
- emptying the mixer.

It is anticipated that the mixing and stabilization process will take about four (4) minutes per batch. The mix shall then be poured into a dedicated open truck for APCR transport of a capacity of 15 m³, similar to the ones used for the IBA aggregate transport.

As each truck will contain the equivalent of roughly five batches, they will be filled within 20 minutes. The truck will then proceed to the APCR Plant dedicated automated weighbridge then proceed to the New Landfill Residues while another truck will position itself under the mixer. It is anticipated that two to three trucks will be required for the three-step process of:

- Filling;

- Transport and unloading at landfill;
- Cleaning with high pressure washer to remove any remaining concrete cement mix in the bucket.

The process is continuing and thus cannot be delayed or suspended if a truck is unavailable as the mixture in the mixer would result in harden and block the equipment.

As a back-up plan, the O&M Contractor has planned for back-up trucks in case of a breakdown on one of the trucks in use for transporting stabilized APCr.

The stabilization operation will be operated on a one-shift basis only approximately three days a week, including an hour dedicated to the cleaning of the mixer and the trucks using high-pressure water at the washing / cleaning area.

Planned maintenance will be performed outside operating hours. Unplanned breakdown should be limited (based on experience) by using a proven and extremely robust equipment, which is also widely used in concrete processing plants.

2.5.2 APCr testing / operation optimization – On-site laboratory

An on-site laboratory will be operated by a chemist to undertake the various monitoring tests for the Facilities operations such as leachate testing for APCr, boiler water chemistry, IBA, leachates analysis, etc. If needed, the O&M Contractor will have recourse to external laboratories.

The chemist will test the APCr before and after stabilization to ensure the formulation for the mix remains a safe and sustainable landfilling operation. The parameters that will be followed will include:

- pH;
- Conductivity;
- Total Organic Carbon (TOC);
- Inorganic compounds (chlorides, sulphates and soluble fraction);
- Heavy metals.

2.6 Operation of the CDW Treatment Facility

SUEZ can demonstrate its experience in operating CDW treatment plants such as the Saint Jean d’Illac and Lourches plants in France processing each 100,000 tons per year of CDW, similar to the proposed CDW Treatment Facility for Belgrade.

2.6.1 Deliveries and reception

A preliminary information procedure will be first set up at the Site entrance gatehouse for third-party CDW deliveries in order to identify the type of material that the third party wishes to dump.

The CDW will be weighed at the Site entrance gatehouse and directed based on the information collected either to:

- CDW soils (dry earth, wet earth and sludge, stone / gravel / asphalt, sand for around 100,000 tons/year) will be sent either to the Recovered CDW Offtake Area for clean soil material suitable for re-use or disposed of at the New Landfill Inert for soil not suitable for re-use; or
- CDW mixed demolition waste, for around 100,000 tons/year will be directed to the CDW Treatment Facility area for processing.

The CDW Treatment Facility will operate on one shift 5 days a week. The facility has been designed to extract and process recoverable materials as described in **Figure 2.6.1A** from mixed CDW.

The truck driver delivering CDW will accede to the platform and use the CDW tarpaulin removal area, if needed, and then safely tip the Waste to the floor prior to going back to the site entrance for weighing out.

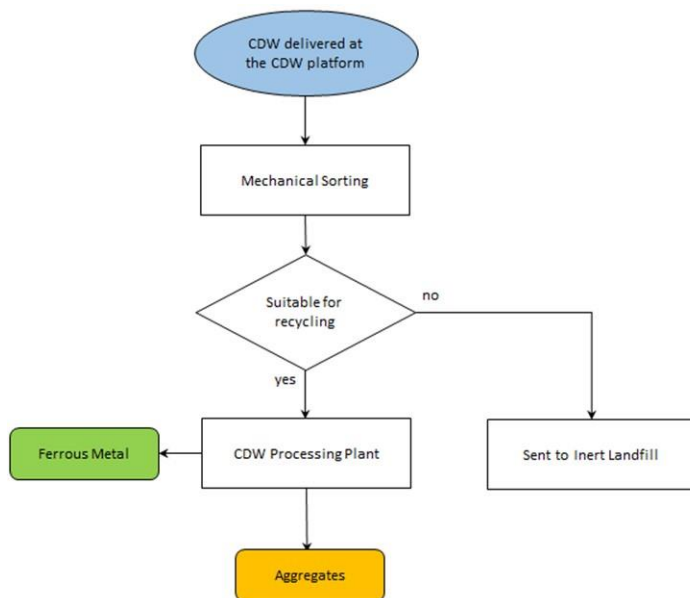


Figure 2.6.1A CDW Processing

The Waste will be first mechanically pre-sorted and prepared with a hydraulic excavator (similar to **Figure 2.6.1B**) to segregate the recyclable fraction which will go through further processing. The non-recyclable fraction will be weighed at the dedicated CDW manned weighbridge and sent to the inert landfill.



Figure 2.6.1B hydraulic excavator



Figure 2.6.1C wheel loader

The recyclable fraction will be processed through the CDW Processing Plant. A wheel loader (similar to **Figure 2.6.1C**) will feed the CDW Processing Plant hopper where CDW will be screened and crushed

in order to segregate ferrous and non-ferrous metal and produce crushed inert material of 3 different fraction sizes (0/32, 32/80, 80/150 mm).

The ferrous metal will be marketed according to the Marketing Plan as well as the aggregate fractions which can be used as granulates, material for road sub-layer, backfill material.

Recyclable material leaving the platform will be loaded onto vehicles using the wheel loader prior to be weighed in the dedicated CDW weighbridge.

If temporary storage is needed prior to the material leaving the Site, storage will take place at the CDW Off-Take Area until an outlet is found.

2.7 Landfill Disposal

Different streams of Waste will be landfilled depending the type of material as shown in **Figure 2.7**:

- Surplus Contract RMW, not being processed through the EfW process will be disposed of at the New Landfill Unprocessed;
- Inert CDW not recovered through the CDW treatment process being disposed at the New Landfill Inert; and
- Stabilised APCR and the IBA Aggregates not re-used disposed of at the New Landfill Residues.

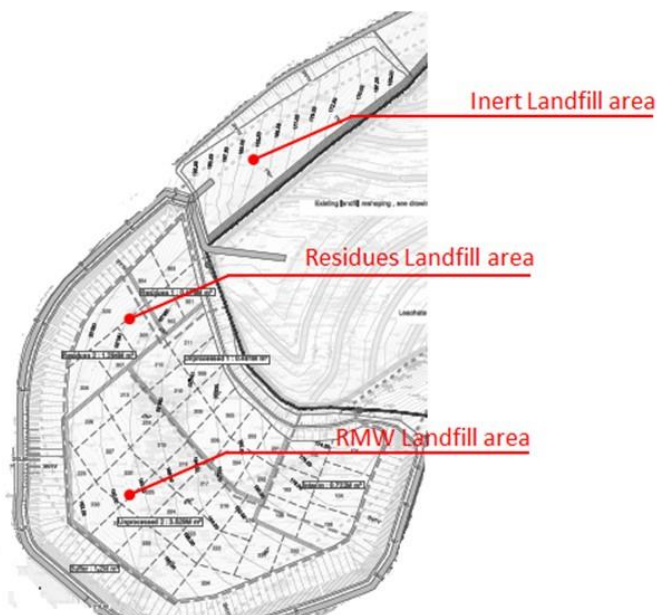


Figure 2.7 Landfill operating areas

2.7.1 Key parameters and design

The landfill operating procedures set out here below are based on the landfill design allowing for:

- Surplus Contract RMW and non-inert CDW: a total void space of roughly 5,29 million m³ for the landfilling of 170 000 tons/annum;
- Inert CDW: a total void space of roughly 1,2 million m³ for the landfilling of 60 000 tons per annum ;

- IBA aggregates and Stabilized APCR : a total void space of roughly 1,59 million m³ for the landfilling of around 55 600 tons/annum of IBA aggregates and 32 600 tons/ per annum of Stabilized APCR.

2.7.2 Operating times

New Landfill Unprocessed	2 shifts, 7 days/week	In line with the deliveries of RMW
New Landfill Inert	2 shifts, 7 days/week	In line with the deliveries of CDW and the operation of the CDW Treatment Facility
New Landfill Residues	1 shift, 5 days/week	In line with the operation of the IBA Treatment Facility and the APCR Stabilisation Plant.

Table 2.7.2 Landfill operating times

Maintenance and repairs will be performed as much as possible outside operating times.

2.7.3 Deliveries and reception

Trucks delivering Waste to landfill will be weighed in and out of the landfills using the Site entrance weighbridges.

Trucks delivering processed CDW and process rejects from the CDW Processing Plant will use a dedicated maned weighbridge out prior being transported to either landfill or to the off-taker storage area for processed CDW.

Processed CDW processed at the Offtake area will be weighed out at the site entrance weighbridges when sent off-site.

Trucks delivering stabilized APCR and IBA aggregates from their respective treatment facilities will use a dedicated fully automated out- weighbridge as the New Landfill Residues will only accept aggregates from the IBA plant and stabilized APCR.

The measurement data will be reported in the same way as the data of the weighbridges at the site entrance.

2.7.4 Waste unloading

Each different stream of Waste will be unloaded directly to their respective landfill cell. The trucks will follow marked access roads to the tipping areas. The unloading area will be located within 100m of the working face, where Waste will be spread and smoothed in order to minimize push distance.

An elevated unloading platform will be set up to ensure a total demarcation between unloading trucks and operating mobile plant. To protect internal sumps, used tyres will be placed, to protect the geomembranes complex.

2.7.5 First waste layer

The first layer of Waste to be placed in a cell is key for the landfill operation. Careful management is required to avoid damage to the liner and leachate collection system and to prevent the Waste itself from penetrating the liner components during initial cell filling (in particular the IBA Aggregates and CDW) and to avoid the risk, the O&M Contractor will follow a tested and proven procedure for the construction of the first layer:

- The access to the working face will be constructed from the top of the cell to the bottom so that the landfill plant will move about over deposited Waste and not the liner of the landfill cell.
- At the end of the access road, a temporary area will be reserved for the manoeuvring of trucks.
- A thickness of at least 50 cm of Waste so it then constitutes a protection layer to the liner and leachate drainage system.

This procedure is not necessary when the whole area of the landfill cell base is covered with Waste with the required thickness hereabove so that no landfill equipment can operate in close proximity to the liner or the base drainage system of the landfill.

2.7.6 Waste disposal

Monitoring the disposal process is the core of a high-quality landfill operation.

The O&M Contractor shall procure that the landfilling process is carried out pursuant to Good Industry Practice.

2.7.6.1 New Landfill Unprocessed

Once unloaded, either a dozer or a track-loader (depending of works) will handle the Waste.

One or more pieces of equipment may operate simultaneously in case of significant Waste disposal in a short period of time.

The dozers will shove the Waste from the tipping area to the compaction area, where a compactor will operate on layers as illustrated below. This piece of equipment is exclusively dedicated to “pass-over” and spread the Waste from different directions so as to reach the appropriate density. Operator will be driven by the GPRS tracking system to optimize number of passes and waste density at better cost.

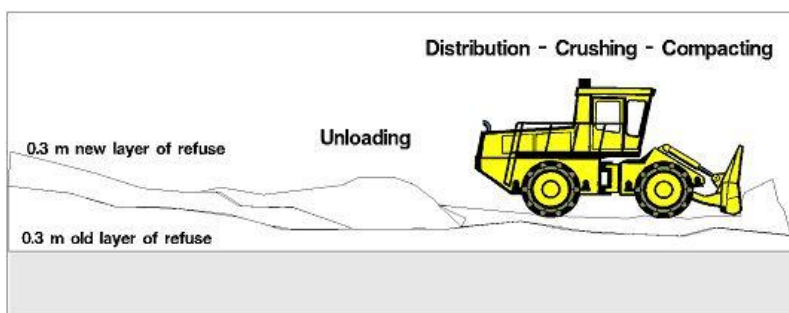


Figure 1: Compaction on flat ground

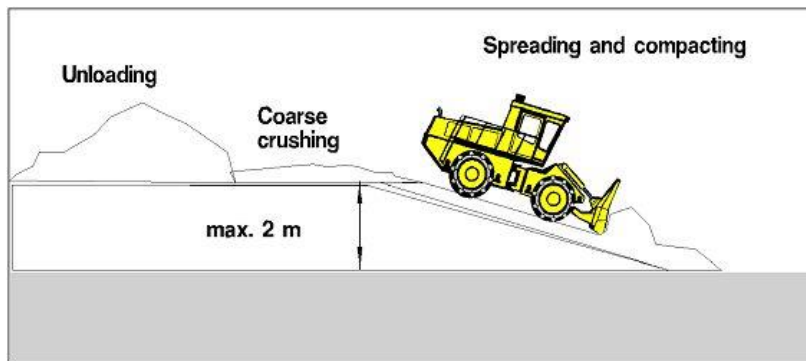


Figure 2 : Compaction on descendent slope

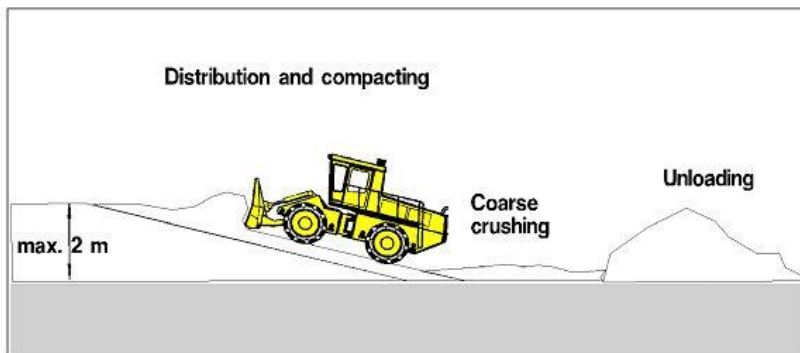


Figure 3: Compaction on ascending slope

The dozers will assist the compactor to push the Waste from the tipping area, provided that the distance between the tipping and the compaction areas does not exceed 100 meters.

The compaction area will have a maximum surface of 5,000 m², so as to optimise the works of the compactor and dozers, and to minimize production of leachate.

These areas will be defined by taking into account the bottom slopes in order to avoid incoming rainwater from the other sections of the landfill.

2.7.6.2 New Landfill Residues

Once the IBA aggregates has been tipped in the landfill, a bulldozer will spread the IBA aggregates to the tipping slope and a loader will further spread and level the waste in layers.

Once tipped, the stabilized APCR is spread in the landfill, in a separate area from the IBA to avoid mixing the two streams, using an excavator, which will be equipped with a smooth blade (as illustrated in **Figure 2.7.6.1A**).

The excavator will spread the APCR to the tipping slope over a layer of 1m and make it smooth. The APCR will harden within a few hours.



Figure 2.7.6.1A Excavator

The pictures herebelow **Figure 2.7.6.1B** are from two SUEZ sites where similar operations are carried out namely Villeparisis and Jeandelaincourt, (France)

Figure 2.7.6.1B Landfills: Villeparisis and Jeandelaincourt, (France)



2.7.6.3 New Landfill Inert

The operations at the New Landfill Inert will be similar to the residues landfilling.

Once the Inert waste loads have been tipped in the landfill, a waste controller will verify that loads do not contain non inert waste.

A bulldozer will spread the inert waste in regular layers. An excavator will cut the slopes according to requirements.

2.7.6.4 Topographical Surveys

The filling operations at the New Landfills will be measured / controlled by topographical surveys performed on a monthly basis by drone (similar to **Figure 2.7.6.4**) and once a year by an external subcontractor in accordance with the Environmental Monitoring Plan. These surveys will give the total volume filled and the actual shape of the landfill as it progresses.



Figure 2.7.6.4 Example of drone used for topographical surveys

2.7.7 Landfill cover

2.7.7.1 Daily cover

The O&M Contractor shall install a “daily cover” the key objectives of placing daily cover being to protect the landfill area from:

- Windblown litter;
- Odours;
- Birds scavenging for food;
- People scavenging for recyclable materials;
- Infestation by pest, flies and vermin;
- Fire risk;
- Water infiltration.

However, in the case of landfilling IBA aggregates and stabilized APCR (a liquid ‘concrete’ cement mix) and inert CDW, the hazards described above are negligible because of the nature of this waste odorless, inert (of no interest for scavenging) and dense (not disturbed by wind).

2.7.7.2 Minimising water infiltration

With respect to reducing water infiltration, the APCR will settle and harden like a cement making it waterproof and presenting no risk of infiltration.

For the IBA aggregates and CDW, the high level of compaction described above will reduce the possibility of water infiltration. As a result, the use of a daily cover for this risk is barely justified.

2.7.7.3 Intermediate Cover

According to filling phases program, when final level has not been reached, O&M Contractor will place intermediate cover on areas in standby, in order to prevent rain water to percolate thru the waste mass.

2.7.7.4 Final cover

Once a cell has been filled, the O&M Contractor will put a definitive cover on the cells in accordance with the capping plan and using the materials described in the design plan for the landfills including IBA Aggregates and recyclable CDW processed at the CDW Processing Plant and surplus balance of excavation / backfill.

Materials will be brought to site in anticipation of the closing date of the cell and temporarily stored on site at an identified location.

2.7.8 Landfill control and monitoring

Landfill control and monitoring will follow rules which have been developed and upgraded by the O&M Contractor and based on other projects.

Drawing from this unrivalled know-how, the O&M Contractor will provide an operation that is seamlessly controlled and comply with Good Industry Practice.

Controls and monitoring to eliminate any potential environmental hazards and continuously optimize the operation, will comprise:

- Weather: daily monitoring to anticipate potential hazards from sandstorms, rainfall etc.
- Dust control: a daily monitoring and water spraying of the access roads;
- Birds, pest, vermin and insects: daily inspections (though none are expected as the Waste to be landfilled are inert);
- Odours: daily inspections though no issue is expected as the landfilled waste is odourless;
- Leachate pond levels: daily inspections to check no overflow and that the pump is working correctly;
- Run off water ponds levels: daily inspections to check no overflow and that the pump is working correctly;
- Leachate and run off waters quality: when possible, and no more than on a quarterly basis, analyses on the leachate to check quality. These tests will allow for operations adjustments if needed;
- Boreholes : control of level of underground water and quality of underground water;
- Compaction: once a week by drone. Once a year, a topography survey will be undertaken on both landfills to check the progression of the filling of the landfill against the design;
- Leachate wells in RMW Landfill : control of level of leachate.

The landfill operations will also be safer with the deliveries of RMW during the night directed to the EfW Plant only and therefore reducing safety issues linked to landfill operations during the night.

2.8 Leachate Treatment Facility

The reverse-osmosis and evaporation Leachate Treatment Plant will operate on an automated mode. On a daily basis, the leachate operator will perform routine inspections to reconcile the existing parameters against the plant working manual. The plant parameters will be adjusted to take into account the quantity of leachate flow to treat and the leachate composition.



The leachate treatment plant will be equipped with:

- A leachate pre-treatment (filtering system) to remove particles;
- An acidification step to transform N-NH₄ and decrease clogging;
- Two reverse-osmosis systems in parallel ;

- One vacuum evaporator fed with reverse-osmosis brines. The hot water loop will be heated on with an electrical heater until the biogas is available where it will be heated on with a biogas boiler.

The evaporator condensates will be treated with a reverse-osmosis system to remove ammonia, COD and metals traces and ensure that treated water meets standards.

Reverse-osmosis permeate and evaporator condensates are then mixed in a tank before going to the drainage system. The water quality is monitored to ensure the treated water respects standards before going to the drainage system.

The evaporator concentrated will be stored in a dedicated tank before to be tipped on the landfill.

Maintenance and repairs will be carried thru “Full Maintenance Service” contracts directly with manufacturers. The purpose is to insure the best availability ratio at the most efficient costs, at optimized technical life of the Plant.

2.9 Biogas Treatment Facility

The Biogas Treatment Plant will operate on an automated mode under the same principle than the Leachate Treatment Plant. The Biogas Technician will carry out daily supervision of the plant to adjust if needed the plant parameters depending on the biogas quality.

The produced biogas will be processed through:

- Two 1560 kwe gensets equipped with cogeneration loop. The heat produced by the jacket water and the exhaust gases of the engines will be valorized at the EfW Plant, or
- Two biogas flares

The biogas flares will start automatically in the event the gensets stop or depending on the vacuum pressure.

The biogas flares will start / stop when the biogas engine send the order and/or depending on the biogas collection network vacuum. The biogas flares will regulate their biogas flow depending on the biogas network vacuum. This type of regulation helps to always vacuum the biogas network, to avoid odours emissions and ensure a straight biogas quality.

In case of failure, flares will send a failure message indicating the type of failure so that operators will come to the Plant to fix it.



Regular controls will be carried out to the biogas network which will allow to adjust the biogas production and maintain as much as possible a constant biogas quality for a better efficiency of the Biogas Treatment Facility. Damages to the biogas network can occur such as damages to the biogas valves, leaking wells, etc. During the monitoring and setting of the biogas network phase, operators will check the biogas network shape and notice all damages prior to carry out the relevant repairs.

Maintenance routines to the plant and biogas network are carried out on a daily / monthly / annual regime according to the manufacturer maintenance program and spare parts are kept at the maintenance workshop to minimize shutdown. Maintenance and repairs will be carried thru “Full Maintenance Service” contracts directly with manufacturers. The purpose is to insure the best availability ratio at the most efficient costs, at optimized technical life of the Plant.

A “Rebuilt” program to perform the general overhauls and reconditioning operations will be realized with the manufacturers to optimise the replacement cost of the Plant.

2.10 Mobile Plant Fleet

A fleet of mobile plant will be managed by the Landfill Operations to serve the various operations on site.

The following type of plant will be used for daily landfill operations:

Type of vehicle	Model	Functions
landfill compactors	type CAT 826K or equivalent	Waste compaction
dozer	type CAT D7E or equivalent	transfer and spreading of Waste from the tipping area to the compaction area
track loader	type CAT 963 K or equivalent	load trucks with cover materials from the stock pile and execute all types of covers; it may also assist the dozer if needed
wheel loader	type CAT 966 M or equivalent	spread cover material, load IBA Aggregates onto trucks or processed CDW onto trucks
wheel excavator	type CAT 320 or equivalent	execution of all earthworks such as maintenance of surrounding embankment, construction and maintenance of external slopes, maintenance of trenches, loading of trucks with cover materials, stockpiling IBA Aggregates for maturation purpose, other loading and excavation needs
tipper truck	type MAN TGS 41.420 8x4 or equivalent	transportation of cover materials between the stockpile and the cell, transport of IBA Aggregates and stabilized APCR
RoRo truck	type MAN TGS 26.360 6x4 or equivalent	transportation of movable containers and lubricants/fuel container
Tanker truck	type MAN TGS 26.360 6x4 or equivalent	(i) transportation of waters as per needs, and (ii) CDW platform and internal roads water spreading to prevent dust
telescopic handler	type CAT TH 417C or equivalent	EfW operations
forklift truck	CAT DP35N or equivalent	EfW operations such as removal of IBA bulky

The Site will be equipped with a fuel station to supply fuel for the vehicles, a mobile fuel and lubricant station mounted on RoRo truck for plants, and a washing area to clean the vehicles and plants.

Maintenance and repairs will be carried thru “Full Maintenance Service” contracts directly with manufacturers. The purpose is to insure the best availability ratio at the most efficient costs, at optimized technical life of the plants and vehicles.

The plants will be equipped with remote telematics, allowing the manufacturers to have a proper follow up of the conditions of use of the plant, with alerts in case of technical troubles.

The landfill compactor will be equipped with a GPRS tracking device in 3 dimensions (X, Y, Z). It will support the O&M team to drive on real time, to analyse and to record the compaction activities for optimization purpose.

A workshop shelter will be built on the operation platform, allowing the manufacturers to perform the maintenance and repair operations in suitable conditions.

A “Rebuilt” program to perform the general overhauls and reconditioning operations will be realized with the manufacturers to optimise the replacement cost of the plants.

Marketing Plan

Form T.3.3

0.2 MARKETING PLAN

3.2 / 3.3 / 3.4 / 3.5 –Marketing Plan

Detailed Recycling/Recovery Materials and Products Marketing Plan. The Bidder must submit an outline of a Marketing Plan using Form T.3.3 that presents how the Bidder proposes to fulfil the CDW Recycling/Recovery Target Rate in compliance with Form T.1.2 and the MW Recycling/Recovery Target Rate in compliance with Form T.1.2 (if applicable). The Bidder shall demonstrate how and in which way the materials and products will be separated or produced and recycled / recovered including destinations on Site and off Site. The Marketing Plan shall comprise separate sections for each type of material and product as well as material flows recovered on Site. Furthermore, the Marketing Plan must outline the appropriate quality standards and requirements of marketable materials and products and how these qualities will be achieved by the Bidder.

If available, the Bidder shall substantiate its Marketing Plan by letter of intent from off-takers.

INTRODUCTION

The Consortium' proposal includes a strategy to generate value from the input waste streams by processing waste in accordance with the waste hierarchy to reduce as much as possible the quantity of Waste being landfilled and includes direct diversion of CDW soils suitable for the recycling market and the construction and operation of a CDW Facility for processing CDW generated by the demolition market, which will target removal of inert material suitable for the recycling market.

Materials suitable for the EfW process will be delivered to the Main Facility and any residues generated after the Waste processing will go through a recycling process while the remaining fractions not suitable for any recycling will be definitely landfilled.

The proposed Bottom Ash Plant located at the Main Facility aims to extract ferrous metals from the IBA stemming from the EfW process. It also produces aggregates a fraction of which will be used at the landfill for internal use and thus improving the landfill diversion rate.

The following recyclates and treatment residues identified from the incoming Waste streams are summarized in the **Table 1** below.

Recyclates Description	Source / Process	Average Quantity per Year	Market Type
Soils	Direct CDW incoming stream	70 000 tons	Construction Industry (landscaping, etc.)
CDW aggregates	CDW treatment platform	70 000 tons	Construction Industry Internal Use at Landfill
IBA aggregates	IBA treatment Plant	25 500 tons	Internal use at Landfill
Ferrous Metal	IBA Treatment Plant CDW treatment platform	4 300 tons	Ferrous Metal Re-Processing industry

Table 1 Recyclates List

The Consortium Suez can demonstrate a significant knowledge and track-record on various markets to generate extra revenues to address any waste downturn.

Recyclates will always meet a demand whichever the local market is and the Consortium will always seek to identify and develop additional local markets for output materials from the Facility.

The Consortium understands that supporting local markets and local recyclers and re-processors brings a number of various benefits:

- Creation of jobs;
- local manufacturing;
- reduced transport costs;
- lower overall CO2 impact;
- Value for money for the City.

MATERIALS MARKETING PLAN

Recyclable materials separated from RMW

At this juncture, the Consortium does not envisage to recover any other material deriving from RMW.

Recovered Inert CDW / Recovered Inert CDW Unprocessed

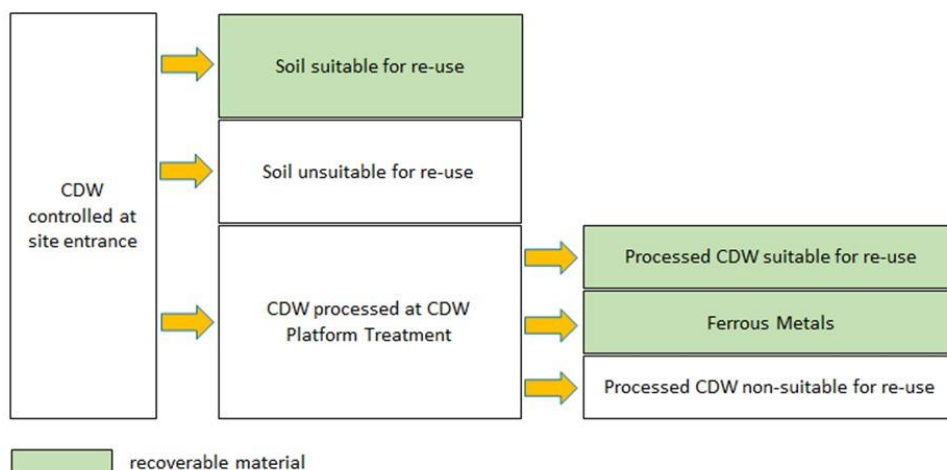


Figure 2.2A CDW Recoverable Material

The construction waste (“CDW”) delivered to the CDW Facility will be controlled on arrival at the site entrance gatehouse. Based on previous deliveries, visual and / or waste description, CDW will be segregated in three different categories as described in **Figure 2.2A**:

- Soil suitable for re-use and directly sent to the Off-Take area for re-use;

- Soil unsuitable for re-use sent to Inert Landfill;
- CDW to be processed at the CDW Facility.

The CDW processing activity will focus primarily on processing CDW coming from the demolition of buildings in the Municipal Area.

The main operation will be a pre-sorting of material of interest for the recycling market and crushing CDW to improve the quality of these materials prior pre-storage in the Off-Take storage area located within the Existing Landfill.

Ferrous metals contained within processed CDW will also be segregated.

The Consortium has investigated the local market and identified potential off-takers for the different streams of recoverable material as described in the **table 2.2B** below.

Letters of support from these potential off-takers are set out in Annex 1.

Material	Facility	Location
Recoverable Soil	EX ING B&P	Dubljanska 98, 11000 Beograd
	NEIMAR VAD	Kneginje Zorke 2, Beograd
Recoverable Aggregates	EX ING B&P	Dubljanska 98, 11000 Beograd
	NEIMAR VAD	Kneginje Zorke 2, Beograd
Ferrous Metals	See Table 2.3B	

Table 2.2B Potential Outlets – Recoverable CDW Material

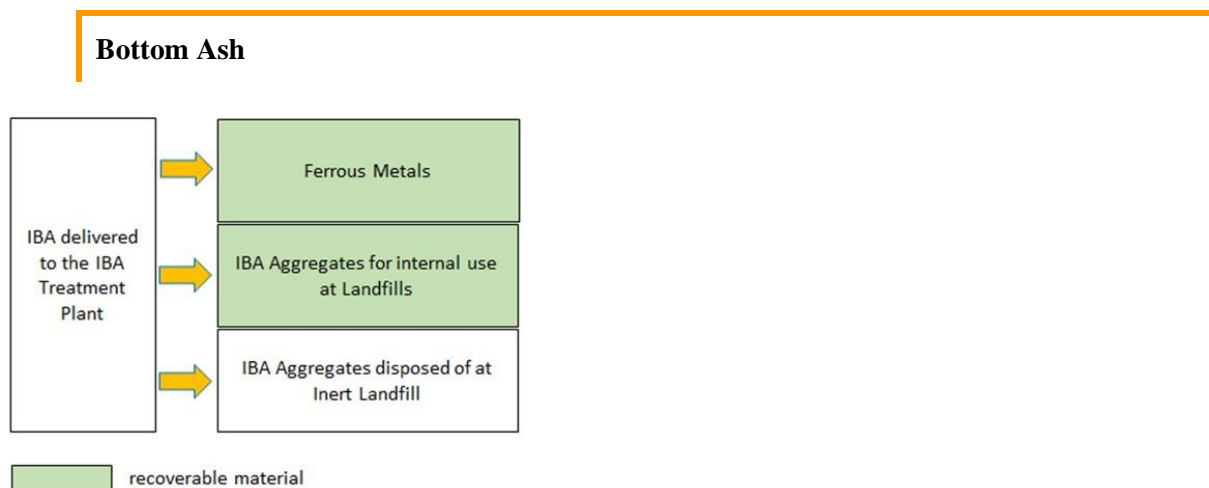


Figure 2.3A CDW Recoverable Material

The proposed Bottom Ash Plant will process the IBA from the EfW Facility to produce different fractions described in **Figure 2.3A**.

It will be equipped with magnet metal separator equipment allowing extraction ferrous metals for recycling and produce IBA aggregates.

A fraction of the IBA aggregates will be suitable for internal use at the New Landfill such as *inter alia* capping layer or temporary access roads and therefore contribute to the landfill diversion rate.

The metals recovered from the Bottom Ash Plant will be marketed through local metal re-processing companies or alternatively through framework contracts secured by SUEZ for the different IBA Treatment Plant operated worldwide.

The Consortium has investigated and identified potential off-takers for ferrous metals as described in the **table 2.3B** below.

Letters of support from these potential off-takers are set out in **Annex 1**.

Material	Facility	Location
Ferrous Metals	BEORECIKLAŽA d.o.o.	Bulevar Peke Dapčevića 42, Beograd
	CE-ZA-R d.o.o.	Tome Buše 14, 11250 Železnik

Table 2.3B Potential Outlets – Recoverable CDW Material

Other Marketable Materials

At this juncture, the Consortium does not envisage to recover any other material deriving from the operations of the Facilities.

However, should any opportunity developments arise in the Municipal Area or otherwise, the Consortium shall discuss with the City to explore such opportunities likely to generate additional upside.

ANNEX 1

Exingb&p
www.exingbp.rs

EX ING B&P doo
Broj
10.01.2017. god.
Beograd, Dubljanska 98

SUEZ
Tour CB 21
16, place de l'Iris
92040 Paris La Défense Cedex
France

Belgrade, July 10, 2017

City of Belgrade – SUEZ Project

Dear Laurent,

Further to our meeting, I am pleased to provide SUEZ with this letter of support.

Our company is specialized in the field of Civil Engineering.

It is anticipated that Aggregates produced from the crushing of demolition waste/Clean Soil material arising from SUEZ processes as part of the City of Belgrade Project, would fit our activities.

Whether SUEZ being successful in their current bid with the City of Belgrade we look forward to discussing further the opportunity of an offtake agreement for such material.

Yours sincerely,

«EX ING B&P»


EX ING B&P

Sedište: Dubljanska 98, 11000 Beograd, **Direkcija:** Jurija Gagarina 32a, 11070 Novi Beograd,
tel/fax: +381 11 2284 200, 2284 202, 2284 300, www.exingbp.rs, e-mail: office@exing.co.rs
PIB: 101149539 MB: 06001629 Tekući račun: 160-5095-20



Neimar V A.D.
Knekinje Zorke 2
Belgrade
Serbia

SUEZ
Tour CB 21
16, place de l'Iris
92040 Paris La Défense Cedex
France July 10, 2017

City of Belgrade – SUEZ Project

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Whether SUEZ being successful in their current bid with the City of Belgrade we look forward to discussing further the opportunity of an offtake agreement for such material.

Yours sincerely,



Neimar V A.D.

Bozo Vukovic mr ecc

0.4 Project Organisation Chart for the Services Period and Human Resources Plan Form T.3.4

Project Organisation Chart for the Services Period

Form T.3.4.1

0.4.1 PROJECT ORGANIZATION FOR THE SERVICES PERIOD

The Bidder must submit organisation charts for the Interim Services Period and the Services Period depicting functions and responsibilities, and showing the organization during the Interim Services and Services phase using Form T.3.4.1.

This should include the functions and responsibilities of Operating Sub-Contractor(s).

1 INTERIM SERVICES PERIOD

During the Interim Services Period, the O&M Contractor organizational structure will be constituted around the New Landfill activities employing 63 staff broken down into:

- 3 x Overhead staff;
- 60 x Landfill activities staff.

The full organizational structure is shown in **Figure 1**.

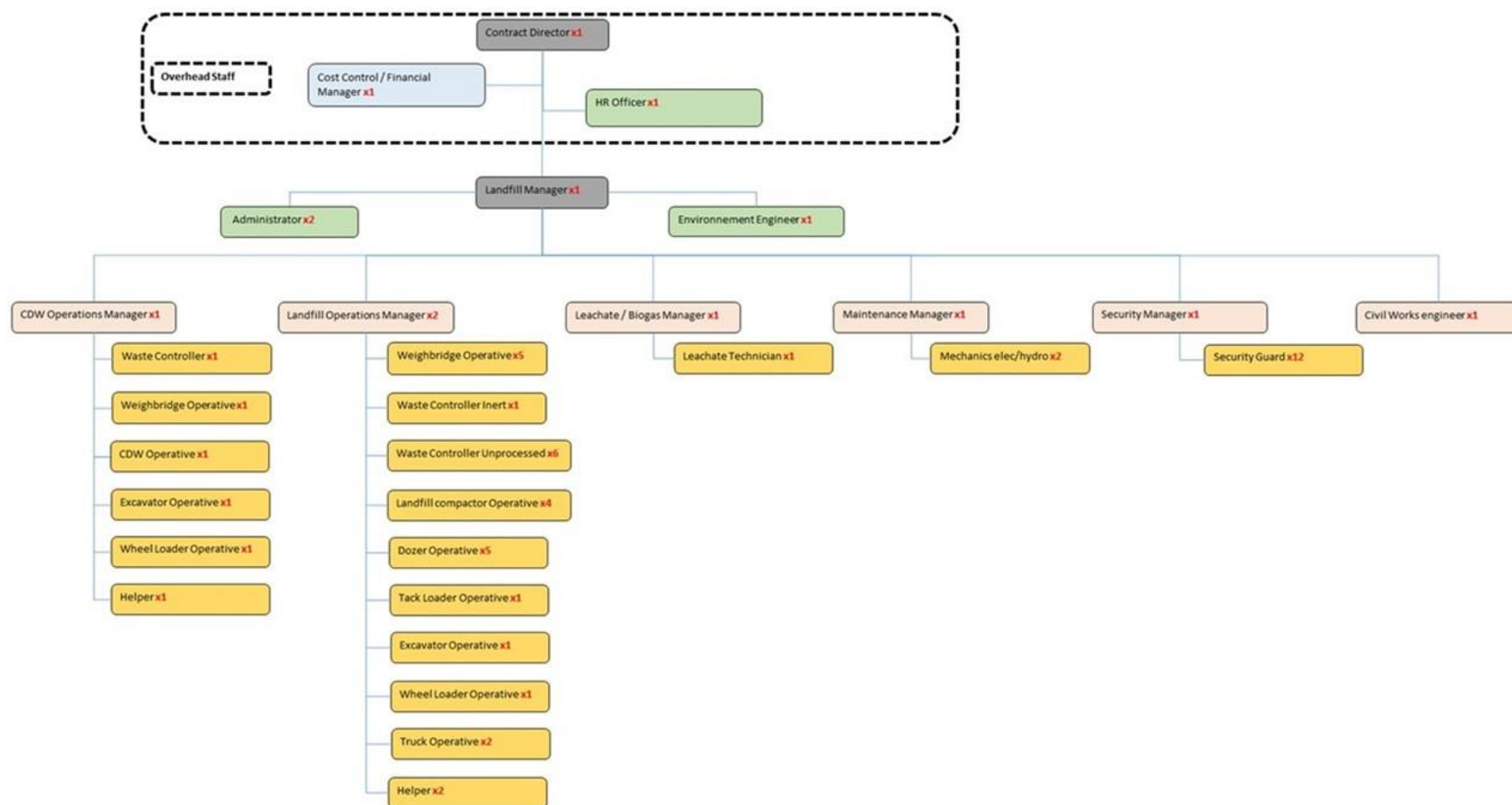


Figure 1 Interim Services Period Organizational Structure

1.1 Management and Administration (Overhead)

The Contract Director, (acting as General Manager) will be the main point of contact with the City for the Site operations. The Contract Director will manage an administrative team providing support to the O&M teams and have overall responsibility for the delivery of the Services to The City. The Contract Director will be appointed following Financial Close and will oversee the construction and commissioning of the Facilities into their operational phase. During the Interim Services Period, the Contract Director will also manage (jointly with the Human Resources Officer) the Main Facility staffing mobilization phase.

1.1.1 Financial matters

The Financial matters will be handled by the Cost Control / Financial Manager who will oversee and coordinate all the financial aspects of the Contract including invoicing and billing, accounts and monitor budgets. The Cost Control / Financial Manager will also manage the financial reporting to the City pursuant to the PPP Contract.

1.1.2 Human Resources department

During the Interim Services Period, a Human Resources Officer (HR Officer) will be appointed to manage the HR administration including the staff training programme, staff movement, sickness, potential labour issues etc. The main function of the HR Officer during the Interim Services Period will be organised around the recruitment of staff for the EfW Facility mobilisation to ensure that the facility is properly staffed and trained before the Services Commencement Date. The HR Officer will be recruited with the aim to further take the HR Manager position by the start of the Services Commencement Date, building on the skills and knowledge obtained during this intensive recruitment phase.

1.2 Landfill Operations

The Landfill Manager, (assisted by an administrative team) will report to the Contract Director and will manage the following activities for the Landfill operations.

An Environment Engineer (who will report to the Landfill Manager during the Interim Services Period) will coordinate the landfill monitoring activities (analysis reports, topographic surveys, etc.) to ensure that such monitoring complies with Schedule 2 ("*Output Specifications*") of the PPP Contract.

The Environment Engineer will develop, implement and monitor the Quality and Environmental Management systems throughout the Interim Services Period in accordance with the relevant provisions of Schedule 2 and 9 of the PPP Contract based on:

- A Quality Management System, in compliance with the latest version of ISO 9001;
- An Environmental Management System in compliance with the latest version of ISO 14001;

- An OHS Management System in compliance with the latest version of OHSAS 18001.

A Civil Works Engineer, (reporting to the Landfill Manager) will oversee landfill cell design and assist the leachate and landfill gas operations.

1.2.1 New Landfills

Two Landfill Operations Managers will supervise the following activities:

- The site entrance weighbridge activities;
- The different landfill activities (RMW Unprocessed, Inert and Residues).

The Landfill Operations Managers will work five days a week on an 8 hours basis per day with one person at a time to cover any overtime as the case maybe.

The site entrance gatehouse will be staffed in order to be capable of receiving waste deliveries at any time, 24/7.

The weighbridge staff will work in shift of 8 hours each to ensure that one staff is at all time at the Site entrance gatehouse and an additional staff during peak delivery traffic periods. Their will *inter alia*:

- Register people and Waste truck deliveries;
- Manage weighbridge activities.

The landfill team will be mobilised 7 days a week on an eight-hour basis and will be composed of Waste controllers coordinating vehicle tipping and Mobile Plant Drivers (excavators, bulldozers, compactors) for landfill operations. This team is completed with Truck Drivers moving processed CDW arising from the CDW platform operations.

1.2.2 CDW Platform

A CDW Operations Manager will manage the CDW Facility team.

The main CDW Facility team will work 5 days a week on an eight-hour basis. This team will comprise Operatives, including a weighbridge operative for outgoing processed CDW and Mobile Plant Drivers for the CDW treatment operations.

The CDW Waste Controller will work on a 7 days basis to cover the daily deliveries of CDW at the CDW Facility where trucks will offload on a dedicated pre-storage area.

1.2.3 Leachate & Biogas Operations

A Leachate / Biogas Manager will manage the Leachate Treatment Facility and the Landfill Gas Facility activities. During the Interim Services Period, the sole Leachate Treatment Facility will be operational. The Leachate / Biogas team will work on an 8 hours per day basis, 5 days a week.

A Leachate Technician will supplement the team, supervise and adjust the Leachate Treatment Plant parameters (leachate flow, storage ponds, etc.)

1.2.4 Landfill Maintenance

The Maintenance team will include a Maintenance Manager and two Mechanical Operatives. The Maintenance team will work on an 8 hours per day basis, 5 days a week. It is anticipated that mobile plants will operate on a full service basis. The key role of the Landfill Maintenance team is to administrate the maintenance contracts and organise the maintenance schedules and manage the landfill.

1.2.5 Security Team

A Security team will ensure the security of the Site. The Security Foreman, working on an 8 hours per day basis, 5 days a week will manage a team of Security Operatives working in 8 hours shift, ensuring security of the Site 24/7, doing inspections on the perimeter of the Site, checking the Site fences integrity and managing the CCTV network.

2 SERVICES PERIOD

During the Services Period, the O&M Contractor will employ 119 staff broken down into the following categories:

- 14 x Overhead staff;
- 49 x EfW activities staff;
- 56 x Landfill activities staff.

The complete organizational structure during this period is set out in **Figure 2**.

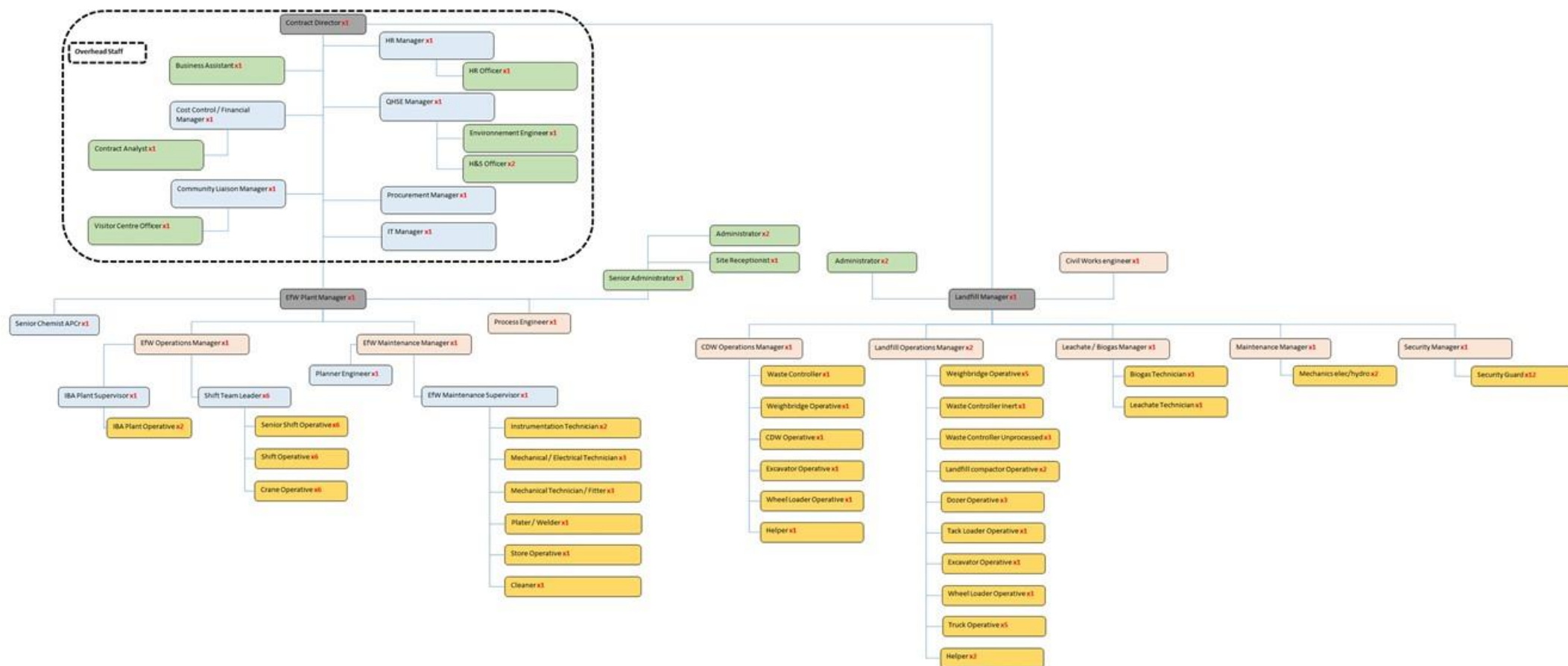


Figure 2 Services Period Organizational Structure

2.1 Management and Administration (Overhead)

The Contract Director, (acting as General Manager) will be the main contact with the City for the administration of the PPP Agreement. The Contract Director will manage an administration team, providing support the O&M teams and have overall responsibility for the proper delivery of the Services to the City.

2.1.1 Financial matters

The financial matters will be handled by the Cost Control / Financial Manager, assisted by a Contract Analyst. The Cost Control / Financial Manager will oversee all the financial aspects of the Contract which includes invoicing and billing, prepare accounts and monitor budgets. The Contract Analyst main function will focus on the Contract financial requirements and produce financial reporting to the City.

2.1.2 Human Resources Department

Human Resources (HR) will be managed by the HR Manager, who will be assisted by the HR Officer. They will be in charge of:

- Ensuring all recruitments and related processes are in accordance with international / Serbian Law;
- Managing local / expatriate staff and ensure their function are of O&M Contractor's interest;
- Tackling labour issues, if any
- Preparing the pay schedule;
- Monitor staff training, leave, sickness, etc.

2.1.3 Communications

The Community Liaison Manager, assisted by the Visitor Centre Officer will liaise/coordinate/consult with clients, any stakeholders, public, and any third parties to resolve any issues regarding the operations of the Facilities :

- Attending to issues related to outage such as telephone, internet, electricity and water;
- Truck timings and coordination issues with clients;
- Third party complaints/claims;
- Communications to the public such as site visits and presentations at the Visitor Centre, schools, etc.

2.1.4 Quality Health Safety and Environment (QHSE)

The QHSE team will be managed by the QHSE Manager, assisted by Health and Safety Officers. The Environment Engineer previously reporting to the Landfill Manager during the Interim Services Period will be embedded in the QHSE team and report to QHSE Manager.

This team will implement, monitor and follow-up the Quality and Environmental Management systems throughout the Services Period in accordance with Schedule 2 – (“*Output Specifications*”) and Schedule 9 (“*Environmental and Social Requirements*”) based on:

- A Quality Management System, in compliance with the latest version of ISO 9001;
- An Environmental Management System in compliance with the latest version of ISO 14001;
- An OHS Management System in compliance with the latest version of OHSAS 18001.

The team will be responsible for:

- Monitoring objectives and the key performance indicators, in accordance with the Quality and Environmental Management systems;
- Raising the staff awareness of environmental and safety risks;
- Briefing the staff of the target achieved;
- Monitoring compliance with environmental and safety instructions by periodic QHSE rounds;
- Coordinate environmental monitoring on site and relevant sample analysis regimes;
- Implementing and monitoring corrective actions jointly with the O&M Director;
- Coordinating QHSE plans and audits

2.1.5 Procurement

A Procurement Manager will be responsible for the procurement of all the services and consumables necessary for the operations *inter alia*:

- Sourcing the required services and supplies;
- Finalising the requirements of the order with the assistance of technical teams where necessary, and issuing purchase orders to suppliers;
- Follow-up of the purchase orders including claims;
- Optimisation of the purchase orders (costwise, qualitywise and quantitywise);

2.1.6 IT Management Service

The IT Manager will be responsible for managing all aspects and components of the IT system of all the Facilities, especially data servers, IT system hardware and software and ensure the full implementation, operation and maintenance of the WMIS.

2.2 EfW Facility Operations

The EfW Plant Manager, assisted by an administrative team and directly reporting to the Contract Director will manage all the following activities related to the EfW Facility operations.

2.2.1 EfW Operations

The operations of the EfW Facility (burners, flue gas treatment and turbine ...) will be managed by the EfW Operations Manager and organised in shifts of eight hours each to cover 24 hours a day, seven days a week operations. Each team will comprise:

- A Shift Team Leader
- A Senior Shift Operative
- A Shift Operative
- A Crane Operative

2.2.2 APCR Stabilization Operations

The APCR stabilisation plant will be operated three days a week on an eight-hour basis under the EfW Operations Manager and its team in charge of:

- Supervising and operating the stabilization mixing process;
- Loading trucks with stabilised APCR;
- Regularly cleaning and washing the mixing equipment.

A Senior Chemist will work on daily hours to carrying out internal analysis on APCR and IBA, as well as the boiler analysis and any other analysis required.

2.2.3 IBA Treatment Operations

The IBA Treatment Plant team will operate five days a week on an eight-hour basis. The team will report to the EfW Operations Manager and comprise one Supervisor, two Operatives. With the support of the Truck Drivers managed by the Landfill operations, they will have the following principal tasks:

- Supervising and controlling IBA treatment process;
- Organising IBA movements;
- Emptying and moving containers;
- Cleaning the IBA Treatment Plant.

2.2.4 EfW Maintenance

The Technical & Maintenance Team will be mobilized five days a week on an eight-hour basis and will be organised into two departments managed by the EfW Maintenance Manager:

- Maintenance Team;
- Engineering.

The team will define and schedule all the maintenance services to ensure the reliability and quality of the process operations. It will perform daily maintenance and part of the major maintenance and equipment overhaul. Among other actions, this team will:

- Manage the spare parts inventory and prepare supplies needed for maintenance;
- Prepare and implementing internal and external preventive/corrective actions;
- Supervise external contractors and suppliers;
- Ensure that the emergency repairs are properly carried out;
- Review failures to identify remedies;
- Entering information to the maintenance management system.

The Maintenance Team will be in charge of daily maintenance of the EfW Facility, the APCR Stabilization Plant and IBA Treatment Plant from Waste Reception to the Landfill).

The Maintenance Team will be composed of technicians (Mechanical, Electricians, Instrumentation) and operatives reporting to an EfW Maintenance Supervisor who will then escalate to the EfW Maintenance Manager.

The maintenance team will be “on call” in the event of an incident during out of hours work.

The Maintenance Manager will be assisted with an engineering team in charge of planned maintenance and shutdown maintenance. This team will include a Project Engineer and a Planner Engineer.

2.3 Landfill Operations

The Landfill Manager, assisted by an administrative team and directly reporting to the Contract Director will manage all the following activities related to the landfill operations.

A Civil Works Engineer, reporting to the Landfill Manager will mainly oversee landfill cell design and assist the leachate and landfill gas operations.

2.3.1 New Landfills

Two Landfill Operations Managers will supervise the following activities:

- The site entrance weighbridge activities;
- The different landfill activities (RMW Unprocessed, Inert and Residues).

The Landfill Operations Managers will work five days a week on an 8 hours basis per day with mainly one person at a time to cover longer hours per day.

The site entrance gatehouse will be staffed in order to be capable of receiving waste deliveries at any time, 24 hours a day, seven days a week. The weighbridge staff will work in shift of 8 hours each to ensure that one person is at all time at the site entrance gatehouse and an additional people during peak delivery traffic periods. Their main tasks will be to:

- Register people and trucks;
- Manage weighbridge activities.

The landfill team will work 7 days a week on an eight-hour basis. The team will be composed by Waste Controllers coordinating vehicle tipping and Mobile Plant Drivers (excavators, bulldozers, compactors) for landfill operations. This team is completed with Truck Drivers moving processed CDW arising from the CDW platform operations.

The landfill team will be in charge of:

- Moving IBA by trucks from the IBA treatment plant to landfill;
- Moving stabilised APCR by trucks from the APCR stabilisation plant to landfill;
- Coordinating tipping in landfill, moving and equalising with bulldozers;
- Compacting with compactors;
- Spreading and levelling stabilised APCR with excavators;
- Implementing dust controls on internal roads.

Waste Controllers and Mobile Plant Operatives will have a reduced number compared to the Interim Services Period due to the fact that the EfW Facility will accept all Waste delivered during the night. This will impact on the staff required for the Landfill operations as well as reducing safety issues with Waste tipped after regular working hours.

The number of truck drivers will increase compared to the Interim Services Period due to the APCR and IBA treatment plants requiring transport of material for landfill disposal.

2.3.2 CDW Platform

A CDW Operations Manager will manage the CDW Facility activities team.

The main CDW team will work 5 days a week on an eight-hour basis. This team will comprise Operatives, including a weighbridge operative for outgoing processed CDW and Mobile Plant Drivers for the CDW treatment operations.

The CDW Waste Controller will work on a 7 days basis to cover the daily deliveries of CDW at the CDW Platform where trucks will offload on a dedicated pre-storage area.

2.3.3 Leachate & Biogas Operations

A Leachate / Biogas Manager will manage the Leachate Treatment Facility and the Landfill Gas Facility activities. The Leachate / Biogas team will work on an 8 hours per day basis, 5 days a week.

A Leachate Technician and a Biogas Technician will complete the team, supervise, control and adjust the Leachate Treatment Facility parameters (leachate flow, storage ponds, etc.) and the Biogas for the Landfill Gas Facility parameters (motors, biogas flow, etc.).

2.3.4 Landfill Maintenance

The Maintenance team will include a Maintenance Manager and two Mechanical Operatives. The Maintenance team will work on an 8 hours per day basis, 5 days a week. It is anticipated that mobile plants will be on a full service basis.

The main role of the Landfill Maintenance team will be to manage the maintenance contracts and organise the schedules of maintenance, manage the landfill warehouse and perform repairs to landfill operations equipment.

2.3.5 Security Team

A Security team will ensure the security of the Site. The Security Foreman, working on an 8 hours per day basis, 5 days a week will manage a team of Security Operatives working in 8 hours shift, ensuring security of the Site 24 hours a day, seven days a week, doing rounds on the perimeter of the Site, checking the Site fences integrity and managing the CCTV network.

Human Resources Plan

Form T.3.4.2

0.4.2 HUMAN RESOURCES PLAN FOR THE SERVICES PERIOD (KEY STAFF)

The Bidder must submit a list using Form T.3.4.2 with details of its Human Resources Plan considering the indicative number and functions of personnel required to fulfil the Contractor's obligations in the event of award of the Contract

1 INTERIM SERVICES PERIOD

During the Interim Services Period, the O&M Contractor organizational structure will be organised around the New Landfill activities, employing 63 staff broken down into the following:

- 3 x Overhead staff;
- 60 x Landfill activities staff.

1.1 Management and Administration (Overhead)

Table 1.1 below shows the indicative number and functions of personnel during the Interim Services Period.

Role	Staff Category	Indicative Staff Number
Contract Director	Overall management	1
Cost Control / Financial Manager	Administrative	1
HR Officer	Administrative	1
Management and Administration Total		3

Table 1.1 Interim Services Period Management and Administration Staff

1.2 Landfill Operations

Table 1.2 below shows the indicative number and functions of personnel during the Interim Services Period.

Role	Staff Category	Indicative Staff Number
Landfill Manager	Administrative	1
Administrator	Administrative	2
Civil Works Engineer	Technical	1
Environment Engineer	Technical	1
CDW Operations Manager	Supervisor	1
CDW Waste Controller	Operative	1

CDW Weighbridge Operator	Operative	1
CDW Operative	Operative	1
CDW Helper	Operative	1
CDW Excavator Operative	Driver	1
CDW Wheel Loader Operative	Driver	1
Landfill Operations Manager	Supervisor	2
Site Entrance Weighbridge Operative	Operative	5
Waste Controller Inert Landfill	Operative	1
Waste Controller Unprocessed Landfilled	Operative	6
Landfill Compactor Operative	Driver	4
Dozer Operative	Driver	5
Tack Loader Operative	Driver	1
Excavator Operative	Driver	1
Wheeled Loader Operative	Driver	1
Truck Operative	Driver	2
Helper	Operative	2
Maintenance Manager	Supervisor	1
Mechanical Elec / Hydro	Technical	2
Leachate / Biogas Manager	Supervisor	1
Leachate Technician	Technical	1
Security Manager	Supervisor	1
Security Guard	Operative	12
Landfill Operations Total		60

Table 1.2 Interim Services Period Landfill Operations Staff

1.3 Interim Services Period Staff Number

Table 1.3 below summarises staffing number according to their functions and qualifications.

Interim Services Period

Organizational division	Indicative Staff Number				
	Administrative	Technical	Supervisors	Drivers/ Operators	Total
Overall management	1				1
Accounting and administration	1				1
Compliant group		1			1
Public relation group					
Human Resources	1				1
New Landfill for RMW Landfilled Unprocessed	3	2	4	37	46
CDW storage and treatment			1	6	7
New Landfill for Inert Waste				3	3
Leachate Treatment Facility		1	1		2
Existing Landfill Remediation Works		1			1
Total on Site	6	5	6	46	63

Table 1.3 Interim Services Period Staff Number

EfW Facility Mobilisation

Role	Number	Recruitment Phase
Overhead		
Business Assistant	1	1 year prior Services Commencement Date
Contract Analyst	1	1 year prior Services Commencement Date
HR Manager	1	1 year prior Services Commencement Date
Procurement Manager	1	1 year prior Services Commencement Date
IT Officer	1	9 months prior Services Commencement Date
Compliance / QHSE Manager	1	9 months prior Services Commencement Date
HSE Officer	2	9 months prior Services Commencement Date
Community Liaison Manager	1	1 year prior Services Commencement Date
Visitor Centre Officer	1	9 months prior Services Commencement Date
EfW Plant		
EfW Plant Manager	1	1 year prior cold commissioning
Process Engineer	1	9 months prior Services Commencement Date
Senior Administrator	1	9 months prior Services Commencement Date
Administrator	2	6 months prior Services Commencement Date
Site Receptionist	1	6 months prior Services Commencement Date
EfW Maintenance Manager	1	6 months prior cold commissioning
Planner Engineer	1	3 months prior cold commissioning
EfW Maintenance Supervisor	1	9 months prior Services Commencement Date
Instrumentation Technician	2	cold commissioning
Mechanical / Electrical Technician (Senior)	1	cold commissioning
Mechanical / Electrical Technician	2	cold commissioning
Mechanical Technician Senior	1	cold commissioning
Mechanical Technician	2	cold commissioning
Welder	1	cold commissioning
Cleaner	1	9 months prior Services Commencement Date
Store Operative	1	3 months prior commencement date
EfW Operations Manager	1	6 months prior cold commissioning
Shift Team Leader	6	9 months prior commencement date
Senior Shift Operative	6	9 months prior Services Commencement Date
Shift Operative	6	9 months prior Services Commencement Date
Crane Operative	6	9 months prior Services Commencement Date
APCr Plant		
APCr Senior Chemist	1	9 months prior Services Commencement Date
Bottom Ash Plant		
IBA Plant Supervisor	1	9 months prior Services Commencement Date
IBA Plant Operative	2	6 months prior Services Commencement Date

Table 1.4 EfW Facility Mobilisation during Interim Services Period

During the Interim Services Period, the Management staff will focus on recruitment for the EfW Facility staff mobilisation to ensure it is adequately staffed and trained to operate by the Services Commencement Date.

An indicative mobilisation plan is shown in **Table 1.4**.

The Contractor already made contacts with local recruitment agencies such as Stanton Chase in Belgrade specialised in middle to top management people in order to recruit high qualified staff to manage the facility.

2 SERVICES PERIOD

During the Services Period, the O&M Contractor will employ 119 staff broken down into the following:

- 14 x Overhead staff
- 49 x EfW activities staff
- 56 x Landfill activities staff

Management and Administration (Overhead)

Table 2.1 below shows the indicative number and functions of personnel during the Services Period.

Role	Staff Category	Indicative Staff Number
Contract Director	Overall management	1
Business Assistant	Administrative	1
Cost Control Manager	Administrative	1
Contract Analyst	Administrative	1
HR Manager	Administrative	1
HR Officer	Administrative	1
Procurement Manager	Administrative	1
IT Officer	Administrative	1
Compliance / QHSE Manager	Administrative	1
HSE Officer	Administrative	2
Environment Engineer	Administrative	1
Community Liaison Manager	Administrative	1
Visitor Centre Officer	Administrative	1
Management and Administration Total		14

Table 2.1 Services Period Management and Administration Staff

EfW Operations

Table 2.2 below shows the indicative number and functions of personnel during the Services Period.

Role	Staff Category	Indicative Staff Number
EfW Plant Manager	Administrative	1
Process Engineer	Administrative	1
Senior Administrator	Administrative	1
Administrator	Administrative	2
Site Receptionist	Administrative	1
EfW Maintenance Manager	Administrative	1
Planner Engineer	Administrative	1
EfW Maintenance Supervisor	Supervisor	1
Instrumentation Technician	Technical	2
Mechanical / Electrical Technician (Senior)	Technical	1
Mechanical / Electrical Technician	Technical	2
Mechanical Technician Senior	Technical	1
Mechanical Technician	Technical	2
Welder	Technical	1
Cleaner	Operative	1
Store Operative	Operative	1
EfW Operations Manager	Administrative	1
Shift Team Leader	Supervisor	6
Senior Shift Operative	Operative	6
Shift Operative	Operative	6
Crane Operative	Operative	6
APCr Plant		
APCr Senior Chemist		1
Bottom Ash Plant		
IBA Plant Supervisor		1
IBA Plant Operative		2
EfW Operations Total		49

Table 2.2 Services Period EfW Operations Staff

Landfill Operations

Table 2.3 below shows the indicative number and functions of personnel during the Services Period.

Role	Staff Category	Indicative Staff Number
Landfill Manager	Administrative	1
Administrator	Administrative	2
Civil Works Engineer	Technical	1
CDW Operations Manager	Supervisor	1
CDW Waste Controller	Operative	1
CDW Weighbridge Operator	Operative	1
CDW Operative	Operative	1
CDW Helper	Operative	1
CDW Excavator Operative	Driver	1
CDW Wheel Loader Operative	Driver	1
Landfill Operations Manager	Supervisor	2
Weighbridge Operative	Operative	5
Waste Controller Inert	Operative	1
Waste Controller Unprocessed	Operative	3
Landfill Compactor Operative	Driver	2
Dozer Operative	Driver	3
Tack Loader Operative	Driver	1
Excavator Operative	Driver	1
Wheeled Loader Operative	Driver	1
Truck Operative	Driver	5
Helper	Operative	2
Maintenance Manager	Supervisor	1
Mechanical Elec / Hydro	Technical	2
Leachate / Biogas Manager	Supervisor	1
Biogas Technician	Technical	1
Leachate Technician	Technical	1
Security Manager	Supervisor	1
Security Guard	Operative	12
Landfill Operations Total		56

Table 2.3 Services Period Landfill Operations Staff

Services Period Staff Number

Table 2.4 below summarises staffing number according to their functions and qualifications

Services Period

Organizational division	Indicative Staff Number				
	Administrative	Technical	Supervisors	Drivers/ Operators	Total
Overall management	1				1
Accounting and administration	3				3
Compliant group	4				4
Public relation group	2				2
Human Resources, Procurement and IT	4				4
Sub-total headquarter staff	14				14
Main Facility	9	9	7	20	45
Bottom Ash Treatment, Treatment of FGT Residues		1	1	2	4
CDW storage and treatment			1	6	7
New Landfill for RMW Landfilled Unprocessed	3	2	4	30	39
New Landfills for Treatment Residues				3	3
New Landfill for Inert Waste				3	3
Leachate Treatment Facility		1	1		2
Landfill Gas Facility		1			1
Site Condition Monitoring		1			1
Sub-Total on the Site	12	15	14	64	105
Total number of staff under the contract	26	15	14	64	119

Table 2.4 Interim Services Period Staff Number

0.5 WASTE MANAGEMENT INFORMATION SYSTEM

The Bidder must submit a description of the Waste Management Information System (WMIS) in compliance with Schedule [2] (*Output Specification*) using Form T.3.5. This must include a confirmation that it is capable of generating at minimum the reports specified in Part 2 of Schedule [2] (*Output Specification*).

The Bidder must outline the interfaces between the Contractor and the City, the information placed in the WMIS as well as the information which shall be accessible to the City representatives.

1 OVERVIEW

The Consortium will procure the installation of an IT based Waste Management Information System (the “WMIS”) that will allow the City to access to the records within a maximum of 24 hours of the information made available on the WMIS by the O&M Contractor.

Such device will allow the Consortium to:

- Record and track performance;
- Fulfil its commitments to The City;
- Monitor the financial obligations to The City;
- Monitor progress against targets / programmes; and
- Analyse the effectiveness of corrective actions.

All information technology (IT) arrangements will be fully compatible with IT systems used by the City. Contract data will be directly transferred to the authorised officers, provided in a compatible electronic format.

The WMIS will be fully operational by the Interim Services Commencement Date and throughout the Interim Services Period and the Services Period. Any documentation and operating manuals requested by the City before the WMIS being fully operational will be supplied.

Once operational, the Consortium will procure that regular upgrading of the software shall be implemented to keep it well designed and user-friendly.

The Consortium will provide an Extranet linked to the site’s intranet to transfer waste-flow data to the City as illustrated in **Figure 1** within a secured close-circuit access.

The extranet will be accessible through secured login details and passwords issued to designated representatives of the City.

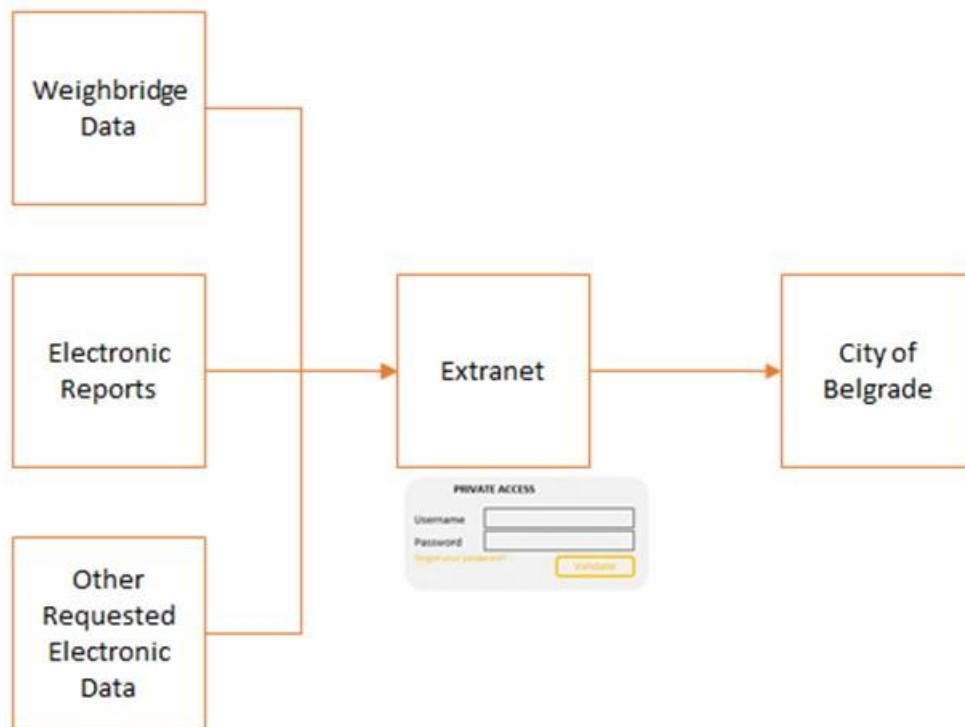


Figure 1 Online reporting to the City

In the event of a temporary outage of the WMIS or if the information requested by the City cannot be made available through the WMIS for any reason, the Consortium will respond to any reasonable data request from the City in writing within 10 Business Days of receiving the request.

1 MONITORING, RECORDING and REPORTING DATA

The Consortium already operates similar facilities under PPP scheme that require the same level of contract monitoring reporting and audit and is able to demonstrate a comprehensive track-record.

1.4 Reports

The Consortium will provide all reports required under the PPP Contract pursuant to Schedule 2 – “Output Specifications” such as *inter alia*:

- Waste delivery, treatment, recycling, storage and landfill records;
- Waste rejections and associated reasons;
- Information on remaining landfill space on newly built landfills cells and at the Site as a whole;
- Performance monitoring data of the Facilities and the Site against the Key Performance Indicators, Key Service Indicators, Guaranteed Performance Levels and the baseline values for groundwater monitoring;
- Details of all Performance Failures and Service Failures;
- Records on details of incidents, accidents, injuries or other dangerous occurrences;
- Record of complaints and grievances and notices received and remedies taken thereupon;

- Record of scheduled and unscheduled outages as well as downtimes of the Facilities, and the nature of any outage and repair activities;
- Major maintenance works, repairs and replacements carried out at the Facilities;
- Record of Changes instructed by the City.

The WMIS will have data base functions to allow the Consortium and the City to generate data reports for freely selectable periods.

Where data relates to figures, daily, monthly and yearly summaries as well as summaries for the selected period of assessment will be generated.

Records of written data will be listed for the selected period or their headings with a link to the listed records for longer texts, reports or documents.

The Consortium will provide monthly records and generate reports to supply information against performance requirements and to issue detailed invoices to the City.

The Consortium will assist the City in its reporting obligations in compliance with the associated requirements described in Schedule 2 (“*Output Specifications*”) and ensure the information it provides is consistent with their requirements and is compatible with reporting information required.

Information required on request can be provided directly or through the Extranet depending on the nature of the request.

The Consortium will install weighbridges at the Facility site entrance to record Waste deliveries.

Each passage of a vehicle with Waste will generate a weighbridge ticket containing all information needed to monitor and report on contract performance

An online access to the weighbridges information will be supplied to the City through the Extranet to transfer the entrance weighbridges’ data.

2.2 Information Supplied during Design Phase, Construction Phase and Commissioning and Testing Phase

The reporting of information to the City during design phase, construction phase and commissioning and testing will be supplied via email pending the installation of the WMIS.

2.2.1 Design Phase Information

The Consortium will supply the following information during design phase:

Type of Documentation	Time of submission to the City
Monthly Project status report:	on or before the tenth of the following month

Final Works Delivery Plans for all Facilities	once completed
Design Data prepared for the purpose of filing an application for the Construction Permit and other related Consents	once completed
Detailed design drawings, calculations, descriptions and other data for each Facility, prepared for the purpose of filing an application for the building Consents	once completed
List of Key-Suppliers and Key Sub-Contractors	once finalised
Site Condition Monitoring Protocol	once finalised

2.2.2 Construction Phase and Commissioning and Testing Information

The Consortium will supply the following information during construction phase and commissioning and testing:

Type of Documentation	Time of submission to the City
Monthly construction progress reports	on or before the tenth of the following month
Updates of Reviewable Design Data for RDDC or RDDE pursuant to the Review Procedures.	once available
Daily construction log	on reasonable time request from The City
Delivery notes on equipment, machinery etc.	on reasonable time request from The City
As-Built Drawings following request of the City	on reasonable time request from The City

2.3 Reporting during Interim Services Period and Services Period

Daily, monthly and yearly reports during the Interim Services Period and the Services Period will be supplied to the City through the WMIS in a form to be agreed.

It is proposed that the reports shall include the following contents:

2.3.1 Daily Reports

Daily reports will be made for each Facility.

See herebelow a draft of the format (headings) to be proposed to the City:

Daily Report

1. RMW and Third Party MW Accepted
2. CDW Accepted and Third Party CDW Accepted
3. Daily tonnages landfilled
4. Other waste types
5. Daily tonnage of materials and products recycled/recovered
6. Maintenance
7. Incidents
8. Miscellaneous
9. Visitor and public

2.3.2 Monthly Payment Report

The Monthly Payment Report will set out the calculation of the Services Payment in accordance with Schedule [4] ("*Payment Mechanism*") of the PPP Contract

An example of the format (headings) to be proposed to The City:

Monthly Payment Report

1. Charges

- 1.1 Annual Fixed Fee
- 1.2 Charge for Treatment of RMW Processed
- 1.3 Charge for landfilling RMW Landfilled Unprocessed
- 1.4 Charge for Treatment of CDW Processed and Non-Inert CDW
- 1.5 Charge for landfilling of CDW Landfilled Unprocessed
- 1.6 Third Party Income Adjustment

2. Performance Failures Deductions

- 2.1 BMW Diversion Deduction
- 2.2 Landfill Diversion Deduction
- 2.3 CDW Recovery Deduction
- 2.4 MW Recycling/Recovery Deduction

3. Services Failures Deductions

4. Contract Waste Refusal Deductions

5. Waste Treatment Charges Escrow Account Credit Balance

6. Reconciliation Items from last Payment Period of the Reconciliation Period

2.3.3 Monthly Services Report

The Monthly Services Report will set out all information required to verify the performance of the O&M Contractor against the requirements to accept Waste, the Key Performance Indicators and the Key Service Indicators defined in the Output Specifications, and the Interim Services Payment and the Services Payment (as applicable) in respect of a given Payment Period.

The Monthly Services Report will include the proposed contents described in Schedule 2 – Output Specifications.

An example of the format (headings) to be proposed to The City:

Monthly Services Report

1. Actions from previous Monthly Services Report
2. Daily Reports monthly summary
3. EfW Plant processed MW average monthly calorific value
4. Contract Waste reception
5. Key Performance Indicators
 - 5.1 Landfill diversion
 - 5.2 CDW recycling
 - 5.3 MW recycling / recovery
6. Key Service Indicators
7. Other performance indication
 - 7.1 Electricity selling
 - 7.2 Heat selling
 - 7.3 Landfill Gas collection
 - 7.4 Leachate treatment
8. Consents

2.3.4 Annual Services Report

The Annual Services Report will be submitted to the City, within thirty 30 Days of the end of each Reconciliation Period.

The Monthly Services Report will include the proposed contents described in Schedule 2 – Output Specifications.

An example of the format (headings) to be proposed to The City:

Annual Services Report

1. Monthly Services Report annual summary
2. Annual R1 calculation
3. Landfill Void Space
 - 3.1 New Landfill RMW
 - 3.2 New Landfill Inert
 - 3.3 New Landfill Residues
 - 3.4 Drawings
6. Updated Final Disposal Plan

2.3.5 Other data

The Consortium will comply with all reasonable written requests made by the City for any additional information such as:

- Clarification of the contents of the Daily Reports, the Monthly Payment and Service Reports and the Annual Services Report;
- Assisting the City in the drafting of its annual waste management report, annual performance assessment and updating its waste management plan.

In the event this information above is not available through the WMIS, the Consortium will make available to the City any other reasonable data requested in writing by the City.

The Consortium will update from to time the complete records/documentation/manuals of all Facilities, equipment, staff and Off-Take Agreements in the WMIS, with access to the City for the following documentation as set out in Schedule 2 (“*Output Specifications*”):

- Modifications, repairs and replacements upon completion of the Works;
- Assets and equipment data base update;
- Staff movements/turn-over;
- Updated Landfill Map.

As soon as they become available, the Consortium will provide the City:

- Quitus from the tax department;
- Quitus from the insurance company;
- As the case maybe, the Consortium’s registration required under the Legislation.

CITY OF BELGRADE
CITY ADMINISTRATION – SECRETARIAT FOR ENVIRONMENTAL PROTECTION

SERVICES DELIVERY PLAN 1 TO 5

Table of Content for the specific Services Delivery Plan (common to SDP 1 to SDP 5)

Reference No. of the corresponding Works Delivery Plan	WDP 1 to WDP 5
Reference No. of the corresponding Services Delivery Plan	SDP 1 to SDP5
Facility No. Name of the Facility	

Table of content for the specific Services Delivery Plan

(valid to all SDP)

1. Operating Parameters
2. Emission Monitoring
3. Quality Monitoring of recyclable / recoverable products / residues / energy

Facility Monitoring Protocol

Form T.3.7

3.11 FACILITY MONITORING PROTOCOL

The Bidder must submit an outline of the Facility Monitoring Protocol for monitoring the Guaranteed Performance Levels and other monitoring parameters for each of the proposed Facilities in compliance with the requirements of Part [5] - Part B (Requirements for the Facility Monitoring Protocol) of Schedule [2] (Output Specifications) using Form T.3.7.

1 OVERVIEW

The O&M Contractor will monitor the performance of the Site activities through the Facility Monitoring Protocol in accordance with Part 5 – Part B (*Requirements for the Facility Monitoring Protocol*) of Schedule 2 (*Output Specifications*) for:

- Main Facility and related treatment of Treatment Residues;
- CDW Treatment Facility;
- New Landfill for RMW Landfilled Unprocessed;
- New Landfill for Landfilled MW Process Residues;
- New Landfill for Inert Waste;
- Leachate Treatment Facility;
- LFG Facility.

The O&M Contractor will prepare the Facility Monitoring Protocol, using Suez monitoring know-how to prepare and carry out regular monitoring to the Facilities by implementing through:

- Defining responsibilities: a management team that will set targets to continuously assess and improve the operations as well as allow for an overview of the overall performance of the Facilities;
- Developing and Implementing monitoring programmes in accordance with the Contract and legislation requirements;
- Identifying and reporting failures;
- Self-monitoring the performance of the operation against the Contract requirements as well as high operating standards of Suez.

Monitoring will be carried out through:

- The QHSE management system;
- Maintenance regime.

2 MONITORING

2.1 QHSE Management System

The EfW Plant Manager and the Landfill Manager will have the responsibility of monitoring the Services they cover.

The Quality Health & Safety and Environmental (QHSE) Manager with the H&S Officers and the Environment Engineer will have the responsibility of monitoring the Facilities' QHSE performance such as:

- Noise levels;
- Air emissions levels;
- Health and Safety incidents;
- Fire and Emergency management.

The QHSE Manager and the EfW Plant Manager with the Landfill Manager will then report on the overall performances of the Facilities to the Contract Director, who will set the performing targets and ensure the facility is compliant and operates in an integrated manner.

These targets will be based on:

- Those set by the Contract and Legislation
- Those discussed and agreed with the City to improve the services.

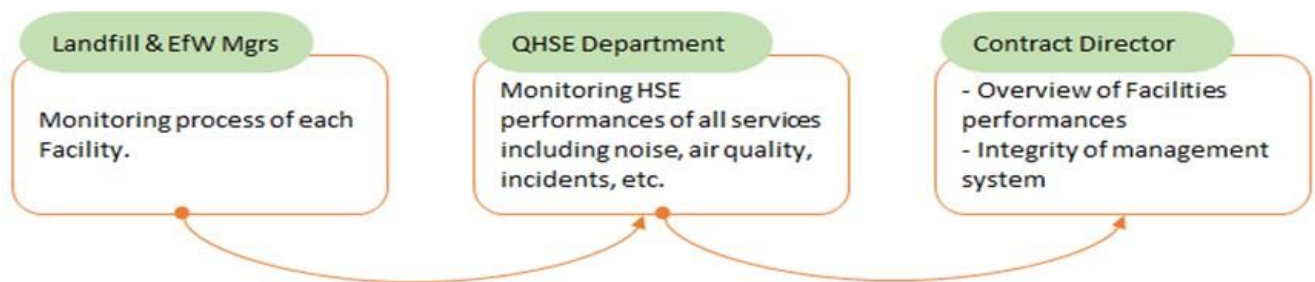


Figure 1 Monitoring responsibilities

The QHSE department will pilot the management system accredited to ISO 9001 for quality management systems and ISO 14001 for environment management systems and OHSAS 18001 accreditation for its health and safety management.

Internal audits will be conducted at planned intervals to determine whether or not the management system:

- conforms to the planned arrangements for health and safety, environmental and quality management within the Contract including the requirements of the international standards;
- has been properly/effectively implemented and maintained;
- is effective in meeting the Site policies and objectives;
- review the results of previous audits; and
- provides information on audit results to management.

The audit timetable will be planned each year to take into account the potential environmental impacts of the operations and the results of the previous audits and risk assessments. Also, to ensure that results are not affected by pre-knowledge of an audit, audit timetables will not be made available. As such, the frequency of audits will vary during the Contract Period.

An audit procedure will be produced that will define who is responsible for planning and conducting audits, for reporting results and for retaining associated records.

The O&M Contractor is committed to monitoring the Service; analysing the data to look for ways to improve performance, efficiency. The O&M Contractor will establish a regime of routine and ad-hoc inspections to ensure compliance with:

- the requirements of the contract, including the performance standards;
- all relevant legislation and regulations; and
- the Site policies and procedures.

Monitoring will be carried out through:

- appropriately qualified and experienced staff (e.g. using daily or weekly inspection sheets); or
- automated systems which are readily verifiable and auditable.

2.2 Maintenance

In order to maintain the performance levels, the O&M Contractor will maintain, update and implement a programmed maintenance for all key facilities and equipment commensurate with their age and in accordance with the manufacturer's instructions and ensure that all such items used for the performance of the Service are in an efficient, clean and serviceable condition.

Maintenance of the equipment will allow the Facilities to maintain:

- The guaranteed operating parameters
- The guaranteed emission parameters
- The Quality parameters for recyclable / recoverable materials from MW and CDW
- Other parameters

Reference No. of the corresponding Works Delivery Plan	WDP 1
Reference No. of the corresponding Services Delivery Plan	SDP 1
Facility No.	1.2
Name of the Facility	Energy from Waste Plant

Facility Monitoring Protocol

3 MAIN FACILITY: Energy from Waste

3.1 EfW Process

The EfW Maintenance Manager supported by the Maintenance Supervisor and the maintenance team will be responsible for managing and monitoring the plant and equipment during the day to day operation of the EfW Facility. Key staff at the EfW Plant will be employed before completion of the construction of the facilities and the operational and maintenance personnel will be provided with all necessary training, including training from the EPC contractor to familiarise with the process equipment and to ensure the safe and efficient operation and continued maintenance of the EfW Facility. This training will be in accordance with the information and procedures contained in the plant operation and maintenance manuals, and will be supported where appropriate by relevant specialist sub-contractors and specialists.

The EfW Facility will be equipped with a computerized maintenance management system (CMMS) to assist the maintenance team in planning, scheduling the maintenance schedules and recording any maintenance work, including past maintenance issues such as preventative maintenance discoveries, routine test failures, equipment histories and maintenance costs. Routine maintenance will be executed via a system of 'work orders' based on priorities established by the Maintenance Team.

The CMMS will allow to make key maintenance items such as the preventative maintenance schedule, the inventory of spares list, work order raising, repairs history, details of purchase orders and provision of data reports

Operational monitoring supported by programmed maintenance schedules across the Main Facility will reduce the likelihood of unplanned unavailability of the EfW Plant. This will maximize the availability of the EfW Plant to divert Contract Waste from landfill and meet diversion targets. Operational monitoring and programmed maintenance of equipment, especially the turbine, at the EfW Facility, will

ensure maximum benefits are realized from the generation and subsequent sale of electricity to generate income.

The O&M Contractor will regularly carry out inspections and preventative maintenance of building and process equipment as part of programmed maintenance to maintain, update and implement all key plant and equipment.

Planned outages of the EfW Plant will be organized at regular intervals. Outages will be prepared prior to each contract year and will include recurrent tasks as well as specific interventions (on equipment prior to its possible failure) ensuing from the preventative/predictive maintenance management system. Scheduled outages are critical to the success of any operation. They ensure that unscheduled events and the inefficiencies created by them are minimized. They also assist in maintaining a high availability of plant and high performance. Major outage scheduling is primarily concerned with boiler or turbine generator downtime and is driven by three factors:

- manufacturers' recommendations and warranty requirements;
- unit performance regarding safety, environmental compliance and total throughput; and
- operating experience.

The turbine generator will typically undergo a major maintenance program, lasting 30 days, every 7 years, with an intermediary maintenance program, lasting 10 days, every 3 years. During the turbine maintenance periods, it will still be possible to treat Contract Waste, with the turbine placed into by-pass operation.

Equipment	Typical Minor Yearly Overhaul (7 days)	Typical Major Yearly Overhaul (14 days)
Grate	Planned maintenance. Cleaning, inspection and replacement of damaged areas. Cleaning under the grate	Routine overhaul of mechanism. Expected 10% replacement at times.
Waste Handling	Thorough inspection.	Statutory inspection.
Furnace	Inspection of tiled refractory. Cleaning of slag, temporary repair damaged areas.	Refractory repairs. Expected 20% replacement at times.
Boiler	Cleaning of convection pass.	Statutory inspection. Cleaning and tube thickness survey. Possible replacement of radiant and convection tubes.
Flue Gas Treatment	Cleaning of reactor. Inspection of fabric filter. Check lime and carbon delivery.	Overhaul of major mechanical equipment. Cleaning and calibration.
Residues Handling	Thorough inspection.	Statutory inspection. Replacement of conveyor wear parts and chains.
Steam, Feed and Condensate	Inspection and calibration.	Statutory inspection. Cleaning of condenser.
Turbine / Generator	Inspection of hydraulics.	Minor or major overhaul. Insurance inspection.
HV / LV Electrical	Inspection.	Testing as required.
Emissions Monitoring	Cleaning and calibration.	Major cleaning and calibration.

Figure 1 Planned outage maintenance items

All equipment that is used for weighing and measuring will be subject to a regular calibration programme. At the Main Facility this includes the weighbridges at the site entrance, and the continuous emission monitoring system (CEMS) and equipment.

Weighbridges will be calibrated, tested and independently certified.

The Continuous Emission Monitoring System (CEMS) monitors the flue gas properties and composition in the flue gas duct after the last flue gas cleaning stage, i.e. immediately upstream of the stack.

The main system components include:

- instruments for temperature, pressure and flow rate measurement;
- measurement instrument for particulate matter;
- extractive gas concentration measurement system for determination of gaseous flue gas components (H₂O, O₂, CO, HCl, SO₂, NO_x); and
- a computer-based data acquisition system.

The instruments are installed directly on the flue gas duct. For the gas concentration measurement, a small flue gas stream is extracted through a heated extraction line and conveyed to the measurement system installed in a separate emission measurement enclosure.

The O&M contractor will formally calibrate the CEMS through an approved contractor, usually with the equipment supplier or an approved / accredited body, as part of the maintenance carried out during scheduled outages.

The emission measurement system is designed to meet the particular requirements of the operating permit for the plant.

The operational performance testing regime will also help in identifying the plant-critical instrumentation that will require periodic (usually on an annual basis) re-calibration when detected; these are usually associated with safety and plant critical functions of the boiler and steam/condensate systems.

Critical spares for the EfW Facility will be kept on site (e.g. mechanical parts of the grate, spare electronic instrumentation for control systems, equipment for combustion and induced draught fans, critical valves, parts for flue gas abatement and emission monitoring equipment, spares for the turbine/generator system, etc.). The site-based maintenance team will be trained to replace these critical parts or assess and identify any failure to enable the correct sourcing of the repair.

3.2 Bottom Ash Plant

The Bottom Ash Plant will be maintained by the O&M Contractor to maintain its performance level. Each item of equipment will have a daily check, prior to start up, and also a weekly check which is a more thorough inspection of all equipment.

Typical checks are:

- Loading Shovels: tyres, oil levels, fuel levels, lights, greasing, operating conditions, all safety equipment (flashing lights, reversing siren etc.);

- Excavators: oil levels, fuel levels, lights, greasing, operating conditions, all safety equipment (flashing lights);
- Process Plant: belts, bearings, motors, visual inspection of all equipment for cracks etc.

These checks will be recorded. The O&M Contractor will also maintain the correct settings of equipment to ensure that the screens are not damaged and thereby maintain continuity of the processing equipment performance.

Sample of IBA will be regularly analyzed at the Site laboratory completed by external analysis.

Spares will be kept on site.

3.3 APCR Stabilization

The APCR Stabilization Plant will be maintained by the O&M Contractor to maintain its performance level. Each item of equipment will have a daily check, prior to start up, and also a weekly check which is a more thorough inspection of all equipment.

Typical checks are:

- Process Plant: bearings, motors, mixer, visual inspection of all equipment for cracks etc.

These checks will be recorded.

The mixer will be cleaned at the end of each day of operations to ensure stabilized APCR material will not set up in the mixer and block it. In addition, spares will be kept on site.

Sample of APCR and stabilized APCR will be regularly analyzed at the Site laboratory completed by external analysis.

Reference No. of the corresponding Works Delivery Plan	WDP 2
Reference No. of the corresponding Services Delivery Plan	SDP 2
Facility No.	2
Name of the Facility	CDW Treatment and Storage Facility

Facility Monitoring Protocol

4 CDW Treatment Facility

The CDW Treatment Facility will be maintained by the O&M Contractor to maintain its performance level. Each item of equipment will have a daily check, prior to start up, and also a weekly check which is a more thorough inspection of all equipment.

Typical checks are:

- Loading Shovels: tyres, oil levels, fuel levels, lights, greasing, operating conditions, all safety equipment (flashing lights, reversing siren etc.)
- Excavators: oil levels, fuel levels, lights, greasing, operating conditions, all safety equipment (flashing lights)
- Process Plant: belts, bearings, motors, visual inspection of all equipment for cracks etc.

These checks will be recorded. The O&M Contractor will also maintain the correct settings of equipment to ensure that the screens are not damaged and thereby maintain continuity of the processing equipment performance.

Weighbridges will be calibrated, tested and independently certified.

Noise and dust surveys will be carried out to ensure noise levels and dust emissions are below the accepted thresholds.

Reference No. of the corresponding Works Delivery Plan	WDP 3
Reference No. of the corresponding Services Delivery Plan	SDP 3
Facility No.	3.1 / 3.2 / 3.3
Name of the Facility	New Landfills

Facility Monitoring Protocol

5 New Landfills

The New Landfills will be monitored by the O&M Contractor to maintain its performance level on:

- Weather: daily monitoring to anticipate potential hazards from sandstorms, rainfall etc.
- Dust control: a daily monitoring and water spraying of the access roads;
- Birds, pest, vermin and insects: daily inspections (though none are expected as the Waste to be landfilled are inert);
- Odours: daily inspections though no issue is expected as the landfilled waste is odourless;
- Leachate pond levels: daily inspections to check no overflow and that the pump is working correctly;
- Run off water ponds levels: daily inspections to check no overflow and that the pump is working correctly;
- Leachate and run off waters quality: when possible, and no more than on a quarterly basis, analyses on the leachate to check quality. These tests will allow for operations adjustments if needed;
- Boreholes : control of level of underground water and quality of underground water;
- Leachate wells in RMW Landfill : control of level of leachate.

Noise and dust surveys will be carried out to ensure noise levels and dust emissions are below the accepted thresholds.

Mobile plants used for landfill operations will have a daily check prior usage.

The O&M Contractor will do site rounds at a frequency to be determined and clean litter at the boundaries of the Site within a distance to be agreed with the City

Reference No. of the corresponding Works Delivery Plan	WDP 4
Reference No. of the corresponding Services Delivery Plan	SDP 4
Facility No.	4
Name of the Facility	Leachate Treatment Facility

Facility Monitoring Protocol

6 Leachate Treatment Facility

The monitoring regime of the Leachate Treatment Facility will be carried out by the Leachate Plant Technician based on the manufacturer recommendation once the plant is operational. Typical maintenance will be carried out on the following equipment:

- Evaporator;
- Reverse Osmosis;
- Biogas boiler;
- Membrane.

Example of some monitoring are described in **Table 5**.

item	monitoring	action	Periodicity
Chemicals	Membrane Cleaning	Membrane cleaning (8 hours on each Reverse Osmosis)	monthly
	Chemicals stock levels	Order chemicals	when necessary
	Injection pumps / automation	Control check	monthly
	pH meter probe	Cleaning	weekly
		Replacement	yearly
	Conductimeter probes	Cleaning	weekly

		Replacement	yearly
Filters	Pressure	Change in pressure	daily
	Cartridges	Replacement	when necessary
Acidification	pH (corrosion, clogging, lack of nitrogen treatment)	Adjust pH	when necessary
Reverse Osmosis	Operational parameters	Flow stage	daily
		Pressure drop	daily
		High pressure pump	daily
	Permeate and brine parameters	Condensate quality (pH, temperature, conductivity)	every 2 days
		Brine quality (pH, temperature, conductivity)	every 2 days
		Recovery rate of the RO	every 2 days
	Membrane clogging monitoring		

Table 5 Examples of some the Leachate Plant monitoring and frequencies

Analysis will be carried out on site for reverse osmosis condensate and reverse osmosis brine conducted on pH, Conductivity, temperature, N-NH₄, N-total, etc.

The O&M Contractor will install a central monitoring station of the entire system in operation on site. This remote management will allow:

- A viewing the status of the installation remotely;
- A flight distance of the installation and restart if possible;
- A centralization of operational information and history charts;
- Adapted to each recipient Reporting.

Storage of spare parts will be carried out in a building on site. The building will be kept at temperature of at least 15 ° C in order to ensure the immediate availability of the parts on the occasion of each intervention. This building contain all the spare parts recommended by the manufacturer. Once the stock of spare parts is used, SUEZ will ensure its renewal.

Non conformities found during controls will be recorded to decide an appropriate corrective action

The procurement department will have the responsibility to source suppliers and make orders for the supply the reagents for:

- Acid pre-treatment;
- Cleaning products for reverse osmosis;
- Cleaning of the evaporator.

Noise surveys will be carried out at a frequency to be defined.

Minor preventive maintenance operations include all operations of maintenance of first levels whose frequency of achievement is less than or equal to 1 year and that requires a level of technical standard.

The curative maintenance operations include all urgent and unscheduled maintenance operations after an event on the installation. The O&M Contractor will make curative maintenance operations and will adapt the plan of preventive maintenance according to the operations carried out.

Reference No. of the corresponding Works Delivery Plan	WDP 5
Reference No. of the corresponding Services Delivery Plan	SDP 5
Facility No.	5
Name of the Facility	Landfill Gas Facility

Facility Monitoring Protocol

7 Landfill Gas Facility

The Biogas Treatment Plant will work on an automated mode under the same principle as the Leachate Treatment Plant. The Biogas Technician will carry out daily supervision of the plant in order to adjust if needed the plant parameters depending on the biogas quality.

In case of shut down or detected issues of the genset, the supplier on-call staff will come to restart the engines or to fix the problems.

Maintenance from oil change to major overhaul will be performed by the supplier.

Once a year, the technical team will review collected data, procedures, process data with local team to ensure the process performances are optimized (quality, flows).

The biogas network service consists in biogas network monitoring/tuning and a follow up of the biogas network integrity.

The Biogas network monitoring consists in a follow-up one time a week of biogas quality at the biogas consumers (biogas boiler, biogas flares, gen sets). Operators will monitor the:

- biogas quality (CH₄; O₂; H₂S; H₂) with a 4 gases analyser and vacuum at the consumers;
- The biogas flows at each consumer.

In case of drift of parameters with the standards, operators will check and set biogas wells to return to standards.

Monitoring and setting of biogas quality at each well one time a month in there is no biogas quality drift. Otherwise:

- Monitoring and setting at each well : vacuum and biogas quality;

- Depending of biogas quality, vacuum and flow, the operator will set the pressure drop of each well valve to increase or decrease biogas flow of each well. This operation will be done with the four gases analyzer;
- Once all the wells are set, the operator will monitor biogas quality, vacuum and flow at each consumer;
- For all the wells, this task will last about 60 hours;
- When the wells setting are finished, operators have to check if the settings done well/well allow meeting the standards at the consumers.



During the monitoring and setting of the biogas network phase, the operators will check the biogas network shape and notice all damages. All damages noticed will be fixed before the next monitoring and setting phase.

Regular controls of the biogas network will allow to adjust the biogas production and maintain as much as possible a constant biogas quality for a better efficiency of the Biogas Treatment Facility.

Maintenance routines are carried out on a daily / monthly / annual regime according to manufacturer maintenance programme and spare parts are kept at the maintenance workshop to minimize shutdown.

**CITY OF BELGRADE
CITY ADMINISTRATION – SECRETARIAT FOR ENVIRONMENTAL PROTECTION**

**SERVICES DELIVERY PLAN 6
SITE MONITORING AND AFTERCARE (CONDITION MONITORING PROTOCOL)**

Site Condition Monitoring Protocol

Form T.3.8

3.12 SITE CONDITION MONITORING PROTOCOL

In the SDP 6, the Bidder must submit an outline of the Site Condition Monitoring Protocol the Bidders proposes to implement, reflecting its technical proposal, in compliance with Part [6] (Requirements of Site Condition Monitoring Protocol) of Schedule [2] (Output Specifications) using Form T.3.8.

Reference No. of the corresponding Works Delivery Plan	WDP 6
Reference No. of the corresponding Services Delivery Plan	SDP 6
Facility No.	
Name of the Facility	

Site Condition Monitoring Protocol

1 OVERVIEW

The O&M Contractor will develop a Site Condition Monitoring Protocol in accordance with Part 6 of Schedule 2 (*Output Specifications*) covering all Facilities and the Existing Landfill.

The O&M Contractor will use Suez experience in similar projects to prepare a comprehensive Site Condition Monitoring Plan. It will be the responsibility of the Environment Engineer and the QHSE department to ensure monitoring is carried out efficiently, with the help of the Site Operations, equipped with a laboratory to carry out basics analysis and external third party laboratories.

1.1 Monitoring Parameters

The proposed Site Condition Monitoring Plan will be structured around the following parameters:

- Surface water and Groundwater quality;

- Leachate generated (quantity and composition) for all Facilities (including the Existing Landfill);
- Permeability characteristics of the capping systems of Existing and New Landfills to restrict surface water infiltration and landfill gas emission;
- Entire system integrity;
- Stability of the main slope of the Existing Landfill body in direction of the Danube River to be closely monitor / possible movements of the slope, especially at the bottom of the embankment and at stabilization Dam.

1.2 Schedule of Implementation

Within 2 months of Contract Date the O&M Contractor will develop and implement a Site Condition Monitoring Protocol which will be submitted to the Contractor and the City for the period until the Interim Services Commencement Date, in accordance with Services Delivery Plan SDP6 describing:

- Number, location, characteristics of the monitoring points;
- List of parameters to be sampled;
- Frequency of monitoring;
- Methodology for the sampling and analysis;
- Quality control / quality assurance procedures.

One month before the Scheduled Interim Services Commencement Date, a detailed and updated Site Condition Monitoring Protocol will be developed within Services Delivery Plan SDP 6 and in accordance with Part 2 of Schedule 2 (*Output Specifications*) to address the monitoring protocol starting from Interim Services Commencement Date, describing:

- Number, location, characteristics of the monitoring points;
- List of parameters to be sampled;
- Frequency of monitoring;
- Methodology for the sampling and analysis;
- Quality control / quality assurance procedures;
- Recordings of monitoring results in the WMIS.

1.3 Protocol Contents

The Site Condition Monitoring Protocol will contain as a minimum a description (method and frequency) of the:

- Methodology and frequency regime to analyse the quantity and composition of the leachate from the Existing Landfill;
- Methodology and frequency regime to analyse groundwater monitoring points according to Part 6 of Schedule 2 (*Output Specifications*);
- Methodology and frequency regime for monitoring parameters including parameters required by Laws, relevant Consents, parameters and pollutants relevant for monitoring the quality of leachate and a range of heavy metals, BTEX and other VOCs, PAHs, other SVOCs, pesticides and herbicides and hydrocarbon fractioning in aromatic and aliphatic fractions;
- Description activities and methods used for analysing parameters when Monitoring frequencies and parameters and pollutants relevant for monitoring the quality of leachate;
- Methodology and frequency to monitor stability of Existing Landfill and New Landfills;

- Methodology to monitor the berms and the stabilisation Dam;
- Methodology and frequency to monitor landfills' capping;
- Methodology and frequency to monitor drainages for surface water;
- Methodology and frequency to monitor natural springs found on site.

1.4 Analysis

Analysis will be performed on run-off surface water and ground water to control chemical, minerals, metal physico-chemical composition. Control will be carried out according to the thresholds set by Applicable Law allowing release to natural environment.

Internal tests will be performed on a regular basis and by external official laboratory in order to record variations and provide alerts in case of abnormal results.

Regular schedule of analysis is planned as follows:

- Boreholes: 4 time/year for each borehole, by independent licensed laboratory;
- Surface water: 12 times/year in each relevant pond (mix of independent licensed laboratory and internal means).

The external laboratories will perform activities required for analysing the parameters and for inspecting the technical facilities; the O&M Contractor will inform the City of the identity of such laboratory.

The tests results of the analyses will be assessed on a regular basis and permanent measuring instrumentation will be re-calibrated regularly.

1.5 Reporting to the City

Monitoring surveys results will be shared with the City on a quarterly basis.

Baseline report presenting the Site's baseline conditions will be prepared and submitted to the City's Representative for review on or prior the Effective Date (intermediate report) and on or prior the Interim Service Commencement Date (final baseline report).

From Interim Services Commencement Date, the results of the Site Condition Monitoring analyses will be recorded in the WMIS.

2 MONITORING PROGRAM

2.1 Groundwater

Since the groundwater management system is largely inaccessible once installed, it is critical that it be designed and adequately installed from the very beginning.

From the Contract Date, the O&M Contractor will take over and use the existing groundwater management system, and will add new boreholes to comply with the needs: 2 upstream, 2 between the Existing landfill and the new landfills, and 2 downstream according to **Table 2.1**.

Location of the monitoring well	Number (as a minimum)	Periodicity
Downstream of the Existing Landfill	2	3 months
Upstream of the Existing Landfill	2	3 months
Upstream of the complete landfill area on the Site	2	3 months

Table 2.1 New boreholes monitoring

Analysis will be done on regular basis to assess the impact of the operations on the underground water, prior to release to natural environment.

Regular monitoring of the groundwater management system will give quantitative and qualitative records of its efficiency and effectiveness.

To monitor the interface of the bottom of the cells of the new Landfills with underground water, in particular in the areas where excavation is needed, underground water collection system will be installed for drainage purpose under the 50cm clay-like material layer.

2.2 Leachate

From the Interim Services Commencement Date and in compliance with relevant Consents, the O&M Contractor will monitor the collection and treatment of leachate collected from the New Landfills and from the Existing Landfill on a quarterly basis:

- Quantity of leachate collected and directed to the Leachate Treatment Facilities;
- Origin of the leachate (to the extent possible).

The O&M Contractor will monitor:

- the composition of the leachate and the changes in its composition when compared to earlier analysis
- the quality of the discharged treated effluent water after the Leachate Treatment Facilities, in accordance with the standards of the applicable Consents.

The results of the leachate monitoring will be evaluated regularly and in the event of increased quantity and concentrations of pollutants in the leachate, the O&M Contractor will conduct further investigations, informing the City with special note in the event of a case of severe changes (50% increase or more) and carry out analysis to implement the relevant mitigation measures.

2.3 Existing Landfill stability & Dam

On a quarterly basis during the first two years of operations after the Interim Services Commencement Date and annually thereafter, the O&M Contractor will monitor potential movements of the Existing Landfill body and the Dam.

The Site Condition Monitoring Protocol will include:

- Planned monitoring measures and techniques;

- Planned monitoring frequency;
- Monitored indicators.

2.4 New Landfills stability

The O&M Contractor will monitor the stability of the New Landfills.

Topographical survey will have the following purposes:

- To control the variation of the excavation / backfilling at various stage of construction, to assess capacity of void spaces;
- To control the variation of waste filling in the new landfills, crosschecked with weighbridges quantities, and to calculate achievements in term of wastes density.
- To control the levelling and reshaping of the Existing landfill, and the level of the final cover for Existing and new Landfill
- To control stability of the waste mass and dykes during the operation period and aftercare of the Existing landfill

Topographical surveys will be performed with a drone at least once a month and by an independent licensed land surveyor at least once a year.

At sensitive points, specific visual control points will be installed to check on a daily basis potential landslide / mass waste movement.

2.5 Surface water

Surface water management is critical in the prevention of flooding, erosion and landslide as well as to the reduction of leachate. The system proposed for Vinca Landfills has been designed in accordance with the Specifications to provide effective control of the heavy rainfall experienced. It will be operated and maintained to ensure that the design criteria are met.

Routine inspection of the surface water management system will highlight areas of concern and reveal failures in the system. If deficiencies are identified, remedial works will be immediately implemented. Regular works will include the emptying of sand traps, the clearance of blockages in channels and cascades and the removal of windblown debris. Site personnel will be briefed to ensure that they have a full understanding of the effects of poor maintenance and failure to report defects in the surface water management system.

Before the liner is laid on the slopes of the Landfill, ditches on the berms will intercept surface runoff and direct it away from the placed Waste. The surface water on the lined slopes will be controlled by a system of sandbagged dikes formed on the berms. These dikes will direct the water away from the filling cell and into the surface water collection system. This process is an important element of the routine operation of the Site. Surface water management will always form a critical part of the layout of daily cells.

Regular monitoring of surface water quality will provide warning of developing problems so that they can be mitigated quickly in line with SUEZ commitment to high standards of environmental protection. The O&M Contractor will also monitor, maintain and control the vegetation growing on the landfill capping to ensure that no deep rooting plants can develop on the capping causing integrity damages to the capping system.

The O&M Contractor will conduct monthly inspections of all drainage channels and pipes for draining surface water and spring water outside and around the landfill area. Any detected malfunctions or damages will be immediately repaired and any blockage or clogging removed.

The design is made to serve suitable monitoring programme. Dedicated ponds will allow segregation of origins of run off-surface water: platforms and roads, landfill covers Existing and New Landfills. Controls of water quality will be done in the ponds on regular basis, to ensure conformity to the norms of releases outside the site. External run off water will be released directly.