APPENDIX

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PRELIMINARY ENGINEERING AND DRAINAGE REPORT

PRELIMINARY ENGINEERING REPORT
For
CENTRAL MAUI LANDFILL FACILITIES PROJECT

Prepared for
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This document has been prepared by me or under my supervision.

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1.0 INTRODUCTION

The County of Maui (County) owns and operates the Central Maui Landfill (CML) located at 1 Pulehu Rd, Puunene. See Figure 1. CML is the primary solid waste disposal facility on the island of Maui.

The County proposes to expand the existing Central Maui Landfill (CML) in 2020 to provide additional and improved municipal solid waste disposal and landfill diversion facilities for the residents of Maui. This project is titled the "CML Facilities Project" (Project).

The County has acquired approximately 40.8 acres of former sugar cane farmland located on the north side of Pulehu Road and northwest of the existing CML site to accommodate the Project. Figure 1 illustrates the CML landfill property and the 40.8 acre Project property.

The Project includes the following proposed facilities and related activities:

- refuse collection office, truck parking, and maintenance area;
- storage area for abandoned vehicles prior to final disposition through sale or scrap metal recycling;
- metals processing area (management of scrap vehicles, white goods, batteries, tires, freon, and used motor oil);
- household hazardous waste and electronic waste collection and storage area;
- construction and demolition material recovery area;
- warehouse and storage area;
- office;
- internal access roads; and
- dedicated parking areas.

This report will outline the various development requirements for the facilities and associated structures.

2.0 PROJECT DESCRIPTION

The Project includes the proposed development of 40.8 acres of farmland northwest of the existing CML site and north of Pulehu Road. As illustrated in Figure 2A, the property is proposed to be graded to accommodate structures, work areas, parking areas, access roads, and drainage facilities. Figures 2C and 2D provide cross-sections of the site with existing and the proposed grades to accommodate the facilities and property improvements.

The following describes the facilities and related structures to be located on the Project site:

- *Abandoned Vehicles Area*: approximately 2 acres;
- *Office Structure*: 8,000 square feet (sf) with a parking lot;
- *Construction and Demolition (C&D) Material Recovery Area*: approximately 4 acres, including a 40,000 sf open materials processing area;
- *Metals Processing Area*: approximately 8.2 acres, including a 40,000 sf processing area with canopy cover;
- *Household Hazardous Waste (HHW) and Electronic Waste (E-Waste) Collection and Storage Area*: approximately 2.4 acres, including a 20,000 sf roofed structure;
- *Warehouse and Storage Area*: approximately 1.4 acres, with a 20,000 sf warehouse structure;
- *Refuse Collection Office, Truck Parking, and Maintenance Area*: approximately 3 acres, including a 12,000 sf structure with office and maintenance area, 2 acre refuse collection vehicle parking area, and an adjacent automobile parking lot;
- *Water Tank:* at the highest site location (south corner of expansion parcel);
- *Parking Stalls:* for truck-type vehicles located along the Pulehu Road frontage;
- *Access Roads:* paved internal access roads connecting the Project facilities with site Entrances 1 and 2 off Pulehu Road, and connecting the Project site to the CML ;
- *Stormwater Infiltration Basin* "A" with a net storage capacity (i.e., after deducting a 1 foot freeboard) of approximately 12,000 cubic yards, or about 7.2 acre-foot; and
- *Stormwater Infiltration Basin "B"*: with a net storage capacity (i.e., after deducting a 1 foot freeboard) of nearly 15,000 cy, or about 9.4 acre-foot.

3.0 EXISTING SITE CONDITIONS

The site is bounded by the existing CML landfill to the east/southeast, former sugar cane fields to the west and north, a gulch to the north and Pulehu Road to the south/southwest. The site is former farmland, and is presently vegetated by a variety of plants and grasses typical of fallow farmland in the area. The property is crossed by a number of former cane roads/trails that run in a northerly direction across the property towards Haiku Ditch.

As shown in Figure 3, the ground surface elevations on the property range from approximately 270 feet above mean sea level (MSL) in the south corner of the property, adjacent to Pulehu Road, decreasing to approximately 205 feet to the northwest, and to 196 feet to the north and northeast, with drainage towards the northwest, north and northeast, respectively, mostly by shallow channel flow.

Natural slope gradients are locally no steeper than about 16 percent around the site's highest elevations, gradually decreasing towards the northwest, north and northeast, with corresponding natural drainage flow directions mostly towards Haiku Ditch. The northeast portion of the property is adjacent to the Kalialinui Gulch, a natural drainage feature that in turn drains to the north/northwest.

Running parallel to Pulehu Road and approximately 120 feet to the northeast, there is a 50-foot-wide electrical utility (MECO) line easement. A 15 feet wide water easement line (W-1) crosses the property in a southwest to northeast direction and is located approximately 450 feet west of the parcel boundary with the adjacent CML property.

The site is relatively dry with approximate average yearly rainfall of 20-inches. Prevailing tradewinds are from the northeast and high velocity gusts are not unusual.

Recently, the County utilized portions of the Project site for a temporary facility to manage collection and processing of storm debris which involved improvements consisting of limited grading of the property and siting of a modular office trailer.

4.0 SEISMICITY & GEOLOGY

4.1 Regional Seismicity

The CML Facility and the Project site are located within a "seismic impact zone" on the island of Maui. The United States Geological Survey (USGS) has classified the island of Maui in UBC Seismic Zone 2B, defined as having a ten percent probability of exceeding a peak ground acceleration of 0.15 g (g = force of gravity) in 50 years (USGS, 2004a). USGS earthquake hazard maps (Klein, Frankel, Mueller, Wesson, and Okubo, 2001) estimate the peak horizontal ground acceleration in central Maui to be 0.36 g with a 2% probability of occurrence in 50 years.

4.2 Site Geology

The natural surface at adjacent CML is composed predominantly of Kula volcanic rocks. Quarrying activities at the CML have provided good exposures of the uppermost 40 feet of lithology, where these volcanic rocks have been weathered to reddish colored silty clay. Where undisturbed, this surficial soil horizon ranges in thickness from about 5 to 15 feet. Relatively fresh volcanic rocks of the Kula Series underlie this surficial soil horizon.

Additional geologic characterization of site lithology was obtained from lithologic logs of six CML groundwater monitoring wells: MW-1 through MW-3 drilled in 1995, and MW-4 through MW-6 drilled in 2001, where MW-5 is the closest to the Project site. These wells range in depth from 245 to 327 feet, and are located as shown on Figure 1. The Kula Series volcanic rocks, which can be up to 30 feet thick locally, are in most areas of the site underlain by:

Saprolite: An approximately 5 to 15-foot thick, reddish brown, silty clay weathering horizon which is, in turn, underlain by

Volcanic clinker: A horizon ranging from less than 5 feet to as much as 20 feet thick.

Volcanic tuff: At monitoring wells MW-4 and MW-5 the clinker horizon apparently changes character somewhat, and is characterized as a moderately weathered tuff, ranging in color from gray to dark brown to red brown. Taken as a whole, this saprolite/clinker/tuff horizon appears to be laterally continuous beneath most of CML.

Volcanic Basaltic Rock: Below the saprolite/clinker/tuff horizon, site-monitoring wells encountered basaltic volcanic rocks thought to be the upper portions of the Honomanu volcanic series. These materials, which extend to the maximum depth explored in the boreholes (327 feet below natural grade), are primarily hard basaltic flow rocks, with some laterally discontinuous weathered horizon and clinker zones.

Groundwater Conditions: The regional aquifers underlying the CML are part of the Paia aquifer system, which is in turn part of the larger Central aquifer sector on Maui. No high-level or perched

aquifer has been identified at the CML site during previous investigations. The lack of perched groundwater is indicated by previous site characterization activities at CML, as follows:

- Lithologic logging of borings for site monitoring wells has included descriptions of moisture conditions. No indication of perched groundwater is noted on lithologic logs from any of the site monitoring wells; and,
- Quarrying activities at the site have locally extended completely through the Kula Series Volcanics - the lithologic unit most likely to contain perched groundwater zone - with no evidence of perched groundwater being noted.

The elevation of the basal groundwater zone has typically ranged from +1.5 to +3.5 feet (MSL) in CML monitoring wells (or approximately 220 to 300 feet below ground surface).

5.0 SITE PREPARATION, EARHWORK, AND FOUNDATIONS

5.1 Site Preparation and Earthwork

To develop building pads, work areas, parking lots, internal roads, and drainage features, the site will be re-graded to a slope of 2% to 2.2%.

Except for landscaped areas, perimeter slopes, and the stormwater basins, the graded area will be covered with either concrete, asphalt, or crushed rock to ensure all weather access and all-weather work areas.

The earthwork is balanced with excavation of 198,000 cy (plus approximately 2,000 cy for road base and building foundation excavation) and fill of 200,000 cy.

The building pad that runs parallel to Pulehu Road will range in elevation from approximately 212 to nearly 245 feet. The building pad that is adjacent to the CML property boundary and existing infiltration basin will range in elevation from approximately 229 to 238 feet. Grading plans are illustrated on Figure 2A. Based on proposed grading plans, cuts and fills generally less than 20 feet in depth will be necessary. Deepest cuts will be made just north of the proposed water tank and at the location of proposed Infiltration Basins "A" and "B" (about 15 to 25 and 12 to 15 feet, respectively). Deepest fill areas will generally be along the northern and western edges of the proposed building pads. See Figures 2C and 2D, which illustrate cross-sections of the existing and proposed grades.

Excavation and Subgrade Preparation: Considering that the thickness of the surficial silty clayey soils is roughly on the order of 10 feet (saprolite), some excavation into volcanic rock (tuff, clinker and basalt) using heavy dozers (Caterpillar D10 or heavier), should be expected. While not anticipated localized use of explosives may become necessary if rock formations are encountered that cannot be removed using heavy equipment as the sole means of excavation.

Before the start of cut operations, the construction area should be cleared of organic matter, debris, or other deleterious materials. These materials should be removed from within the limits of the construction area, and should not be incorporated into structural fill. Existing underground utilities that are not abandoned, such as the water easement W-1 (see Figure 2A), should be protected and/or rerouted.

Recommended excavation should extend to a minimum depth of 3 feet below bottom of shallow spread footings or mat foundations and slabs on grade. Near-surface soil removal and re-compaction should also extend laterally a horizontal distance at least equal to the depth of over excavation beyond the perimeter of footings or foundation mats. If soft spots are encountered, deeper excavation may be locally required, as determined by a representative of the Engineer in the field.

All excavations shall comply with the most current Occupational Safety and Health Administration (OSHA) requirements. Temporary excavation in residual surficial soils and highly weathered volcanic bedrock up to 20 feet in height should not be steeper than 1:1 (H:V). Temporary excavations into soils and moderately weathered to fresh volcanic rock should be no

steeper than 1:1 and 0.5:1 (H:V), respectively. Where a shoring system is used, it shall be designed by a licensed professional engineer and installed to sustain all existing and expected loads.

Engineered Fill: Fill materials should be mostly granular, not contain particles greater than 3 inches in maximum dimension in the upper 5 feet, and have less than 50% of material passing standard US sieve No. 200 (minus 74 microns, per American Society for Testing and Materials (ASTM) D422). Liquid limit and plasticity index of fill soils should be less than 40 and 15, respectively (per ASTM D4318).

Select engineered fill, such as backfill to be placed behind footings, retaining walls and within the upper three feet of fill below all slabs-on-grade and pavements, should additionally have an expansion index (per ASTM D4829, or Unified Building Code (UBC) standard method 18-2) no greater than 20.

Use of On-Site Materials: Excavated materials can be reused for the construction of proposed engineered fill pads, provided they meet the above specifications for engineered fill materials. Some processing may be required to reuse some of these materials, such as screening out and breaking down oversize rock materials (maximum particle dimension greater than 3 inch) for use within the upper 5 feet of the structural fill layer. Excavated materials larger than 3 inches in maximum size should be used for structural fills at depths greater than 5 feet in accordance with the project specifications.

Treatment of Expansive Soils: It is anticipated that some of the near-surface silty clayey soils may have potential for expansion upon wetting. Expansive soils will heave and/or shrink upon moisture change cycles (wetting and drying) and may damage slabs on grades, pavements, and lightly-loaded shallow foundations. Alternatively, the use of post-tensioned slabs on grade and other measures would be required to minimize or eliminate the potential damage to structures. Soil characteristics will be further evaluated during the detailed grading and building design phase to ascertain the potential for expansive soil conditions. The findings of this soil testing will be incorporated into the final structural design to minimize expansive soil impacts.

Permanent Cut and Fill Slopes: Proposed permanent cut slopes into native materials, and engineered fill slopes up to 20 feet in height will not be steeper than 2:1 (H:V). Recommendations for other slopes should be considered on a case-by-case basis.

5.2 Foundation Recommendations

Following the recommended site preparation described above, foundations of the proposed structures (office, metals processing, household hazardous waste, warehouse, vehicle maintenance) may be preliminarily designed as discussed below.

Bearing Capacity: The proposed structures may be supported on isolated and continuous shallow spread footings or mat foundations bearing upon engineered fill. An allowable bearing capacity of 2,500 pounds per square foot (psf) may be used for design. This value may be increased by 200 psf for every additional foot of depth to a maximum of 3,000 psf.

For transient load applications, such as wind or seismic loads, allowable foundation bearing pressures may be increased by one-third. Where footings are adjacent to below-grade walls or underground utilities, the footing should extend below a 45-degree plane projected upward from the backside of the wall footing or bottom of the underground utility trench.

Settlements: Shallow foundations designed according to our recommendations are estimated to have total settlements less than ¾ inch, with differential settlements between adjacent columns of less than 1/2 inch. Foundation settlements resulting from building loads are anticipated to occur mostly during and shortly after construction. In addition, seismically-induced settlements are anticipated not to exceed approximately ¼ inch.

Resistance to Lateral Loads:
Lateral loads can be resisted by passive soil pressures and by friction between concrete and foundation soils. Lateral loads can be resisted by an allowable passive soil pressure of 250 pounds per square foot per foot of depth (psf/ft). The upper 1 foot of passive resistance should be neglected unless the soil is confined by pavement or slab. The allowable passive pressure includes a safety factor equal to 1.5 for relatively large deformations. In addition, a friction coefficient between the mass concrete and compacted fill can be used in combination with passive earth pressures to resist lateral loads. Assuming the engineered fill pads are composed of predominantly granular (sandy/gravelly) material, an allowable base coefficient of 0.45 is estimated. The allowable friction coefficient includes a factor of safety of 1.5. The coefficient of friction should be applied to net dead normal loads only.

Slabs on Grade:
Concrete slabs on grade should be underlain by a minimum thickness of 3 feet of select non-expansive granular engineered fill. This mat may be constructed by removing existing clayey near-surface soils and replacing them with granular structural fill, compacted to at least 95 percent relative compaction (per ASTM D1557). For slabs-on-grade in storage areas, and in areas where heavy vehicular traffic or forklift work is anticipated, the upper 24 inches of the 3 feet of prescribed engineered fill will be constructed of clean gravel or crushed rock (containing no more than 3 percent fines). This layer will help distribute the heavy floor loads more evenly to the foundation soils. Elsewhere, slabs on grade will be underlain by 3 feet of engineered fill with the upper layer composed of compacted clean rock or sand, not less than 4 inches in thickness.

Moisture vapor will tend to migrate through floor slabs. To reduce vapor migration in areas where moisture condensation on the floor is undesirable, consideration should be given to placing a plastic membrane of at least 6 mil thickness over the compacted structural fill layer. All plastic membrane joints should have a minimum overlap of 2 feet and joints should be taped. It is also recommended to lay vapor retarder over footings or to seal foundation walls, or both, and seal around penetrations such as utilities and columns in order to create a monolithic membrane between slab and moisture sources below the slab and at the slab perimeter in accordance with ASTM standard practice E1643 ("Installation of Water Vapor Retarders in Contact with Earth or Granular Fill under Concrete Slabs"). The plastic membrane should be covered with a minimum

of 6 inches of gravel as a capillary moisture retarder. This layer may also be considered as a portion of the recommended 24 inches of select non-expansive fill.

Pavements:

Pavement thickness depends on the strength of construction materials as well as on the loading and repetition of truck traffic. It is recommended that subgrade below pavements, within clayey soil areas, be over excavated a minimum of one foot and be replaced by non-expansive granular engineered fill, compacted to 95 percent relative compaction (per ASTM D1557).

Based on the design procedures in the Highway Design Manual, and using an assumed design R-Value of 10 for subgrade soils and 78 for aggregate base course, the following flexible pavement sections are recommended for various traffic indices (TI):

TI = 7.0 (Truck traffic, fire lanes and major traffic areas): 3 inches of asphaltic concrete over 16 inches of crushed aggregate base.

TI = 5.0 (Minimum adopted by most public agencies): 3 inches of asphaltic concrete over 6 inches of crushed aggregate base.

Prior to placement of the one-foot-thick engineered fill, the existing subgrade soils shall be processed (scarified) to a minimum depth of 6 inches, moisture-conditioned as necessary and recompacted to a minimum of 90 percent relative compaction (Modified Proctor, per ASTM D1557).

In fill areas, soil should be compacted to at least 90 percent relative compaction, but the upper 12 inches of fill soils should be compacted to at least 95 percent relative compaction and moisture-conditioned to at least 0 to 3 percent above optimum moisture content (ASTM D1557).

R-Value or California Bearing Ratio (CBR) tests should be performed on actual subgrade materials during construction to verify the selected resistance value used for design. All base materials should meet the applicable gradation and quality requirements of County of Maui Department of Public Works specifications. Field inspections and periodic testing, as needed during preparation of subgrade and placement of base course materials, shall be undertaken to ensure that the requirements of these specifications are fulfilled.

For the delivery pads areas, we recommend 6 inches of Portland Cement Concrete (PCC) over 6 inches of crushed aggregate base. The PCC sections should be provided with appropriate steel reinforcement and crack-control joints.

6.0 SITE DRAINAGE

The proposed grading plan for the Project results in the surface sloping at an average of 2% to 2.2%. Runoff from the Project area is generally of shallow-channel flow type, to be collected in perimeter asphaltic concrete (AC) paved road drainage ditches with adjacent AC berms, and discharged into the two proposed infiltration basins located as shown in Figure 2B.

The Project area next to Pulehu Road (approximately 28 acres) is graded to drain towards the north/northeast to the AC drainage ditch (approximately 12 inches deep) and berm (approximately 8 inches high) adjacent to the internal access road next to the Project property line (See Figure 2B, Detail 2). The AC drainage ditch will collect surface runoff and flow northwest to an open top concrete culvert crossing under the access road and discharge into Infiltration Basin "A". The concrete culvert will have a traffic-rated cattle crossing-style grate, matching the adjacent road grade, which will bridge over the open top culvert. Infiltration Basin "A" will include an emergency spillway (weir type, 400 feet long) along the north side in case design peak flows are exceeded during the life of this structure. A rip-rap revetment will provide erosion control over the outer slope of this emergency spillway, as shown in Detail 1, Figure 2B.

The Project area abutting the northern property line of the CML (approximately 11 acres) is graded to the northeast. Stormwater will sheet flow over the surfaced operational areas to the graded inlet of Infiltration Basin "B" (elevation 226 ft MSL). Drainage features such as curbs and contoured pavement will be added to this area during final design of the roads and paved operational areas to further define stormwater flow to the basin inlet.

Infiltration Basins "A" and "B" have net capacities (after deducting the one-foot freeboard) of approximately 12,000 and 15,000 cubic yards (cy), or about 7.5 and 9.4 acre-foot, respectively. Stormwater collected in the proposed basins will discharge primarily by infiltration through the fractured bedrock in which these basins are constructed.

Infiltration Basin "B" is proposed to be connected to the adjacent existing 11,000 cy CML Phase IV stormwater basin, as shown on Figure 2B. If the design capacity is exceeded in the event of a major storm, overflow of the combined basins will be conveyed into the adjacent Kalialinui Gulch from the existing Phase IV basin spillway.

The drainage features are sized based on the results of a preliminary hydrology study evaluating them in relation to the design storm (50-year, 1-hour design storm event) specified in County of Maui Department of Public Works regulations (Title MC-15, Subtitle 1, Chapter 4 "Rules for the Design of Storm Drainage Facilities in the County of Maui"). A copy of the preliminary hydrology study is located in Attachment 1.

In addition to the Project infiltration basins being sized to hold and infiltrate 100% of the stormwater run-off associated with design storm, the completed Project will incorporate structural and operational Best Management Practices (BMPs) designed to minimize impacts to stormwater quality as a result of the Project activities.

Structural BMPs will include covered or enclosed areas for activities with a high potential to impact stormwater to prevent their exposure to rainfall. The Metals Processing Area, Vehicle Maintenance Area, the HHW Area, and Warehouse are all covered or enclosed areas providing shelter for activities that could otherwise adversely impact stormwater. Storage of vehicle fluids, solvents, fuels, etc. will be within these covered areas when possible; if outdoor storage is necessary, these areas will be equipped with the applicable secondary containment structures to prevent run-off. Additional structural BMPs will include use of diversion berms and swales to direct run-off around and away from steeply sloped areas and areas with activities that could contribute to stormwater degradation.

Operational BMPs include development and effective implementation of operational practices and procedures which will reduce potential for pollutants to impact stormwater. These will include work practices and procedures for each Project activity that limits pollutant exposure to stormwater, good housekeeping practices, and regular inspections/observations to verify the efficacy of the operational practices.

Operational practices and procedures are prescribed methods of executing work to minimize pollutant exposure to stormwater. Examples include a policy that vehicle fluid changes and maintenance activities involving fluids will only be conducted inside the covered maintenance area, or scrap vehicles leaking fluids when delivered to the Metals Processing Area will only be stored under the canopy and not outdoors. In the case of the C&D Material Recovery Area, an example is to minimize storage of fine-grain soils to reduce potential for erosion of stockpiles and high suspended solids in stormwater.

Good housekeeping will include practices and procedures that maintain the Project facilities and areas in a neat and orderly fashion that prevents exposure of pollutants to stormwater. Regular use of a street sweeper on paved areas to minimize build-up of dirt and oils on the road that would otherwise impact stormwater is an example. Regular cleaning and upkeep of the exposed operational areas is another example.

Finally, the implementation of regular inspections and observations of the Project areas to ensure structural BMPs are in good working order, to verify the adequacy of the operational BMPs, and to identify and correct deficiencies before storms will ensure minimal impact to stormwater.

7.0 SITE ACCESS AND INTERNAL TRAFFIC CIRCULATION

Access to the Project site will be provided by two new driveways located on Pulehu Road (Figure 2B). The southernmost driveway (Entrance 2) is the primary entrance/exit and provides full access, while the northernmost driveway (Entrance 1) is secondary and provides for right in/right out only for traffic traveling north on Pulehu Road.

Access to the Project site from the CML will be by connecting the Project internal access roads to existing internal CML access roads. One connection between CML and the Project access roads will be located to the south of Infiltration Basin "B" where the Project access road located near the Refuse Collection Office, Truck Parking, and Maintenance Area will connect to the CML roads. A second connection is the Project access road located between the Household Hazardous Waste and Electronic Waste Collection and Storage Area, and the Warehouse and Storage Area which will connect to the CML internal access road located approximately 300 feet northeast of the self-haul waste drop off area. See Figure 2B for location of the two access road connections between CML and the Project.

Project driveways will be designed to meet all American Association of State Highway and Transportation Officials (AASHTO) standards as well as County of Maui Department of Public Works standards for intersection design. Separate entrances for the Project site and the landfill should reduce the risk of conflicts between landfill traffic and vehicles accessing the Project site.

The site provides maneuverability for a WB-40 tractor semi-trailer as defined by the American Association of State Highway and Transportation Officials (AASHTO). All Project-related equipment and vehicles should be able to maneuver throughout the site. All Project roads are asphalt, a minimum width of 24 feet, and will accommodate 2-way traffic.

Signage will be installed at the entrances off Pulehu Road, on internal access roads connecting with the CML internal access roads, and at all internal access road intersections indicating the directions to the various Project facilities. Signage identifying each operational area will be placed at its entrance.

Internal traffic control will be achieved with standard traffic signage, primarily 4-way stop signs at intersections requiring traffic from all directions to stop prior to proceeding through the intersection.

Pedestrian traffic will be limited to only those areas next to the Project structures. To ensure safety of the public attending the periodic abandoned vehicle auctions at the Office, a pedestrian path from the Office to the Abandoned Vehicles Area is planned. This will include pedestrian crossing signage and a painted cross walk across the road extending from Entrance 2 off Pulehu Road. Similarly, signage and a walkway and cross walk is also planned across the road running between the Refuse Collection Office, Truck Parking, and Maintenance Area and

the adjacent automobile parking lot. Movement of personnel and customers to and between the other Project facilities should be by vehicle rather than walking to ensure maximum safety.

Customers seeking to access the Office, Abandoned Vehicles Area, or the Household Hazardous Waste and Electronic Waste Collection and Storage Area will enter the Project area from Pulehu Road using Entrance 2 and will follow the paved roads to the desired location.

Customers seeking to drop materials at the Metals Processing Area or the Construction and Demolition (C&D) Material Recovery Area will enter the CML entrance off Pulehu Road and proceed to the truck scales to be weighed and ticketed and will then proceed to their destination in the Project area using the access road located between the Household Hazardous Waste and Electronic Waste Collection and Storage Area and the Warehouse and Storage Area. Customers, after dumping their loads, requiring to return to the scales to be weighed for their empty weight will return using the same route. Customers not returning to the scales will exit the Project area using Entrance 2.

Refuse vehicles, operating from the truck parking area at the Refuse Collection Office, Truck Parking, and Maintenance Area, in the morning at the beginning of their route, will travel the internal access roads to Entrance 2 and exit the site onto Pulehu Road. When they return with a payload of waste, they will enter the CML entrance off Pulehu Road, be weighed and ticketed at the scales, and proceed to the landfill. They will exit the landfill, to continue their daily routes, following the same route in reverse. After dumping their last load of the day at the landfill, the refuse vehicles will return to the truck parking area via CML roads that connect to the Project access road.

Trucks transporting outbound materials, such as processed scrap metal, processed C&D, or hazardous waste/electronic waste will follow the internal access roads to the CML scales to be weighed and the loads documented. After processing at the scales, the trucks will exit the site via the CML internal roads and entrance on Pulehu Road. Processed C&D materials, while some portion may be transported off-site occasionally, will more typically be utilized at the CML as landfill cover (dirt) and as road base (concrete, asphalt, rock, etc.). Wood recovered at the C&D Area is to be transported to the EKO Systems composting facility located on the CML property. Wood loads transported to EKO will follow the same previously described route to the CML scales, travel to EKO via the CML access roads, and return to the C&D Area via the access road located between the Household Hazardous Waste and Electronic Waste Collection and Storage Area and the Warehouse and Storage Area.

Employees will normally access the Project area from Pulehu Road by way of Entrance 1 or 2, but may on occasion enter through the CML entrance off Pulehu Road and travel to the Project area via the CML internal access roads.

8.0 LANDSCAPING

Given the remote location of the Project, the industrial nature of the adjacent land uses (rock quarry, rock processing, paving company yard, precast concrete products plant, and landfill) and the zeroscape landscape approach utilized at the adjacent CML, the County proposes to continue with the zeroscape landscape approach for the Project area as well. The Pulehu Road frontage of the CML is not landscaped. Plant growth in this frontage area is cut and maintained in a neat and orderly fashion. The Project frontage on Pulehu Road is proposed to be maintained in a similar fashion. The additional benefit of this approach is reduced water demand and reduced water extraction from the underlying groundwater aquifer which is planned be the Project water supply source.

9.0 AREA DESCRIPTIONS AND DESIGN CRITERIA

9.1 General

The areas and related structures to be developed as part the Project are listed as follows:

a. Office;
b. Metals Processing Area;
c. Household Hazardous Waste and Electronic Waste Collection and Storage Area;
d. Refuse Collection Office, Truck Parking, and Maintenance Area;
e. Warehouse and Storage Area;
f. Abandoned Vehicles Area; and
g. Construction and Demolition (C&D) Material Recovery Area

The Project and the associated structures will be developed for expanded solid waste and diversion services for the citizens of the County.

The County plans to incorporate into the Project sustainable construction materials and construction practices, energy and water efficient systems, and a healthy indoor environment in an effort to achieve LEED Certification. In an effort to achieve LEED Certification, the project will incorporate the following features into the Project:

- Water Conservation Measures
  - EPA WaterSense labeled plumbing fixtures
  - Flow reducers and faucet aerators in all domestic plumbing fixtures
  - High-efficiency toilets
  - Xeroscape landscaping
  - Paved internal roads to minimize need for dust control water

- Energy Conservation Measures
  - High-Efficiency HVAC systems with programmable controllers
  - EPA EnergyStar appliances/office equipment
  - Energy efficient lighting systems (LED and/or Fluorescent) with multi-zone control
  - Incorporate skylights and locate windows in a strategy to maximize natural lighting
  - Cool roof materials

The current County of Maui Building Code is the 2006 Edition of the International Building Code that will apply to all Project Structures.

9.2 Office

9.2.1 Description and Design Considerations

The Office will house personnel associated with the operation of the Abandoned Vehicles Program, Construction and Demolition (C&D) Material Recovery Area, and the Metals Processing Area.

The exterior dimensions of the Office structure are 80 ft. by 100 ft. At the front of the structure, within the 8,000 square foot (sf) footprint, a 30 ft. by 40 ft. (1,200 sf) open-sided canopy cover is planned to accommodate persons participating in the periodically conducted abandoned vehicle auctions. Within the enclosed portion, approximately 3,000 sf of the interior will house a combination of offices, workstations, and sanitary facilities (mens and womens restrooms and locker rooms) that will accommodate the following: 1) personnel associated with the Abandoned Vehicles Program; 2) personnel operating the Construction and Demolition (C&D) Material Recovery Area; and 3) personnel operating the Metals Processing Area. The remaining portion of the interior will be for storage.

9.2.2 Parking, Circulation, and Access

Parking is proposed in the area immediately around the structure and will accommodate automobile or light-duty utility vehicles. This parking capacity is adequate to accommodate personnel regularly housed in the structure as well as the public attending the periodic abandoned vehicle auctions. The parking lot will be asphalt and access is from the internal access road. The parking lot encircles the structure and enables vehicles to enter off the internal access road, drive around the entire structure, and exit back onto the access road. Personnel working in the Office will park in the surrounding lot, as will attendees of the abandoned vehicle auctions, with access to the structure via several exterior doors.

9.3 Metals Processing Area

9.3.1 Description and Design Considerations

The Metals Processing Area structure will house activities associated with the receipt, management, storage, and outgoing transportation of recycled metals generated through the management of junked vehicles, white goods, and other scrap metal. The structure will house systems for the draining and management of fluids and freon from junked vehicles and white goods. Collected fluids and freon will be stored before transport off-site. After removal of fluids and freon, vehicles and white goods will be size reduced as necessary, before being crushed/baled. After being crushed/baled, scrap will be stored inside until being loaded for transport off-site.

The exterior dimensions of the structure are 100 ft. by 400 ft. (40,000 sf). The structure is open-sided on all four sides with a full canopy roof. To accommodate operation of heavy equipment consisting of excavators, wheel loaders, forklifts, and crushers/balers, the structure will be clear span and have a minimum internal clearance of 35 ft. (floor to roof structure). The floor is steel reinforced concrete (8" minimum). The layout includes a loading area next to the baled product storage area. See Figure 5 for conceptual illustration of the floor plan and elevations. The structure will likely be equipped with steel reinforced concrete pushwalls (8 to 10 ft. in height) in areas where scrap metal will be stored prior to crushing/baling to facilitate efficient storage and ease of handling with a wheel loader.

Equipment for the draining and management of fluids and freon is electrically powered. All mobile equipment is to be either gasoline or diesel powered. The crusher/baler, depending on the equipment selected by the County, is to be either diesel powered or electrically powered.

Restroom facilities for the operating personnel are proposed to be located within the structure footprint.

9.3.2 Parking, Circulation, and Access

Parking will be provided in the area along the Pulehu Road frontage. The Metals Processing Area is an 8.2-acre portion of the Project site which provides staging area for vehicles to be processed.

The area surrounding the structure will be asphalt pavement, compacted crushed rock, or compacted recycled asphalt/concrete base material to ensure all weather access from the paved internal access road to the structure, provide traffic circulation around the structure, provide access to the interior, facilitate loading of trucks for transportation of scrap metal to off-site buyers or end-users, and the loading of trucks for transportation of recovered automotive fluid and freon to permitted off-site processors.

Vehicles loaded with white goods, scrap metal, and scrap vehicles will enter the area via the paved internal access road after being weighed at the CML scales. The vehicles will park parallel to the northern end of the structure for off-loading. Off-loading will be done with a forklift or wheel loader equipped with forks or a grapple attachment, and items not suitable for storage or staging outside are to be staged inside the structure to await further processing for removal of fluids and freon, if necessary, prior to being dismantled, crushed/baled, and prepared for off-site transport.

9.4 Household Hazardous Waste and Electronic Waste Area

9.4.1 Description and Design Considerations

The Household Hazardous Waste and Electronic Waste Area structure will house activities associated with the receipt, management, storage, and outgoing transportation of household hazardous waste and electronic waste collected from County residents. The structure will house a drive-through area to receive wastes from County residents, an area to handle and package wastes as necessary, areas to store different types of waste, a loading area to facilitate loading outbound materials for off-site transportation, and an office area to accommodate the operational personnel.

The exterior dimensions of the structure are 100 ft. by 200 ft. (20,000 sf). Within the 20,000 sf footprint, there will be a 40 ft. wide x 200 ft. long covered drive-thru with 2 parallel lanes. The drive-thru will be open on each end to permit traffic flow and on the exterior wall for ventilation, with a canopy cover. The remaining portion will measure 60 ft. wide by 200 ft. long and provide an enclosed area to house the operations office and the waste handling and storage areas. Roll-up doors will permit forklifts to move materials from the drive-thru to the structure interior. On the side of the structure opposite the drive-thru, a loading area for loading outbound materials into transport vehicles is proposed. Figure 6 provides a conceptual illustration of the floor plan and elevations.

9.4.2 Parking, Circulation, and Access

Parking will be provided in the area immediately around the structure and will accommodate automobile or light-duty utility vehicles. This parking capacity is adequate to accommodate the operational personnel and provide several stalls for limited customer parking. The drive-thru design will eliminate the need for customer parking as customers will not have to park to unload their vehicles.

The area surrounding the structure will be asphalt pavement to ensure all weather access. Customers seeking to deliver HHW and e-waste will enter the area off the internal access road and will drive counter clockwise around the northerly end of the structure and proceed to the southerly end to the drive-thru lanes and proceed under the canopy cover. Operational personnel will direct them to the appropriate location and assist in the off-loading of waste materials. After all waste has been unloaded, the customer will exit out of the northerly end of the structure and exit the area onto the internal access road and proceed to exit the Project area via Entrance 1 or 2.

A load out area is located on the southwesterly side of the structure, the side opposite the drive-thru, for loading HHW and e-waste materials onto transport trucks, with forklifts, for transport off-site. Wastes being loaded are to be palletized or packed in drums, and are weighed prior to loading to permit accurate manifesting of outbound loads. The transport trucks will access the area via the same entrance off the internal access road that is used by customers and once loaded

will travel around the structure and exit back onto the internal access road and proceed to exit the Project area via Entrance 2. Loading of outbound materials will, as a rule, be scheduled on days the operation is not receiving wastes from customers.

9.5 Refuse Collection Office, Truck Parking, and Maintenance Area

9.5.1 Description and Design Considerations

The Refuse Collection Office, Truck Parking, and Maintenance Area will house personnel and activities associated with the operation and maintenance of the County refuse collection vehicle fleet, and some administrative personnel associated with operation of the landfill. This structure and the associated truck parking area, located immediately adjacent, will accommodate the Upcountry and Central/Wailuku refuse collection operations presently operating in two separate locations. The area has been sized to permit the County to also accommodate the Westside collection operation in the future.

The conceptual design provides for a 2-story office area, 3 bays for vehicle repair and maintenance, and a canopy covered vehicle wash bay. See Figure 7 for the floor plan and Figure 8 for the elevations. The dimensions are 80 ft. wide x 150 ft. long (12,000 sf footprint). The office portion of the footprint measures 80 ft. wide x 50 ft. long and is 2 stories tall; area is 4,000 SF per floor (8,000 sf total). The vehicle maintenance area accommodates 3 enclosed, drive-thru repair/maintenance bays (each bay measuring 80 ft. long x 25 ft. wide) with roll-up doors; total area for 3 bays is 6,000 sf. The canopy covered wash pad measures 80 ft. long x 25 ft. wide; total area is 2,000 sf, and will abut the structure on one side and be open-sided on the remaining 3 sides.

The vehicle maintenance areas and wash bay floors will be surfaced with steel reinforced concrete (8" minimum). The maintenance bays and wash bay floor will drain to a grated collection trench in the floor, through a clarifier to separate oils/grease and solids from the water before it is conveyed to a waste water storage tank. The County may elect to utilize a wash water recycling system which will reduce the need for off-site water disposal, but a waste water storage tank will be necessary. Waste water will likely be transported to one of the County-owned treatment plants for final disposal.

The maintenance and repair of refuse collection vehicles includes vehicle fluid products (lubricating oils, hydraulic fluids, antifreeze, etc.) and generation of waste versions of these fluids. The area design will incorporate storage areas for these fluids and wastes. Typically, these fluids are stored in tanks located outside, but immediately adjacent to the structure, to facilitate access by bulk delivery trucks (and waste removal trucks). The tanks will be equipped with secondary containment structures. Certain fluid types, used in smaller quantities, may be purchased in 55-gallon drums, or smaller containers, and may be stored inside the structure.

The facility will include a station for fueling the refuse collection truck operating out of the yard. The station will consist of one or more above ground diesel storage tanks, with a total capacity of 4,000 to 5,000 gallons, and a pump and nozzle for dispensing fuel to the trucks.

The ground floor of the office area will house offices required for refuse collection operations management, administrative, and maintenance personnel, as well as office space for landfill administrative positions. The second floor will initially be used only to house storage for non-flammable vehicle maintenance supplies, and possibly a driver training room. The balance of the second floor area is proposed to be reserved for development of additional office space if needed in the future.

9.5.2 Parking, Circulation, and Access

Employee vehicle parking will be provided in a parking lot located immediately to the north of the structure. This parking capacity will accommodate initial employee headcount as well as the additional personnel if the Westside yard is consolidated into this area, and potential growth in the office staff. The parking lot is proposed to be surfaced with asphalt pavement. Employees parking in the lot will access the structure via a cross walk across the internal access road.

The refuse collection and fleet support vehicles, when not operating, are to be parked in the 2-acre truck parking area located immediately to the south and east of the structure, which can easily accommodate 50 refuse collection vehicles (current fleet size for all 3 current operating base yards is 24 collection trucks). The parking area and its ingress and egress points to the internal access road will be asphalt pavement.

9.6 Warehouse and Storage Area

9.6.1 Description and Design Considerations

The Warehouse and Storage Area will be used for storage of operating supplies and materials for the facilities and activities located within the Project area as well as for the adjacent operations. Materials anticipated to be stored are metal and plastic such as heavy equipment parts, refuse collection carts, metal drainage pipe, plastic drainage pipe, landfill tarps, etc.

The exterior dimensions of the structure is proposed to be 100 ft. by 200 ft. (20,000 sf). The structure is proposed to be fully enclosed with access via 4 roll-up doors (16 ft. wide x 18 ft. high) and pedestrian doors. The floor is steel reinforced concrete (8" minimum). To maximize usable floor space and facilitate movement of materials, the structure is recommended to be clear span with a minimum floor to ceiling clearance of 18 ft.

See Figure 9 for conceptual illustration of the floor plan and elevations.

9.6.2 Parking, Circulation, and Access

Parking will be available around the structure perimeter. As this structure will not normally be staffed on a regular basis, parking space requirements are very limited. The area surrounding the structure will be surfaced with compacted crushed rock or compacted recycled asphalt/concrete base material to ensure all weather access from the paved internal access road. Vehicles accessing the structure will enter the area via the paved internal access road. The yard is large enough to permit trucks to maneuver and back up to the roll-up doors of the structure, or pull along the side if a flat-bed trailer is used. Loading and off-loading will be done with a forklift.

9.7 Abandoned Vehicles Area

The Abandoned Vehicles Area will function as a storage area to accommodate vehicles that are taken into custody by the County of Maui. Abandoned vehicles will be stored until such time the means of their final disposition is determined. Periodically the program will conduct public auctions of abandoned vehicles as a means to put the vehicles to productive use and prevent their disposal as scrap. The auctions will be held in the canopy covered meeting area of the adjacent office structure. The public attending the auctions will be, prior to the auctions, permitted to observe the vehicles to be auctioned that are to be stored in the yard. Vehicles that are not purchased at auction will be recycled either through a 3rd party scrap metal processor or through the adjacent Metals Processing Area.

9.7.1 Description and Design Considerations

The Abandoned Vehicle Area will be a 2-acre area located southeast of the office structure and immediately to the northwest of the Metals Processing Area. The area will be surfaced with compacted crushed rock or compacted recycled asphalt/concrete base material to provide an all-weather operating surface and access to the paved internal road. Crossing the area, parallel to Pulehu Road, is a 50 foot wide electric transmission line easement which is restricted from use for parking or storing vehicles. The portion of the area located to the northeast of the easement will receive and store primarily automobiles and light duty utility vehicles with 25 foot traffic lanes between each row of parking stalls. The area to the southwest of the easement is proposed to be used for the storage of large vehicles and vessels. To provide security and control access, the area will be enclosed with a 6 foot high chain link fence and locking gate.

9.7.2 Parking, Circulation, and Access

Parking for staff personal vehicles will be provided in the parking lot at adjacent the office. Staff will access the area from the office via a walkway and painted cross walk across the internal access road extending from Entrance 2 off Pulehu Road. Vehicle access to the area is via the internal access road through the gated yard entry. The parking stalls for vehicles delivered to the site are arranged in rows with 25 foot wide drive lanes between the rows to provide adequate

room for tow trucks delivering the vehicles to maneuver. The area between the portion of the property adjacent to the Pulehu Road frontage and the 50 foot wide electric transmission line easement is available for storage of larger vehicles or vessels, but can also be used to accommodate automobiles and light duty utility vehicles.

9.8 Construction and Demolition (C&D) Material Recovery Area

The Construction and Demolition (C&D) Material Recovery Area will be a 4-acre area located southeast of the Metals Processing Area and to the southwest of the Household Hazardous Waste and Electronic Waste Collection and Storage Area. The area will accommodate the receipt, processing, and storage of recyclable materials from C&D wastes generated on the island of Maui. Processing utilize heavy equipment to separate and segregate bulky materials and feed non-bulky items into sorting equipment that may include manual sort lines and mechanical screens. Large items of concrete, asphalt, and rock (inerts) will be stockpiled and periodically crushed to permit re-use.

The intent of the C&D processing activity is to minimize quantities discharged into the landfill as trash and recover recyclable materials including metals, wood, inerts, and soils. Metals recovered are planned to be recycled either through a 3rd party scrap metal processor or through the adjacent Metals Processing Area. Wood (including woody vegetative materials) recovered is planned to be directed to the EKO Compost facility located in the adjacent CML facility for processing into compost and soil amendments. Soils recovered are to be utilized as cover at the CML landfill. Inerts recovered are to be utilized as road base at the CML landfill.

9.8.1 Description and Design Considerations

The C&D Material Recovery Area is proposed to be located on 4 acres. The areas used for vehicle access and material stockpiling will to be covered with compacted crushed rock or compacted recycled asphalt/concrete base material to provide an all-weather operating surface and access to the paved internal access road. The central portion of the area where the material handling and processing activities will occur is a 40,000 sf open concrete slab. Due to the heavy-duty service associated with C&D processing, concrete slabs are typically 10 to 12 inches thick and reinforced with steel rebar.

9.8.2 Parking, Circulation, and Access

Parking for staff personal vehicles will be provided at the office. Personnel movement between the office and the C&D area will be done using County work vehicles. C&D waste delivery vehicles will first enter off Pulehu Road through the CML entrance, proceed through the scales to be weighed and ticketed, and then proceed to the C&D area via internal CML and Project access roads. As the waste vehicles travel from the entry driveway and approach the 40,000 sf concrete operating pad they will drive around the pad in a counter clockwise direction and will be directed

by staff to the appropriate location to dump the load, based on the material composition of the load.

After materials are separated and processed, they are to be stockpiled in the areas near the entry or along the graded slope running parallel to Pulehu Road. When materials are to be loaded out, transport trucks will park alongside the various storage areas and be loaded with a wheel loader using a bucket attachment. Outbound materials will typically be directed to on-site destinations with scrap metal being transported to the Metals Processing Area, soil and crushed inert materials being transported to the landfill for re-use as road base, wood materials being transported to the EKO Systems compost facility, and refuse being transported to the landfill for final disposal. All outbound material loads are to be weighed at the landfill scales to document quantities of diverted and landfilled materials; vehicles traveling to the scales will exit the area through the driveway and travel the internal access roads to the scales.

10.0 WATER SYSTEM

10.1 Existing Conditions

There is no water system at the Project site. The County of Maui water system has not been extended to the site, nor is such an extension planned. The landfill operation utilizes an on-site well (State Well No. 5125-07) as its primary source of water. Use of this well was initiated in May 1, 2016. The landfill operation has an average daily water usage of approximately 19,000 gallons per operating day. The landfill offices/entrance facility domestic and fire control water is supplied via a dedicated 100,000 gallon storage tank, water pump, and on-site piping distribution system. Water supply to this tank is currently trucked in from an off-site source by County Highways. Domestic water consumption at landfill offices/entrance facility averages approximately 14,000 gallons/week (approximately 2,500 gallons per day).

The County plans to interconnect the 100,000 gallon tank and the on-site well in order to eliminate the need to truck water. The on-site well is capable of supplying up to 145,000 gallons per day. When the well becomes the supply source for the landfill offices/entrance facility, the average daily water demand will be approximately 21,500 gallons; therefore, the excess supply capacity of the well will be approximately 123,500 gallons per day. This equates to a weekly excess capacity of 886,000 gallons, when accounting for no water usage on Sundays when CML is closed.

10.2 Water System Schematic Design

The proposed Project water system shall conform to County of Maui Department of Water System Standards (2002) and shall meet the requirements of the State of Hawaii Department of Health.

The Project will be serviced by a water tank connected to a pump that will provide adequate pressure for domestic use and fire flow. A distribution network consisting of 8-inch main lines, 6-inch fire hydrant laterals, and 2-inch laterals to the structures should be adequate for the Project. The tank will have a capacity of 0.6 million gallons. See calculations below.

10.3 Water Demand Calculations

The Project area is 40.8 acres in total. A portion of the total Project area is occupied by light industrial uses with the balance of the area occupied by non-water demand uses of infiltration basins, roads, parking areas, utility easements, etc. The following table summarizes the land uses and the areas associated with each.

Table - 1

Light Industrial Use Areas	Area (sf)	Area (acres)	Use Area Total (acres)
Refuse Collection Office and Maintenance Area	131,000	3.0	
Household Hazardous Waste Area	103,000	2.4	
Metals Recovery Area	358,000	8.2	
Warehouse & Storage Area	63,000	1.4	
C&D Material Recovery Area	176,000	4.0	19.1
Parking Areas, Roads, and Un-Used Areas	**Area (sf)**	**Area (acres)**	**Use Area Total (acres)**
Basins A & B	128,000	2.9	
Office & Parking Area	63,000	1.4	
Abandoned Vehicle Area	96,000	2.2	
Refuse Truck Parking Area	26,000	0.6	
Roads	152,000	3.5	
Undeveloped/Unused Areas (slopes, easements, etc)	481,248	11.0	21.7
Total Project Area			40.8

The following domestic and fire flow requirements are based on guidance provided in the County of Maui Department of Water System Standards (2002):

Domestic and Light Industrial Flow Requirement

Domestic flow requirement, associated with water uses inside the various Project office areas and non-industrial activities, is assumed to be equivalent to 100% of the waste water flows calculated for these areas (See Section 11.0 for calculations). The flow requirement associated with the light industrial activities is based on the 6,000 gallons/acre/day prescribed in the County of Maui Department of Water System Standards (2002).

Domestic Flow = (100% of domestic waste water flow)	1,828 gallons/day; round up to 2,000 gpd
Light Industrial Land Use Area	19.1 acres
Average daily demand for water consumption for light industrial use =	6,000 gallons/acre/day
Light Industrial Average Daily Demand =	6,000 gallons/acre/day x 19.1 acres 115,000 gallons/day

Domestic + Light Industrial
Daily Demand = 2,000 + 115,000
117,000 gallons/day

Maximum Daily Demand = 1.5 x Average Daily Demand
1.5 x 117,000 gallons/day
175,500gallons/day
Roundup to 176,000 gallons/day

Peak Hour Flow = 3 x Average Daily Demand
3 x 117,000 gallons/day
351,000 gals/day

Fire Flow Requirement

The following table summarizes the Project structures, their total floor area, and the NFPA (National Fire Protection Association) Construction Type assumed for each structure. NFPA 1, Fire Code, Table 18.4.5.1.2 prescribes a minimum fire flow and flow duration for a structure based on the type of construction (defined in NFPA 220, Standards on Types of Building Construction) employed.

Table - 2

Structure	Total Floor Area (sf)	NFPA Construction Type	Required Fire Flow (GPM)	Required Flow Duration (hours)
Office	8,000	III (200)	2,000	2
Metals Processing Area	40,000	I	2,250	2
Household Hazardous Waste Area	20,000	III (211)	2,000	2
Refuse Collection Office and Maintenance Area	16,000	III (211)	1,750	2
Warehouse	20,000	I	1,500	2

The required fire flow and fire water supply storage capacity is based on the single Project structure with highest fire flow requirement which represents the worst-case scenario for fire protection water supply. The Metals Processing structure is the largest proposed structure at 40,000 SF and, based on the previously referenced NFPA criteria, requires a fire flow of 2,250 gallons per minute (GPM) for a duration of 2 hours. The other Project structures combined floor area and construction type result in lower required fire flows, and therefore are not used for calculating required fire water supply storage capacity. Based on the fire flow and duration applicable to the metals processing structure, the fire flow is calculated as follows:

Required Fire Flow =	2250 gpm
Flow Duration (hours) =	2
Flow Requirements(gallons/day) =	2250 gpm x 2 hours x 60, minutes 270,000 gallons

Water Storage Tank Sizing

The County of Maui Department of Water System Standards (2002) require storage capacity to satisfy the following criteria:

1. Meet maximum day consumption. Reservoir full at the beginning of the 24-hour period with no source input to the reservoir.
2. Meet maximum day rate plus fire flow for duration of fire. Reservoir ¾ full at start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.
3. Minimum size reservoir shall be 0.1 MG.

Maximum Daily Demand (gallons) =	176,000
Fire Flow (gallons) =	270,000
Total Demand (Maximum Daily + Fire Flow) = (assumes reservoir is ¾ full)	446,000
Required Reservoir Capacity (100% full) =	595,000
Reservoir (Tank) Capacity (million gallons) =	0.6

10.4 Developed Condition

The combined water demand of the existing landfill operation (21, 500 gallons/day average) plus the estimated demand of the Project (117,000 gallons/day) results in a daily water demand of 138,500 gallons for each day the facilities operate. Assuming 6 operational days per week, the projected weekly water demand is estimated to be 831,000 gallons. The production well is planned to be the source of water for both the existing demand and the Project demand and is capable of supplying up to 145,000 gallons per day. Therefore, with a daily production capacity of 145,000 gallons and a daily water demand of 138,500 gallons, the production well capacity has a daily excess capacity of 6,500 gallons. On a weekly basis, the production well capacity is 1,015,000 gallons and the operational demand is estimated to be 831,000 gallons. Therefore, the production well capacity will exceed the weekly water demand by approximately 184,000

gallons. In reality, the operational water use on Saturdays, due to reduced operational activity as compared to Monday through Friday, is typically 50% to 75% of the average operational weekday. Therefore, the excess capacity of the production well is likely closer to approximately 250,000 gallons per week.

11.0 Wastewater System

11.1 Existing Conditions

Currently, there is no existing wastewater system in the vicinity of the Project site and there are no plans to service the site. The landfill operation utilizes a septic system and leach field to meet the wastewater demands of the offices at the CML.

11.2 Wastewater System Schematic Design

Wastewater generated by the proposed Project will to be treated with septic systems consisting of septic tanks and leach fields designed to the standards of the State of Hawaii Department of Health.

The tanks and leach fields are sized to accommodate the anticipated occupants for each of the areas. The septic tanks and leach fields are located where traffic is not expected.

Septic systems are not allowed within 1,000 feet of potable water wells. The landfill production well is located at the corner of the Project property; adjacent landfill property near Pulehu Road. Additionally, septic systems are not allowed within 50 feet of any surface body of water. These siting restrictions apply to the Project as a result of the on-site production well and the infiltration basins being considered bodies of water for the purposes of the restrictions.

The Warehouse structure will not have bathroom facilities. The Warehouse will not be staffed on any regular basis and will only be accessed from time to time when materials are placed in or removed from the structure.

The Household Hazardous Waste and Electronic Waste Collection and Storage Area and the Metals Processing Area structures are both located within the required 1,000 foot offset from the production well, therefore domestic wastewater generated at these structures are proposed to be managed in the septic system that also services the Office. The Office septic system, consisting of a septic tank, distributor box, and leach field, are to be sized to accommodate the waste water flows for it, the HHW structure, and the Metals Processing structure. This septic system is to be offset at least 50 feet from the new Infiltration Basin "A".

The Refuse Collection Office, Truck Parking and Maintenance Area septic system is to be offset at least 50 feet from the new Infiltration Basin "B" located to the east of the area. This septic system, consisting of a septic tank, distributor box, and leach field, will serve only the Refuse Collection Office, Truck Parking, and Maintenance Area. See Figure 10 for proposed location of septic leach fields and conceptual layout of septic piping.

11.3 Wastewater System Design Calculations

Table 3 presents the calculations and associated assumptions for the sizing of the septic system for the Refuse Collection Office, Truck Parking, and Maintenance Area domestic waste water, and the system that will service the combined domestic waste water flows from the Office, the Metals Processing Area, and the Household Hazardous Waste and Electronic Waste Collection and Storage Area. In both systems, the sizing is based on maximum anticipated occupant loading.

The calculations are compliant with design requirements of HRS Chapter 11-62 – Waste Water Systems.

As presented in Table 3, both systems flows at maximum anticipated loading are below 1,100 GPD. Each system will utilize the largest septic tank size permitted, 1,250 gallons. Based on the percolation rate observed at the landfill leach field, each system leach field is required to be at least 1,913 sf. With dimensions of 65 ft. x 30 ft., each field will provide the required absorption area.

Table 3 - Waste Water Volume & Septic System Sizing Calculations

Structure	Occupant Description	Headcount		Average Daily Waste Water Generation Rate/Occupant (GPD) (2)	Daily Waste Water Volume (3)		Proposed Septic Tank Size (gallons) (4)	Leach Field Sizing			Leach Field Dimensions	
		Initial	Maximum Future (1)		Initial	Future		Percolation Rate (minutes/inch) (5)	Required Absorption Area per 200 Gallons (6)	Required Absorption Area (SF) (7)	Length (ft) (7)	Width (ft)
Refuse Collection & Maintenance	Office Staff	5	40	20	100	800						
	Mechanics	2	3	55	110	165						
	Drivers/Helpers	37	45	20	93	113						
					303	1078	1,250	48	306	1913	65	30
Office, Metals Recovery, & HHW Areas	Abandoned Vehicle Staff	3	3	20	60	60						
	C&D Operation Staff	3	9	20	60	180						
	Metals Processing Staff	3	9	20	60	180						
	HHW Staff	4	6	55	220	330						
					400	750	1,250	48	306	1913	65	30
Totals					703	1828						

Notes:

1. Maximum headcount based on the following asumptions:
   a. Refuse Collection Vehicle Maintenance Shop
      Maximum office personnel is based on an assumed 200 sf/per person. First and second floor space availabe for office area is 4,000 sf/floor (total = 8,000 sf).
      Potential for future consolidation of West Side Base Yard operations into this facility, therefore, increase mechanics by 1, and drivers/helpers by 8 positions
   b. Office
      Abandoned Vehicle Program not anticipated to grow beyond initial staffing levels
      C&D Operations Staff - staff could increase by factor of 4X if intensive processing systems implemented
      Metals Processing Operations Staff - staff could increase by factor of 4X if intensive processing systems implemented
      Maximum future headcount with the planned 3,000 sf of office space developed within the bldg equates to an average area per person housed of 140 sf.
   b. HHW
      Will only operate 2 to 3 days per week. If higher usage is experienced, staff would not be expected to grow by 50%.
2. Source: HRS Chapter 11-62 Appendix D Table 1
   a. All staff positions categorize as "Workers - Day, at schools and offices" with a 20 GPD waste water generation rate.
   b. Categorize HHW Contractor Staff & Mechanics as "Factory" which adds 35 GPD for these positions in addition to the "Workers - Day, at schools and offices" contribution of 20 GPD for waste water generation purposes. Daily waste water generation rate per position = 35 gpd for Factory + 20 GPD = 55 GPD.
3. a. Waste water volume generated by Drivers/Helpers uses 1/8 of the total headcount. These employees work off site except for beginning and ending of 8 hour shift. Assumed these employees occupy the building for a maximum of 1 hour of the normal 8 hour shift, therefore 1/8 of total headcount used for waste water volume calculation.
4. Maximum septic tank size permitted is 1,250 gallons.
5. Assumed similar percolation rate as found at adjacent landfill leach field as documented in:
   Geotechnical Engineering Exploration Central Maui Landfill Phase IV Expansion and
   Facilities Infrastructure Puunene, Maui, Hawaii, August 26, 2002, Geolabs, Inc.
6. Source: HRS Chapter 11-62 Appendix D Table 3
7. Calculated as follows:
   (Required Absroption Area/200 Gallons) x Septic Tank Size = Area (SF)
   (306/200) x 1,250 = Area (SF)

12.0 ELECTRICAL SYSTEM

12.1 Existing Conditions

Electrical utility service for the Project will originate from the overhead utility lines along the Project side of Pulehu Road. There is an existing 23 KV Maui Electric (MECO) line extension that runs from Pulehu Road between the Project parcel and the landfill property. This line extension services the existing landfill offices near Pulehu Road, and the leachate and landfill gas flare facilities approximately 1,500 feet northeast of Pulehu Road. Some portion of the Project facilities may be powered from this line, depending on available capacity. There is no existing electrical service located within or presently servicing the Project area, and MECO will need to perform a line extension from Pulehu Road.

12.2 Developed Condition

Electrical service to the Project areas and related structures will likely be provided via an overhead electrical extension from Pulehu Road that will likely run along the internal access road. From the overhead line, legs will be extended to each area and structure via underground conduit that will feed pad mounted transformers adjacent to these areas or structures. Electrical service characteristics are 480Y/277V, 3-phase, 4-wire, 400 amperes. Electrical service equipment is comprised of a pullbox, current transformer cabinet, meter socket, and enclosed circuit breaker. Step-down transformers (480V-208Y/120V, 3-phase, 4-wire) and branch circuit panelboards will be located as necessary in each structure or area to further distribute power to wiring devices and miscellaneous loads.

Electrical load for each of the areas and structures will depend directly upon the specific uses, occupant count, and equipment utilized. As the activities and uses are specified by the County, detailed electrical load calculations will be developed which will be used to develop detailed electrical distribution system design as well as detailed electrical system design for each area and structure. The Office, Household Hazardous Waste and Electronic Waste Collection and Storage Area, and Warehouse and Storage Area will have electrical loads primarily driven by lighting, IT infrastructure, and HVAC/ventilation, and can be reasonably estimated at this time. These structures would likely be adequately serviced with a 200 amp distribution panel.

The Refuse Collection Office, Truck Parking, and Maintenance Area, Metals Processing Area, and the Construction and Demolition (C&D) Material Recovery Area electrical loads will be largely defined by the number and type of equipment utilized in each area. If the County elects to shred and/or bale scrap vehicles using electrical powered equipment, the electrical load will be significantly higher than if diesel powered equipment is used. Electrical powered balers and shredders utilize electric motors as large as 300 horsepower. This structure, if diesel powered equipment is utilized, will likely not require much more than a 200 amp service. If electrical powered equipment is utilized, the service could well exceed 1000 amp, depending on motor size and number. Depending on the use of diesel or electrical powered C&D screening and crushing equipment will define the electrical load at the Construction and Demolition (C&D) Material

Recovery Area. If diesel equipment is utilized, the electric load of the operation will likely be limited to exterior lighting and the load will be very small. Whereas if electric powered equipment is used, the service could well exceed 1000 amp, depending on motor size and the specific equipment utilized. Similarly, the maintenance activities and equipment used in the Refuse Collection Office, Truck Parking, and Maintenance Area will significantly impact the overall electrical load. Typical refuse maintenance facilities of the size proposed for the Project would require electrical service of about 600 amps.

Project design is at a conceptual level at this point in time and electrical load calculations are to be viewed as preliminary.

Electrical load can be moderated and reduced through the use of high efficiency lighting systems (LED and fluorescent), use of skylights to take advantage of natural lighting, and high efficiency HVAC systems. Architectural design and selection of building materials can also positively impact electrical consumption. Exterior walls and roof construction materials of a light color or reflective nature that absorb less heat will reduce HVAC costs, as will strategic use of landscaping to provide shade to the structures.

12.3 Developed Condition

Incorporation of renewable energy systems into the Project will reduce the amount of electricity purchased from MECO to operate the Project areas and activities. Renewable energy options available for consideration are photovoltaic (solar), wind turbines, and LFG to energy (utilizing landfill gas (LFG) from the CML to generate electricity).

The size and scope of a renewable energy generating system is based on the anticipated electrical load of the Project. Given the conceptual level of the electrical load, the specific sizing of an electrical generating system is not appropriate at this time, but a general strategy for sizing the system is discussed in the following.

Once the electrical demand of the Project is reasonably estimated, the capacity of the energy generating system can be defined. Under the current circumstances, sales of excess power to MECO from an on-site generating system are limited with revenue of power sales being extremely low to zero revenue. As the Project moves forward, the terms and conditions of MECO's various interconnect agreements, power purchase programs, and the Public Utilities Commission (PUC) tariff programs should be evaluated to determine if opportunities develop that would incentivize the County to generate excess power for sale and export to the utility.

Until such time that revenue associated with the sale of excess power improves, the strategy for an energy generating system would be to size the capacity of such a system to match the electrical power needs of the Project and minimize the purchase of power from MECO for the Project. Under the current programs available and assuming a system rated generating capacity of greater than 100 kW, this would likely be a standard interconnect agreement with MECO which would ensure the County's ability to purchase power as needed but provide no revenue for

excess power exported to the grid. Currently, a MECO program exists (Customer Grid Supply) for systems with rated capacity of less than 100 kW that provides for customers generating excess power to receive credits that offset the cost of power they purchase from MECO. However, this program is limited by capacity caps on total program generating capacity set by the PUC, and was previously closed to new projects until additional capacity was recently added. It is uncertain how long this or similar programs will be available in the future.

Additionally, the PUC has placed a limit on MECO distribution circuits of 15% of peak circuit demand on the total aggregate capacity of non-MECO generating systems on each circuit. Presently, the circuit serving the Project is well below the 15% saturation limit, so for the near term such a limitation should not be a concern.

Assuming solar (photovoltaic) power to be the likely electrical generating technology to be used, the following provides some concept of possible power generating capacity if solar systems were deployed on portions of the roof area provided by the Project structures.

Total roof area for the Project structures is 80,000 sf. Assuming 50% of this area is aligned in a southerly direction to optimize power generation, then 40,000 sf of solar panels could be deployed. Assuming a nominal area of 10,000 sf is required for a 100 kW system, the roof space of 40,000 sf could accommodate a generating capacity of 400 kW. This would be the rated capacity and the true generating efficiency will be affected by the degree to which alignment of panels with the sun is optimized, inclination of the panels, and maintaining the panels in a clean condition.

Additional generating capacity could be realized by placing panels on the portions of the roof area that do not have the optimum southern exposure, which would result in a lower power output per panel. Utilization of additional structures such as parking lot canopies that are designed with optimum alignment to the south and panel inclination would increase generating capacity but would require additional capital costs associated with these structures.

As with all capital projects, a cost benefit analysis will be necessary to determine the appropriate level of development of power generating capacity that will maximize the benefit to the County for the minimum required investment.

13.0 SITE SECURITY

Upon development of the Project, the site will be secured to prevent unauthorized access during non-operational hours. The perimeter of the property will be enclosed by a 6 foot high chain link fence. In areas where there is a graded slope, the fence will be located at or near the crest of the slope. The fence will tie-in to the existing CML security fencing along Pulehu Road. Locking gates are proposed to be installed at Entrance 1 and 2.

To provide further security at the Abandoned Vehicles Area, the area will be enclosed with a 6 foot high chain link fence with a locking gate.

Project areas will be equipped with security and alarms systems monitor and alert the County of unauthorized entry during non-operating hours.

Video surveillance and recording systems may be installed to monitor the Project entrances off Pulehu Road and the structure exteriors 24-hours per day, 365 days per year.

14.0 SOLID WASTE

The development of the proposed solid waste management facilities in the Project will be beneficial to the County and its residents by providing more and improved waste diversion services and will increase operational efficiency of the refuse collection system by consolidating at least two base yards and reducing non-productive drive time to and from the landfill.

Currently the County residents have limited C&D recycling options with most facilities only accepting a source separated portion of the C&D waste stream. With the development of the Construction and Demolition (C&D) Material Recovery Area, residents and businesses generating C&D waste will have a permanent and centrally located facility that will be able to accept and process mixed C&D waste. In late 2016, Maui Demolition and Construction Landfill, the destination for most C&D wastes on Maui, ceased operation. The average annual volume of C&D wastes discharged in the previous 5 years at Maui Demolition and Construction Landfill is estimated at approximately 36,000 tons per year (100 to 150 tons/day). Since its closure, most C&D waste is now being received by CML with a portion of the waste being processed for use. With the development of the Construction and Demolition (C&D) Material Recovery Area in the Project, most of the C&D waste being delivered to CML will be processed for recovery and re-use. Depending on the specific processing methods applied, diversion rates for this operation can be reasonably expected to range between 50% and 80%.

The Metals Processing Area will provide an additional option for the recovery of scrap metal. Currently only one scrap metal processor capable of dismantling and preparing scrap metal for off-island recyclers is operating on Maui. If this facility were to close, there would be no remaining service provider to manage scrap metal generated on the island. Therefore, the County intends to develop the Metals Processing Area to ensure there is a reliable means of management for scrap metal.

Household Hazardous Waste and Electronic Waste Collection and Storage Area will provide the County a permanent collection facility for these wastes. Currently, the County conducts periodic collection events at different temporary locations around the island. With the establishment of a permanent facility, the County will be able to have regularly scheduled collection events at a fixed facility which will improve participation rates of the public and reduce quantities of these materials now being abandoned or illegally disposed of.

The relocation of the Abandoned Vehicles Area from its current temporary location on the corner of Pulehu Road and Hansen Road will provide a larger, more secure, and permanent location to receive, store, and auction abandoned vehicles. Abandoned vehicles are a significant problem on the island and establishment of a permanent and adequately sized management area will complement the current and ongoing efforts to manage this problem.