

ANNEX 16

Environmental Impact Assessment

An environmental assessment will be conducted on all subprojects to be implemented under Component 4. The conduct of an environmental assessment (EA) ensures that potential impacts of a project on its biophysical and socioeconomic environment are identified and mitigated in the most practical and cost-effective way. It also establishes the vulnerability of the project to natural and man-made hazards within its surroundings. Undertaking an EA also facilitates effective initiatives that can enhance existing environmental conditions in the project areas.

The Environmental Assessment Framework (EAF) for Component 4 serves both as a reference that summarizes the environmental assessment processes which the feasibility and design work undertook, and as a guide that ensures that environmental safeguards are considered prior to the implementation of sub-activities within each of the components. The EAF satisfies the requirements of the decision makers (AusAID and GOP) and provides the tools for the implementers (City of Taguig and possible private sector partners) to be in line with poverty alleviation and sustainable development principles and strategies.

The legal and policy context of the EAF is anchored on AusAID's internal and international obligations and the partner government legislation relevant to the proposed interventions. Aside from multilateral environment agreements, AusAID activities are bound to development cooperation policies and Commonwealth environmental legislation, particularly the Environment Protection and Biodiversity Conservation Act of 1999 (EPBC Act). The EPBC Act requires AusAid to seek advice from the Minister for the Environment and Heritage before entering into contracts or agreements for the implementation of subprojects that have the potential to cause significant impacts on the environment anywhere in the world. The Environmental Management System (EMS) of AusAid institutes steps which guarantee that the magnitude of impacts is considered in every activity phase of the aid program.

A Strategic Environmental Assessment (SEA) was conducted as part of preparing the BRACE Program and subsequent Initial Environmental Examination (IEE) identified potential environmental issues and impacts affecting the proposed program components. Significant environmental impacts were not foreseen, thus, referrals to the Minister for the Environment and Heritage were deemed unnecessary. Nevertheless, the feasibility and design studies require Environmental Management Plans (EMP) derived from Environmental Impact Assessment (EIA) processes for each sub-activity.

This Environmental Impact Assessment document and the accompanying Environmental Management Plan covers the proposed construction of mixed use MRBs in Novelty and Dumlao properties both in Brgy. Bagumbayan, Taguig City. In summary, construction activities and the actual occupancy of ISFs in both sites potentially cause impacts on the physical, biological and socioeconomic environment that are preventable and manageable. The application of best engineering and construction practices, coordination with the local communities, and the incorporation of environmental management measures in the design will help keep the impacts from both construction and operations to acceptable levels.

Proposed Subproject Sites

1. Novelty Site

The proposed site in Novelty is a 1.3 hectare property located within the Mañalac Industrial Estate in Brgy. Bagumbayan. It is bounded on the north by a paint repacking facility, on the west and south by warehouses and on the east by the Joseph Sitt Street facing the Joseph Sitt Village. The site is a gently sloping outcrop of tuff bedrock several meters above sea and lake levels. Novelty used to be a garments factory and is currently covered by demolition debris. The present land use classification is industrial although the LGU is proposing to convert the site into a Socialised housing area. Along its eastern perimeter, a satellite market and tricycle terminal was established to service residents of Joseph Sitt Village, a residential area that slopes down to Mauling Creek.

The proposed development in Novelty constitutes the construction of a mixed use commercial building and eight (8) housing structures covering an aggregate area of 0.55 hectares. A multi-purpose loop road surrounds the structures along the area's perimeter. A network of pathways, greenbelts, and courtyards fill the spaces between the atrium-type structures that are expected to house at least 440 families upon full occupancy. Completion of site development and construction works are expected to take a year and full occupancy of the structures are planned within a year of its completion.

2. Dumlao Site

The proposed site in Dumlao is a 1.1 hectare interior lot located within the previously-agricultural areas of Brgy. Bagumbayan. It is bounded on the north by the Sta. Teresa Elementary School, and on the rest by subdivisions and residential structures. The site is generally flat and covered with wild plant growth. It has become susceptible to flooding due to the unplanned development of adjacent residential areas. Stormwater finds its way to the Dumlao property since it is the least developed among the properties within the area. The present land use classification is residential and the LGU intends to develop the area for Socialised housing.

The proposed development in Dumlao is characterized by eight (8) housing structures covering a total area of 0.31 hectares. A multi-purpose loop road surrounds the structures and an open park in the middle is integrated with a network of pathways and greenbelts. The structures are expected to accommodate 384 families. Completion of site development and construction works are expected to finish within a year and full occupancy of the structures are planned thereafter.

The AusAid Environmental Management Guide of 2003 prescribes a checklist for infrastructure activities as the tool to start off the EIA process. Through a list of questions that are presented under environmental theme headings, the EIA is conducted to generate planning information that will be reflected in the EMP. Questions within the context of specific habitats, such as forested and coastal areas and small islands, were deemed inapplicable to the sub-activity and thus were omitted from the checklist.

CHECKLIST	NOVELTY SITE	DUMLAO SITE
Resource use and socioeconomic impacts		
> Is the local population living a basically traditional lifestyle? If so, how will the activity affect resources (drinking and washing water, marine or land food, fuel, medicines, building materials, shells, coral, lime) that local people take from the natural environment?	No	
> Will the activity add to demands on local water supplies or other local resources? Or will it restrict people's access to natural resources? What plans are there to provide additional resources to meet increased needs?	Local water demand is expected to increase both during construction and during occupancy of the MRBs. Water is adequately supplied by a private utility that sources water from multiple reservoirs located in protected watersheds.	
> Will the activity affect downstream users of resources, especially water? If so, how will these resources be protected?	N/A	
> Will future opportunities to use natural resources be lost? If so, what compensation will be offered?	No	
> Will the activity require land or water use leases or changes in tenure?	No	
> Will the activity require any residents to be resettled?	No	
> Will the activity result in construction workers or other people moving into or having access to the area? How many people will be involved? Is this a large increase on the normal population of the area? How will this affect local resource availability?	Yes, approximately 500 workers are expected to be employed simultaneously within the site. Adequate water supply can be provided by the water utility (Manila Water Company Inc.) but the Proponent should ensure that the Contractor establishes temporary facilities to address water and sanitation concerns.	
> Will the activity create jobs locally? If so, will some be for women and some be for local youth?	Yes. During construction, laborers and skilled workers will be hired. Hiring is dependent on skills set. However, the Contractor should be encouraged to make certain job openings available for women.	
> Will the activity provide safe reliable transport to and from the workplace, and a safe working environment?	Residents of the adjacent Joseph Sitt Village and workers of neighboring warehouses and industrial facilities use safe and reliable public transport services. Safety is expected to be a priority of the Contractor.	Manuel L. Quezon Street, a major road in the City plied by public transport services, is walking distance from the site. Safety is expected to be a priority of the Contractor.
> Will some activity outputs meet the needs of special groups in the community (women, youth, elderly, or infirmed people)?	Yes. The design incorporated features for persons with disabilities.	
Biophysical/landscape impacts		
> Is the local vegetation mainly forest, mangroves, swamp vegetation or garden land?	No	
> Will vegetation cover be changed by the immediate or 'downstream' effects of the activity?	N/A	Yes. The site is covered with wild plant growth of mostly grass, shrubs, vines, and fruit bearing

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		trees (banana, jambolan, and tamarind). Proposed layout of the area indicates that 42% will be open space, mostly for perimeter landscaping and green areas within the pedestrian core.
> Are there important species, habitats or ecosystems in the area to be affected? Or is the area ecologically sensitive or fragile?	None	
> Can construction areas be located away from sensitive ecosystems and on flat or very gently sloping land?	N/A	
> Are there areas of limestone karst? Or are there areas of wetlands? If so, has special consideration been given to their management?	None	
> Will the activity remove any vegetation? Will it leave any surface bare? If so, what impact will the clearance have? How will sediment be prevented from entering streams?	Yes. Although the entire site is covered with concrete debris and pavement, plant growth is evident in areas where soil is exposed. Proposed layout of the area indicates that 43% will be open space, mostly for perimeter landscaping and green areas within the pedestrian core. Sediment runoff will occur during construction.	Yes. The site is covered with wild plant growth of mostly grass, shrubs, vines and fruit bearing trees (banana, jambolan, and tamarind). Proposed layout of the area indicates that 42% will be open space, mostly for perimeter landscaping and green areas within the pedestrian core. Sediment runoff will occur during construction.
> Will the activity affect coastal areas, wetlands or swamps directly or through 'downstream' effects?	No	No
> Will the activity affect slope or soil stability or involve heavy machinery?	Heavy equipment will be used during construction. Existing roads within the site will facilitate access without affecting soil stability.	Heavy equipment will be used on a generally flat work area during construction.
> Will a large land area (or a high proportion of one community's land) be affected?	No	
> Will the activity develop or operate quarries or borrow pits?	No	
> Will the activity alter the present landscape by, for example, removing rock or soil, dumping spoil or removing timber?	No. As much as possible, the housing structures and its components will maintain the existing contour of the land and minimize cut and fill sections.	Yes, existing soil containing organic debris will be removed and subsequently replaced with suitable soil foundation.
> Is the area culturally or archaeologically sensitive? For example, is it behind a beach or headland, on a low ridge, near a creek or waterhole, on a ridge or saddle in hilly country or along a traditional walking route? Are rock	No	

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shelters or caves present? Is the area named in stories? Or is it a burial area?		
> Will the activity affect traditional cultural (men's or women's) or archaeological sites? If so, what steps will be taken to protect or salvage information from the sites?	No	
Water and air quality		
> Will the activity generate waste products (including increased sewage or solid wastes)? Will waste products be disposed of locally? How will sewage be treated? How will solid waste be treated? How will rock or soil waste or chemically contaminated soil be treated?	Yes. Solid wastes and wastewater are expected to be generated during construction and upon occupancy of the MRBs. Ecological solid waste management will be practiced by both the contractor and the residents. The design provides for garbage shoots and community materials recovery facility for solid wastes, and adequate septic systems for initial wastewater treatment. Training on proper usage will be complemented with regular garbage collection and septic tank maintenance by the City.	
> Does the activity have site-specific erosion and sediment control plans for each sector of the site?	None.	
> Will the activity or its waste disposal affect the quality of local streams or the ground water? What steps are being planned to minimize sedimentation in streams or contamination of ground water?	Unlikely. Ecological solid waste management will be implemented thus minimizing impacts on local streams and groundwater.	
> Will toxic chemicals (including herbicides, tar, oils, paints, and other industrial chemicals) be used or disposed of in the area?	No.	
> Will hazardous substances (including large quantities of fuels) be used or stored in the area? What plans are there to contain these substances? How will fuel, oil, or other hazardous chemicals be delivered, transferred and stored to prevent any leakage into the soil, streams, limestone karst areas or the coastal zone?	Yes. Oil and other lubricants will be used for vehicles and equipment during construction. Proper handling and disposal of these petroleum products will be observed using best management practices.	
> Will heavy machinery create dust or noise problems, or reduce safety for pedestrians? What plans are there to minimize these impacts or separate heavy machinery from residential areas?	Yes. Proper scheduling of works in coordination with local community will greatly reduce or prevent social issues that may arise from construction. Provision of barriers or adequate perimeter fence around the construction area, regular watering of unpaved roads or exposed soil or ground and covering of dump trucks, maintenance of construction equipment (removal of soil/mud from tires before leaving the area) and installation of mufflers are ways to mitigate construction impacts through best management practices.	
> How will batching areas (for concrete or bitumen) and other construction sites be contained while in use and cleaned and rehabilitated after use?	N/A	
Environmental health and natural and construction hazards		
> Will the activity create a need to protect the environment or repair environmental damage (especially after the activity ceases)? If so,	N/A	

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has the cost of this work been built into the activity's budget?		
> Will water pond at the activity site? What steps will be taken to provide disease vector (especially mosquito) control?	Probable. Provision of ditches and onsite water impounding areas with silt traps to manage sedimentation of waterways allows the possibility of water ponds. However, these are expected to be temporary based on the construction schedule and are not expected to encourage the proliferation of disease vectors.	
> Is the environment naturally unstable (prone to coastal erosion, within a zone that would be affected by any rise in sea level or in an area of known earthquake or landslip activity, cyclones, or severe storms, floods, or droughts)?	The site is at least 200 meters from the West Valley Fault. Soil foundation, however, is stable tuff bedrock.	The site is susceptible to flooding. Adequate drainage systems incorporated in the design is expected to address the issue on potential local flooding. Structures are also prone to soil liquefaction. Replacement of underlying unstable organic debris with suitable materials was made part of the design for Dumlao.
> What plans are there to protect the activity against natural hazards? Will the presence of the activity cause increased environmental damage should hazardous natural events occur? If so, what environmental protection measures will be implemented?	N/A	
> Will any used machinery be brought to the site from other regions or from another country? If so, what steps will be taken to avoid the entry of noxious organisms? How will it be cleaned? How will the washing water be disposed of?	No	
> Are safety measures in place to protect the workforce? Is the necessary safety clothing/equipment available to all workers? Have they been trained in its use?	Occupational health and safety will form part of the contract with the service contractor. Local laws on construction safety will be employed.	
> Is there a contingency (emergency) plan to deal with spills of hazardous chemicals (including oil products) in the area?	N/A	
> Are firefighting materials and spill clean-up chemicals (water, sand, detergents, acid and alkali) available for use at the site?	Spill clean-ups are not expected. Fire extinguishers form part of the temporary facilities which will be provided by the service contractor.	

The checklist generally identified construction impacts that are temporary in nature and are preventable through best management practices by the service contractor. Effects of dust and air pollution, as well as noise and odor emissions from earthmoving activities and operations of heavy equipment could be minimized through temporary fencing, regular maintenance of vehicles and equipment, and watering of exposed soils.

During construction, possible local flooding and siltation of existing urban drainage systems can be averted through the establishment silt traps along temporary ditches or onsite water impounding areas. Issues on occupational health, sanitation and safety are anticipated with the influx of workers in the construction sites. Temporary facilities with adequate sanitary features will be built for workers while protective gear, safety signs, and debris nets will be provided and installed to prevent unsanitary workplace conditions and reduce the incidence of accidents within and around the site. Proper solid waste management during construction will also be prioritized through the orientation of workers on waste segregation, provision of separate trash receptacles for biodegradable, non-biodegradable and recyclable wastes, and regular waste collection of the City government.

During occupancy of the housing units, the potential impact to the environment is unsanitary living conditions for residents due to poor management of solid wastes and sewage/wastewater. The design incorporated solid waste management features to the building structures to facilitate segregation, temporary storage and collection of garbage. Areas for materials recovery facilities were designated in the mixed use sections and perimeter roads were given ample width to accommodate garbage collection trucks. For wastewater management, sanitation code requirements were met and green technology is considered for the treatment of sewage in lieu of the City's sewerage systems and wastewater treatment facilities.

Site-specific issues include possible disturbance of classes in adjacent schools and right-of-way concerns in Dumlao. Timely coordination with the local community in terms of scheduling construction works and materials delivery may prevent such nuisances. In addition, the lost of vegetation in Dumlao will be mitigated through replacement measures as landscaping works and provisions for vegetative buffer zones are incorporated in the design.

For Novelty, the proper relocation of the existing satellite market and tricycle terminal occupying the eastern boundary of the site will prevent possible losses of livelihood and income. These establishments are set to be accommodated in the newly developed site and are expected to continue to provide services in a more convenient and orderly facility.

Environmental hazards related to land use incompatibility in Novelty are triggered once residents start occupying the dwelling units. Operations within the Mañalac Industrial Estate will continue to pose risks to residents even if the official use of the area is lawfully reclassified. Vulnerability to the health effects of industrial fires is reduced through the provision of a perimeter road with a vegetative buffer zone. The road serves as a firebreak that gives residents additional response time for evacuation during incidents. Carriageway width allows mobility of fire trucks around the buildings and strategically-located fire hydrants facilitate fire suppression procedures. Vulnerability of residents to road accidents due to delivery vans and trucks servicing the area can be controlled through traffic management strategies that may include vehicle rerouting, scheduling, and employment of traffic aides. Exposure to heavy metals detected in the soil can be reduced through comprehensive vegetation and inhibition to tap onsite groundwater as potable water source.

Table 1 below presents the summary matrix of the EMP where management and planning tools are provided in detail to address specific environmental issues during construction and occupancy of the proposed MRBs.

Table 1. Environmental Management Plan Summary Matrix

Ref. No.	Issue	Objective	Management Strategy	Responsibility	Performance Indicator	Target Date
I. Construction Phase						
1.	Dust /air pollution and odor/noise emissions from earthmoving activities and operation of vehicles heavy equipment	To minimize disturbance to adjacent establishment in terms of air and noise quality.	<p>Provision of barriers or adequate perimeter fence around the construction area.</p> <p>Regular watering of unpaved roads or exposed soil or ground and covering of dump trucks.</p> <p>Maintenance of construction equipment (removal of soil/mud from tires before leaving the area).</p> <p>Installation of mufflers.</p> <p>Proper scheduling of works in coordination with local community.</p>	Contractor	<p>Presence of temporary barriers enclosing the site.</p> <p>Occurrence of dust suspension.</p> <p>Quality of vehicular emissions.</p> <p>Noise quality.</p> <p>No. of barangay complaints regarding construction nuisance.</p>	Construction
2.	Local flooding and siltation of existing urban drainage systems due to earthmoving activities	To maintain drainage flow and water quality in surrounding areas.	Provision of ditches and onsite water impounding areas with sediment management installations (silt traps).	Contractor	<p>Incidence of local flooding.</p> <p>Water quality of storm runoff.</p>	Construction
3.	Loss of vegetation (Dumlao only)	To replace absorptive characteristics of the existing vegetative cover of Dumlao site.	Replacement of green cover through landscaping works and provision of vegetative buffer zones around the housing units.	Design Team	Ratio of area covered by vegetation over total area.	Construction
4.	Capacity of public utilities and facilities to accommodate influx of workers into the area	To reduce and/or regulate the impacts of worker migration to service utilities and facilities in the area.	<p>Provision of temporary facilities for workers.</p> <p>Regulation of commercial development in the area, particularly on sanitation (food preparation and solid waste generation).</p>	Contractor	<p>Presence of temporary facilities to include water and sanitation provisions.</p> <p>Presence of color-coded trash receptacles for biodegradable, non-</p>	Pre-Construction

Ref. No.	Issue	Objective	Management Strategy	Responsibility	Performance Indicator	Target Date
5.	Occupational Health and Safety	To minimize incidence of accidents within and around the site.	<p>Provision of separate trash receptacles for biodegradable, non-biodegradable and recyclable wastes, with complementary orientation for workers on waste segregation.</p> <p>Provision of safety and protective gear for workers.</p> <p>Installation of safety signs.</p> <p>Provision of debris nets.</p>	Contractor	<p>biodegradable and recyclable wastes.</p> <p>No. of workers trained in solid waste management.</p> <p>Presence and usage of safety gear.</p> <p>Incidence of construction-related accidents.</p>	Construction
6.	Contamination of water bodies from oil and lubricants used during construction	To retain the quality of water bodies within and around the construction site.	Proper handling and disposal of petroleum products, including designation of a motor pool area with oil traps and provision of oil drums for disposal.	Contractor	Water quality of stormwater	Construction
7.	Displacement of existing satellite market and tricycle terminal along Joseph Sitt Street (Novelty only)	To compensate for potential losses in income of vendors and drivers during construction.	Relocation of market and transport terminal to a temporary site within the Joseph Sitt Village.	Taguig City	Income records of vendors and drivers	Pre-Construction
II. Operations and Maintenance Phase						
1.	Exposure to risks associated with land use incompatibility (Novelty only)	<p>To minimize risks from industrial operations of surrounding areas, to include:</p> <ul style="list-style-type: none"> ▪ Incidence of fire in adjacent warehouses and factories ▪ Road safety concerns from delivery vans and trucks servicing the 	<p>Incorporating a loop road and vegetation buffer in the design provides adequate distance from the surrounding industries to the housing units resulting to additional response time for residents.</p> <p>Carriageway width allows mobility of fire trucks around the buildings and strategically-located fire hydrants facilitate fire suppression procedures.</p>	Design Team	Incidence of deaths, injuries or property losses in case of fire.	Pre-Construction

Ref. No.	Issue	Objective	Management Strategy	Responsibility	Performance Indicator	Target Date
		area <ul style="list-style-type: none"> Exposure to heavy metals detected on soil samples 	Traffic management strategies that include rerouting, scheduling, and employment of traffic aides may reduce risks to traffic-related accidents in the area.	Taguig City in consultation with TBCAI	Incidence of accidents related to the transport system of industries surrounding the site.	Occupancy of the structures
			Immobilization of soil through vegetative cover and landscaping works. Tapping of groundwater for water source is constrained by the perceived depth of the water table.	Taguig City	Water quality	Occupancy of the structures
2.	Increased generation of solid wastes	To effectively manage increased generation of solid wastes in the community.	IEC campaign and training of residents on ecological solid waste management. Provision of segregation-friendly garbage storage bins and areas for collection. Regular collection of residual wastes by the City of Government. Establishment of community materials recovery facility.	Taguig City and Design Team	Volume of residual wastes generated by the community. Monthly income of the materials recovery facility. Presence of foul odor resulting from unmanaged solid wastes.	Pre-Construction
3.	Increased generation of wastewater	To effectively treat wastewater discharged by hundreds of residents.	Provision of a 3-chambered septic tank connected to a secured sub-surface/ surface treatment pond or bed in lieu of a local sewerage treatment facility.	Design Team	Water quality of wastewater	Pre-Construction
4.	Accumulation of drain and storm water causing local flooding within and around the vicinity	To address local flooding concerns arising from the development of the sites.	Provision of adequate drainage lines connected to an effective local drainage system.	Design Team	Incidence of local flooding within the area and the outlying vicinity	Pre-Construction