Overview: Oxygen Plant Site Considerations

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This document was developed by Build Health International for the Global Fund's Project BOXER.

This document contains checklists to assess potential locations for three types of PSA plant housing methods. These include:

1. **Existing rooms or buildings** within the facility that must be retrofitted to meet the vendor's space, ventilation, and structural requirements.
2. **A new plant building** that must meet vendor's space, ventilation, and structural requirements, but allows for extra flexibility to include additional supporting spaces, such as an office, storage room, or restroom.
3. **A containerized plant**, which requires a concrete slab (size meeting vendor minimum requirements) and canopy, which is strongly recommended (and in some cases required) to provide protection to the container and its operators.

The PR should use these checklists to evaluate spaces available on their facility campus to host the PSA plant. The checklists identify key considerations for ensuring adequate site readiness and are not exhaustive. Consult with the PSA plant supplier about the intended site to ensure all requirements are considered.

1. For an existing structure that will house a PSA Plant

Area / Conditions / Access	
Consider space to install the equipment The proposed space will need to be large enough to host the PSA plant (large mechanical equipment). This space will need to meet the supplier's minimum requirements. An additional one meter around the perimeter of the oxygen plant is recommended for safe operation and maintenance. *Note: At the time of procurement, specify the room dimensions in the tender to ensure bids are suitable for the space. If suppliers report that the space is not large enough to accommodate the PSA plant size requested, alternative housing options will need to be explored.*	☐
Consider door openings The door openings will need to meet the minimum required dimensions (typically 2.3m) provided by the supplier to accommodate the PSA plant equipment. If existing doors do not meet these dimensions, consider if they can be enlarged in the relevant directions.	☐
Consider ceiling height The ceilings in the space must be high enough to meet the minimum height requirements provided by the supplier to accommodate the PSA plant equipment. Average ceiling heights (approximately 2.4m) are typically insufficient to accommodate PSA plant equipment.	☐

Consider cylinder transportation If you intend for your plant to fill cylinders, consider the ease of access for filled and empty cylinders. Consider the following: ● Proximity to cylinder storage areas ● Proximity truck loading areas, if cylinders will be transported via trucks ● Proximity to wards or manifolds where cylinders intend to be used. ● The presence of obstacles, such as stairs and narrow hallways ● The presence of ramps to accommodate cylinder transportation or the space available to create ramps ● The presence of paved walkways from the building to ensure smooth transportation of cylinders in the event of flooding, heavy rain, or snow	☐
Consider cylinder storage If you intend for your plant to fill cylinders, consider if there is space in the existing structure for full and empty cylinders to be stored. If storage is not possible in the existing structure, consider alternative cylinder storage locations.	☐
Consider MGPS connections If you intend for your plant to connect to a Medical Gas Piping System (MGPS) to deliver oxygen directly to patient bedsides, consider the structure's proximity to the end use wards. Consider if the distances to pipe will present a challenge physically or financially. Piping over long distances can also cause oxygen pressure to drop between the source and the patient oxygen outlet.	☐
Consider access for plant delivery Consider whether access to the space is sufficient to navigate a forklift or pallet jacket to transport the plant equipment from the delivery truck or container into the identified space.	☐
Consider structural stability Consider if the identified structure is structurally sound. The existing structure must support large, heavy mechanical equipment.	☐
Consider sources of air pollution Examine the structures or activities around the existing structure. Sources of smoke and exhaust (including burn pits, incinerators, diesel generators, and vehicle exhausts) must be greater than 10 meters of the PSA plant. Open flames and other ignition sources must also be greater than 10 meters from the PSA plant.	☐
Consider flood risk Consider whether or not the space is prone to flooding. If the site is prone to flooding, equipment will need to be raised to an appropriate height to protect the PSA plant.	☐
Consider PSA plant noise level Consider if the plant is in an area where equipment noise will be objectionable. If the identified location is near sensitive areas such as patient wards or residences, the location may need to be reevaluated or noise reduction measures may need to be considered.	☐
Consider underground utilities Consider if there may be any underground utilities running below the identified location. If so, these may need to be rerouted for the space to be utilized.	☐
Consider supporting spaces Some PSA plant installations include site-specific supporting infrastructure, such as offices, storage rooms, cylinder storage spaces, toilets, and meeting rooms. Consider if any of these additions are required for your PSA plant and determine if the existing space can accommodate these features.	☐

HVAC	
Consider ventilation Consider whether there are enough louvers or windows to allow ample fresh air into the space. If it is identified that additional ventilation is required, the space will need to be retrofitted to allow for additional ventilation.	☐
Consider space for air compressor ducting Consider whether the room can accommodate new ductwork. This often requires at least one exterior wall or the ability to install ductwork into the ceiling to outside.	☐
Consider the temperature of the space PSA plant equipment can only operate in a specific temperature range. This range varies by manufacturer, but often does not exceed 40°C. Consider if the space selected reaches or approaches 40°C. If it does, cooling systems will need to be considered.	☐
Consider active cooling Consider if the space can accommodate air conditioning units, should they be required.	☐
Electrical	
Consider electrical power supply connections The PSA plant will need at least one three-phase power supply, which can already exist at the facility or can be installed before the PSA plant arrives. Consider if the structure is near to transformers or diesel generators with existing capacity that can supply the PSA plant. If existing power supplies do not exist or do not have sufficient capacity, consider if there are areas of the campus near to the existing structure where new power supplies can be installed.	☐
Consider electricity for accessory functions The existing space must already have or have the capacity to add lighting and power outlets.	☐

2. For a new plant building

Area / Conditions / Access	
Consider size of the available space The proposed space will need to be large enough to construct a building that can house the PSA plant (large mechanical equipment). This building will need to meet the supplier's minimum requirements. *Note: At the time of procurement, specify the available plot dimensions in the tender to ensure bids are suitable for the space. If suppliers report that the space is not large enough to accommodate the PSA plant size requested, alternative housing options will need to be explored.*	☐
Consider cylinder transportation If you intend for your plant to fill cylinders, consider the ease of access to/from the identified building location for transporting cylinders. Consider the following: ● Proximity to cylinder storage areas (if it will not be in the new structure) ● Proximity truck loading areas, if cylinders will be transported via trucks ● Proximity to wards or manifolds where cylinders intend to be used. ● The presence of obstacles, such as stairs and narrow hallways ● The presence of ramps to accommodate cylinder transportation or the space available to create ramps	☐

• The presence of paved walkways from the building to ensure smooth transportation of cylinders in the event of flooding, heavy rain, or snow	
Consider cylinder storage If you intend for your plant to fill cylinders, consider if the available plot will accommodate a structure large enough to store full and empty cylinders in addition to the plant. If storage is not possible in this location, consider alternative cylinder storage locations.	☐
Consider MGPS connections If you intend for your plant to connect to a Medical Gas Piping System (MGPS) to deliver oxygen directly to patient bedsides, consider the proximity of the proposed location to the end use wards. Consider if the distances to pipe will present a challenge physically or financially. Piping over long distances can also cause oxygen pressure to drop between the source and the patient oxygen outlet.	☐
Consider access for plant delivery Consider whether access to the space is sufficient to navigate a forklift or pallet jacket to transport the plant equipment from the delivery truck or container into the identified space.	☐
Consider sources of air pollution Examine activities around the proposed location. Sources of smoke and exhaust (including burn pits, incinerators, diesel generators, and vehicle exhausts) must be greater than 10 meters of the PSA plant. Open flames and other ignition sources must also be greater than 10 meters from the PSA plant.	☐
Consider flood risk Consider whether or not the identified site is prone to flooding. If the site is prone to flooding, the foundation of the structure will need to be raised to an appropriate height to protect the PSA plant.	☐
Consider PSA plant noise level Consider if the identified location is in an area where equipment noise will be objectionable. If the identified site is near sensitive areas such as patient wards or residences, the location may need to be reevaluated or noise reduction measures may need to be considered.	☐
Consider underground utilities Consider if there may be any underground utilities running below the identified location. If so, these may need to be rerouted for the space to be utilized.	☐
Consider supporting spaces Some PSA plant installations include site-specific supporting infrastructure, such as offices, storage rooms, cylinder storage spaces, toilets, and meeting rooms. Consider if any of these additions are required for your PSA plant and determine if the existing space can accommodate these features.	☐
Consider the grading of the site Consider if the identified location has a relatively level surface or if it has a slope or incline. Sites with slopes or inclines will require additional earthwork to ensure the concrete pad is level.	☐
HVAC	
Consider the temperature of the space PSA plant equipment can only operate in a specific temperature range. This range varies by manufacturer, but is often capped at 40°C. Consider if the space selected reaches or approaches 40°C. If it does, cooling systems will need to be considered.	☐

Electrical	
Consider electrical power supply connections The PSA plant will need at least one three-phase power supply, which can already exist at the facility or can be installed before the PSA plant arrives. Consider if the structure is near to transformers or diesel generators with existing capacity that can supply the PSA plant. If existing power supplies do not exist or do not have sufficient capacity, consider if there are areas of the campus near to the existing structure where new power supplies can be installed.	☐

3. For a Containerized PSA Plant

Area / Conditions	
Consider space to accommodate container The proposed site will need to be large enough to house the concrete pad that will support the container or containers. Containers are typically 6m or 12m in length, but the concrete pad typically extends around the container to accommodate external PSA plant equipment and create a working area for plant operators. Suppliers will have different minimum dimension requirements for concrete pad. The capacity of the PSA plant requested will determine the size and number of containers needed to house the PSA plant equipment.	☐
Consider cylinder transportation If you intend for your plant to fill cylinders, consider the ease of access for filled and empty cylinders. Consider the following: ● Proximity to cylinder storage areas ● Proximity truck loading areas, if cylinders will be transported via trucks ● Proximity to wards or manifolds where cylinders intend to be used. ● The presence of obstacles in cylinder transportation pathways throughout the facility (e.g, stairs, narrow hallways, etc) ● The presence of ramps to accommodate cylinder transportation or the space available to create ramps ● The presence of paved walkways from the building to ensure smooth transportation of cylinders in the event of flooding, heavy rain, or snow	☐
Consider cylinder storage If you intend for your plant to fill cylinders, consider if there is space in the existing structure for full and empty cylinders to be stored. If storage is not possible in the existing structure, consider alternative cylinder storage locations.	☐
Consider MGPS connections If you intend for your plant to connect to a Medical Gas Piping System (MGPS) to deliver oxygen directly to patient bedsides, consider the structure's proximity to the end use wards. Consider if the distances to pipe will present a challenge physically or financially. Piping over long distances can also cause oxygen pressure to drop between the source and the patient oxygen outlet.	☐
Consider access for plant delivery Consider whether access to the space is sufficient to navigate a lifting crane of sufficient capacity to the site. Consider if it is possible to unload the container from the truck using the crane at the selected location. Consider that it is possible to remove obstacles such as fencing or walls and re-establish boundary features following the installation of the container. Consider if the roads leading to the location can accommodate the truck. The roads to the site must: ● Be of sufficient width ● Contain turns or turn-around areas navigable by the truck	☐

• Be free from height restrictive obstacles, such as low power lines and arches, or able to mitigate these obstacles prior to delivery.	
Consider sources of air pollution Examine the structures or activities around the existing structure. Sources of smoke and exhaust (including burn pits, incinerators, diesel generators, and vehicle exhausts) must be greater than 10 meters of the PSA plant. Open flames and other ignition sources must also be greater than 10 meters from the PSA plant.	☐
Consider flood risk Consider whether or not the space is prone to flooding. If the site is prone to flooding, equipment will need to be raised to an appropriate height to protect the PSA plant.	☐
Consider PSA plant noise level Consider if the plant is in an area where equipment noise will be objectionable. If the identified location is near sensitive areas such as patient wards or residences, the location may need to be reevaluated or noise reduction measures may need to be considered.	☐
Consider underground utilities Consider if there may be any underground utilities running below the identified location. If so, these may need to be rerouted for the space to be utilized.	☐
Consider supporting spaces Some PSA plant installations include site-specific supporting infrastructure, such as offices, storage rooms, cylinder storage spaces, toilets, and meeting rooms. Consider if any of these additions are required for your PSA plant and determine if the existing space can accommodate these features.	☐
Consider the grading of the site Consider if the identified location has a relatively level surface or if it has a slope or incline. Sites with slopes or inclines will require additional earthwork to ensure the concrete pad is level.	☐
Consider space for a canopy Canopies over containerized plants are recommended to provide shade and protection from the elements. Consider if the identified location can accommodate a canopy. Specifically, consider if there are any overhead cables or other obstacles that may need to be adjusted.	☐
Consider security measures Containerized plants may have equipment on their exterior and access to this space should be restricted. Consider if the identified location can accommodate fencing or other necessary security measures.	☐
Consider environmental conditions Consider if the container will be exposed to harsh environmental conditions. Explore if the container will be exposed to blowing dust, dirt, sand, rain, sleet or snow. This information is important to share with the supplier. This will also inform the design of the canopy, as extended roof projections or other opening protection may be needed to facilitate plant operations.	☐
HVAC	
Consider the temperature of the space PSA plant equipment can only operate in a specific temperature range. This range varies by manufacturer, but often does not exceed 40°C. Consider if the space inside of a container housed under a canopy is likely to exceed 40°C in your environment. If it does, cooling systems will need to be considered.	☐

Electrical	
Consider electrical power supply connections The PSA plant will need at least one three-phase power supply, which can already exist at the facility or can be installed before the PSA plant arrives. Consider if the structure is near to transformers or diesel generators with existing capacity that can supply the PSA plant. If existing power supplies do not exist or do not have sufficient capacity, consider if there are areas of the campus near to the existing structure where new power supplies can be installed.	☐