

1. Low Impact Development [LID] Storm Water Management

The project storm water management design will be required to comply with the City of El Segundo LID requirements. The first flush (85th percentile annual rainstorm) of storm run-off will need to be either:

- Infiltrated in the soils, by mean of deep infiltration wells or shallow infiltration trenches;
- Captured in a cistern and treated for on-site re-use [irrigation];
- Filtered through bio-retention planters and released.

LID design will be reviewed by the City of El Segundo Building and Safety Division. In the City of El Segundo, infiltration is the first tier of stormwater management design that should be considered to satisfy LID. If infiltration is deemed infeasible by the geotechnical engineer, the second tier of capture and re-use may need to be considered. If capture and re-use is deemed infeasible, perhaps due to the amount of landscaping provided on site being less than the required amount of landscaping needed to utilize the stormwater captured in the cistern, then the last tier of biofiltration/bioretenion can be explored to satisfy LID requirements.

The type of storm water management system selected will primarily depend on whether the soils are suitable for infiltration. We anticipate the geotechnical engineer to provide this assessment and provide design criteria for the storm water management system.

The LID volume calculations for the project depend on the total project area of disturbance. This includes all existing at grade surfaces being altered, existing buildings roofs areas modifications impacting the existing roof drainage pattern and areas to be excavated within the existing buildings footprints for structural reasons.

Based on the County of Los Angeles guidelines followed by the City of El Segundo Building and Safety Division in charge of reviewing proposed LID designs:

- "Where 50 percent or more of the impervious surface of a previously developed site is proposed to be altered and the previous development project was not subject to post-construction stormwater quality control measures, the entire development site [e.g., both the existing development and the proposed alteration) must meet the requirements of the LID Standards Manual.

- Where less than 50 percent of the impervious surface of a previously developed site is proposed to be altered and the previous development project was not subject to post-construction stormwater quality control measures, only the proposed alteration must meet the requirements of the LID Standards Manual."

Based on these guidelines, preliminary LID stormwater mitigation volumes to be considered for the project are as follows:

- Up to 11,402 cubic feet if the project disturbed area is limited to 50% or less of the total project area.
- 22,804 cubic feet if the project disturbed area is more than 50% of the total project area.

Here below is a breakdown of possible storm water management systems based on the selected Tier.

Tier 1 Design [Infiltration]

LID System components may include:

- a. Pre-treatment: CDS units or downspout filters;
- b. Temporary stormwater detention system: tanks [masonry or prefabricated) and/or detention pipes located on-site. The capacity of the storage system will equate approximately to the LID stormwater mitigation volume;

Drywell[s): passive vertical underground wells located on-site - away from buildings footings and private property lines per LID regulations - to inject storm runoff into the soils. Number and depth of drywells required is dependent on percolation test results which is to be provided by the Geotechnical engineer. We understand the percolation test[s) have not been performed yet but are being planned with the rest of the geotechnical investigation.

- c. Overflow outlet[s) to public storm drain or street.

Storm drainage flow from roof downspouts is first routed to the pre-treatment system[s), prior to being discharged into the detention system[s) and drywell[s).

Tier 2 Design [Capture and Re-use]

The project needs to include sufficient landscaped areas to justify this design. LID System components may include:

- a. Pre-treatment: CDS units or downspout filters;
- b. Permanent storage tank[s): masonry or prefabricated tank[s) located

on- site. The capacity of the tank(s) will equate approximately to the LID stormwater mitigation volume. Prefabricated tanks need to have a third-party rating [UL or other];

- c. Pump and treatment skid [if required];
- d. Connection to irrigation system;
- e. Overflow outlet(s) to public storm drain or street.

Storm drainage flow from roof downspouts is first routed to the pre-treatment system(s), prior to being discharged into the permanent storage tank(s), where it can then be used for irrigation on site.

Tier 2 designs require review and approval by the County Health Department, in addition to the City Department of Building and Safety.

Tier 3 Design [Biofiltration "Flow Through Planters"]

This tier requires the project to capture 1.5 times the amount of storm water required for the previous two tiers. The required volume will dictate the minimum required area of flow through planters.

LID System Components may include:

- a. All roof downspouts to be routed to flow through planters;
- b. Engineered media in flow through planters to treat the stormwater;
- c. Perforated underdrain to collect the treated stormwater;
- d. Connection to a storm drain system on site;
- e. Overflow to public storm drain or street.

The amount of storm water to be mitigated will depend on the amount of hardscape or roof areas that is constructed. Permeable pavement, landscape areas or green roofs can help reduce the amount of storm run-off that requires mitigation.