C. LOW IMPACT DEVELOPMENT TO CONTROL POLLUTANTS IN URBAN RUNOFF FROM NEW DEVELOPMENT/SIGNIFICANT REDEVELOPMENT:

1. Within 12 months of adoption of this order, the permittees shall update the model WQMP to incorporate LID principles (as per Section XII.C) and to address the impact of urbanization on downstream hydrology (as per Section XII.D) and a copy of the updated model WQMP shall be submitted for review and approval by the Executive Officer[55]. As provided in Section XII.J, 90 days after approval of the revised model WQMP, p~~P~~riority development projects shall implement LID principles described in this section, Section XII.C. To the extent the Executive Officer has not approved the feasibility criteria as provided in Section XII.E.1, the infeasibility of implementing LID BMPs shall be determined through project specific analyses, each of which shall be submitted to the Executive Officer, 30 days prior to municipal approval.

2. The permittees shall reflect in the WQMP and otherwise require that each priority development project infiltrate, harvest and re-use, evapotranspire, ~~capture, or~~ bio-treat~~filter~~[56] the 85th percentile storm event ("design capture volume"), as specified in Section XII.B.4.A.1, above. ~~Projects that do not comply with this requirement shall meet the requirements established in section XII.E. for alternative or in-lieu compliance.~~ Any portion of the design capture volume that is not infiltrated, harvested and re-used, evapotranspired~~, captured~~ or bio-treated~~filtered~~[57] onsite by LID BMPs shall be treated and discharged using LID or ~~conventional~~ similarly effective treatment control BMPs or mitigated as set forth in Section XII.C.7, below. Projects that do not comply with this requirement shall meet the requirements established in section XII.E. for alternative or in-lieu compliance, which shall assure at least equivalent environmental performance.

3. The permittees shall incorporate LID site design principles to reduce runoff to a level consistent with the maximum extent practicable standard during each phase of priority development projects. The permittees shall require that each priority development project include site design BMPs during development of the preliminary and final WQMPs. The design ~~strategy~~ goal shall be to maintain or replicate the pre-development hydrologic regime through the use of design techniques that create a functionally equivalent post-development hydrologic regime through site preservation techniques and the use of integrated and distributed micro-scale storm water infiltration, retention, detention,

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[55] The Executive Officer shall provide members of the public with notice and at least a 30-day comment opportunity for all documents submitted in accordance with this order. If the Executive Officer, after considering timely submitted comments, concludes that the document is adequate or adequate with specified changes, the Executive Officer may approve the document or present it to the Board for its consideration at a regularly scheduled and noticed meeting.

[56] A properly engineered and maintained bio~~-filtration, bio-retention or other bio-~~treatment system~~s~~ may be considered only if infiltration, harvesting and reuse and evapotranspiration ~~are~~ cannot be feasibly implemented at a project site ~~feasible~~. Specific design, operation and maintenance criteria for bio-treatment systems shall be part of the model WQMP that will be produced by the permittees.

[57] ~~A properly engineered and maintained bio-filtration, bio-retention or other bio-treatment systems may be considered only if infiltration, harvesting and reuse and evapotranspiration are not feasible.~~ See footnote 56.

evapotranspiration, filtration and treatment systems as close as feasible to the source of runoff. Site design considerations shall include, but not be limited to:

a) Limit disturbance of natural water bodies and drainage systems; conserve natural areas; preserve trees; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from storm water and urban runoff on the biological integrity of natural drainage systems and water bodies;

b) Minimize changes in hydrology and pollutant loading; require incorporation of controls, including structural and non-structural BMPs, to mitigate the projected increases in pollutant loads and flows; ensure that post-development runoff durations and volumes from a site have no significant adverse impact on downstream erosion and stream habitat; minimize the quantity of storm water directed to impermeable surfaces and the MS4s; minimize paving, minimize runoff by disconnecting roof leader and other impervious areas and directing the runoff to pervious and/or landscaped areas, minimize directly connected impervious areas; design impervious areas to drain to pervious areas; consider construction of parking lots, walkways, etc., with permeable materials; minimize pipes, culverts and engineered systems for storm water conveyance thereby minimizing changes to time of concentration on site; utilize rain barrels and cisterns to collect and re-use rainwater; maximize the use of rain gardens and sidewalk storage; and maximize the percentage of permeable surfaces distributed throughout the site's landscape to allow more percolation of storm water into the ground;

c) Preserve wetlands, riparian corridors, vegetated buffer zones and establish reasonable limits on the clearing of vegetation from the project site;

d) Use properly designed and well maintained water quality wetlands, bio-retention areas, filter strips and bio-filtration swales; consider replacing curbs gutters and conventional storm water conveyance systems with biotreatment systems, where such measures are likely to be effective and technically and economically feasible;

e) Provide for appropriate permanent measures to reduce storm water pollutant loads in storm water from the development site;

f) Establish development guidelines for areas particularly susceptible to erosion and sediment loss;

g) Implement effective education programs to educate property owners to use pollution prevention measures and to maintain on-site hydrologically functional landscape controls; and

h) During the early planning stages of a project, the LID principles shall be considered to address pollutants of concern identified in the Watershed Action Plans and TMDL Implementation Plans, and the LID BMPs shall be incorporated into the sites conceptual WQMP.

4. The selection of LID principles shall be prioritized in the following manner (from highest to the lowest priority): (1) Preventative measures (these are mostly non-structural measures, e.g., preservation of natural features to a level consistent with the maximum extent practicable standard; minimization of runoff through clustering, reducing impervious areas, etc.) and (2) Mitigation (these are structural measures, such as, infiltration, harvesting and reuse, bio-treatment, etc. The mitigation or structural site design BMPs shall also be prioritized (from highest to lowest priority): (1) Infiltration (examples include permeable pavement with infiltration beds, dry wells, infiltration trenches, surface and sub-surface infiltration basins. All infiltration activities should be coordinated with the groundwater management agencies, such as the Orange County Water District); (2) Harvesting and Re-use (e.g., cisterns and rain barrels); and (3) Bio-treatment such as bio-filtration/bio-retention.

5. Even though the LID principles are universally applicable, there could be constraining factors, such as: soil conditions, including soil compaction, saturation (e.g., hydric soils) and permeability, groundwater levels, soil contaminants (Brownfield developments), space restrictions (in-fill projects, redevelopment projects, high density development, transit-oriented developments), naturally occurring contaminants (e.g., selenium in the soil and the groundwater in the Newport Bay Watershed), etc. In such cases, the LID principles could be integrated into other programs, such as: Smart Growth[58], New Urbanism[59] or regional or sub-watershed management approaches. Also see Section E, below, for alternatives and in-lieu programs.

6. The LID BMPs shall be designed to mimic pre-development site hydrology through technically and economically feasible preventive and mitigative site design techniques. LID combines hydrologically functional site design with pollution prevention methods to compensate for land development impact on hydrology and water quality.

7. If site conditions do not permit infiltration, harvesting and re-use, ~~and/or~~ evapotranspiration, and/or bio-treatment of the design capture volume at the project site as close to the source as possible, the alternatives discussed below should be considered and the credits and in-lieu programs discussed under Section E, below, may be considered:

    a. Implement LID principles at the project site. This is the preferred approach. For example, in a single family residential development: connect roof drains to a landscaped area, divert driveway runoff to a vegetated strip and minimize any excess runoff generated from the development. The pervious

[58] Smart Growth refers to the use of creative strategies to develop ways that preserve natural lands and critical environmental areas, protect water and air quality, and reuse already-developed land.

[59] New Urbanism is somewhat similar to Smart Growth and is based on principles of planning and architecture that work together to create human-scale, walkable communities that preserve natural resources.

areas to which the runoff from the impervious areas are connected should have the capacity to infiltrate ~~and/or~~, harvest and re-use, evapotranspire and/or bio-treat at least the design capture volume.

b. Implement as many LID principles as possible at the project site close to the point of storm water generation and infiltrate and/or harvest and re-use at least the design capture volume through designated infiltration/treatment areas elsewhere within the project site. For example, at a condominium development: connect the roof drains to landscaped areas, construct common parking areas with pervious asphalt with a sub-base of rocks or other materials to facilitate percolation of storm water, direct road runoff to curbless, vegetated sidewalks. The pervious areas which receive runoff from impervious areas should have the capacity to infiltrate, harvest and re-use, evapotranspire and/or bio-treat at least the design capture volume.

c. Implement LID on a sub-regional basis. For example, at a 100 unit high density housing unit with a small strip mall and a school: connect all roof drains to vegetated areas (if there are any vegetated areas, otherwise storm water storage and reuse may be considered or else divert to the local storm water conveyance system, to be conveyed to the local treatment system), construct a storm water infiltration gallery below the school playground to infiltrate and/or harvest and re-use the design capture volume. The pervious areas to which the runoff from the impervious areas are connected should have the capacity to infiltrate, harvest and re-use, evapotranspire and/or bio-treat at least the design capture volume. (Also see discussion on hydrologic conditions of concern, below.)

d. Implement LID on a regional basis. For example, several developments could propose a regional system to address storm water runoff from all the participating developments. The pervious areas to which the runoff from the impervious areas are connected should have the capacity to infiltrate, harvest and re-use, evapotranspire and/or bio-treat at least the design capture volume from the entire tributary area. (Also see discussion on hydrologic conditions of concern, below.)

D. HYDROLOGIC CONDITIONS OF CONCERN (HYDROMODIFICATION[60])

1. Each priority development project shall be required to ascertain the impact of the development on the site's hydrologic regime and include the findings in the WQMP, including the following for a two-year frequency storm event:

   a) Increases in runoff volume;

   b) Decreases in infiltration;

   c) Changes in time of concentration;

   d) Potential for increases in post development downstream erosion; and,

[60] Hydromodification is the alteration of natural flow characteristics.