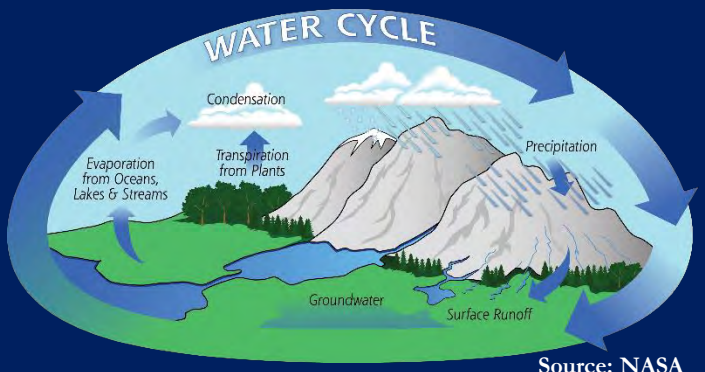
Great Salt Lake Stormwater Study

Basin-Wide Analysis of Stormwater Flows, Low Impact Development (LID), and Groundwater Contributions

The GSL Basin & the Water Cycle

Precipitation (snow, rain) is the only way that water comes to the Great Salt Lake (GSL). No other water flows into the lake from adjacent basins. Evapotranspiration (ET) is the only way which the GLS loses water. ET includes both surface evaporation and vegetation-based transpiration, which is water loss to the atmosphere due to plant uptake and water vapor release.



Source: NASA

Accounting only for these natural processes:

- when **precipitation > ET**, GSL volume and lake level **increase**
- when **ET > precipitation**, GSL volume and lake level **decrease**

Low-Impact Development (LID)

Low-Impact Development (LID), also referred to as **Green Infrastructure (GI)**, are planning and engineered solutions that use or mimic natural processes to promote infiltration, re-use, and evapotranspiration of stormwater flows. They are designed to capture surface flows from impervious surfaces (building roofs, paved surfaces) with the primary purpose of improving water quality, protecting aquatic habitat, and preserving and restoring green space.

Source: Utah Department of Environmental Quality

Components of This Study

Surface Water Model:
Quantifies stormwater runoff and infiltration under future-development scenarios with and without LID.

Groundwater Models:
Predict sub-surface flows from aquifers to Great Salt Lake and ET-based losses from groundwater to surface.

Basin-Wide Water Balance:
Uses previous studies of the GSL Basin to estimate contributions from stormwater, groundwater, and all other sources.

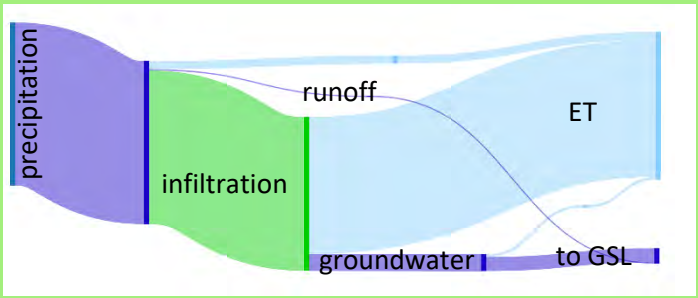
Results Summary

Baseline (existing condition) and two future development scenarios (with and without LID) were evaluated. All future scenarios resulted in increased flows to GSL because of the additional runoff generated by future development. LID routes the additional surface runoff through the groundwater aquifers.

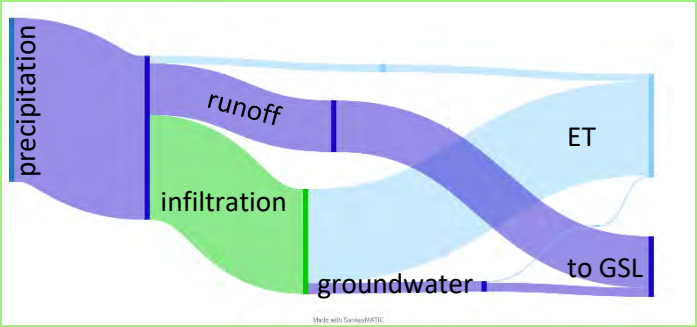
Unitized Stormwater Volumes With and Without LID (per 100 acres)

The diagrams below express the study results in terms of flows per 100 acres to the GSL under three scenarios:

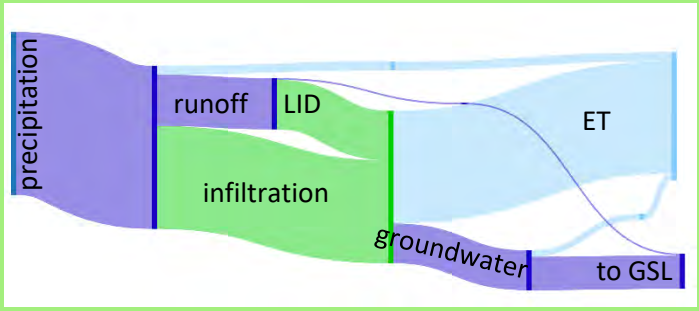
- Undeveloped *(right image)*
- Future development w/o LID *(bottom left image)*
- Future development w/ LID *(bottom right image)*



Undeveloped (per 100 acres): 18 ac-ft/yr to GSL



Development *without* LID (per 100 acres): 71 ac-ft/yr to GSL

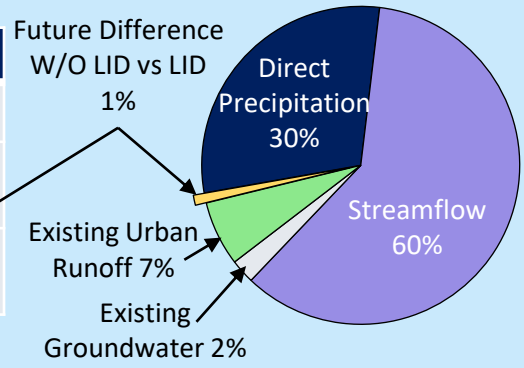


Development *with* LID (per 100 acres): 42 ac-ft/yr to GSL

Total Future Additional Flows to GSL (acre-feet/year)

Year	Without LID	− LID	= Difference
current	3,001,000	3,001,000	n/a
2040	+28,050 (+1.0%) (+19,700 to +37,600)	+12,450 (+0.5%) (+8,750 to +16,700)	+15,600 (+10,950 to +20,900)
2060	+56,100 (+2.0%) (+39,400 to +75,200)	+24,900 (+1.0%) (+17,500 to +33,400)	+31,200 (+21,900 to +41,800)

Ranges shown assume future developed areas may vary by ±10% and the percent of developed area that is impervious may vary by ±5 to 10%.



General Observations

	Overall Development	Without LID	With LID
Benefits	Increases water to the GSL	• More water to GSL than with LID • Water reaches GSL faster (days)	• Improved water quality • Increases groundwater recharge
Drawbacks	Impairs water quality	• Reduces groundwater recharge • Requires alternative water quality treatments	• Water reaches GSL slower (years) • Increased ET resulting in less water to GSL than without LID

Next Steps

LID has important water quality benefits but may reduce surface flows to the Great Salt Lake when compared with development scenarios that do not include LID. Follow-up studies are recommended to explore and quantify:

- The water quality benefits of Utah-appropriate LID practices
- Water quality alternatives to LID
- Cost-benefit analysis of LID vs. alternative water quality treatment