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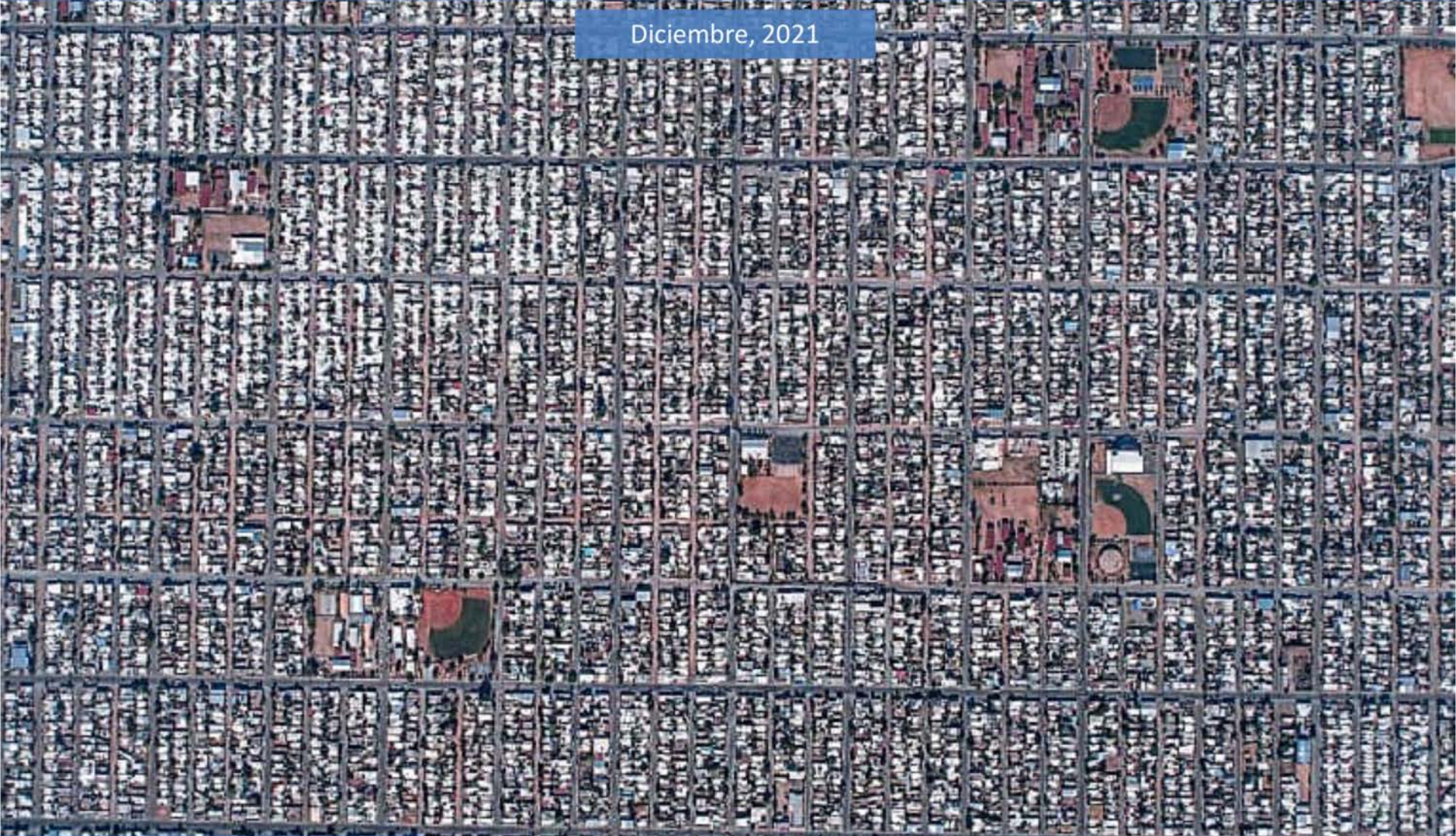


<https://watershedmg.org/>

Infraestructura Verde // La Lluvia:

Casas Productivas y Ciudades Naturales

Diciembre, 2021

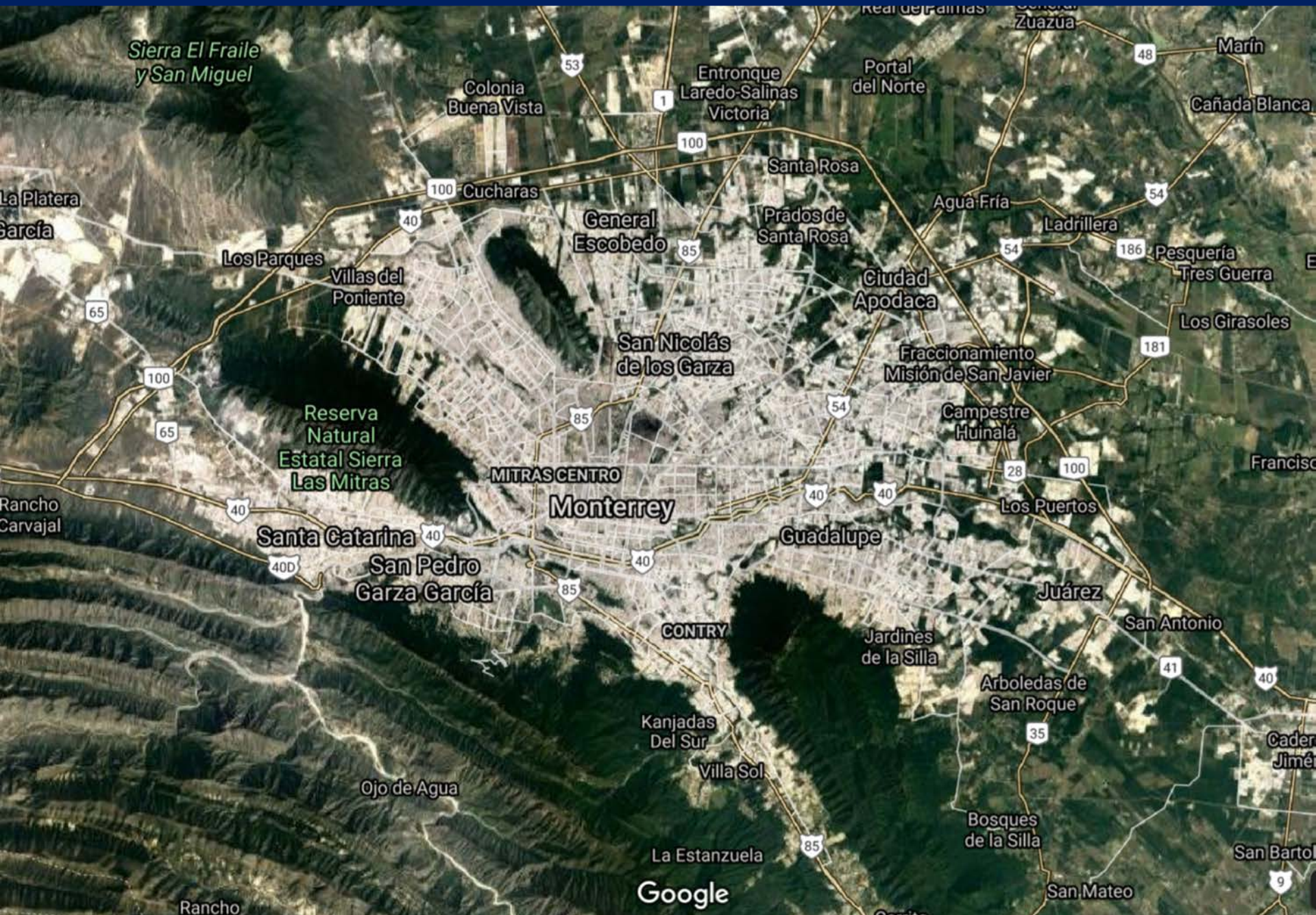


Dr. Joaquin Murrieta Saldivar
Ecología Cultural - WMG









Sierra El Fraile y San Miguel

Colonia Buena Vista

Entronque Laredo-Salinas Victoria

Portal del Norte

Marín

Cañada Blanca

La Platera García

Los Parques

Villas del Poniente

General Escobedo

Santa Rosa

Prados de Santa Rosa

Agua Fría

Ladrillera

Pesquería Tres Guerra

Los Girasoles

65

100

65

Reserva Natural Estatal Sierra Las Mitras

MITRAS CENTRO

Monterrey

Fraccionamiento Misión de San Javier

Campestre Huinalá

Los Puertos

Francisco

Rancho Carvajal

Santa Catarina

San Pedro Garza García

Guadalupe

Juárez

San Antonio

CONTRY

Jardines de la Silla

Arboledas de San Roque

Cader Jiménez

Ojo de Agua

Kanjadas Del Sur

Villa Sol

La Estanzuela

Bosques de la Silla

San Bartolomé

Rancho

Google

San Mateo

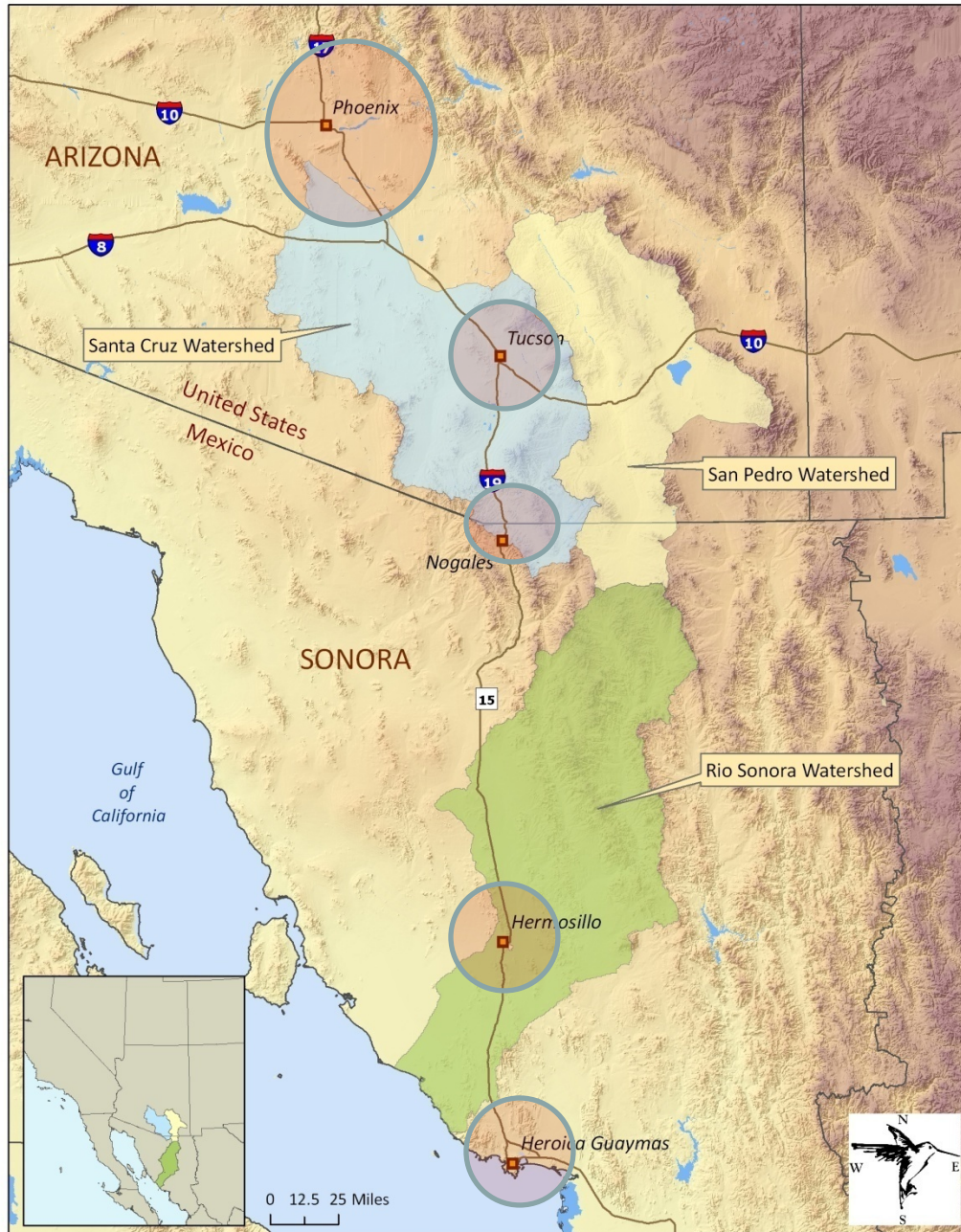


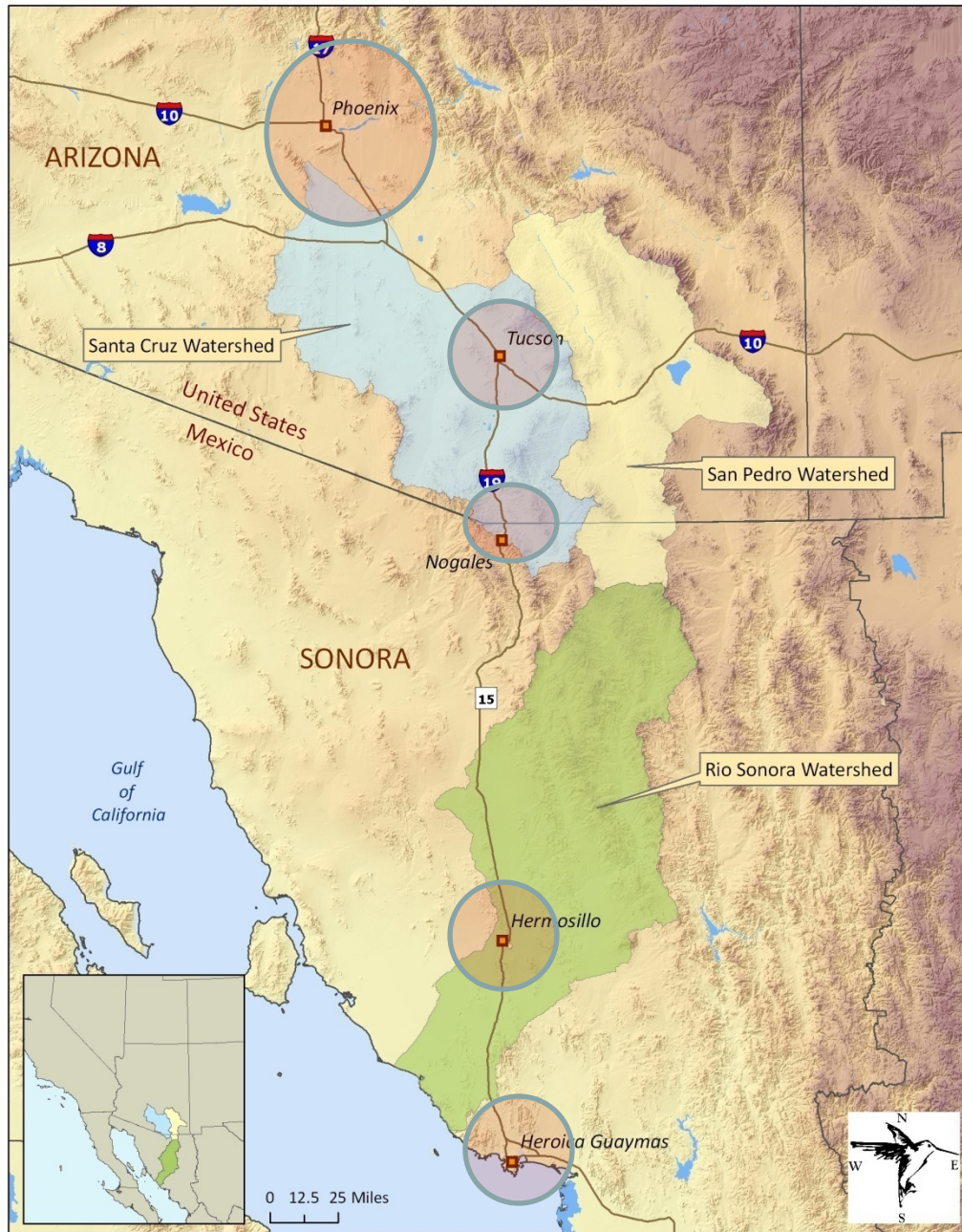
El Futuro de la Humanidad es Urbano



- Adaptabilidad
- Agua
- Drenaje
- Oxígeno
- Movilidad
- Urbanidad
- Naturaleza
- Dimensión Humana







Sistemas Ribereños

Desierto Sonorense



Agua para la
Naturaleza y su
Gente

Y tu que haces cuando llueve?

SERGIO MÜLLER



Impacto Urbano

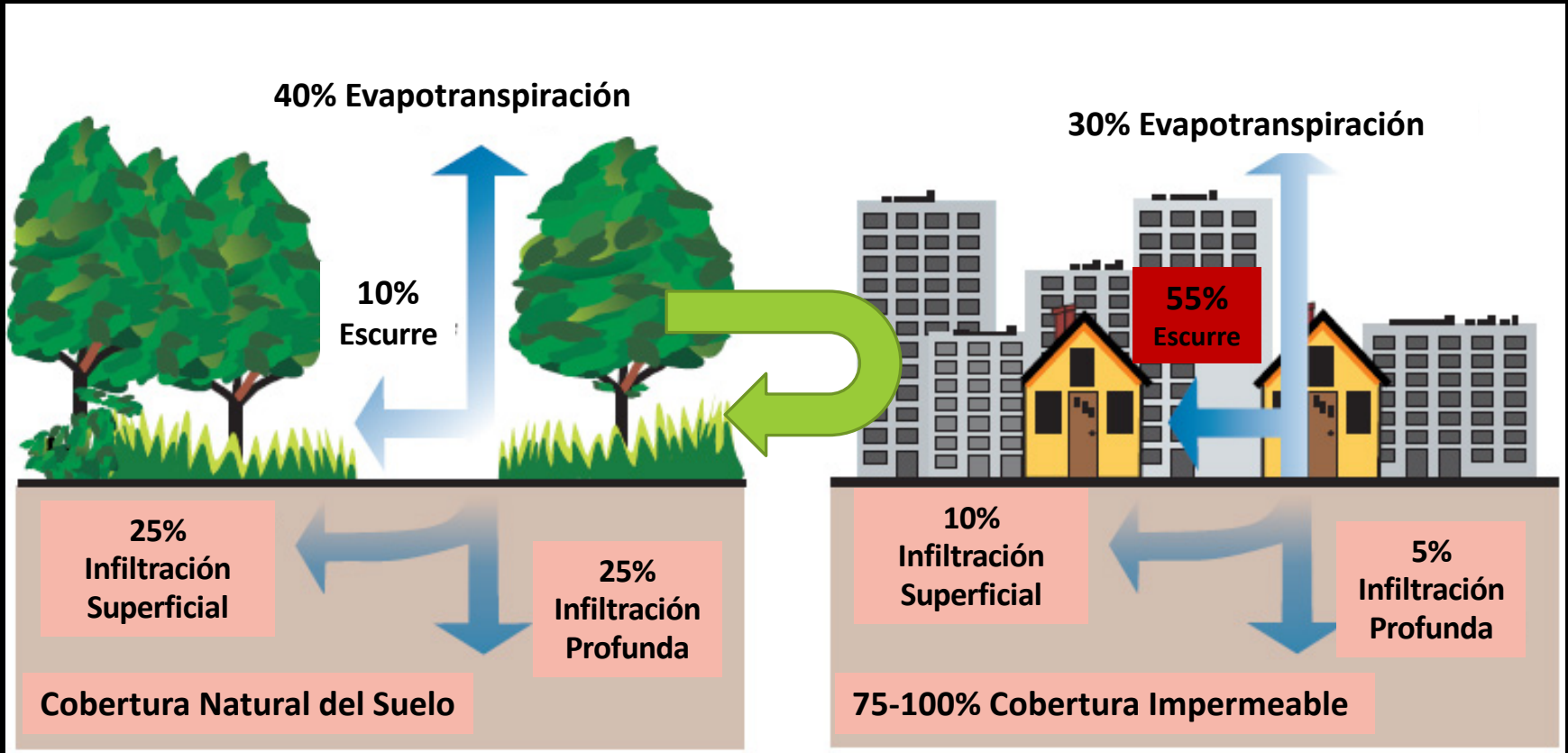


Image source: www.epa.gov

Escorrentía es un Problema -->
Agua de lluvia es un Recurso



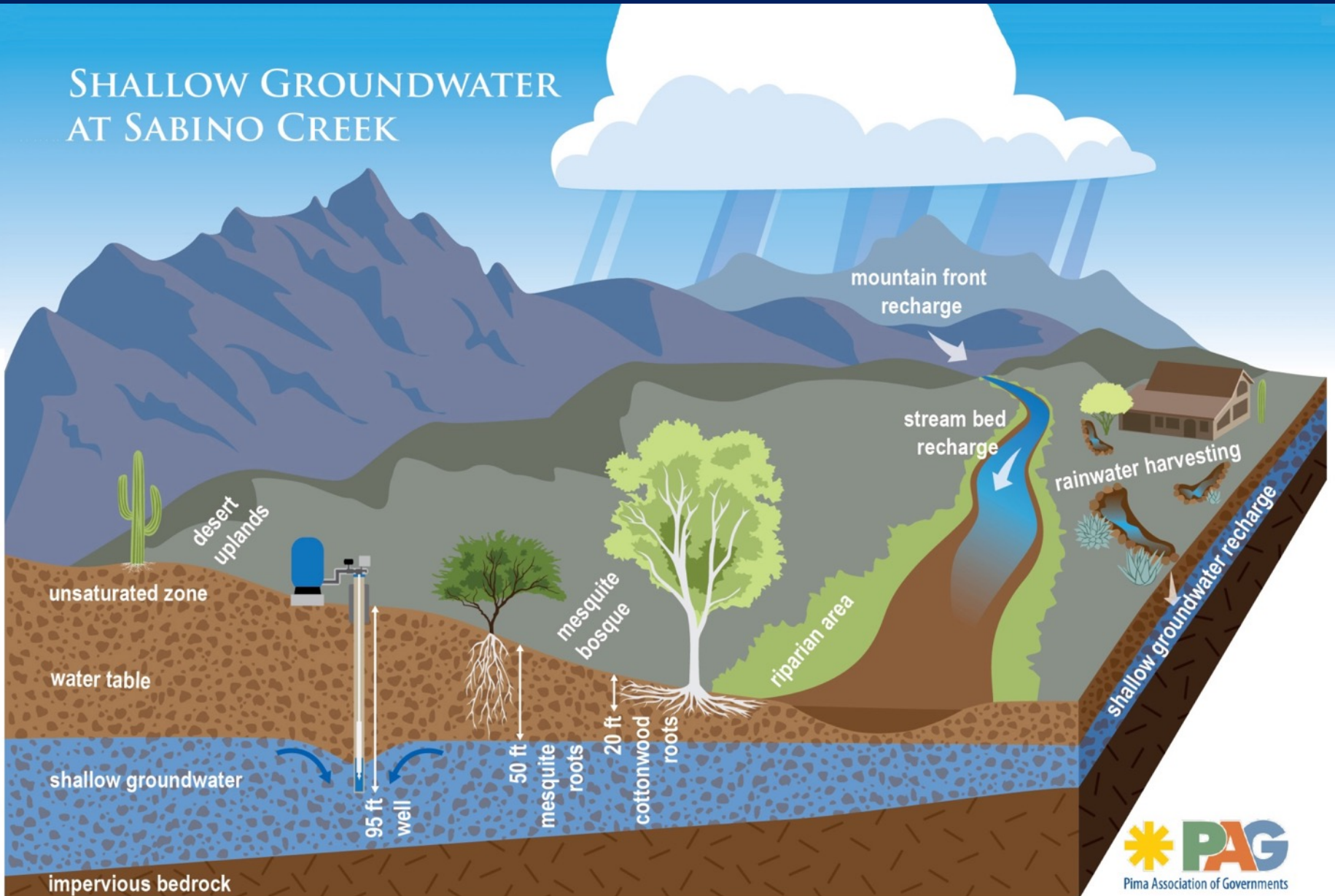
Que es la Infraestructura Verde?

Nuestra definición:

“estructuras construidas con sistemas naturales y vivos que proveen servicios ambientales, como captura, limpieza e infiltración de escorrentías; disminución de isla de calor y *un trafico cortés*”



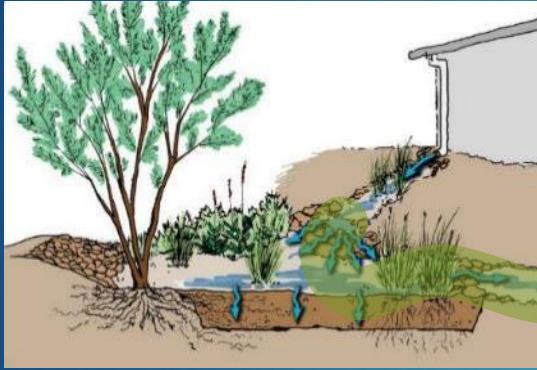
SHALLOW GROUNDWATER AT SABINO CREEK



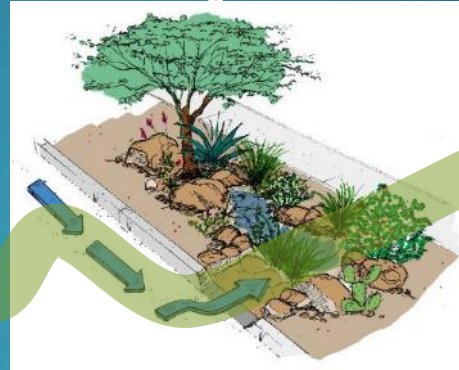
Watershed Restoration

Enhance infiltration and recharge to restore our watersheds

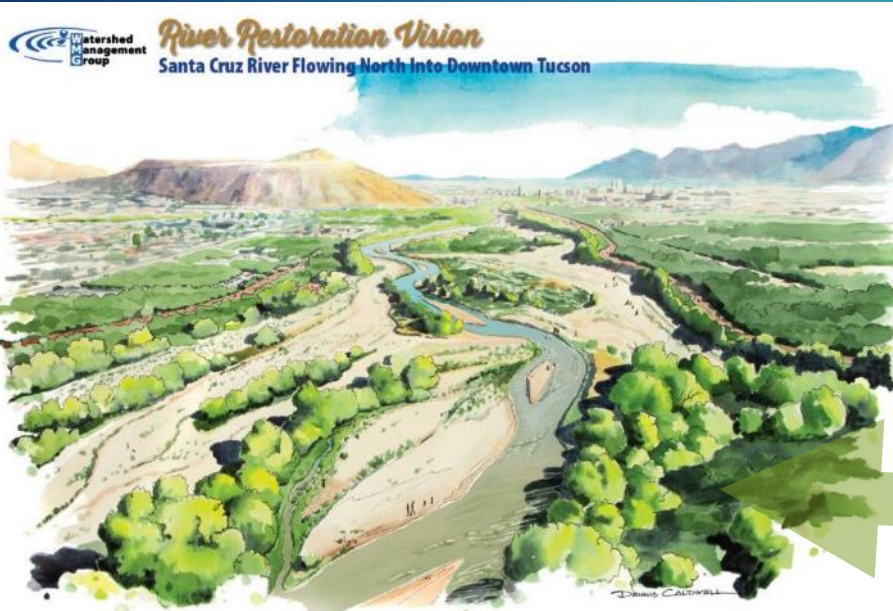
@ Homes, Churches,
Schools, & Businesses



Along Streets



Along Upland Arroyos



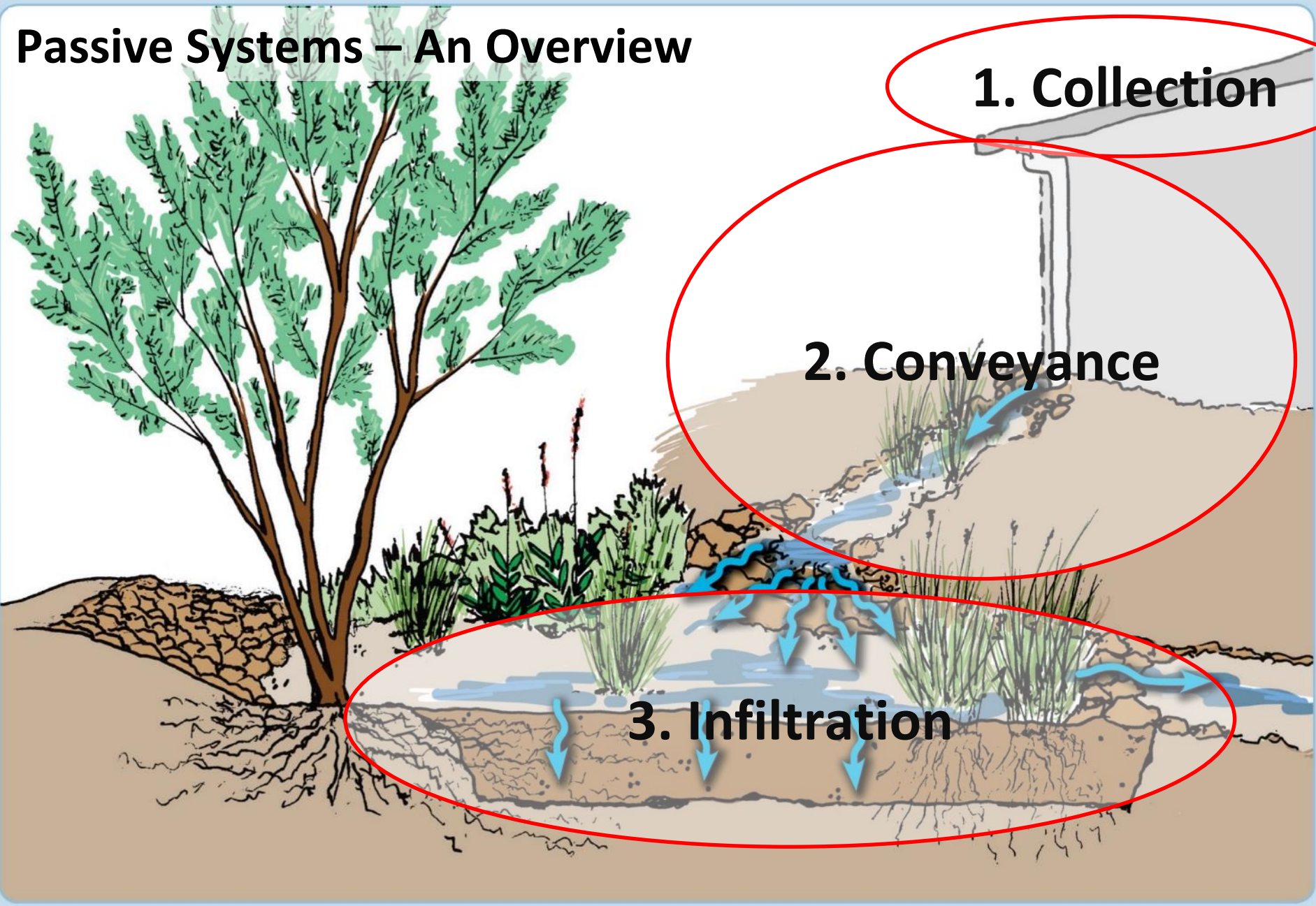
Across Floodplains

Passive Systems – An Overview

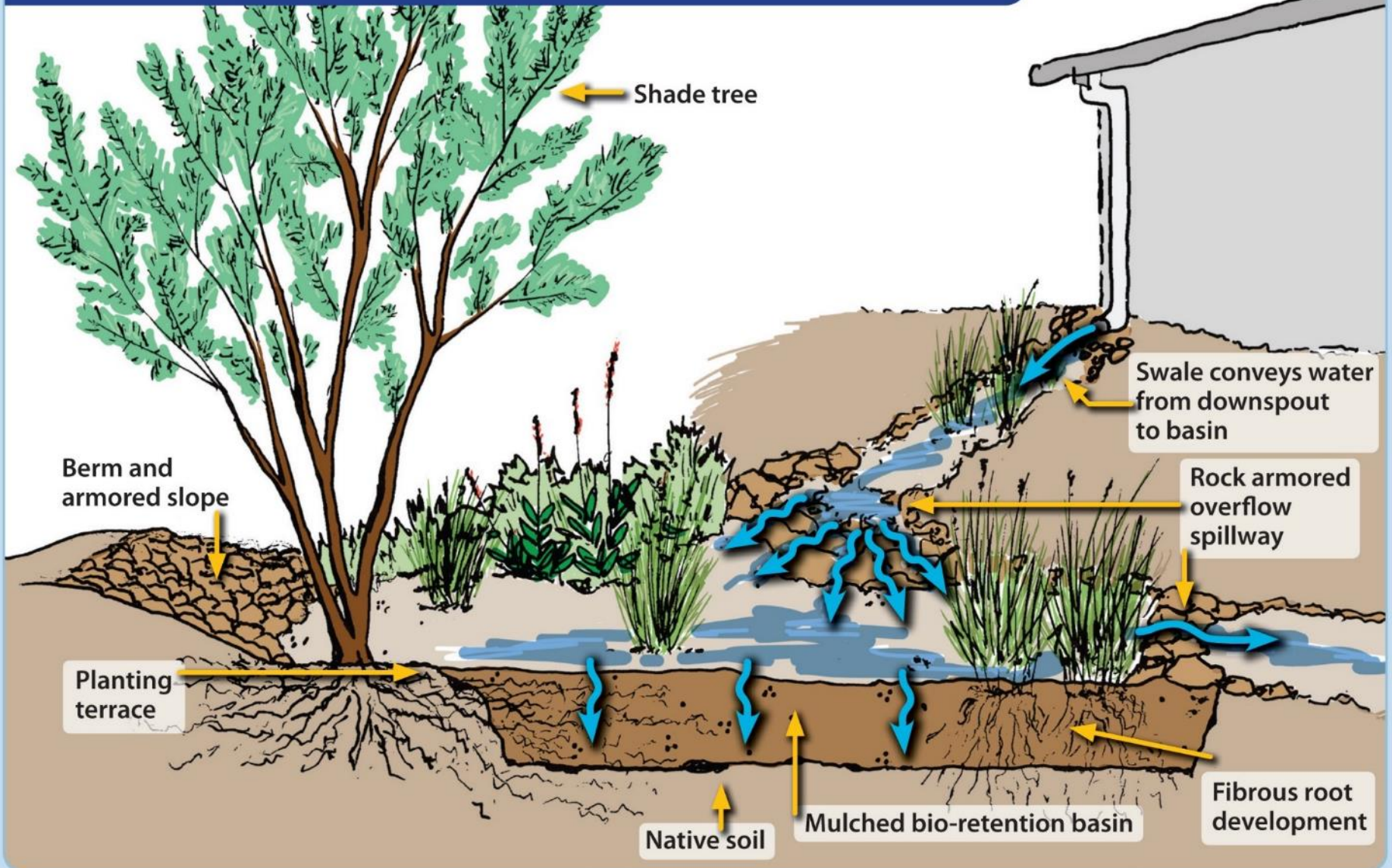
1. Collection

2. Conveyance

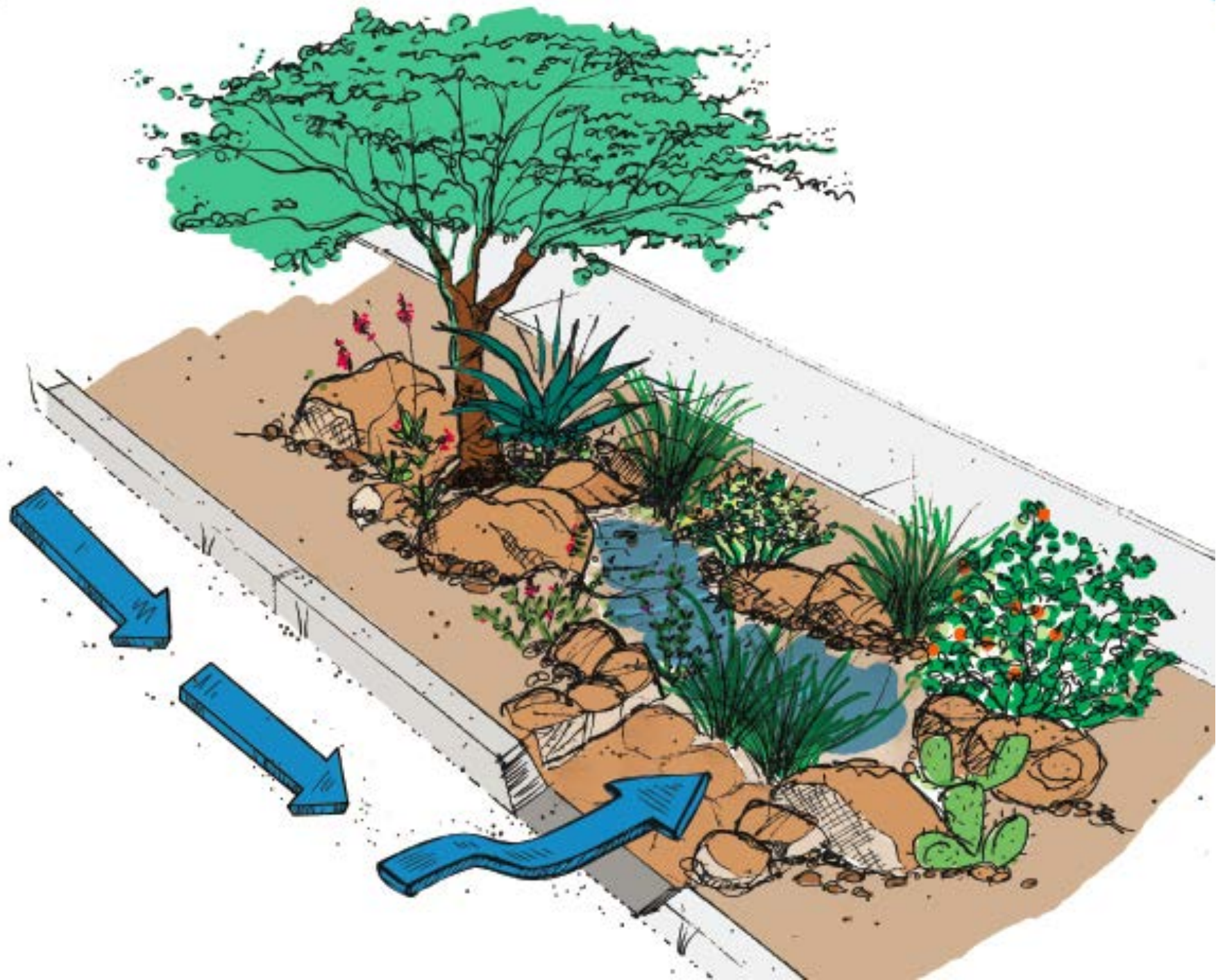
3. Infiltration



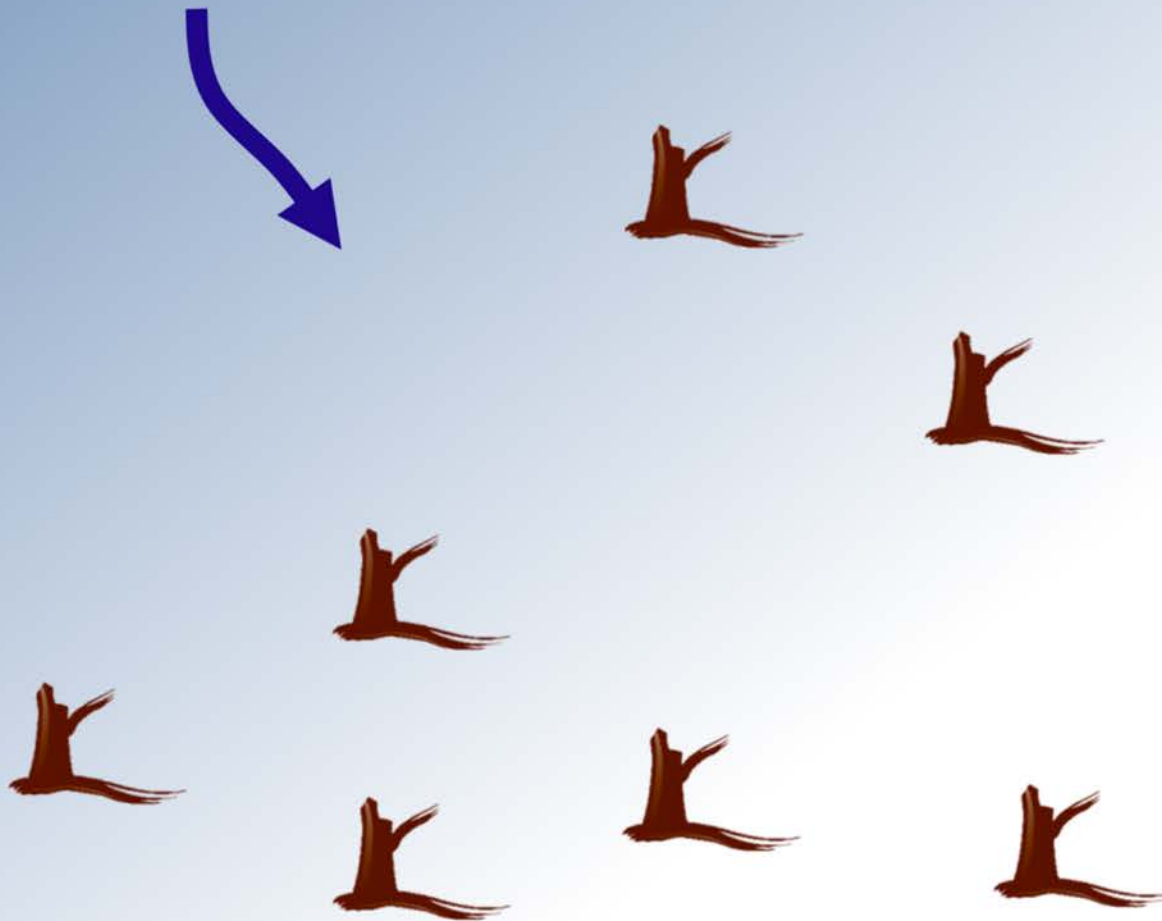
RAIN GARDENS CREATE AN EARTHWORKS SPONGE



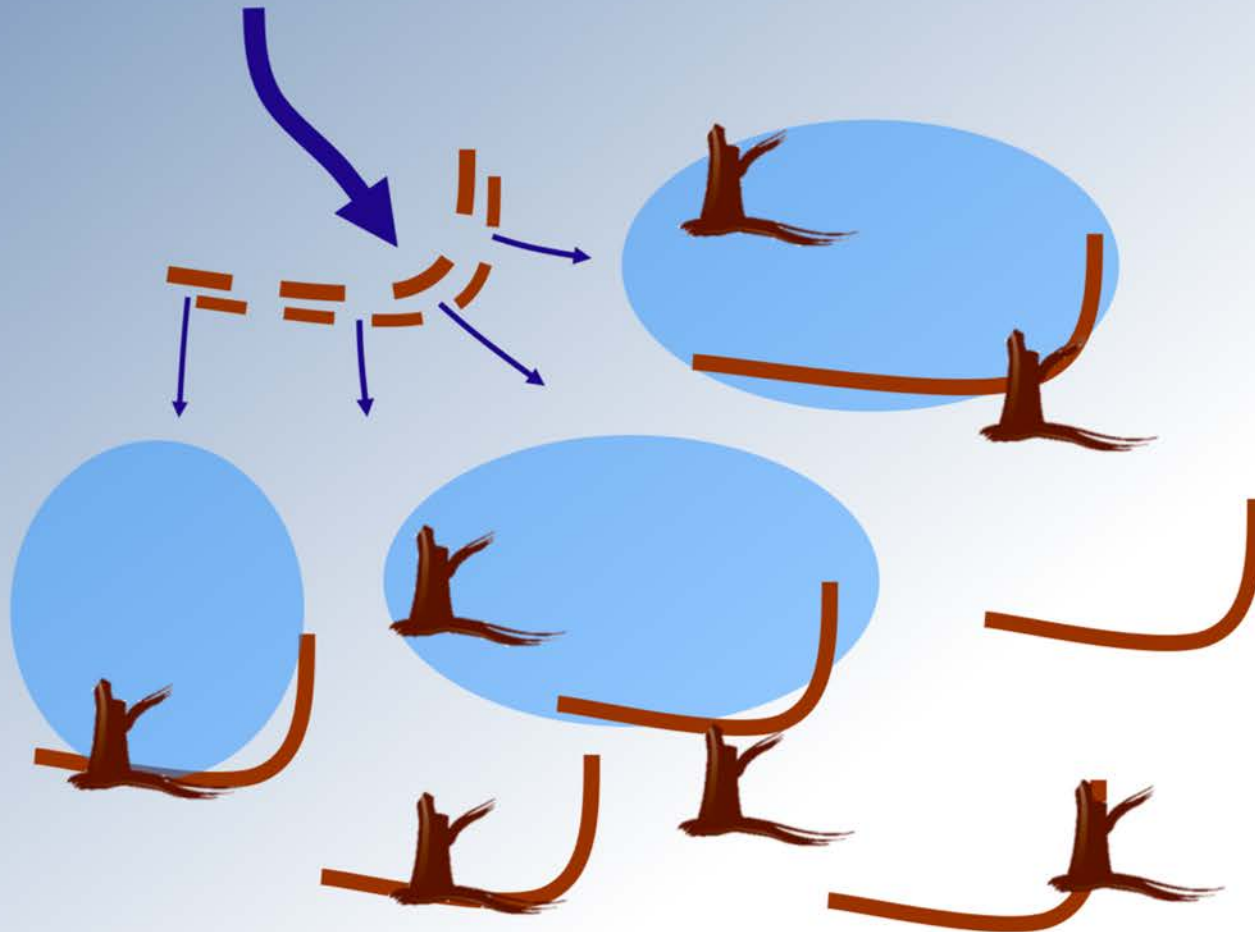
Organic mulch is applied to basins, 2 – 4 inches thick, to help infiltrate more water, reduce evaporation of soil moisture, and replenish nutrients in the soil.



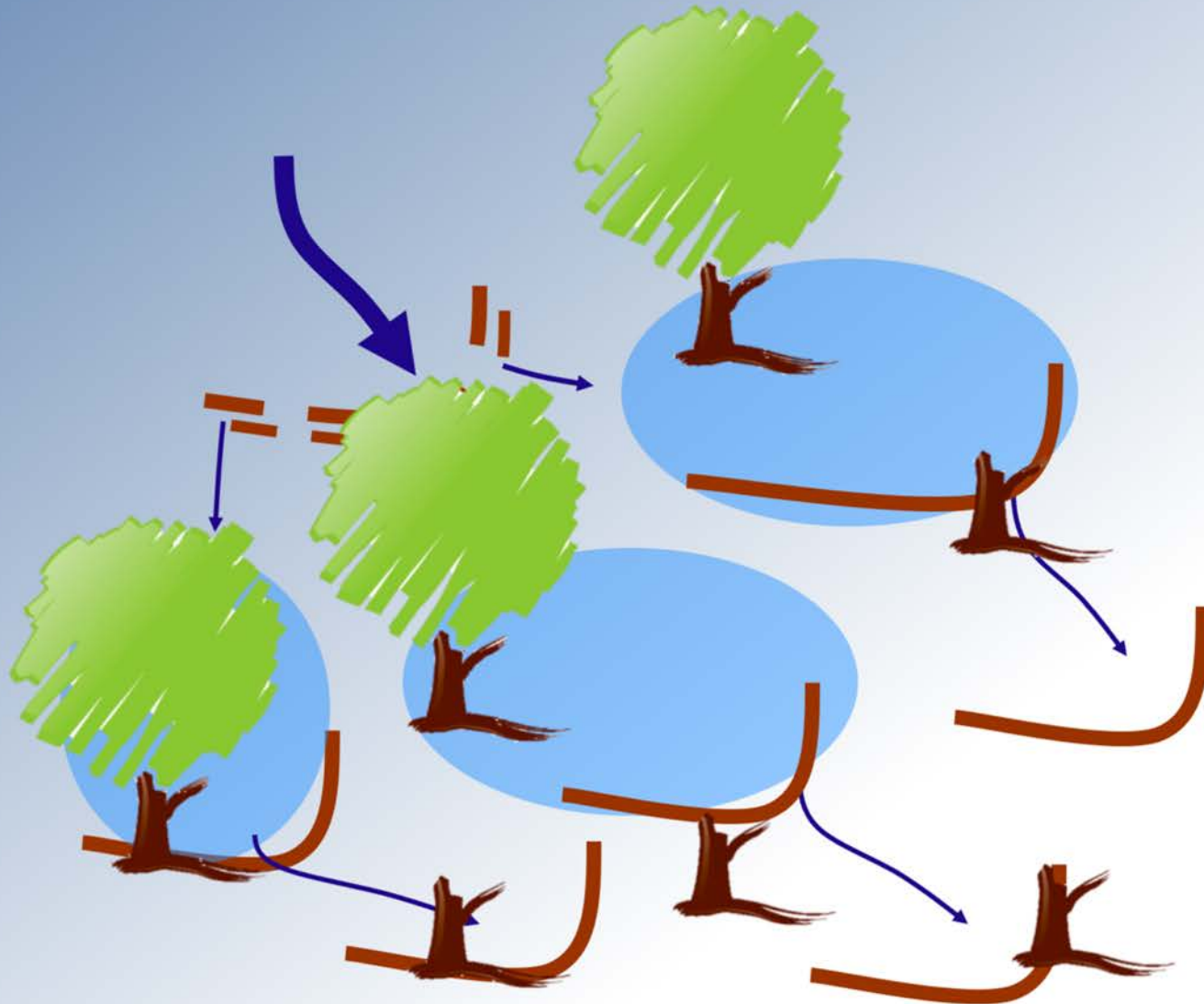
4. Esparcir e infiltrar el flujo de agua



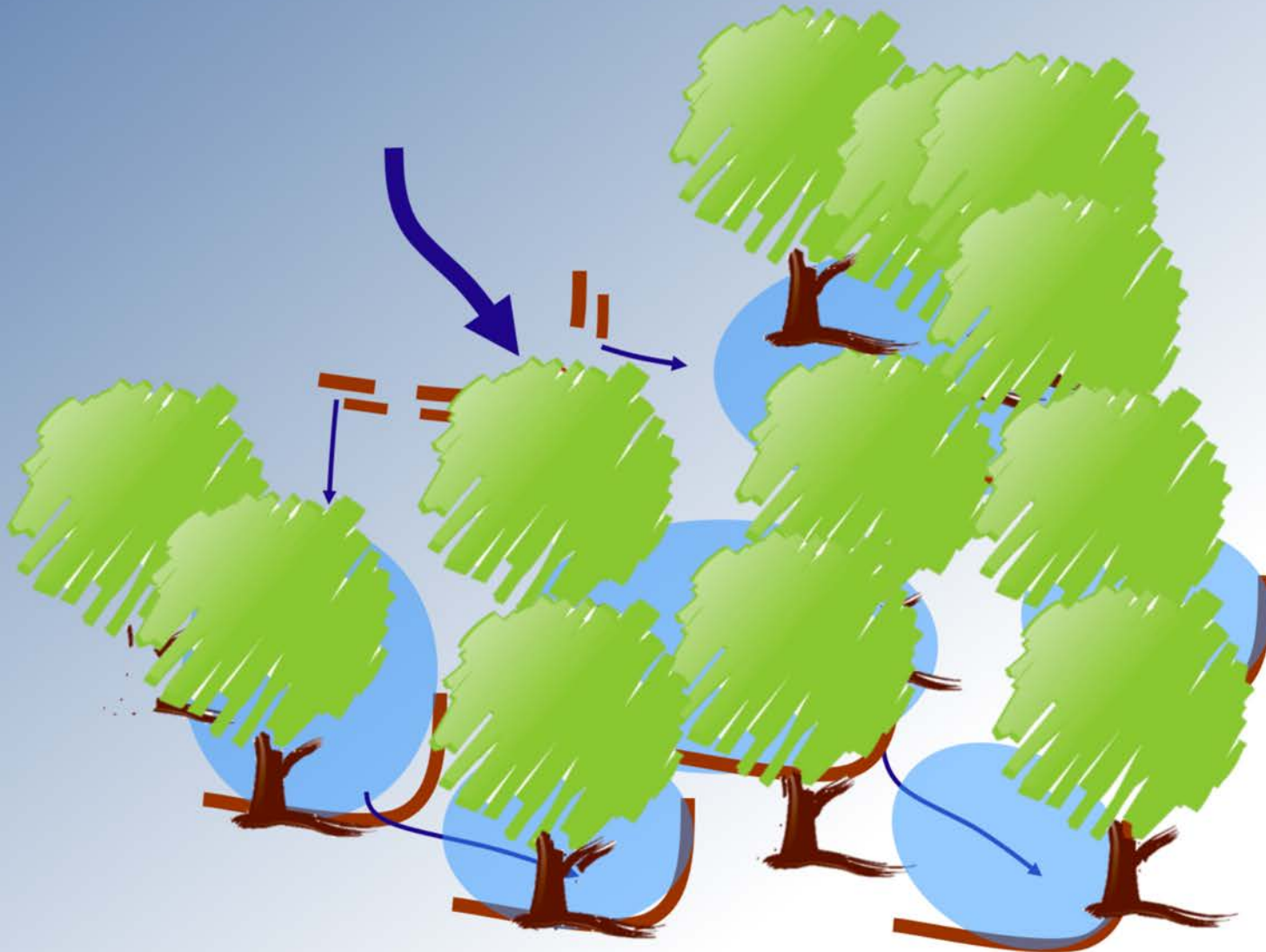
4. Esparcir e infiltrar el flujo de agua



4. Esparcir e infiltrar el flujo de agua



4. Esparcir e infiltrar el flujo de agua



Recursos de Casa y Calle – Hermosillo, Son.

(280 mm/año)

Oferta potencial de agua de lluvia:

- Techo, 75m² = **18,900 lts/año**
- estacionamiento, 8m² = **1,792 lts/año**
- Jardines, 22m² = **2,464 lts/año**
- **Total = 23,156 lts/año**

- Cosecha Pluvial en 1,500m² =
336,000 lts/año

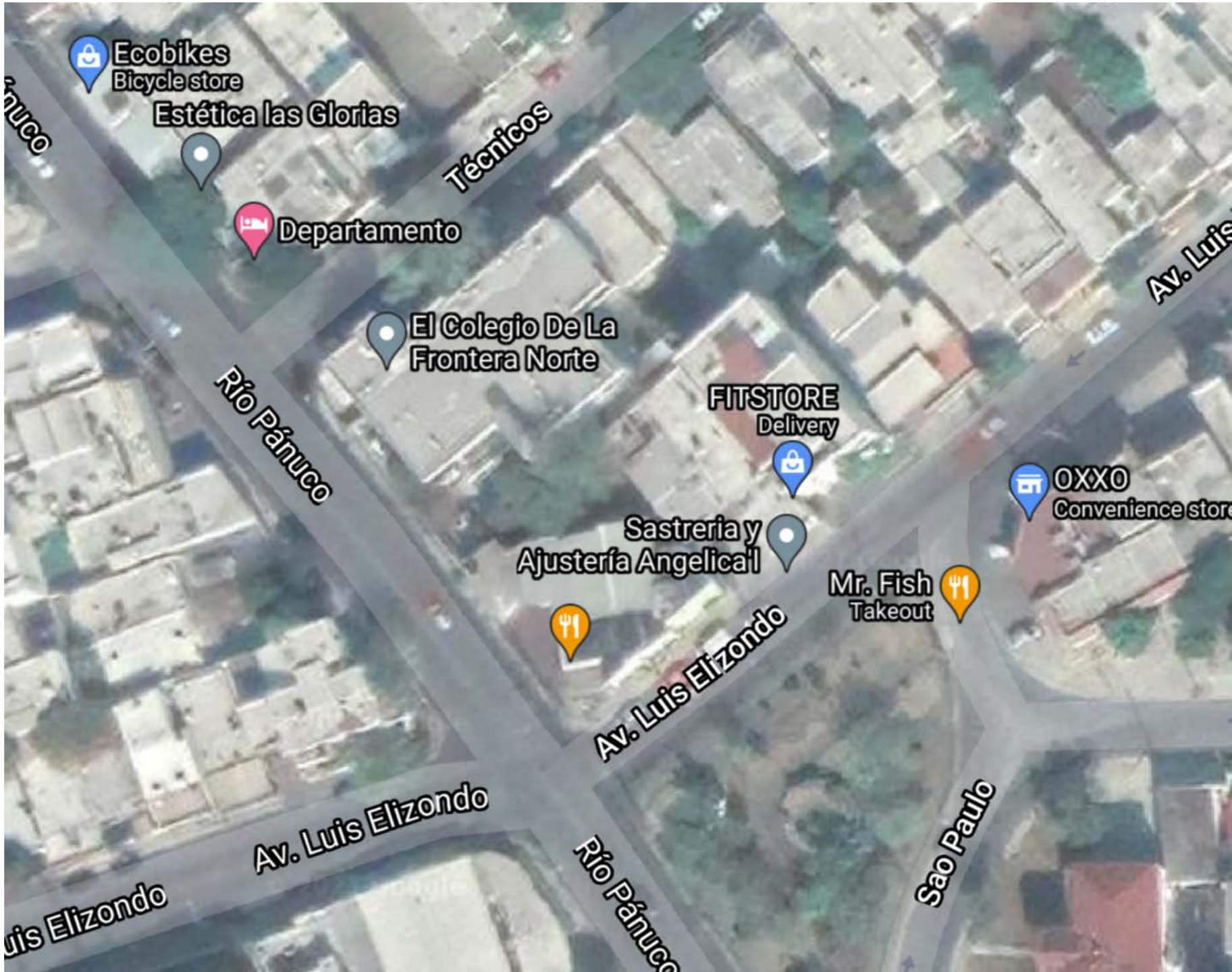
Demanda Estimada Anual de Agua Municipal:

Usos Totales = 250lts/persona/día x
4 personas/casa x 365 días =
365,000 lts/año

Usos en Parques y Jardines (~20 Árboles
regionales; 20 arbustos; plantas de
acento) = **338,820 lts/año**

- + Agua Gris! (~10,000 – 15,000 lts)
- + Condensación de AC! (~750 – 2,000 lts)





Ecobikes
Bicycle store

Estética las Glorias

Departamento

El Colegio De La
Frontera Norte

FITSTORE
Delivery

Sastreria y
Ajusteria Angelical

Mr. Fish
Takeout

OXXO
Convenience store

Río Pánuco

Técnicos

Río Pánuco

Av. Luis

Av. Luis Elizondo

Av. Luis Elizondo

Río Pánuco

Sao Paulo

uis Elizondo

Departamento

Técnicos

Técnicos

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650m²

El Colegio De La
Frontera Norte

Río Pánuco

$$\text{Vol (L)} = A \text{ (m}^2\text{)} \times \text{Precip (mm)} \times \text{Coef Fricc (0.9)} // 650 \times 600 \times 0.9 = 351,000\text{litros}$$

Capacidad de un Sistema Pasivo – Diseño para eventos pico











Planee para un evento de 25 – 50 mm de precipitación

Volumen (litros) por cada 25mm de lluvia = área del techo (m²) x (mm) x 0.9 (coef)

...

Ejemplo: 100m² x 25 mm x 0.9 = 2,250L por cada 25mm de lluvia



-  Basin
-  Tree
-  Berm-Walkway
-  Grass
-  Boulder
-  Accent-Plant
-  Rocks
-  Water-Flow
-  Bush
-  Mount











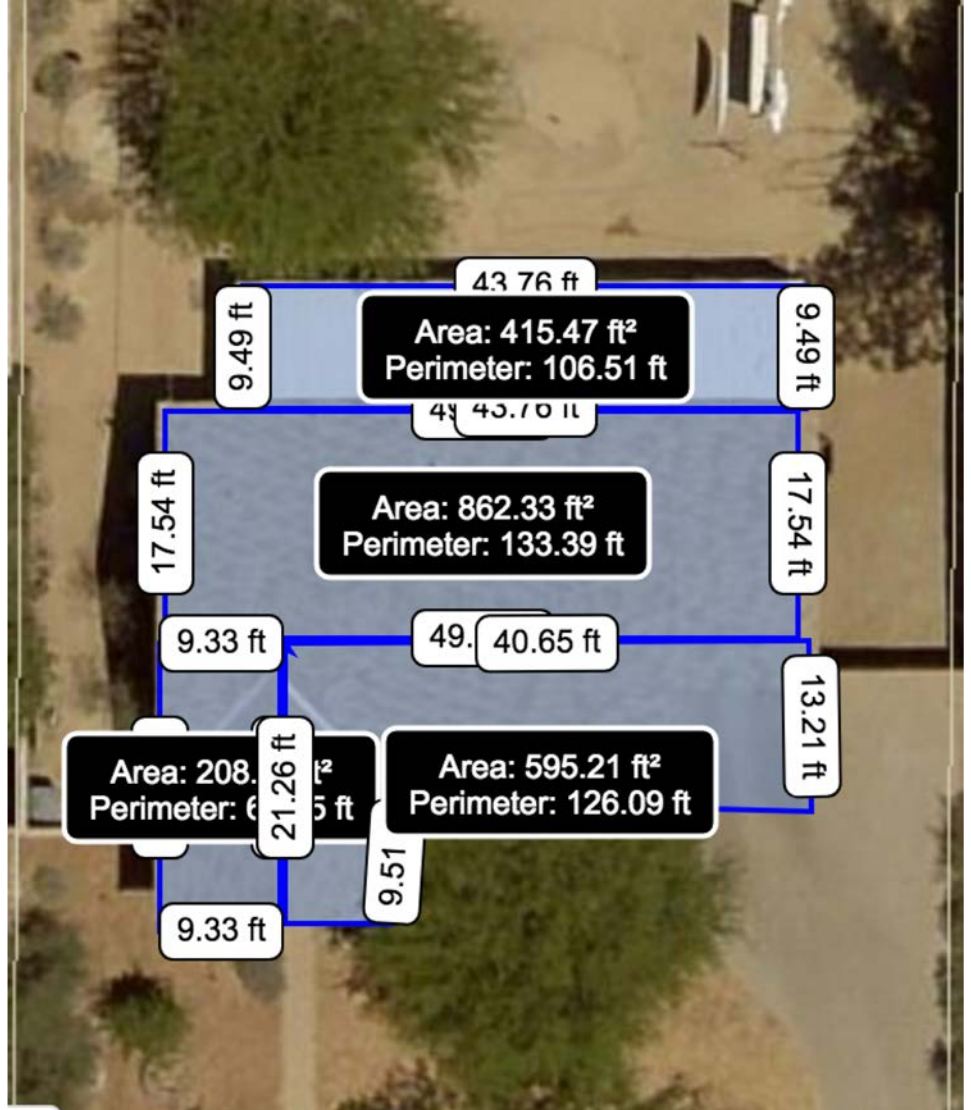










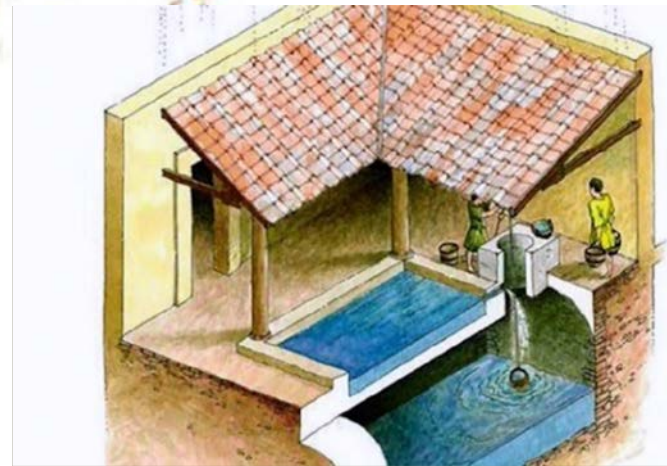


















4419







A person in a dark jacket and light-colored pants stands on the far left edge of the frame, partially cut off.

Two people are standing in the middle ground. One is wearing a bright pink long-sleeved shirt and blue pants, with their back to the camera. The other is wearing a dark jacket and dark pants, facing the person in pink.

A silver SUV is parked in a two-car garage on the right side of the house. The license plate is visible and reads "19K 444".

A yellow wheelbarrow is parked on the paved driveway area, near the garage.

A blue power tool, possibly a generator or pump, is lying on the paved driveway.

Several large, light-colored rocks are placed at the base of a tree on the left side of the yard.















River Run
Network
Let's Restore the Flow

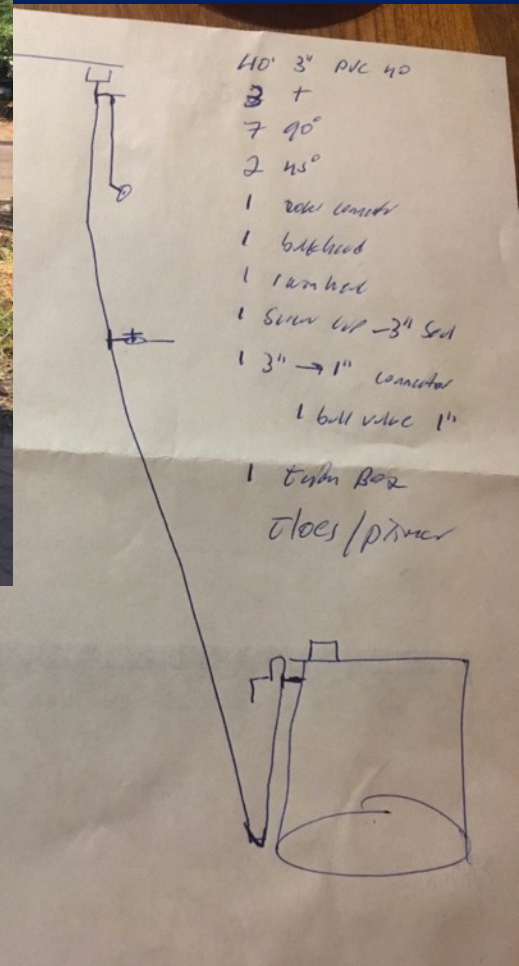




















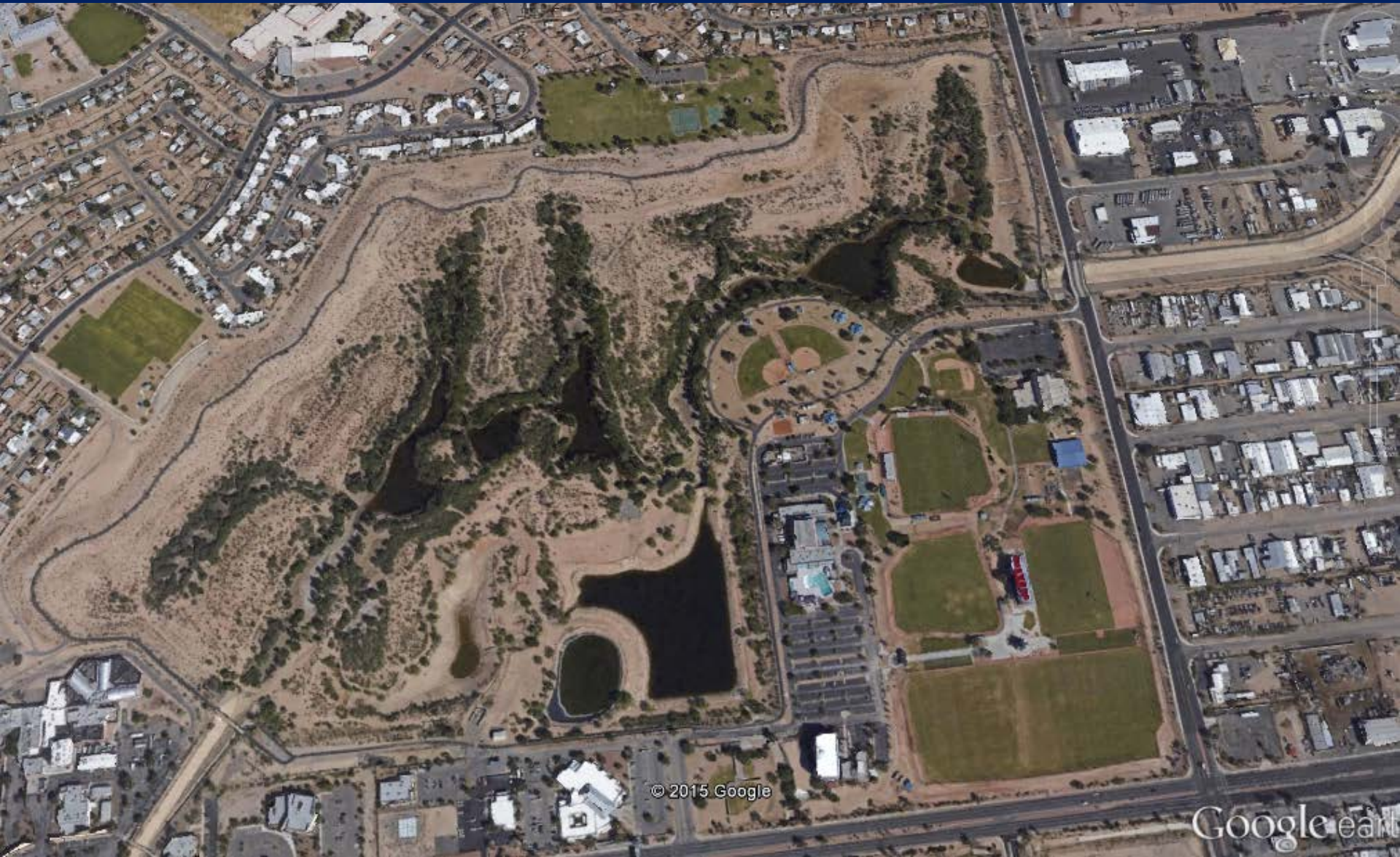






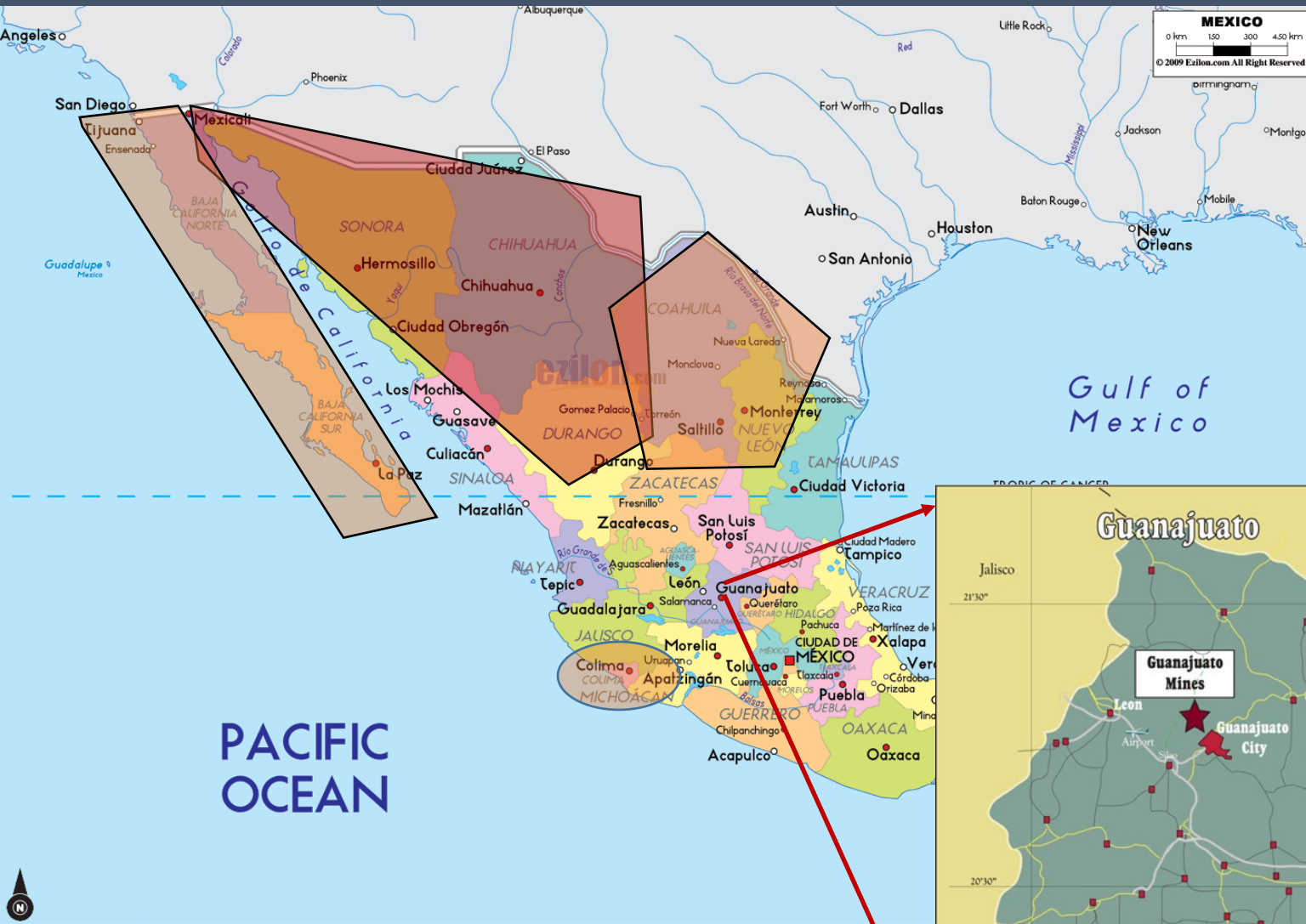






© 2015 Google

Google earth



Modificación de Leyes en el Estado de Sonora y De Reglamentos Municipales Relacionados:

INICIATIVA DE LEY (CONGRESO DEL ESTADO DE SONORA)



La inclusión del concepto de **Infraestructura Verde** dentro de la **Ley 254 de Ordenamiento Territorial y Desarrollo Urbano**, así como de la **Ley del Equilibrio Ecológico y Protección al Medio Ambiente**; permitirá generar el Marco Jurídico para que los Municipios modifiquen los Reglamentos correspondientes relacionados.



Herramientas



Liderazgo



Visión



Convocatoria



Decisión

Saltillo, Coahuila. México



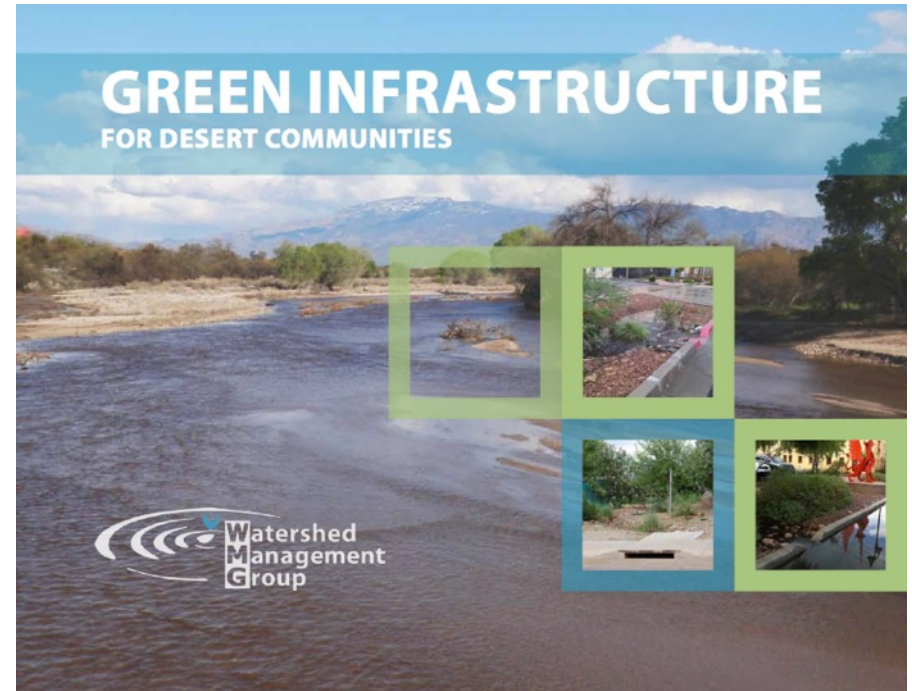


Resources

<https://watershedmg.org/learn/resource-library>

Resources

<https://watershedmg.org/learn/resource-library>



A Playbook for Transportation
Projects in Pima County
Communities

Resources

<https://watershedmg.org/learn/resource-library>



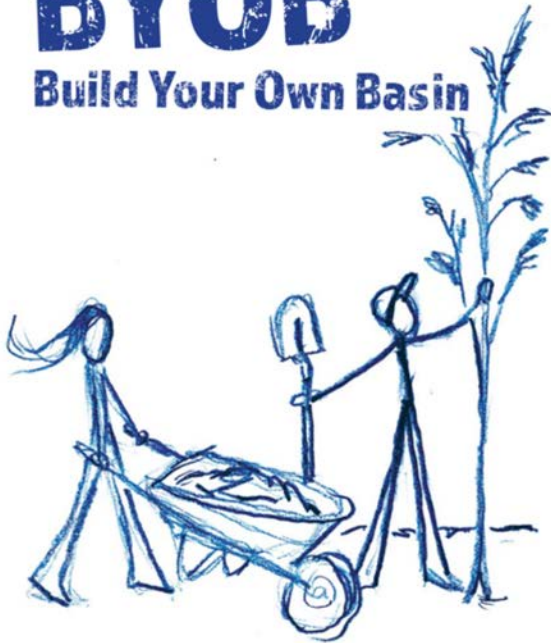
Resources

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BYOB

Build Your Own Basin



City of Tucson Department of Transportation Permit Center

Right-of-Way PERMIT APPLICATION For Barricade and Excavation of Construction

INSTRUCTIONS: Please complete entire application with accurate information. If you have any questions, please contact Engineering at 791-4259. Save application as a PDF and email to tdp@perc.tucson.gov. Forms of payment accepted are cash, check and credit cards.

Please charge to the following Advanced Payment Account Number: _____

This application is for: (Please check the following) Barricade Excavation Both

Work Location: _____ Township: _____ Range: _____ Section: _____
(A unique physical address is required or an existing permit number for renewal)

Renewal / Days of Renewal: _____

Work Order Number: _____ Complete Closure Partial Closure Plan Add/Change

Aerial Boring Drainage Way Emergency Roll Off Storm Drains Streetcar (See 791-3333)

City of Tucson Projects: (Please check the appropriate boxes if applicable) Not applicable Initials required

Capital Project Name and Number: _____ Utility Relocation

COT Project Manager: _____ PIA - Project # _____

Project of Another Jurisdiction: ADOT (See note 4) Marana Pima County South Tucson

Development Plan Number: _____ Indicate total linear footage of excavation and bore: _____

Work Description:

1 Day More than 1 day Restrictions Start Date: _____ Project End Date: _____

Day 9AM-3:30PM Night 6PM-6AM 24HR Weekend Holiday Other _____

MAJOR IMPACT TRAFFIC ZONE (MITZ): If any one of these items apply to your project, barricade plans are required: (See note 4)

- Central Business District, Downtown, 4th Avenue, or Main Gate (See note 4)
- Complete closure of any street
- If traffic control extends through a railroad crossing
- If traffic control extends through a signalized intersection
- More than one lane closed at any time on an arterial or collector street
- Restrictions on arterial or collector streets during peak hours
- Streetcar Route

Applicant Information:

Applicant Firm: _____ ROC #: _____

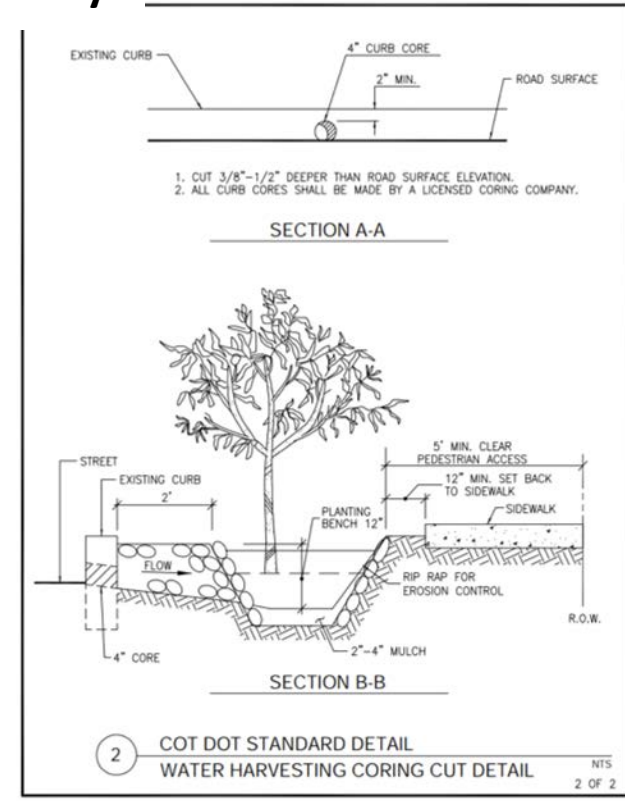
Contact Name: _____ Mobile Number: _____

Business Address: _____

City: _____ State: _____ Zip Code: _____

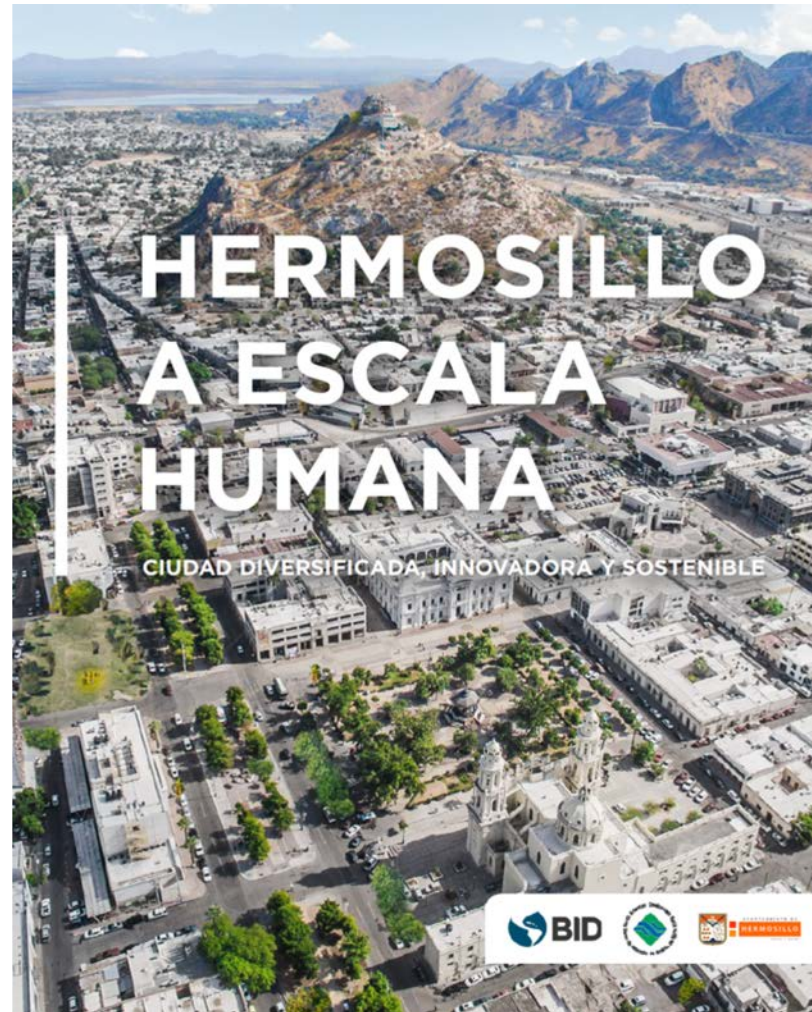
Email: _____ Office Phone #: _____

Mail: Engineering 5th Floor, P. O. Box 27210 Tucson, Arizona 85726-7210 / Email: tdp@perc.tucson.gov Revised 02/2016



Resources

www.implanhermosillo.gob.mx







**Muchas
Gracias**

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