LIVING STREAM LITE
Information Support Tool

PURPOSE

In light of escalating climate change, increasing pressure from urbanisation, and accelerated loss of both biodiversity and natural green spaces in Perth city, there has never been a more crucial time to explore and rapidly execute blue-green initiatives. A fast and efficient solution is broad scale tree planting within existing stormwater drains to establish native tree canopy. The Living Stream Lite design simplifies existing revegetation processes to the planting of a single species, the native swamp paperbark (*Melaleuca rhaphiophylla*) along open stormwater drains. The aim of this project is to expedite positive environmental outcomes for biodiversity, connectivity, urban heat, and human health, while continuing to support the primary function of drainage systems across Perth and preserve the potential for future comprehensive living stream conversions. This information support tool, jointly developed by the Water Corporation and NatureLink Perth, presents the environmental context and design considerations that support the implementation of Living Stream Lite tree planting projects in suitable Water Corporation assets, and should be paired with the Living Stream Lite: Practical Support Tool document.

BACKGROUND

In the context of global climate change and urbanisation driven by migration towards urban centres, it is unsurprising that the population of Western Australia is rapidly growing, with much of this growth occurring in the greater Perth region. Unfortunately, the necessary development required to accommodate this expanding population is driving a loss of biodiversity in this global biodiversity hotspot, as natural habitats are degraded and significantly fragmented through land use changes. In conjunction, increased anthropogenic activity in the urban landscape is contributing to increased climate impacts that negatively influence both the unique local ecosystems, and the liveability of these built environments. The detrimental changes that are occurring include:

- Loss of critical habitat and connectivity of fauna refuges
- Loss of ecosystem balance resulting in increased presence of invasive species that outcompete or negatively impact native and endemic species
- Presence of weed species that disrupt the functioning of built infrastructure like drainage systems and reduced community aesthetics (e.g., algal blooms)
- Increased urban heat island effect, resulting in increased water, surface and air temperatures throughout built environments due to a lack of shade and heat absorption from vegetation
- Frequent and more destructive weather events, which negatively affect built infrastructure like drains through increased erosion and structural damage
- Increased pollutants emitted in urban centres, and increased carbon emissions globally
- Impaired hydrological cycling and reduced water quality due to increased impervious surfaces in urban landscapes
- Loss of human connection to the environment, leading to reduced health and wellbeing outcomes
- Increased negative health outcomes relating to climate change (especially temperature related)

ACRONYMS

WC - Water Corporation
LG - Local Government
BAL - Bushfire Attack Level
DPLH - Department of Planning, Lands and Heritage
EOL - End of Life

BENEFITS

The Living Stream Lite design maximises environmental benefits while minimising the time taken to achieve those benefits. This lite version of living stream revegetation retains many of its comprehensive counterparts ecological, climate and community services, as well as providing value to the functioning of stormwater drainage systems.

Ecological

- Increases biodiversity and rebuilds connectivity between urban green spaces, facilitating the movement and survival of local flora and fauna
- Provides refuge, habitat and resources for native aquatic and terrestrial species
- Contributes to nutrient cycling and promotes soil biodiversity and health through increasing available organic matter
- Reduces growth of weed species via shading of stream bank and watercourse

Community

- Improves community health and wellbeing through people's interaction with nature and proximity to green space.
- Buffers local urban climate change impacts (especially reduced heat) to reduce negative health outcomes in the community
- Improves aesthetics of urban spaces

Environmental

- Increases capacity for carbon sequestration and contributes to filtration of air pollutants
- Increases urban cooling effects through shading of water and ground surfaces and transpiration (reducing water, surface, and above ground air temperatures)
- Increases infiltration and canopy interception of precipitation to promote a slower, more natural hydrological cycle, reducing impact of extreme events, erosion and improving water quality
- Contributes to improving water quality of stormwater runoff through trapping or removing pollutants

Logistic

- Provide erosion control and bank stabilisation
- Reduce weed infestations that limit drain operability

SWAMP PAPERBARK

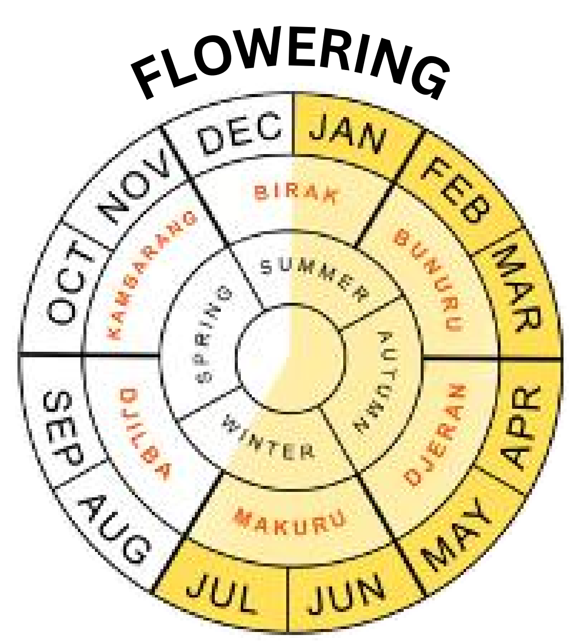
Southwest WA's endemic *Melaleuca rhaphiophylla* (Noongar: Bibool Boorn, Yowarl, or Yiembak) has been carefully selected for Living Stream Lite for its wide-ranging ecological values and its low impact structure.

SALINITY TOLERANT

FLOOD TOLERANT

NON-INVASIVE ROOT SYSTEM

EVERGREEN



DESIGN CONSIDERATIONS

Maintain Function of Drain

The primary purpose of stormwater drainage systems is to protect housing and infrastructure up to the 1:10 year storm event (noting that local governments are responsible for protection above this level and sometimes this is achieved through the same drainage corridor). The planting of trees should not directly compromise the flood protection provided, nor should the presence of trees impact the structure or function of the drainage system in the short or long-term.

Maintain Safe and Efficient Serviceability

To ensure that stormwater systems can function to their full capacity when required, the Water Corporation requires access to maintain the hydraulic capacity of these systems. The planting of trees should not compromise the ability for this maintenance work to be carried out safely and efficiently.

Manage Land Agreements and Insurance Risk

The Water Corporation's land portfolio is composed of Crown land, freehold land and land owned by another agencies with easement rights provided. The appropriate access arrangements are therefore required to allow local government access to sites for planting and ongoing maintenance requirements. Access agreements for planting and maintenance, as well as risk and insurance responsibilities, should be clearly defined prior to the planting of trees.

When considering land matters in the context of this initiative, land may be categorised to the following agreement negotiation effort level:

1. Low: Land with which the LG already has access
2. Medium: Land that this currently owned by WC (freehold)
3. High: Crown land with which the local government has no current access rights to (requires approval through DPLH, with a processing time of approximately 12-24 months)

Engage Community

While there is a strong argument in favour of tree planting, and the beneficial ecosystem services they provide, it is noted that local governments are closest to their communities and are best placed to make decisions on their behalf, for what are socially acceptable locations for tree planting. Wherever possible, tree planting should take into consideration the concerns and requirements of the local community and adjacent land holders.

Protect Existing Assets

The Water Corporation owns and maintains both below and above ground assets that provide critical services to the local community, including drinking water, wastewater removal and stormwater conveyance. The planting of trees should not compromise the structure or function of any existing assets or impede the safe and efficient replacement of these assets at EOL.

Manage Safety

The existing risk profile of the drain should be maintained to ensure the safety of existing assets and the local community. This includes consideration of fire risk within the system, BAL rating implications for neighbouring infrastructure, and CPTED requirements. The planting of trees should not alter the risk profile of Water Corporation owned or managed land, and trees should be maintained to preserve this risk profile over time.

Maintain Trees

Trees have maintenance requirements to ensure their establishment and longevity, in addition to those for the mitigation of safety risks. The location of trees, once planted, should be logged for periodic assessment and maintenance. The responsibility for the tree and its maintenance falls with the local government and should be carried out as per the management guidelines for street trees under their administration.