



Overview of the Darwin Harbour WSUD Strategy

Darwin Harbour WSUD Strategy

Background Research

- Interviews and Desktop Research
- Implementation and Technical Issues

WSUD Policy and Targets

WSUD Technical Guidelines and Tools

Practical Implementation - Bellamack



Our Harbour / Our Life / Our Future

DARWIN HARBOUR WATER SENSITIVE URBAN DESIGN STRATEGY



Home

About the Project

WSUD Strategy

Science + Modelling

Guidelines + Tools

WSUD Showcase

Publications

Images

Links

Contact Us

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Welcome to the Water Sensitive Urban Design Strategy for Darwin Harbour

Darwin Harbour is a unique natural resource, and provides significant community and environmental values. The Harbour is also the ultimate receiving environment for all stormwater and wastewater discharge from Darwin and Palmerston urban areas. Recent research has identified that although the harbour is considered to be in a near pristine condition with good water quality, the impacts of urban stormwater runoff and wastewater discharges are evident. As new development occurs in the region, there is potential for increasing impacts on the Harbour.

Water Sensitive Urban Design (WSUD) is a new approach to development, that takes an holistic approach to the planning and design of urban development that aims to minimise impacts on the natural water cycle and protect the health of aquatic ecosystems.

The **Water Sensitive Urban Design Strategy for Darwin Harbour** is a joint project between the Department of Planning and Infrastructure (DPI) and the Department of Natural Resources, Environment and the Arts (NRETA), supported by funding from the Commonwealth Coastal Catchments Initiative (CCI). It will provide policy, tools and resources to ensure that urban development in the Darwin region is underpinned by a commitment to sustainable urban water cycle and stormwater management.

WSUD Policy and Targets

Principles of WSUD

- Protection and enhancement of natural water systems
- Treating urban stormwater to meet water quality objectives for reuse and/or discharge to receiving waters.
- Matching the natural water runoff regime as closely as possible
- Reducing potable water demand
- Minimising wastewater generation and treatment of wastewater to a standard suitable for effluent reuse opportunities
- Integrating stormwater management into the urban landscape



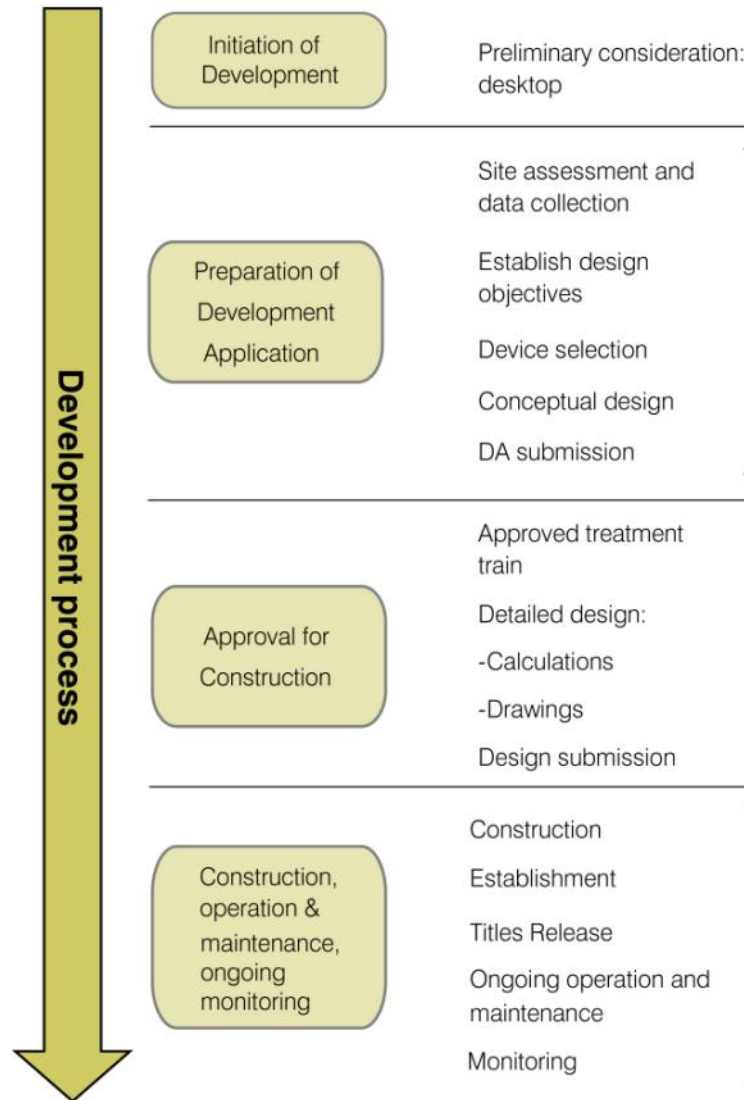
Darwin WSUD objectives

WSUD Objective	Performance Measure/Target
Potable Water Conservation	A 20% water conservation target is considered technically feasible and is suggested as an interim target
Stormwater Quality	<p>Stormwater discharged from development areas to be treated in accordance with best practice:</p> <ul style="list-style-type: none">• 80% reduction in the mean annual load of Total Suspended Solids (TSS)• 60% reduction in the mean annual load of Total Phosphorus (TP)• 45% reduction in the mean annual load of Total Nitrogen (TN)• 90% reduction in the mean annual load of Gross Pollutants

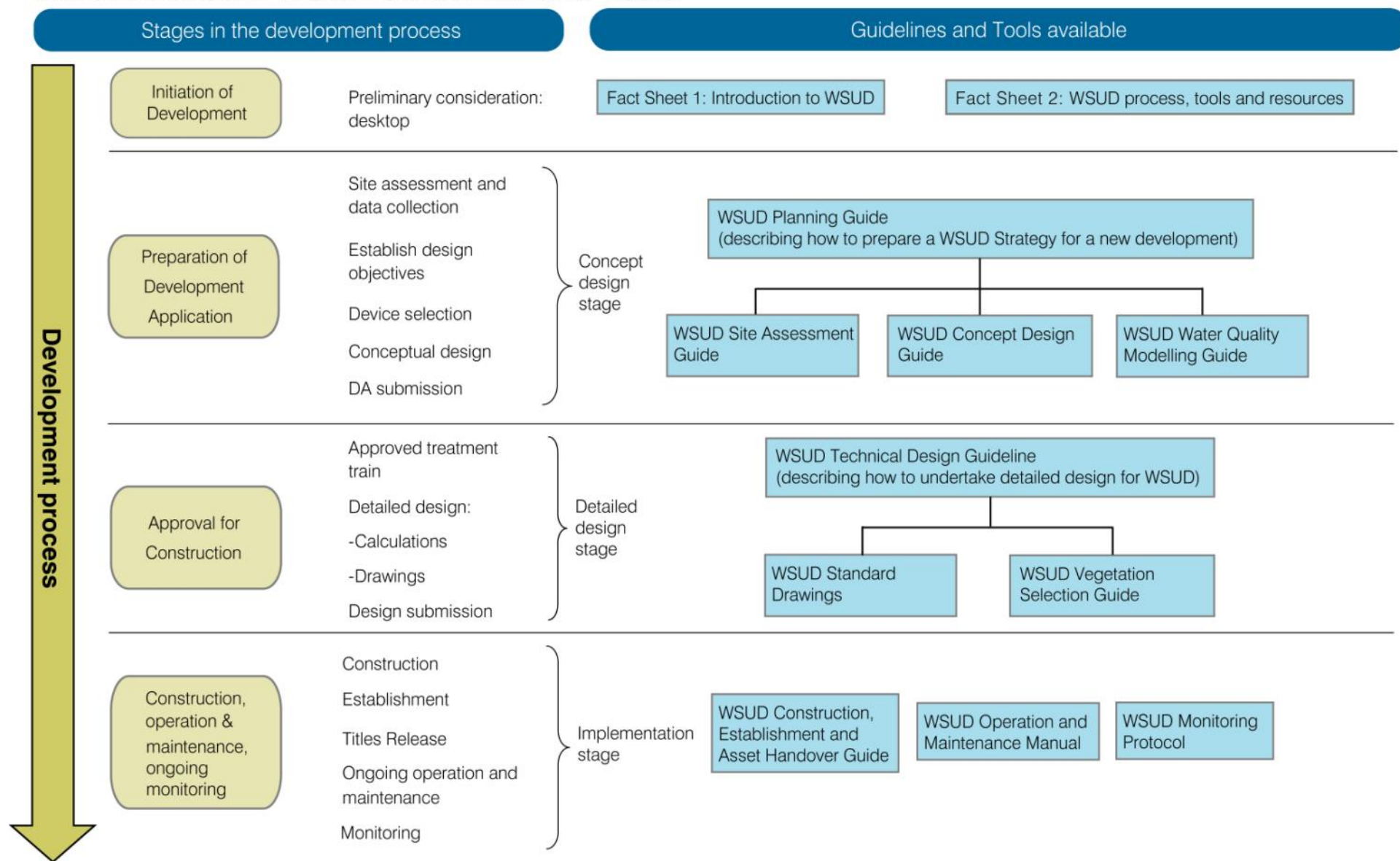
WSUD Guidelines and Tools

Darwin Harbour WSUD Guidelines and Tools

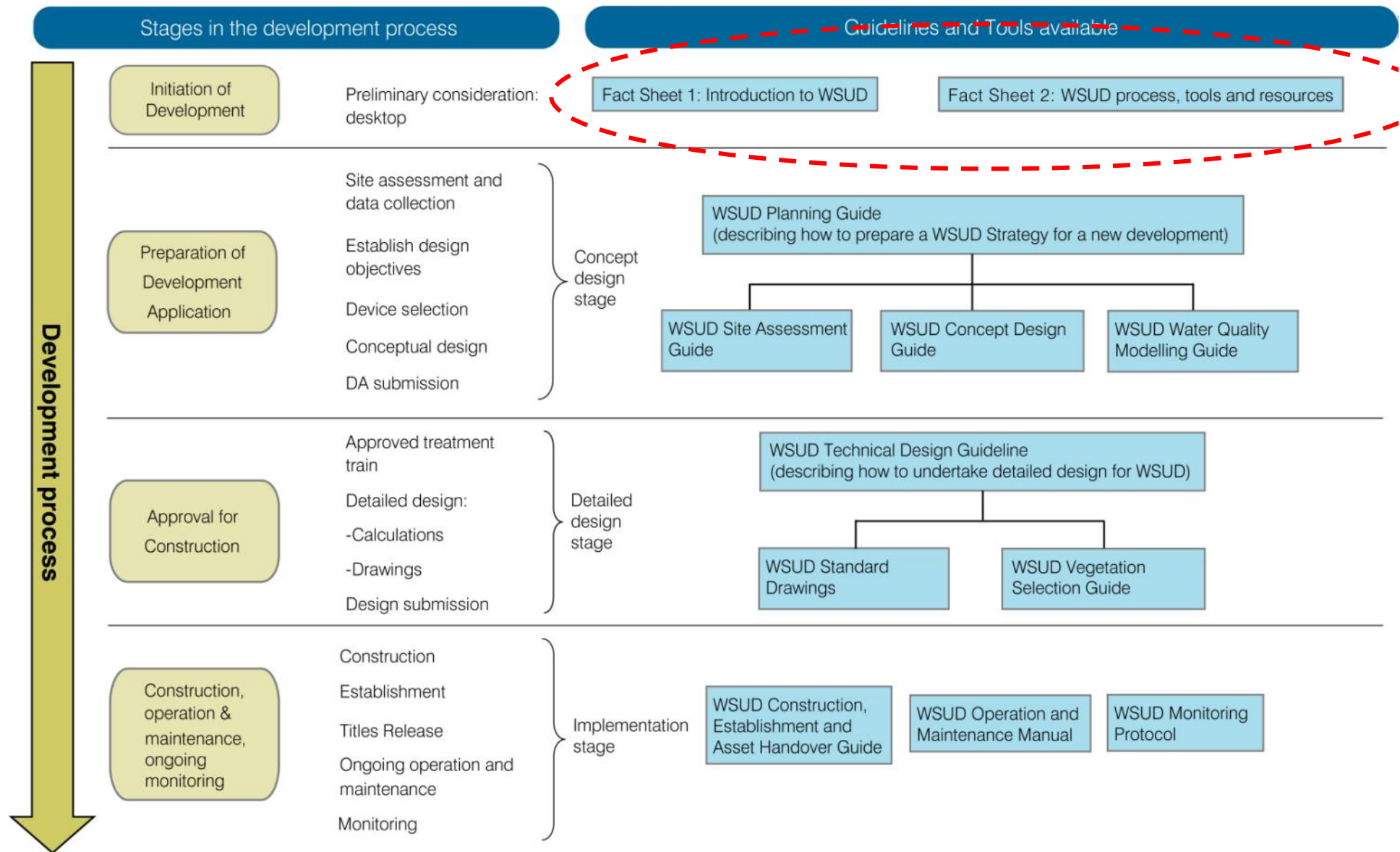
Stages in the development process



Darwin Harbour WSUD Guidelines and Tools



Darwin Harbour WSUD Guidelines and Tools



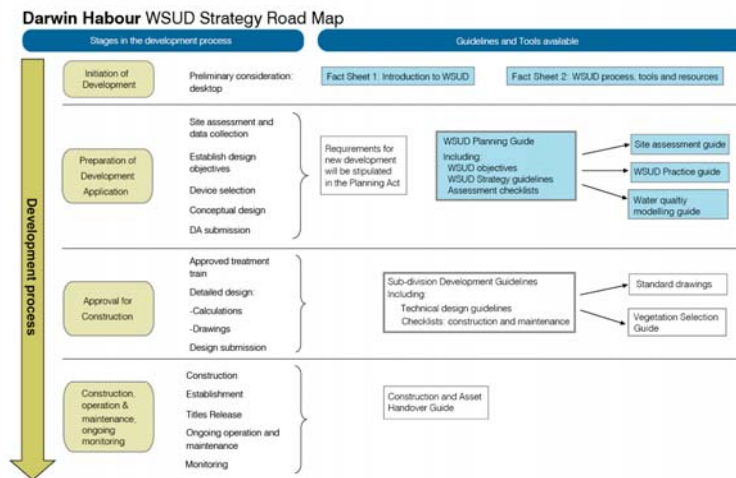
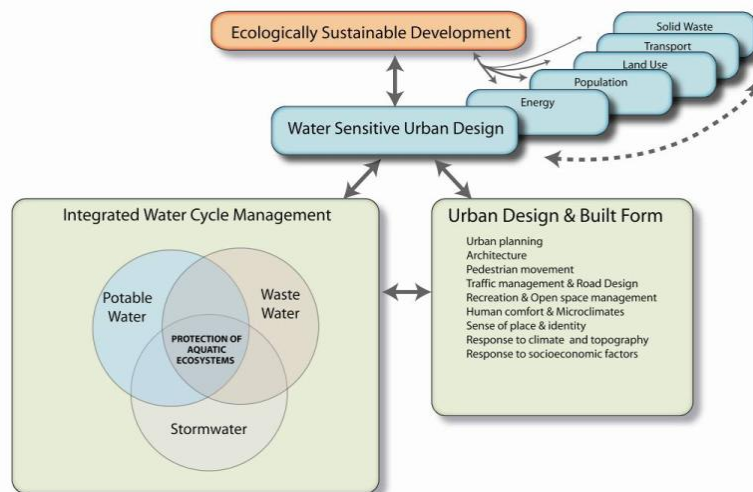
Fact Sheets

Introduction to WSUD

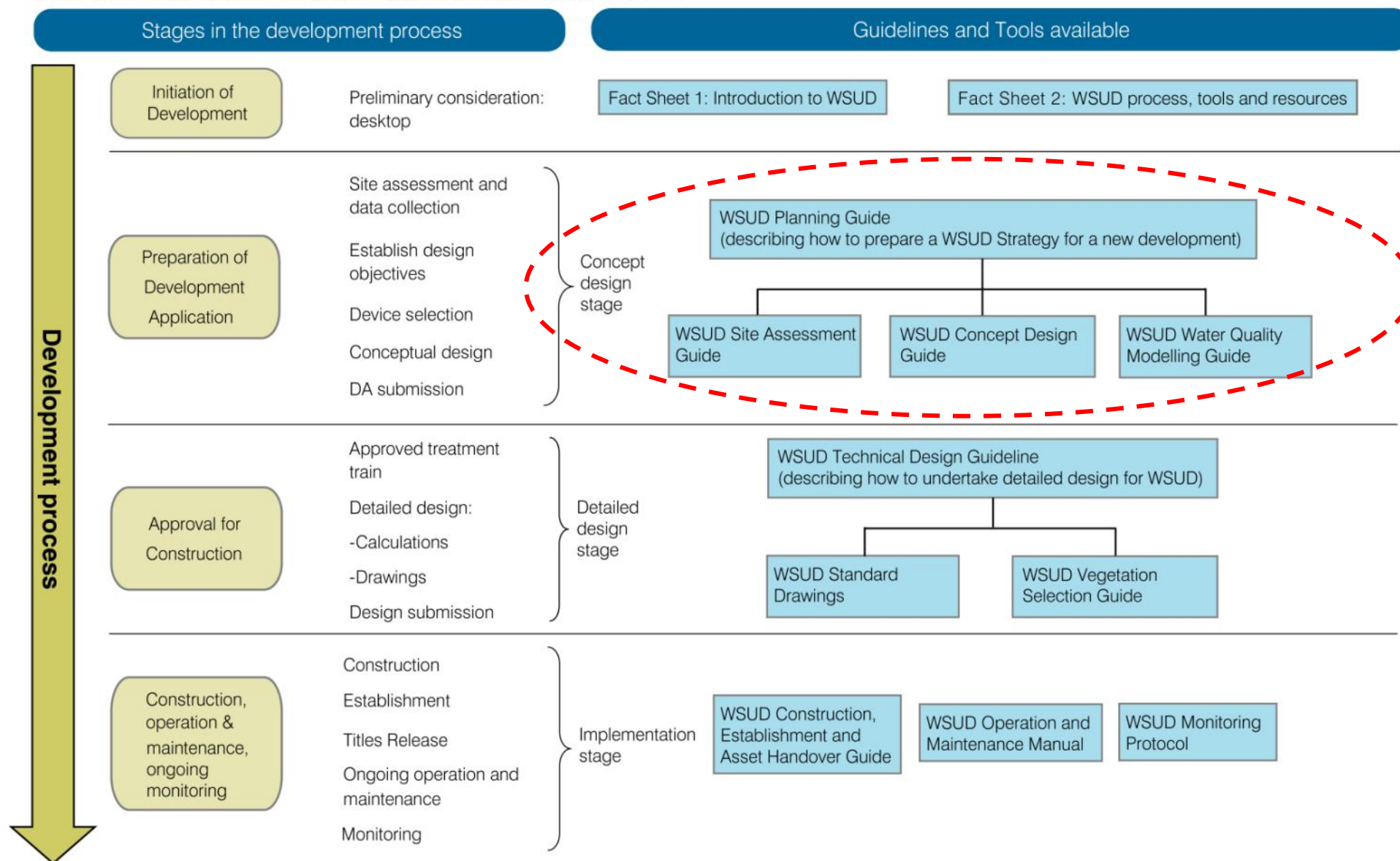
- Relationships to other plans
- Darwin Harbour Catchment
- WSUD
- Elements of WSUD
- Objectives

WSUD Process Tools and Resources

- Objectives
- Preparing a Water Sensitive Urban Design Strategy



Darwin Harbour WSUD Guidelines and Tools



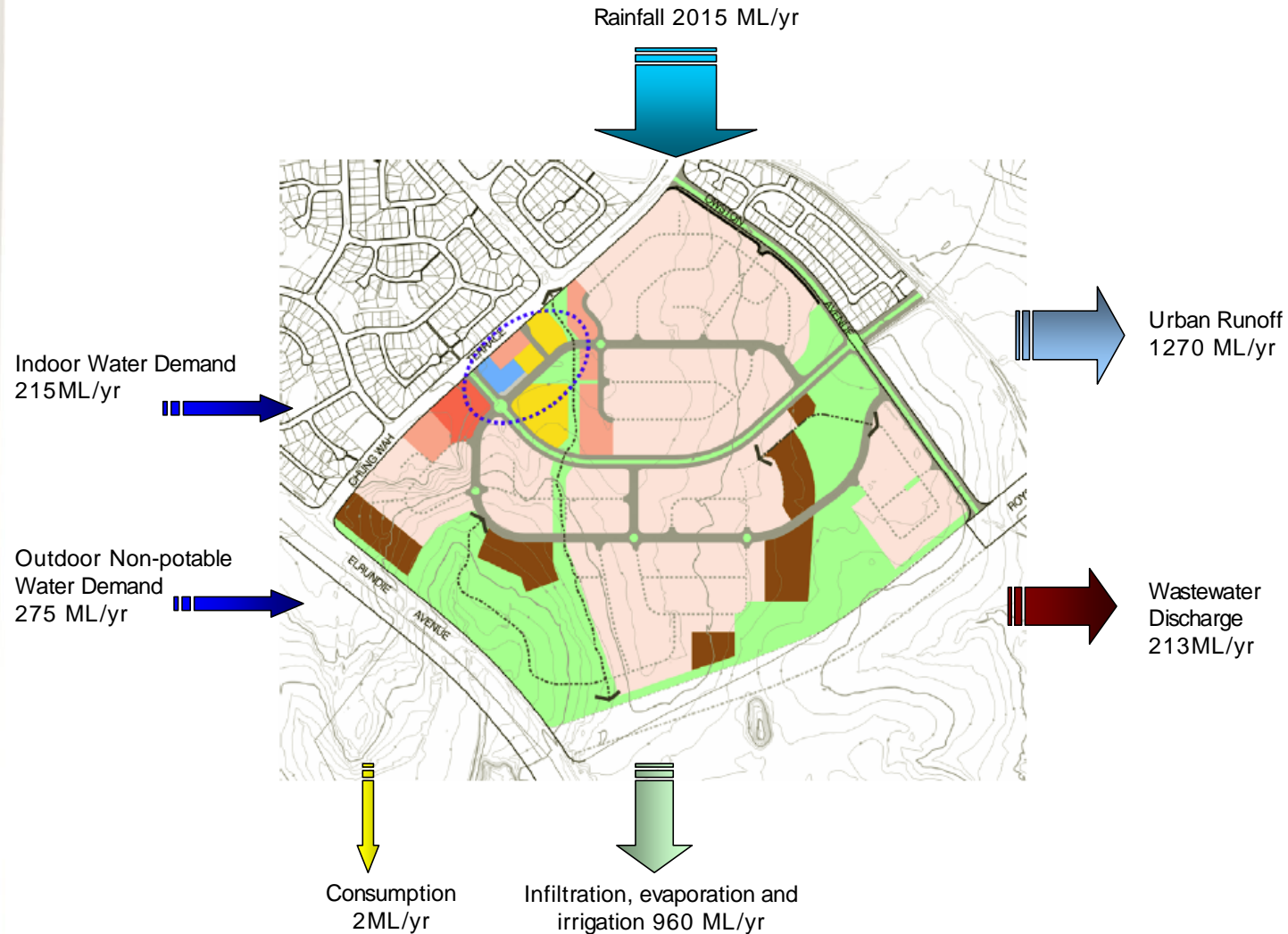
WSUD Strategy

- Establish the site context:
 - Climate
 - Ecology
 - Landscape
 - Physical infrastructure
 - Development imperatives
- Interpret topography, drainage, geology, soils and groundwater
- Establish key outcomes / performance objectives
- Critique and review solutions against key outcomes
- Meet potable water conservation and stormwater quality objectives.
- An appropriate solution for the site.
- Integrated with the urban design, landscape strategy and civil infrastructure plans for the site.
- Technically feasible and appropriate.
- Appropriate overall urban design outcome for the site.

Site Assessment Guide

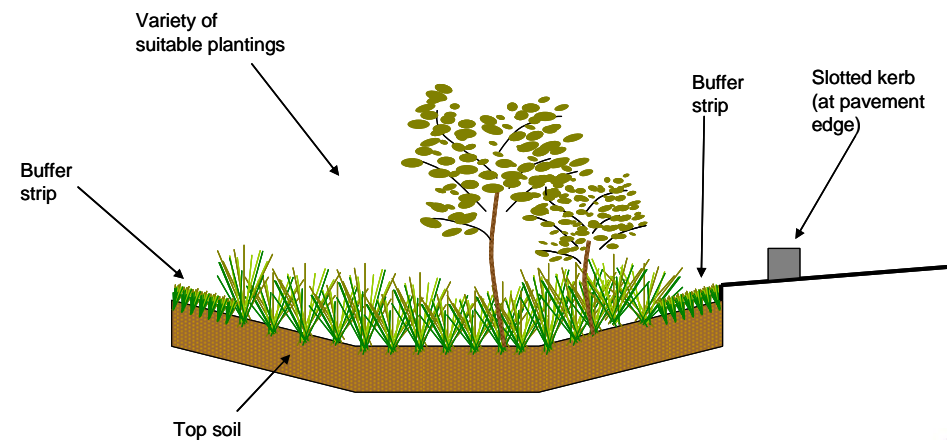
- Climate
- Natural capital
- Ecology
- Landscape attributes
- Physical infrastructure
- Development imperatives
- Topography and drainage
- Geology, soils and groundwater
- Existing development

Site Assessment – Water Balance

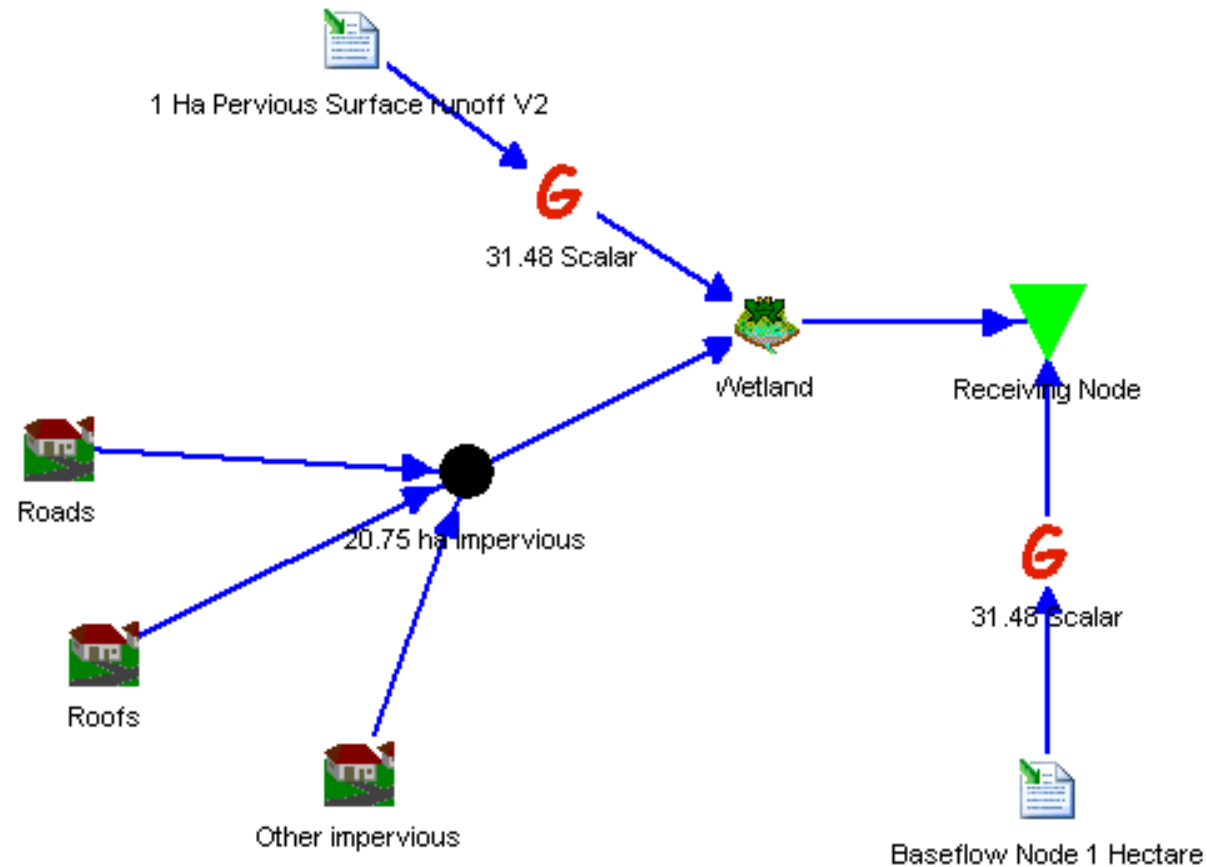


WSUD Concept Design

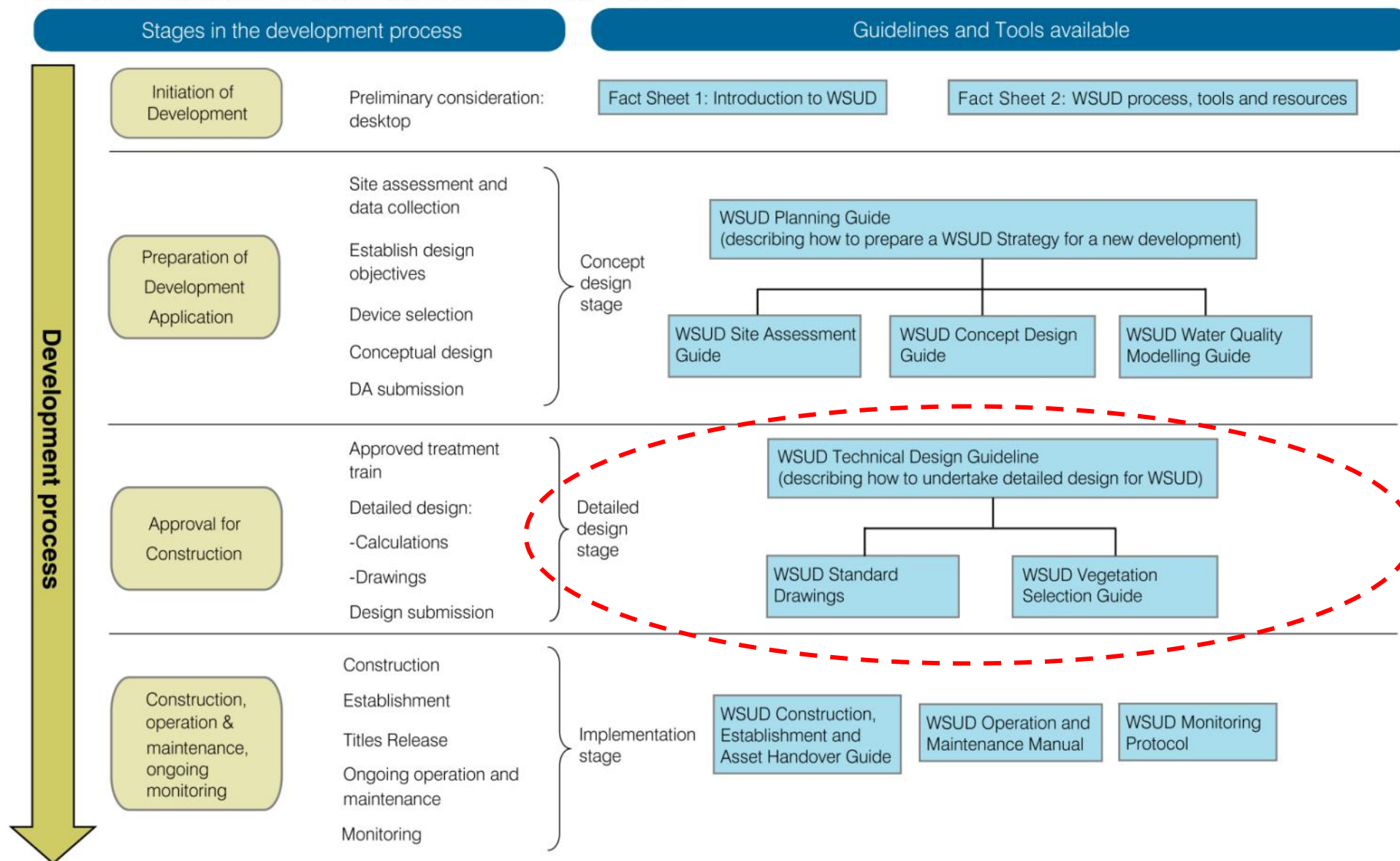
- Water Conservation
 - Demand Management
 - Rainwater Tanks
 - Water Recycling
 - Stormwater Harvesting
- Stormwater Quality
 - Swales
 - Bioretention Systems
 - Wetlands
 - GPTs
 - Infiltration
- Location
- Design Considerations
- Sizing
- Maintenance
- Further Information



MUSIC Modelling Guide



Darwin Harbour WSUD Guidelines and Tools



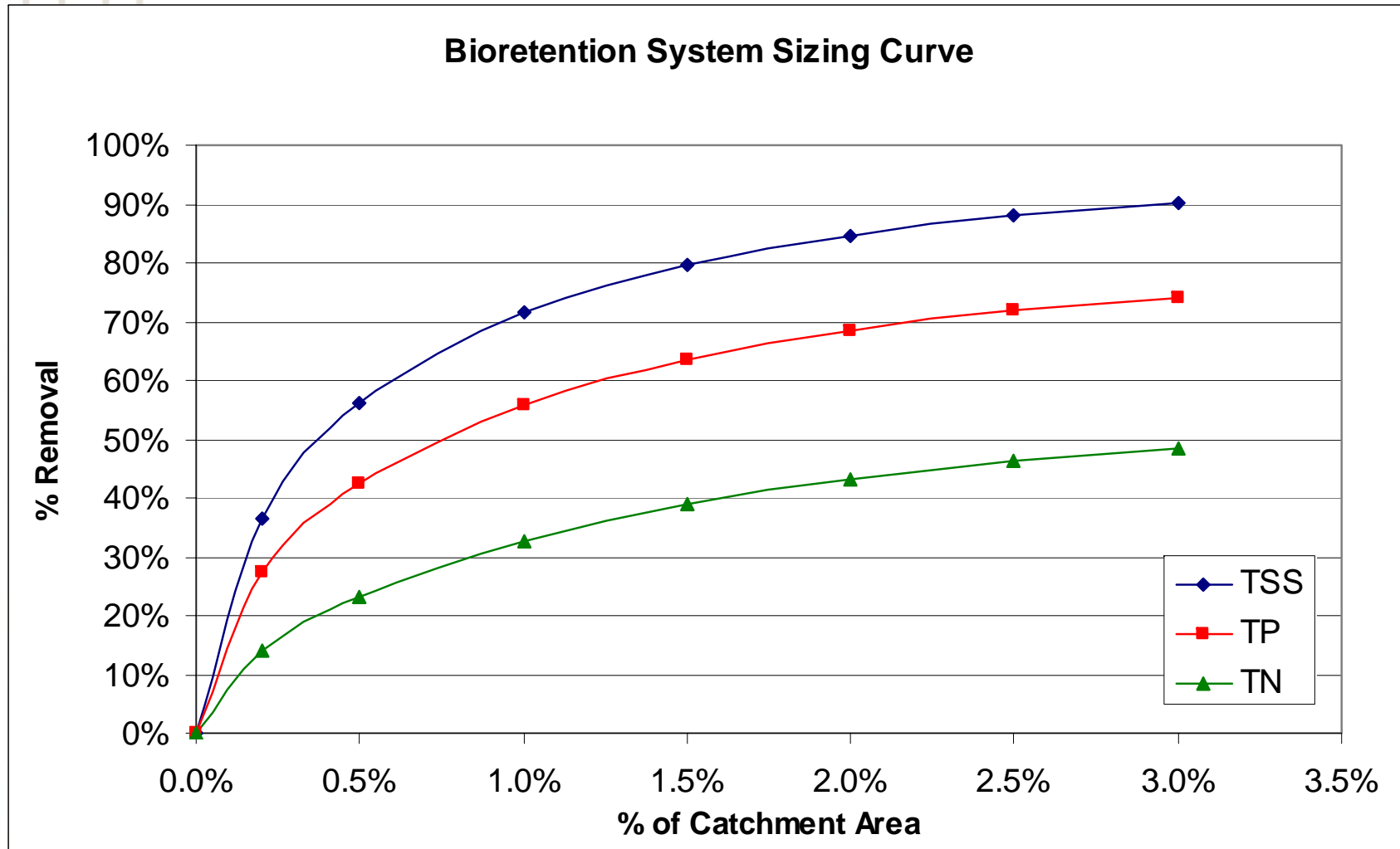
Technical Design Manual

WSUD Measure	Water conservation	Stormwater quality treatment	Peak flow attenuation	Reduction in runoff volume
Swales and buffer strips	-	M	L	L
Bioretention swales	-	H	M	L
Sedimentation basins	-	M	M	L
Bioretention basins	-	H	M	L
Constructed wetlands	-	H	H	L
Sand filters	-	M	L	L
Infiltration measures	-	L	M	H
Aquifer storage and recovery	H	L	M	H

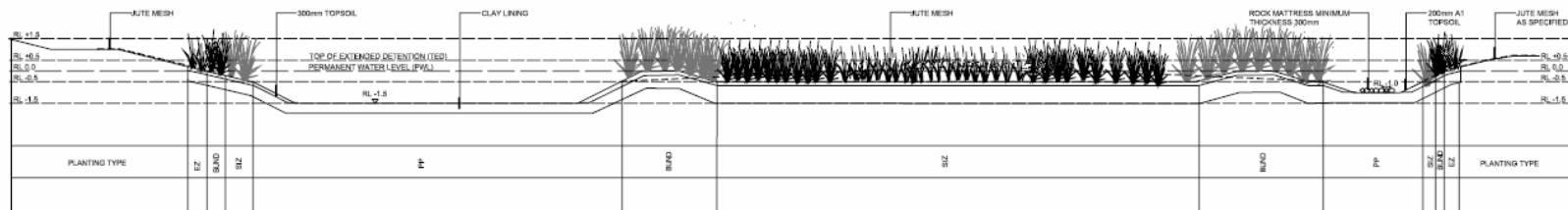
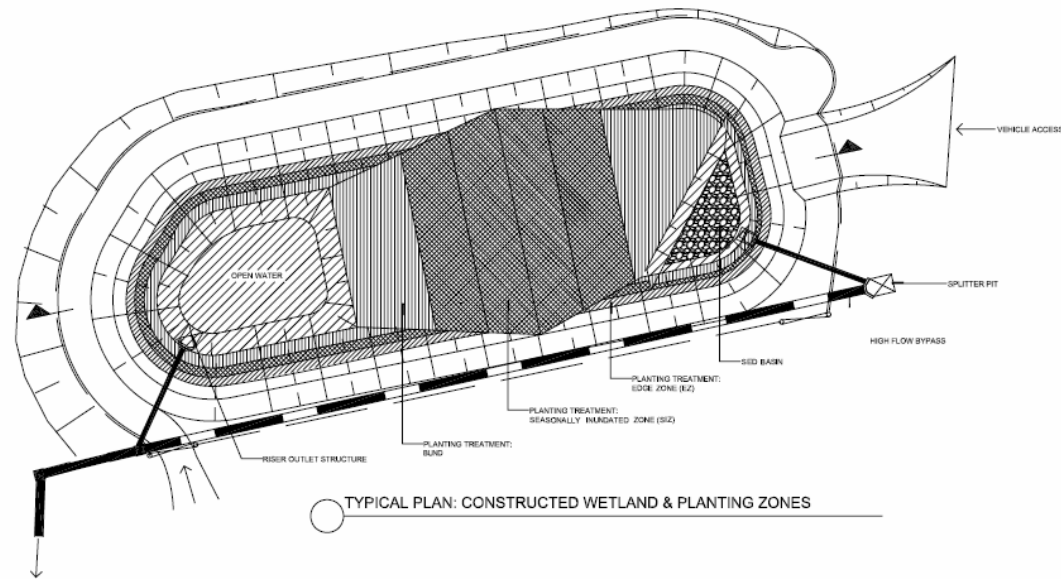
Technical Design Manual

- Swales and buffer strips
- Bioretention systems
- Sedimentation Basins
- Constructed Wetlands
- Sand filters
- Infiltration measures
- Aquifer storage and recovery
- Design Considerations
 - Wet / dry season
- Design process
 - Performance curves
 - Design Flows
 - Filter media
 - Design inlet systems
 - Overflow pits
 - Verification
 - Plants species
 - Maintenance
- Worked Example

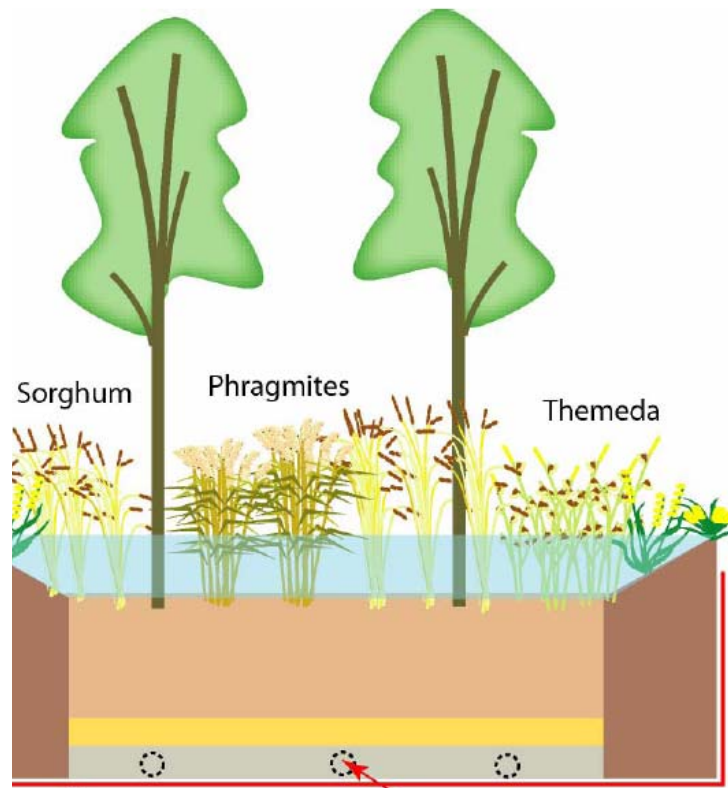
Technical Design Manual



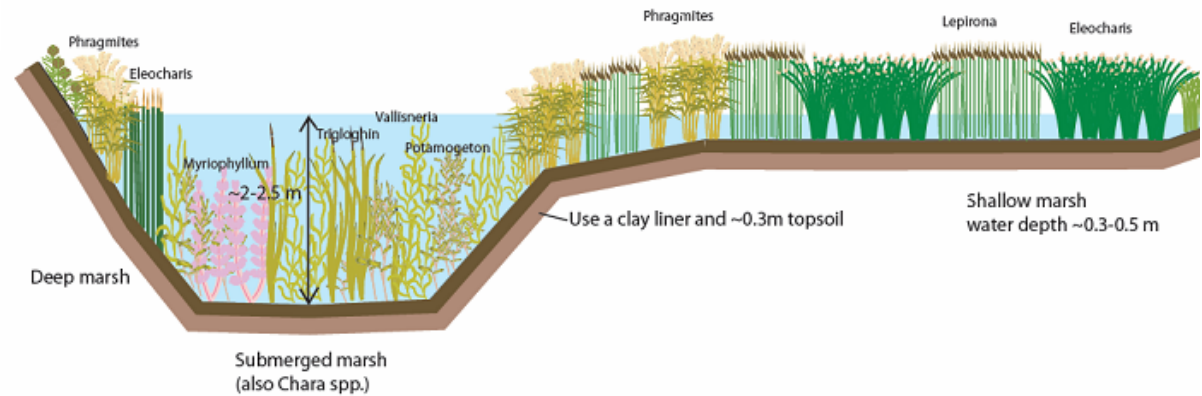
Standard Drawings



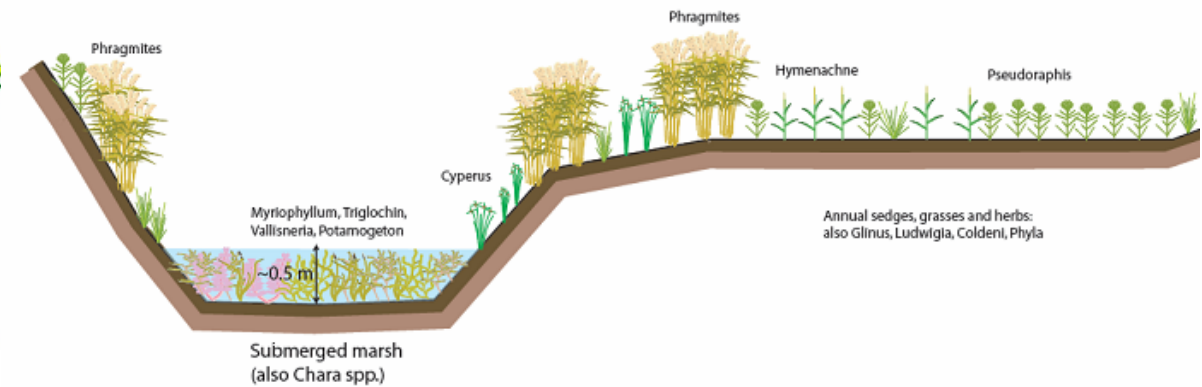
Vegetation Selection



Bioretention



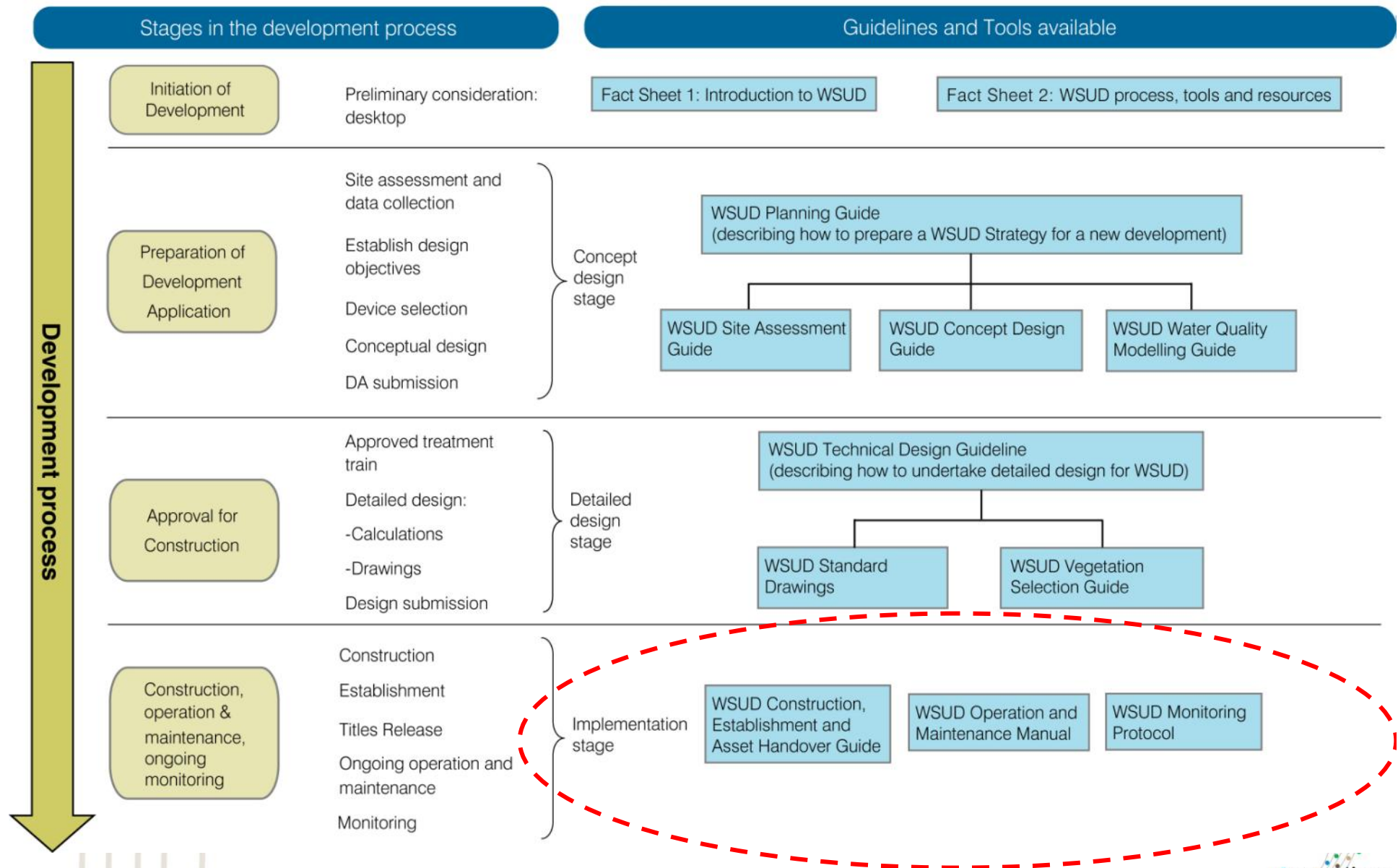
Wet season state



Dry season state

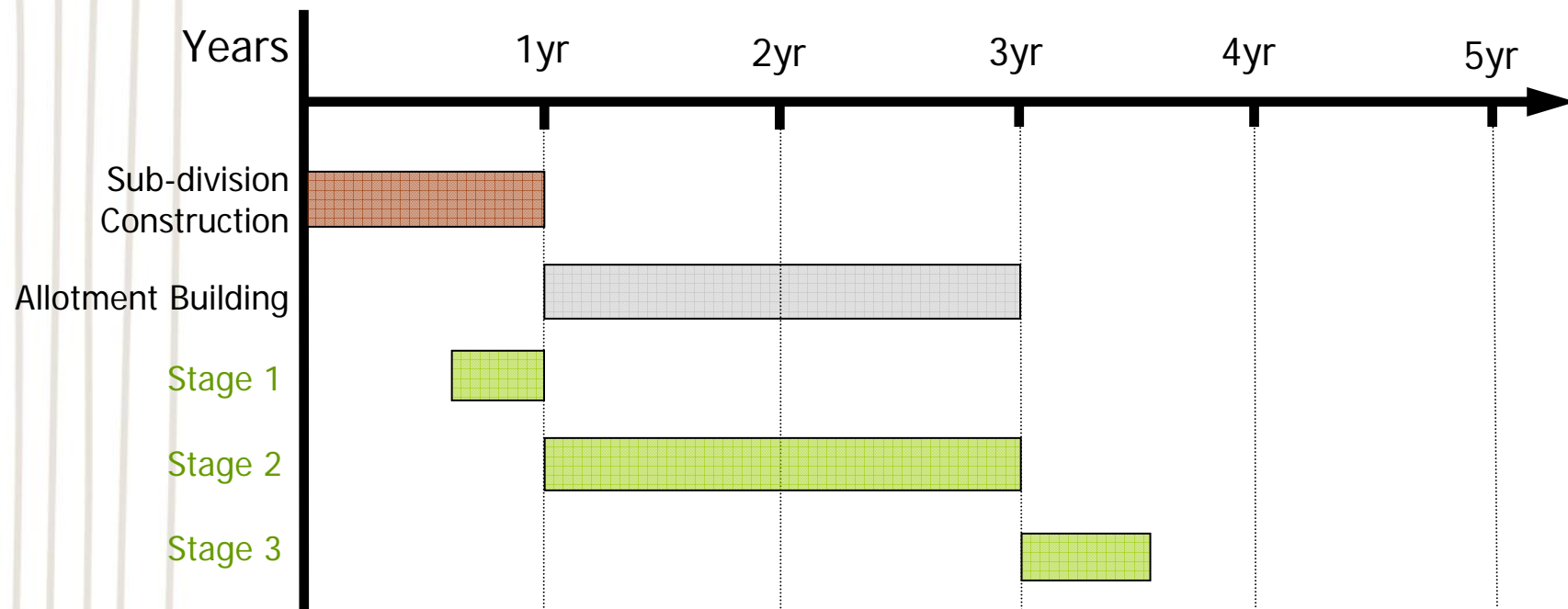
Wetland

Darwin Harbour WSUD Guidelines and Tools



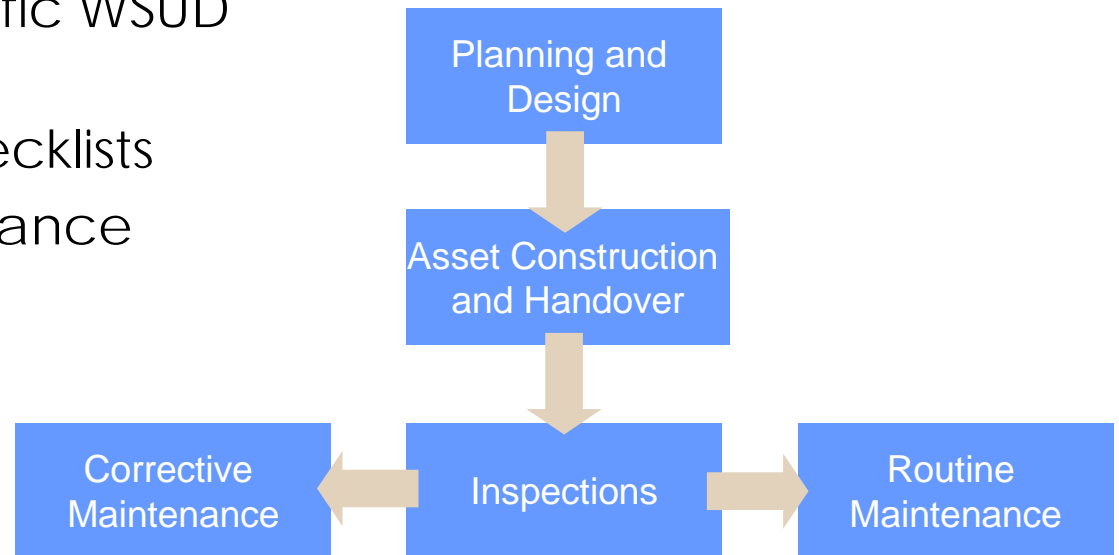
Construction and handover

- Example below refers to a subdivision construction process; similar would apply to any large construction site
- Three (3) Stages of Implementation
 - Stage 1 - Functional Installation
 - Stage 2 - Sediment & Erosion Control Function
 - Stage 3 - Operational Establishment



Operation and Maintenance

- Overview of the operation and maintenance process
- Operating and maintaining specific WSUD elements
- Maintenance checklists
- Example maintenance plan



Monitoring Protocols

- Demonstrating ongoing performance
 - Step Process
- How to design a monitoring program
- Address knowledge gaps on treatment pollutant performance and removal efficiency
- Need to monitor for mosquitoes and modify design parameters
- Improve and evolve design with improved knowledge