

Strategic Investment in run off management

Using spatial decision support tools

Stormwater Victoria Conference, 7 June 2018

Outline

Background and drivers

Introduction to the two tools

The Areas of Interest tool

The feasibility tool

Bringing the tools together

Where to from here

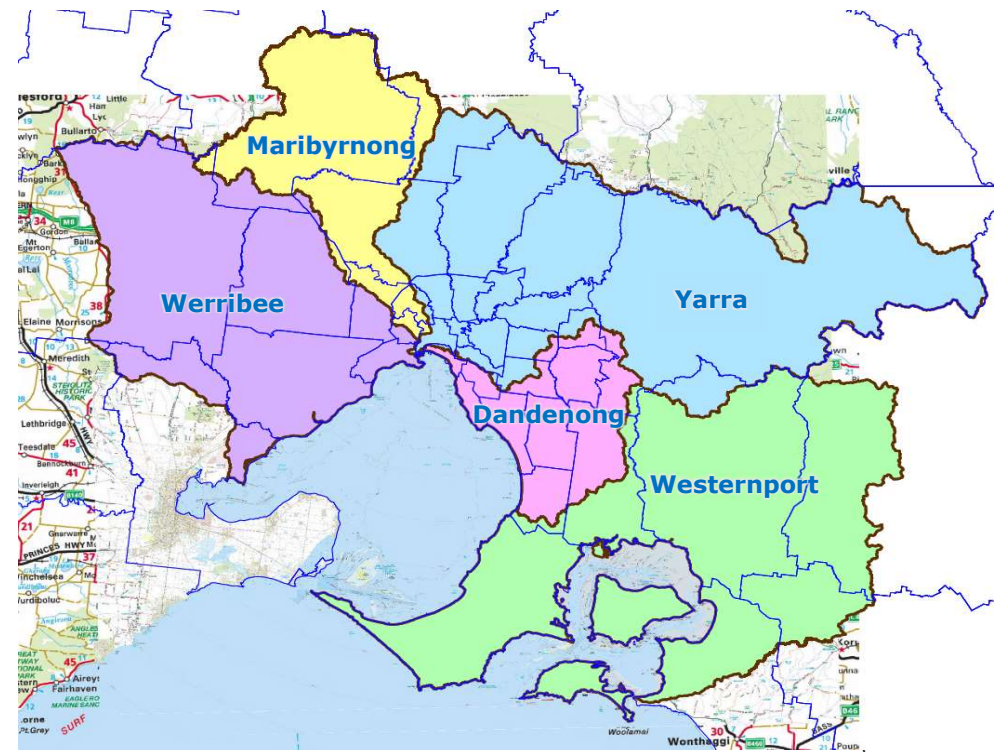


Background and drivers

Drivers

- Designated waterway manager for large region (>12800sqkm)
- Runoff from urban, rural and public forest negatively impacts waterways
- Urbanisation brings greater challenges
- Create tools to help investment planning and drive outcomes
- Support customers that lack capability or resources

MW Operating Area



Introduction to the two stormwater tools

Areas of Interest (AOI)

WHO	Melbourne Water / Jacobs
WHAT	Decision support framework to identify and prioritise areas for investment based on stormwater and surface runoff threats
WHERE	Whole of Melbourne Water management district
WHY	Inform where we should direct investment in stormwater management e.g. through incentives such as the Living Rivers Program, and capital expenditure
RESULTS	Spatial tool displaying 'Areas of Interest' and an excel workbook that sets the framework for new questions to be asked to inform future decision making

Feasibility of stormwater/runoff management actions (FOSMA)

WHO	Melbourne Water Living Rivers and Rural Land Programs / Jacobs
WHAT	Spatial urban stormwater and rural runoff management actions feasibility assessment tool for given areas of interest
WHERE	Whole of Melbourne Water management district
WHY	Identify feasible management actions for a given area of interest to inform master planning
RESULTS	Spatial tool including an Excel workbook and management actions database that identifies what management actions are suitable where within a given area of interest

Areas of Interest

Decision support framework: development process

Identify

Ways in which streams are impacted (threats)

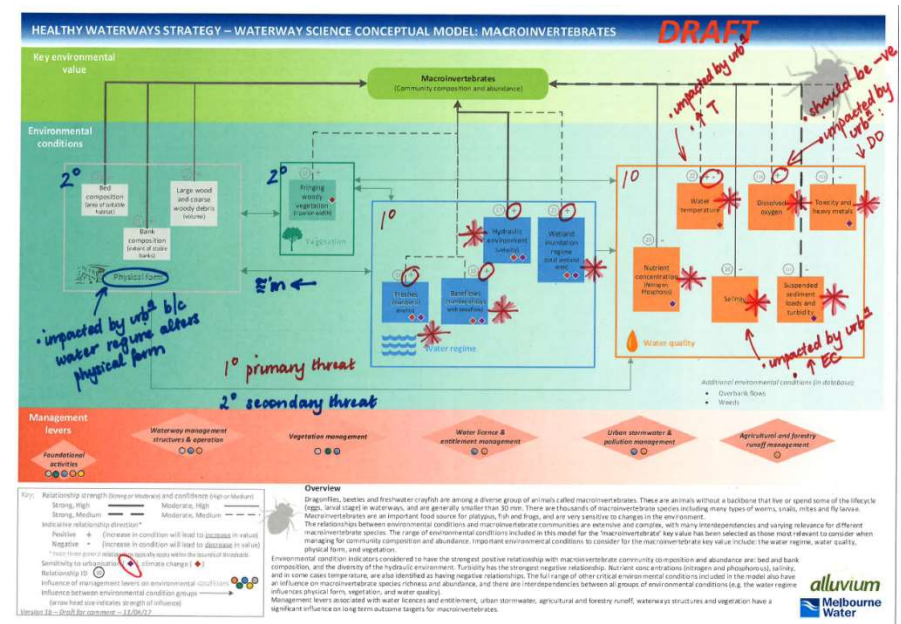
Factors that mitigate or amplify (moderators)

Method: Review of conceptual models backed up by latest scientific studies and a series of workshops

Data collation and processing

Spatially exact

Complete coverage of MW operating area



Decision support framework: input data

Primary threats

Future (2050) DCI

Intensive agriculture

Moderators

Tree canopy cover

Wetlands / water bodies

Secondary threats

Sealed roads

Unsealed roads

Litter and pollution hotspots

Slope

Presence/absence of alluvium

Potential for gully erosion

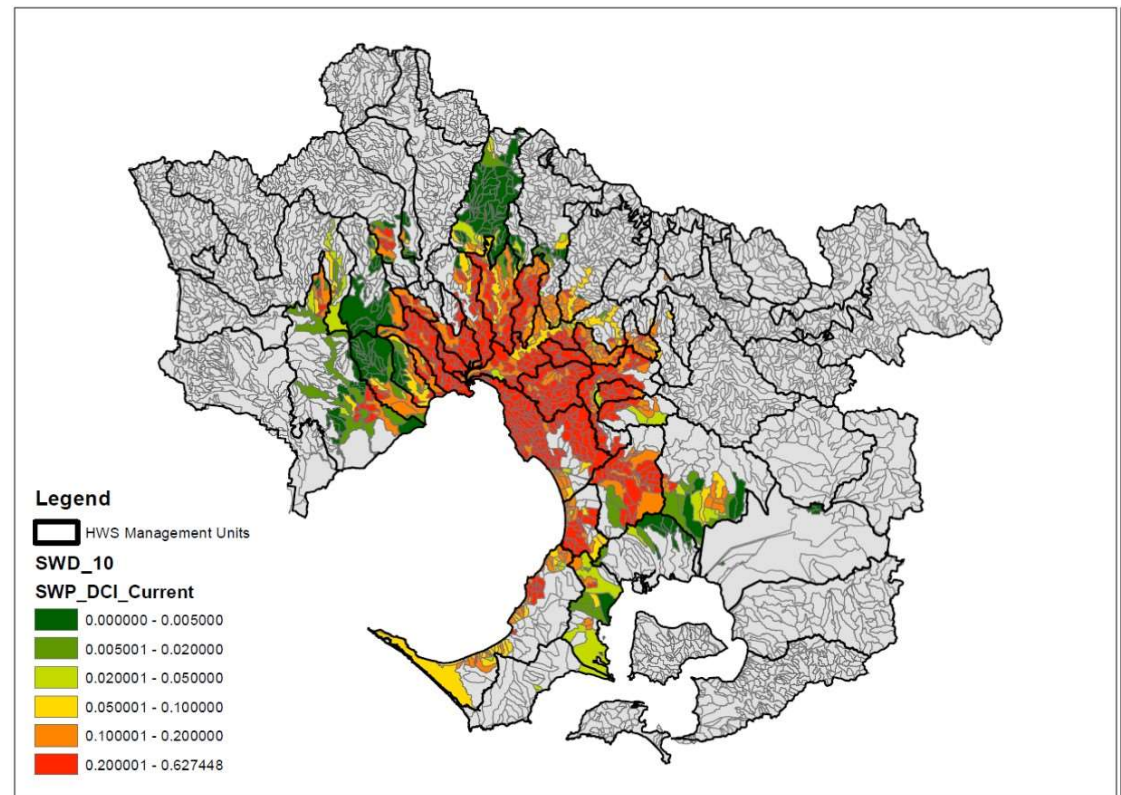
Decision support framework: assigning data to value types

Criteria Description	Criteria Type	Fish	Frogs	Platypus	Macro	Birds	Vegetation	Amenity
Length (km) of unsealed roads in 40m buffer per catchment area (Ha)	Threat	Yes	Yes	Yes	Yes	No	No	Yes
Length (km) of sealed roads per catchment area (Ha)	Threat	Yes	Yes	Yes	Yes	No	No	Yes
Percentage of catchment in litter hotspot	Threat	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of litter hotspots within 40m of streams	Threat	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of catchment in pollution hotspot	Threat	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of pollution hotspots within 40m of streams	Threat	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of stream length in alluvium in catchment	Threat	Yes	Yes	Yes	Yes	No	Yes	Yes
Percentage of catchment with high gully erosion potential	Threat	Yes	Yes	Yes	Yes	No	No	Yes
Percentage of stream length with high gully erosion potential	Threat	No	No	No	No	No	Yes	No
Percentage of catchment logged in last 10 years	Threat	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of tree canopy in catchment	Mod	No	No	No	No	Yes	No	No
Percentage of tree canopy in (20 / 40m) buffer	Mod	Yes	Yes	Yes	Yes	Yes	No	Yes
Percentage of wetlands/waterbody in catchment	Mod	Yes	Yes	Yes	Yes	Yes	No	Yes

Outputs

Urban areas

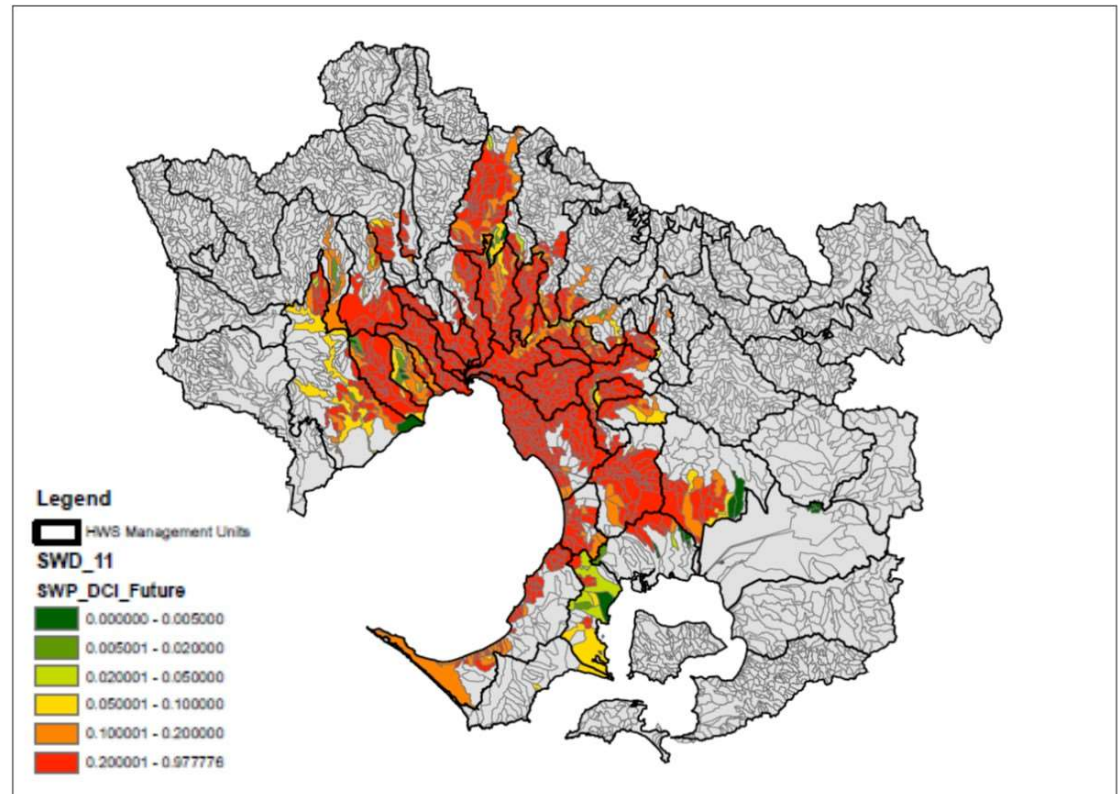
- Current Directly Connected Imperviousness (DCI) within urban growth boundary
- Most established suburbs in catchments with DCI >20%
- Low priority from environmental value perspective



Outputs

Urban areas

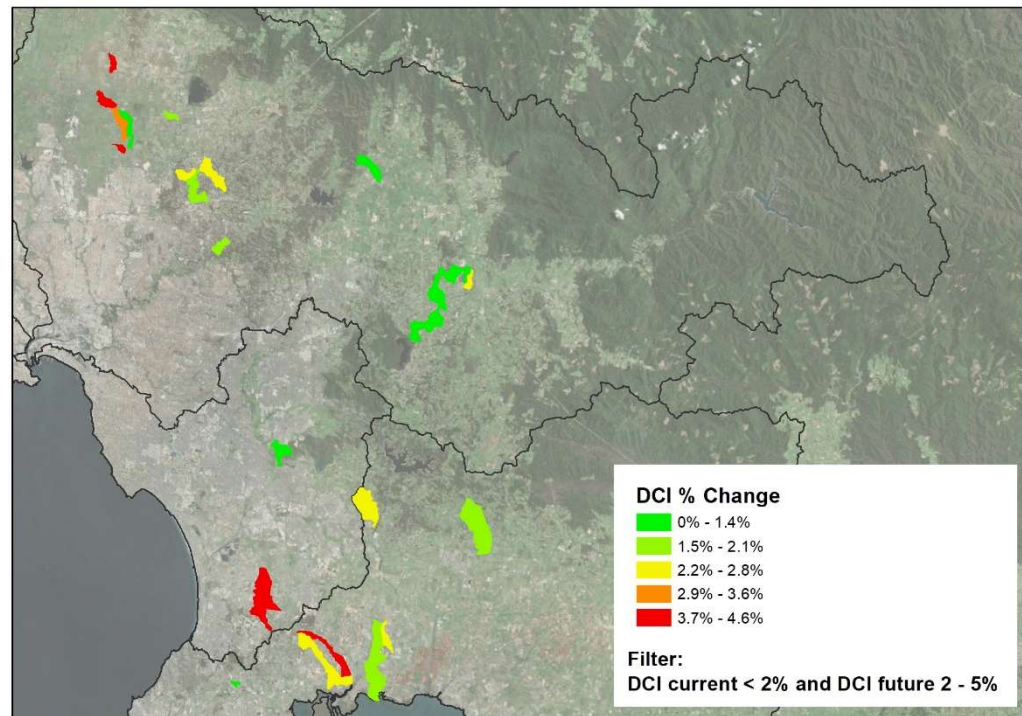
- Predicted future (2050) DCI within urban growth boundary
- Assumes business-as-usual stormwater management



How do we prioritise?

First cut by primary threat

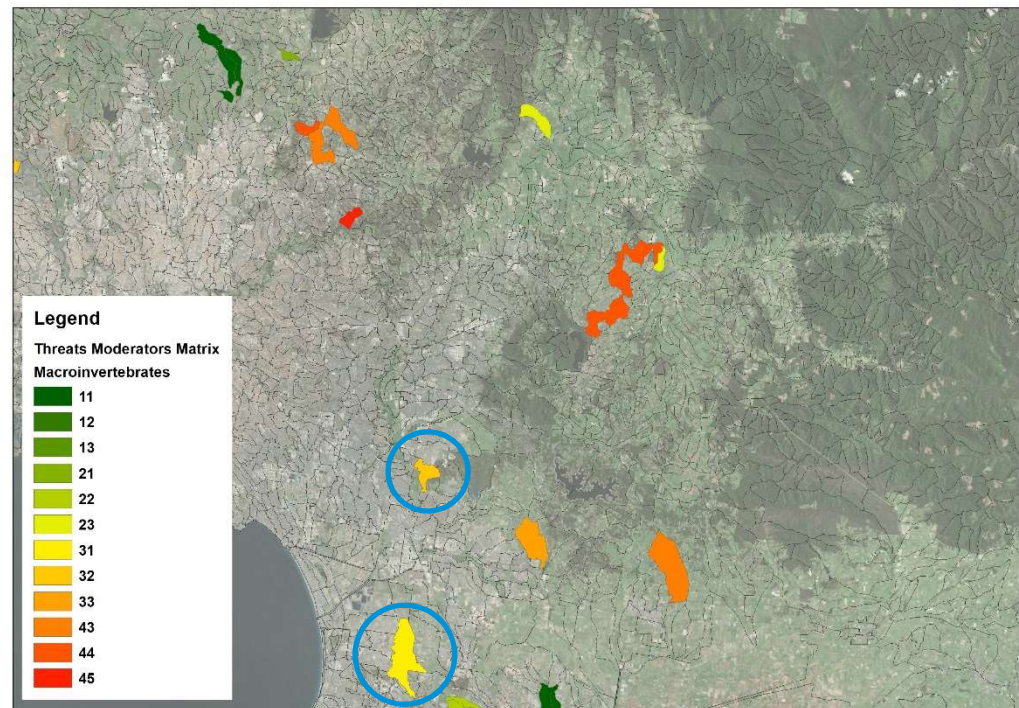
- Current DCI and future projections at 2050
- Consider magnitude of change together with current condition
- Example: Current DCI <2%, future DCI 2-5%



How do we prioritise?

Refine results

- Identify combinations of threats and moderators
- Target high threats and low moderators
- Results show combinations present in areas of interest



The feasibility of stormwater/runoff management actions (FOSMA) tool

What can the tool do?

2 WAYS OF INTERROGATING AN AREA OF INTEREST

1. What stormwater or rural runoff management action can I do here?
2. Where can I do this stormwater or rural runoff management action?

FURTHER FILTERING

1. For end of pipe or distributed solutions or both; and
2. Below objectives

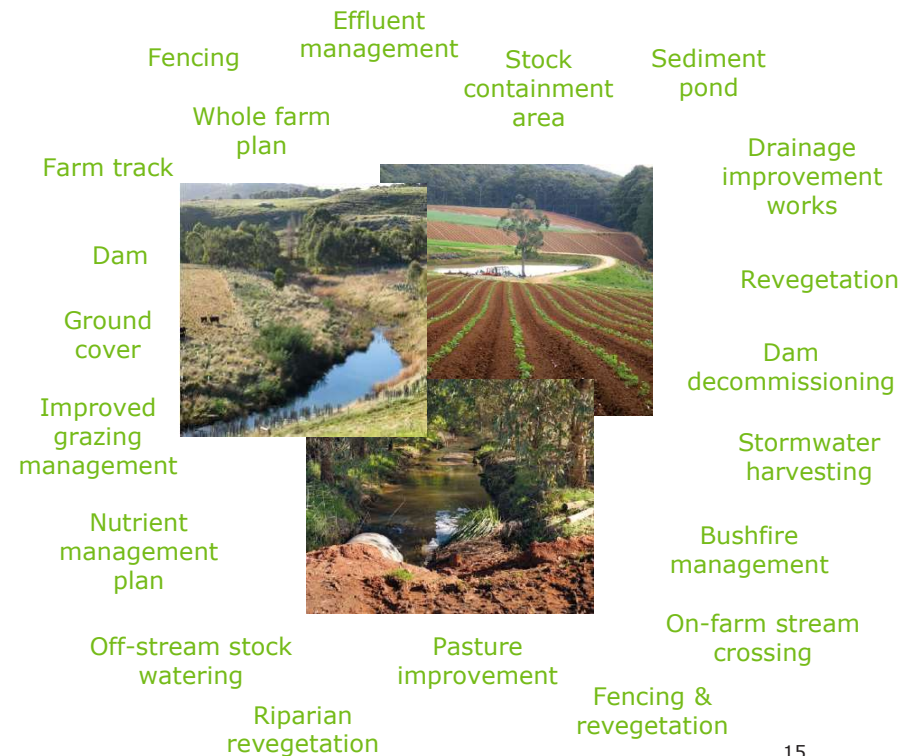
Streamflow					Water quality					Other					
↑ peak flow	↓ runoff vol	↓ runoff frequency	↑ filtered flow	environmental flows	litter	sediment	TN	TP	heavy metals	oil & grease	erosion	water supply	amenity	urban cooling	terrestrial biodiversity

What management actions are included?

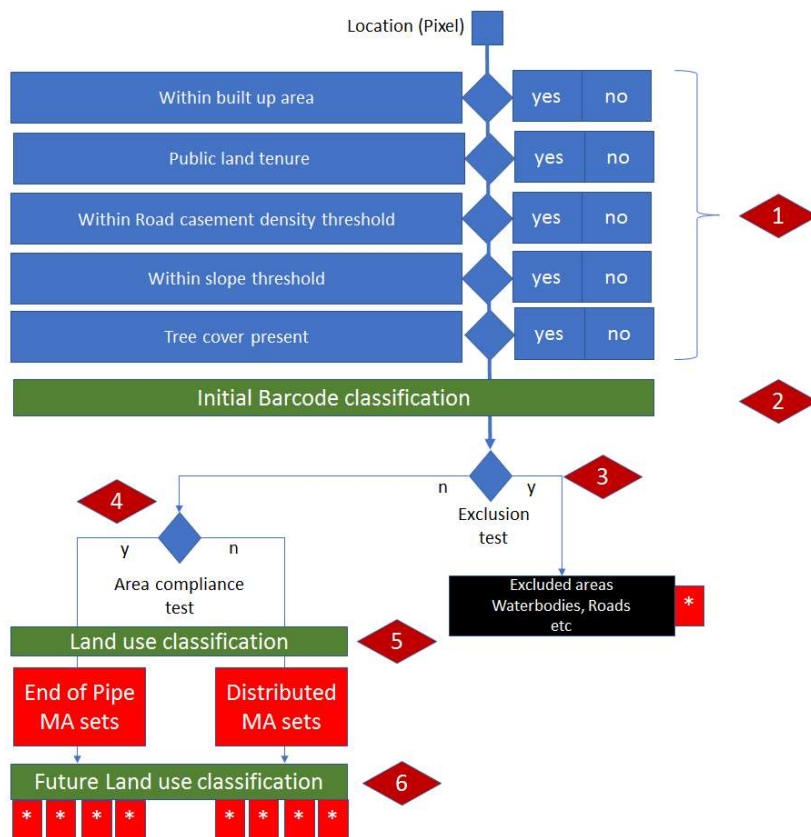
URBAN STORMWATER



RURAL RUNOFF



How does the tool work?



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DECISION FRAMEWORK

User generates barcode based on

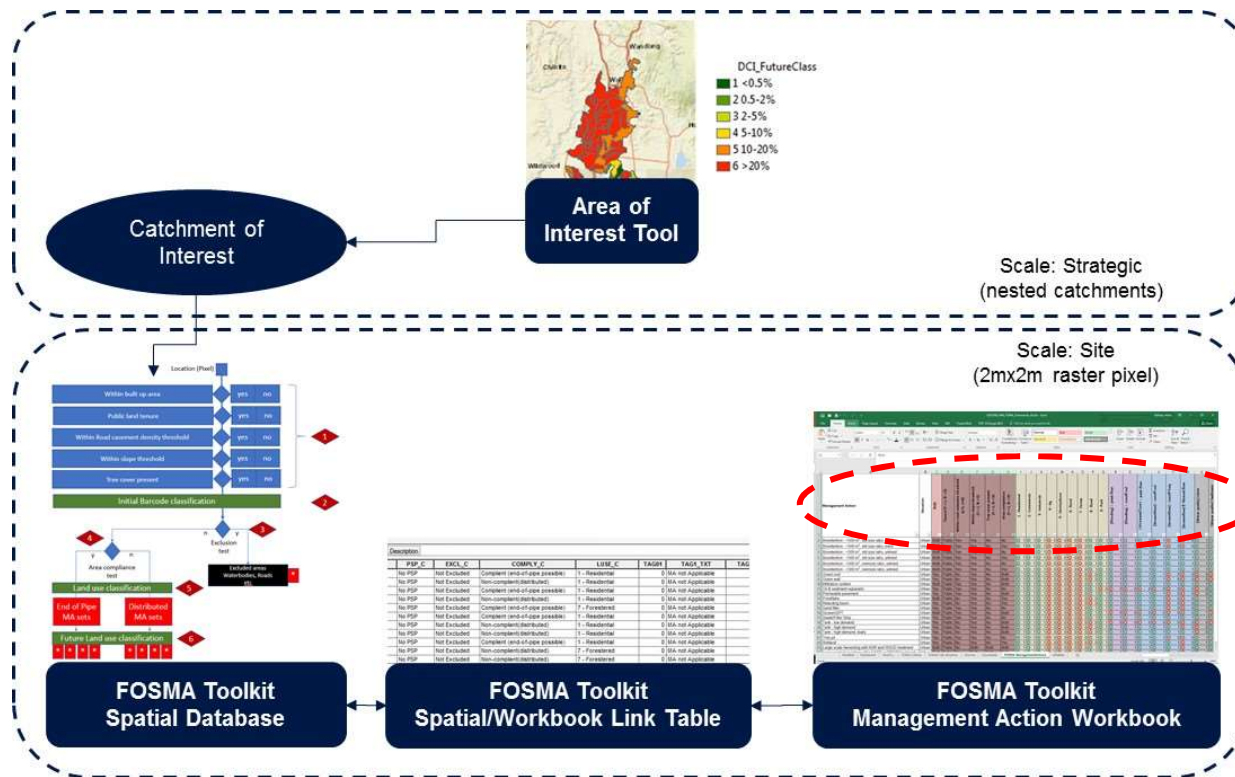
yes	no
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 filtering process.

For example: 01110 – 0 – 0

User generates GIS query using
 barcode to identify results.

Components of the toolkit



Situation	Management Action
Built Up Area	Barcode
Tenure	Barcode
Within road easement threshold	Barcode
Within slope threshold	Barcode
Tree cover present	Barcode
Area compliance	Barcode
Residential	Broad Land Use Category
Commercial	Broad Land Use Category
Industrial	Broad Land Use Category
Agriculture	Broad Land Use Category
Horticulture	Broad Land Use Category
Rural	Broad Land Use Category
Forest	Broad Land Use Category
Road/transport	Broad Land Use Category
Park/reserve	Broad Land Use Category
↓ peak flow	Streamflow
↓ runoff vol	Streamflow
↓ runoff frequency	Streamflow
↑ filtered flow	Streamflow
environmental flows	Streamflow
litter	Water quality
sediment	Water quality
TN	Water quality
TP	Water quality
heavy metals	Water quality
oil & grease	Water quality
erosion	Other
water supply	Other
amenity	Other
urban cooling	Other
terrestrial biodiversity	Other
implementation	Cost
maintenance	Cost

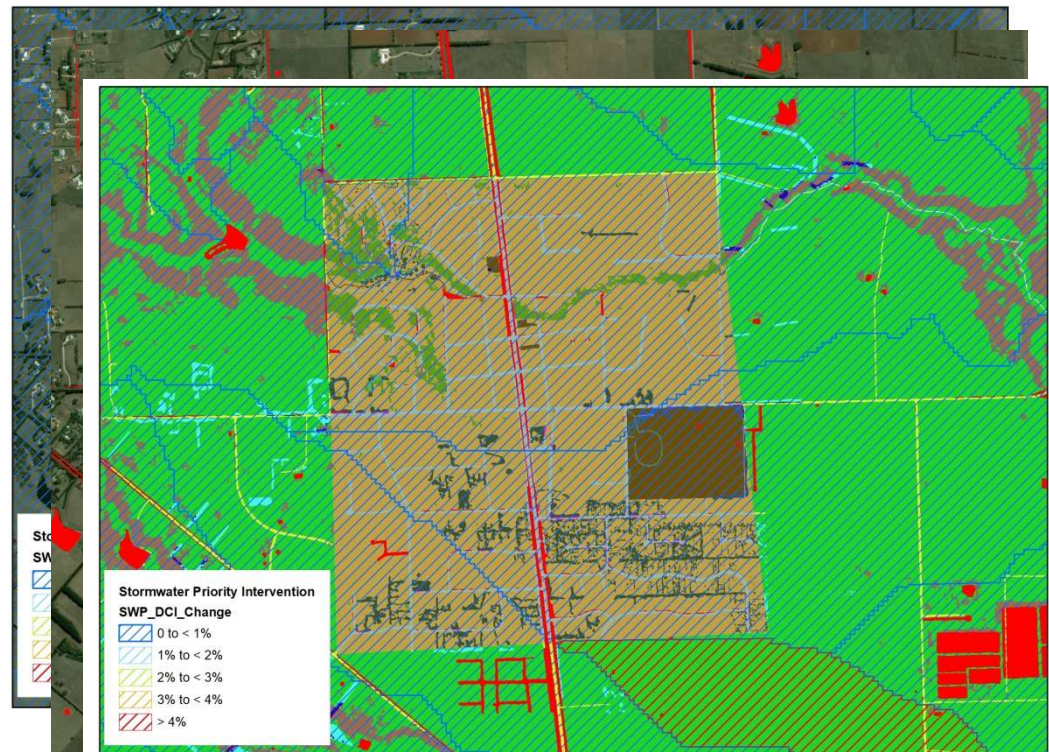
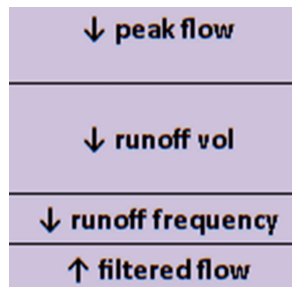
Bringing the tools together

Examples

Query: Where are areas with predicted minor DCI increase and what can I do there to address DCI?

Used AOI to identify areas that currently have a DCI <2% which will increase to 2-5% by 2050.

Used FOSMA to identify upstream areas and actions that can address streamflow objectives.



Examples









Query: What can I do here to address stormwater impacts?

Used AOI for initial DCI filter.










Used FOSMA to identify suitable management actions.



Strengths and limitations – Areas of Interest

Customer <ul style="list-style-type: none">  Enables identification of 'Areas of Interest' to direct investment  Quick to perform standard queries to provide a service for customers 	Technical <ul style="list-style-type: none">  Platform allows easy querying and filtering of various data layer combinations  Interpretation of outputs limited by data availability and quality
Efficacy and performance <ul style="list-style-type: none">  Allows for more in depth queries on specific threat/moderator combinations  Threat based tool so still need to use GIS workspaces to overlay other datasets e.g. HWS values 	Adoption <ul style="list-style-type: none">  Requires ArcGIS operator to run new queries and use full capabilities of the tool  Consider simple online tools or 'workspaces' to facilitate adoption

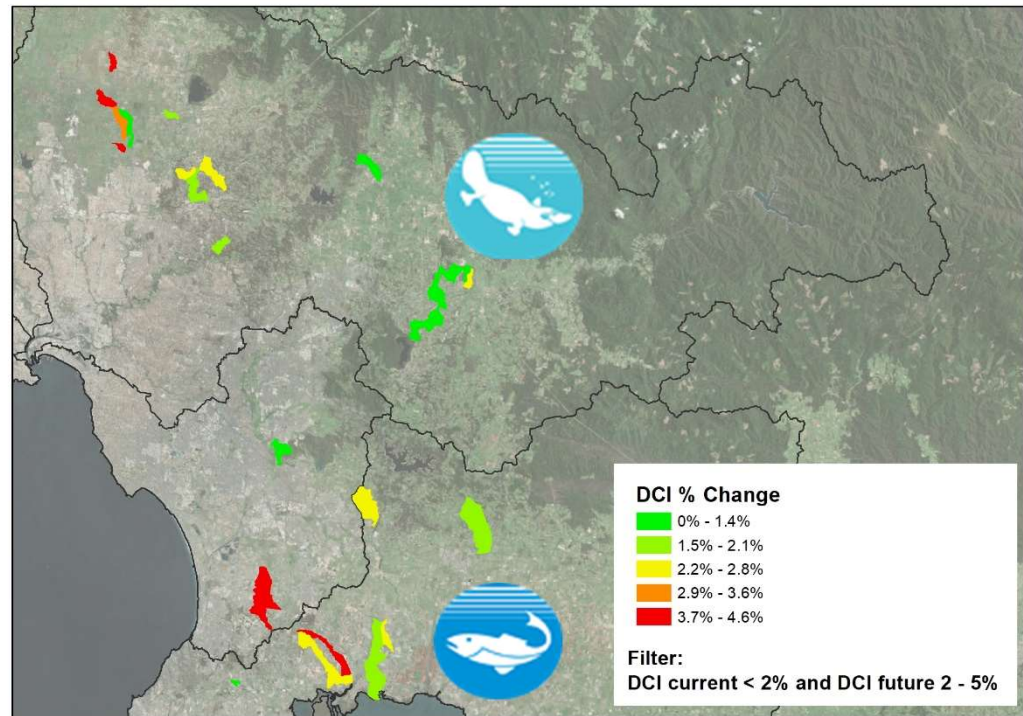
Strengths and limitations - FOSMA

Customer <ul style="list-style-type: none"> Available to partners who wish to inform master planning Not available online	Technical <ul style="list-style-type: none"> Can identify small spaces for distributed management actions Management actions can be filtered based on objectives Datasets can provide misleading answers
Efficacy and performance <ul style="list-style-type: none"> Current decision framework limits inclusion of other useful datasets Effectiveness ranking for comparison of actions not available	Adoption <ul style="list-style-type: none"> Could be used for master planning when combined with AOI and HWS priority areas Requires ArcGIS operator

Where to from here

Where to from here

- Testing workshop with wider group of users
- Technical refinements
- Embed within GIS tools via **creation of 'workspaces'** with initial 'Areas of Interest', HWS values, and popular FOSMA searches to enable broader use
- **Identification of value adds** to the tools for example a network tool to interrogate upstream impacts or downstream values connected to a given location



Thank you

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