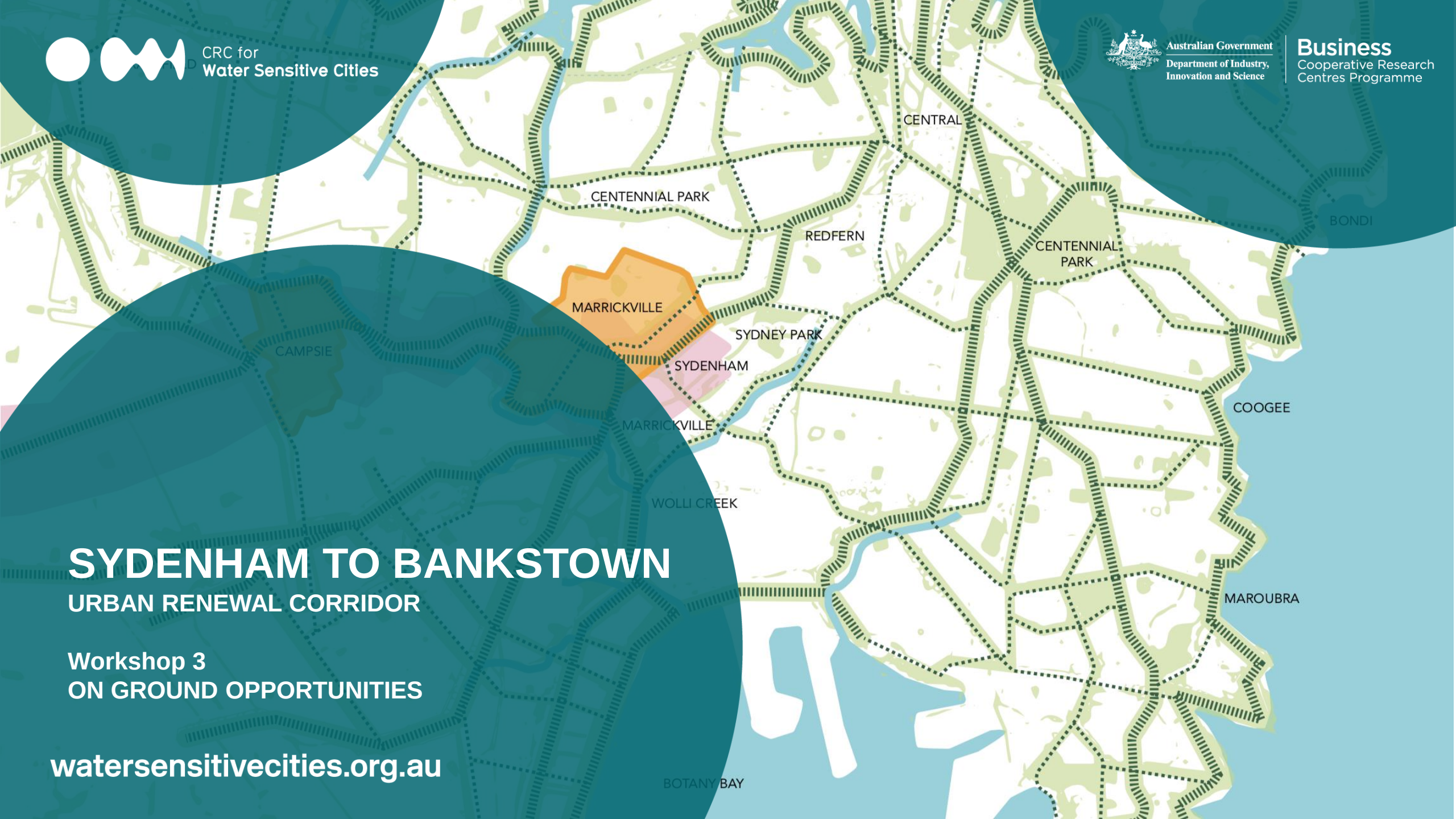
CRC for
Water Sensitive Cities

Australian Government
Department of Industry, Innovation and Science

Business
Cooperative Research
Centres Programme



SYDENHAM TO BANKSTOWN

URBAN RENEWAL CORRIDOR

Workshop 3
ON GROUND OPPORTUNITIES

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Workshop 3 - Outline

ON GROUND OPPORTUNITIES

- Welcome
- Workshop 2 – Recap
- On-ground challenges, opportunities, solutions
- Revisit Principals
- Next Steps

Workshop 2 - Recap

CAMPSIE, NOVEMBER 22, 2018

Purpose:

- Identify principles for development
- Apply to case study areas in Campsie & Marrickville
- Identify challenges and opportunities

Site Challenges Identified:

- Water & wastewater system capacity constraints
- Flooding, drainage issues and changing climate
- Cooks River water quality and local visual connection
- Connecting communities to water and open space
- Lack of greening
- Urban Heat Island

Workshop 2 - Recap

CAMPSIE, NOVEMBER 22, 2018

Opportunities:

- Locally sourced water from stormwater & wastewater systems
- Increasing urban greening, cooling through connecting grids
- Connecting communities to water and open space
- Multipurpose open spaces for flooding, drainage function
- Cooks River water quality and local visual physical connection
- Opportunity to influence new development

Workshop 2 - Recap

MARRICKVILLE, NOVEMBER 23, 2018

Purpose:

- Identify principles for development
- Apply to case study areas in Campsie & Marrickville
- Identify challenges and opportunities

Site Challenges Identified:

- Water & wastewater system issues and impacts sea level rise
- Flooding, drainage issues and changing climate
- Cooks River water quality issues storm and waste water
- Connecting communities to water and open space
- Lack of greening and urban ecology
- Urban Heat Island

Workshop 2 - Recap

MARRICKVILLE, NOVEMBER 23, 2018

Opportunities:

- Increasing resilience through urban greening and cooling
- Reduce imperviousness to reduce run off
- Sustainable Streets retrofit with water sensitive gardens
- Locally sourced water from stormwater & wastewater systems
- Connecting communities to water and open space
- Multipurpose open spaces for flooding, drainage function
- Cooks River water quality and local visual physical connection
- Opportunity to influence new development

On-Ground Challenges

On Ground – Challenges

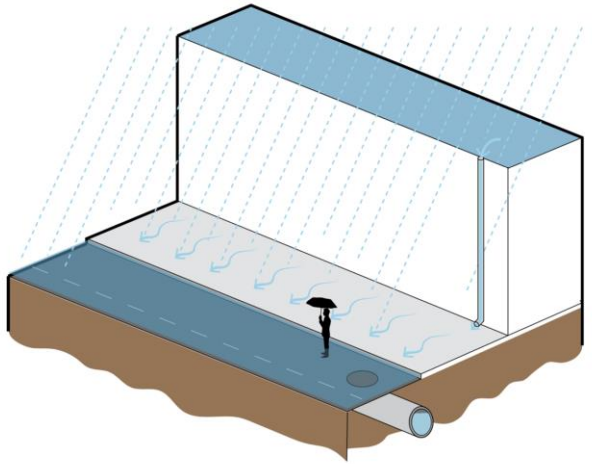
GENERAL

Flooding & Water Quality:

- Large impervious area:
    - High impervious area made up of roofs, paths, driveways roads
    - Sediment, nutrient, sewerage overflow flow untreated to waterways
- Insufficient Drainage:
    - Low drainage conveyance capacity, low lying land
    - Poor overland flow conveyance caused by landform, railway
- Changing climate:
    - Increase in rainfall intensity and sea level rise

Water Servicing:

- Capacity constraints:
    - Increased demand on waste water and water supply networks



On Ground – Challenges

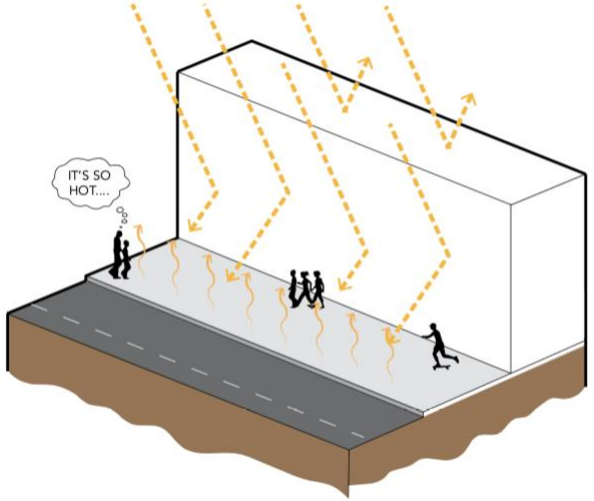
GENERAL

Urban Heat:

- Heat absorption:
  - Abundance of hard surfaces
  - Lack of vegetation
  - Diminishing open space
- Lack of shade:
  - Poor tree selection
  - Lack of street trees

Amenity:

- Dominant built form:
  - Minimal connectivity to greenery
  - Poor connectivity to water
- Solar reflection:
  - Lack of greenery
  - Poor building design and material selection



On Ground – Challenges

CAMPSIE – FLOODING, WATER QUALITY AND WATER SERVICES

- Water system capacity and functional constraints
- Wastewater system capacity constraints
- Flooding, drainage issues and changing climate
- Cooks River poor water quality

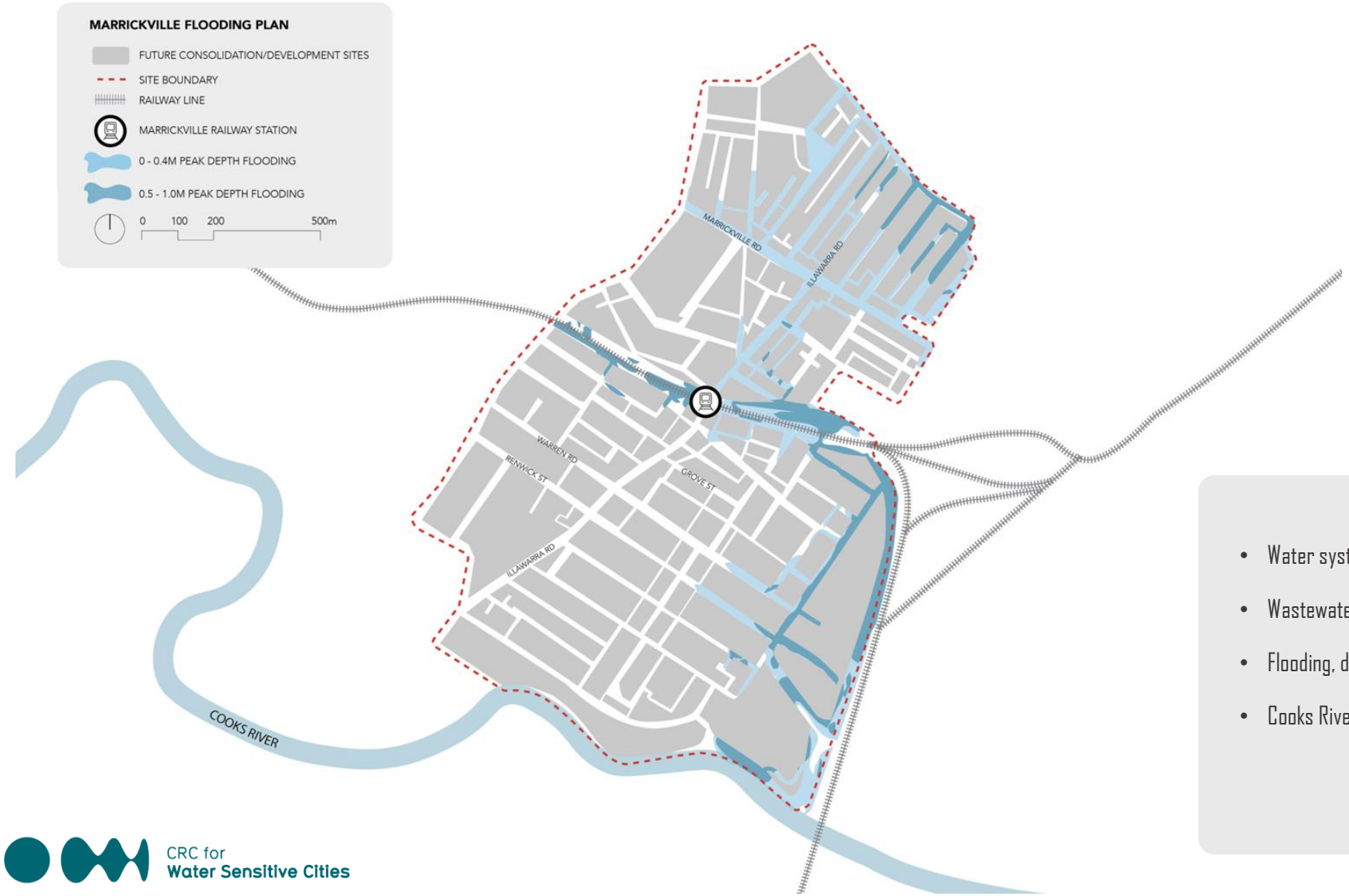
On Ground – Challenges

CAMPSIE – URBAN HEAT AND AMENITY

- Cooks River low visual and physical connection
- Low community connection to water & open space
- Lack of greening
- Urban Heat Island

On Ground – Challenges

MARRICKVILLE – FLOODING, WATER QUALITY AND WATER SERVICES



- Water system capacity and functional constraints
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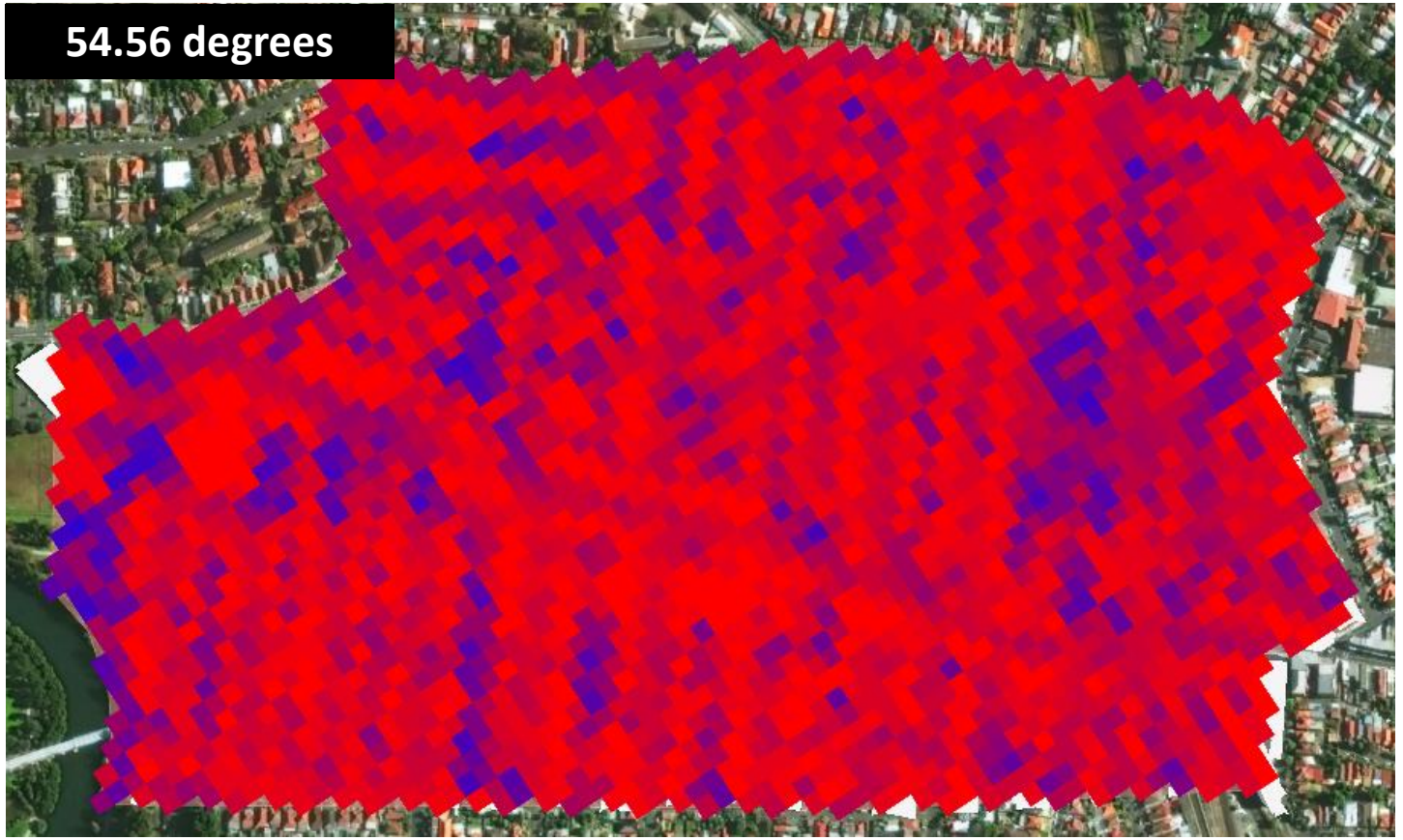
- Flooding, drainage issues and changing climate
- Cooks River water quality issues storm and waste water

On Ground – Challenges

MARRICKVILLE – HEAT AND AMENITY



- Cooks River low visual and physical connection
- Low community connection to water & open space
- Lack of greening
- Urban Heat Island

On-Ground Opportunities

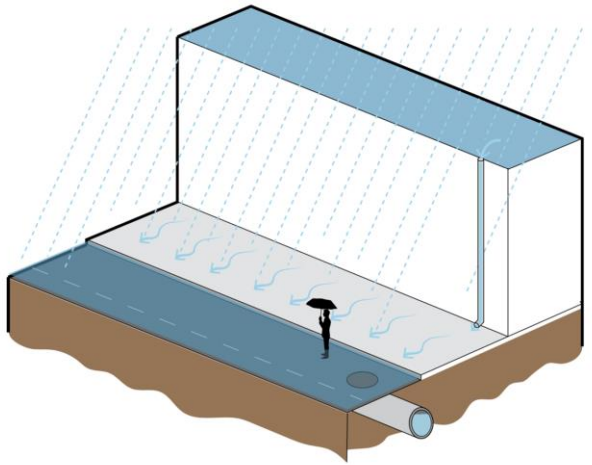
On Ground – Opportunities

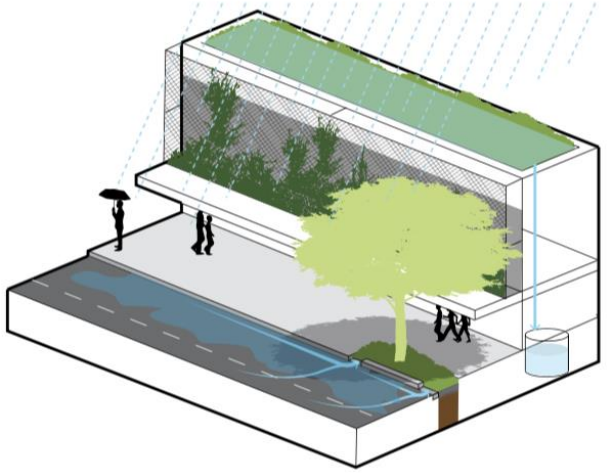
GENERAL

Flooding & Water Quality, Water Servicing:

- Reduce impervious area:
  - Install rain tank installations connected to amenities/irrigation
  - Limit hard surface area increases
  - Retrofit hard surface with rain gardens, permeable surfaces
- Improve quality:
  - Install rain tanks, raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Increase water reuse:
  - Install alt supply, rain tanks, grey water systems, passive irrigation

NOTE: SOME TREATMENTS PROVIDE MULTIPLE BENEFITS





On Ground – Opportunities

GENERAL

Urban Heat:

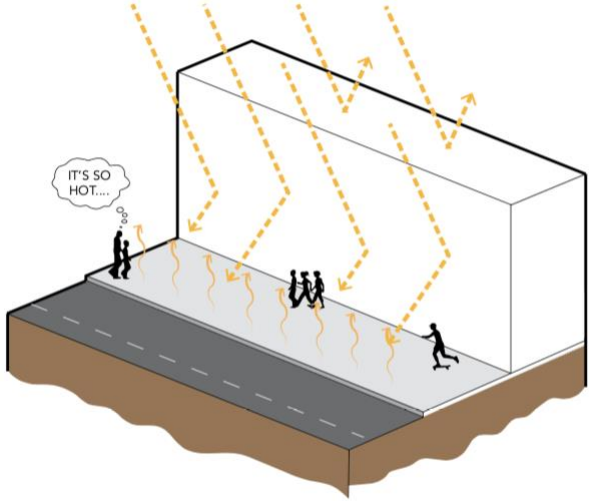
- Reduce heat absorption and increase shade:
  - Increase permeable surfaces and vegetation to replace hard surfaces
  - Select appropriate tree for shade and street size
  - Increase access to green open space and water

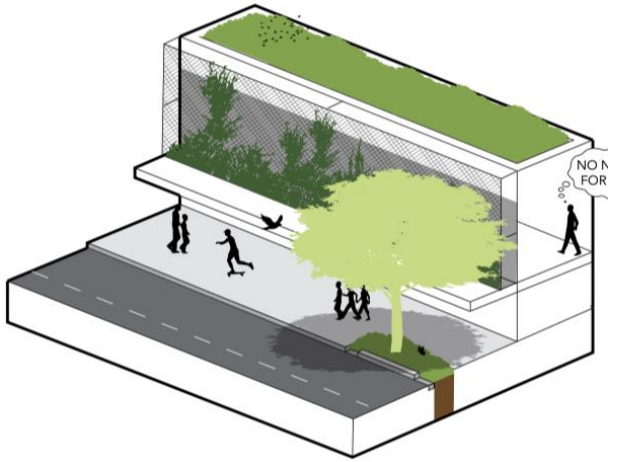
Amenity:

- Dominant built form:
  - Strategically locate trees to break up building form
  - Set back upper level high density buildings

- Solar reflection:
  - Implement green walls /roofs
  - Improve building design and material selection

NOTE: SOME TREATMENTS PROVIDE MULTIPLE BENEFITS





On Ground – Opportunities

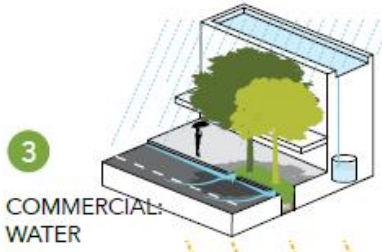
CAMPSIE

On Ground – Opportunities

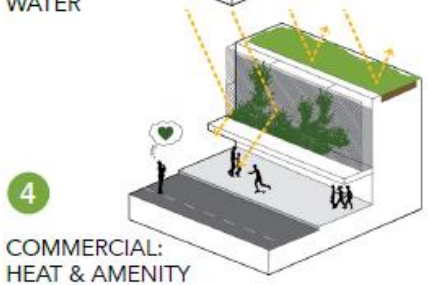
CAMPSIE

1 RESIDENTIAL: WATER

2 RESIDENTIAL: HEAT & AMENITY

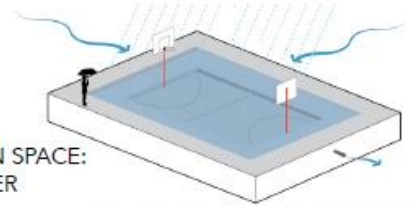


3 COMMERCIAL: WATER

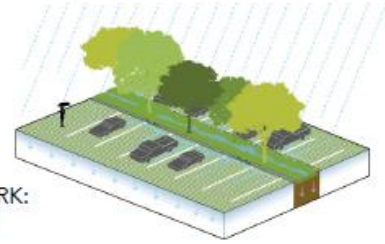


4 COMMERCIAL: HEAT & AMENITY

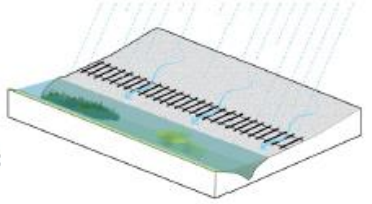
5 HIGH DENSITY: HEAT & AMENITY



7 OPEN SPACE: WATER



9 CAR PARK: WATER



10 RAILWAY: WATER

11 OPEN SPACE: WATER

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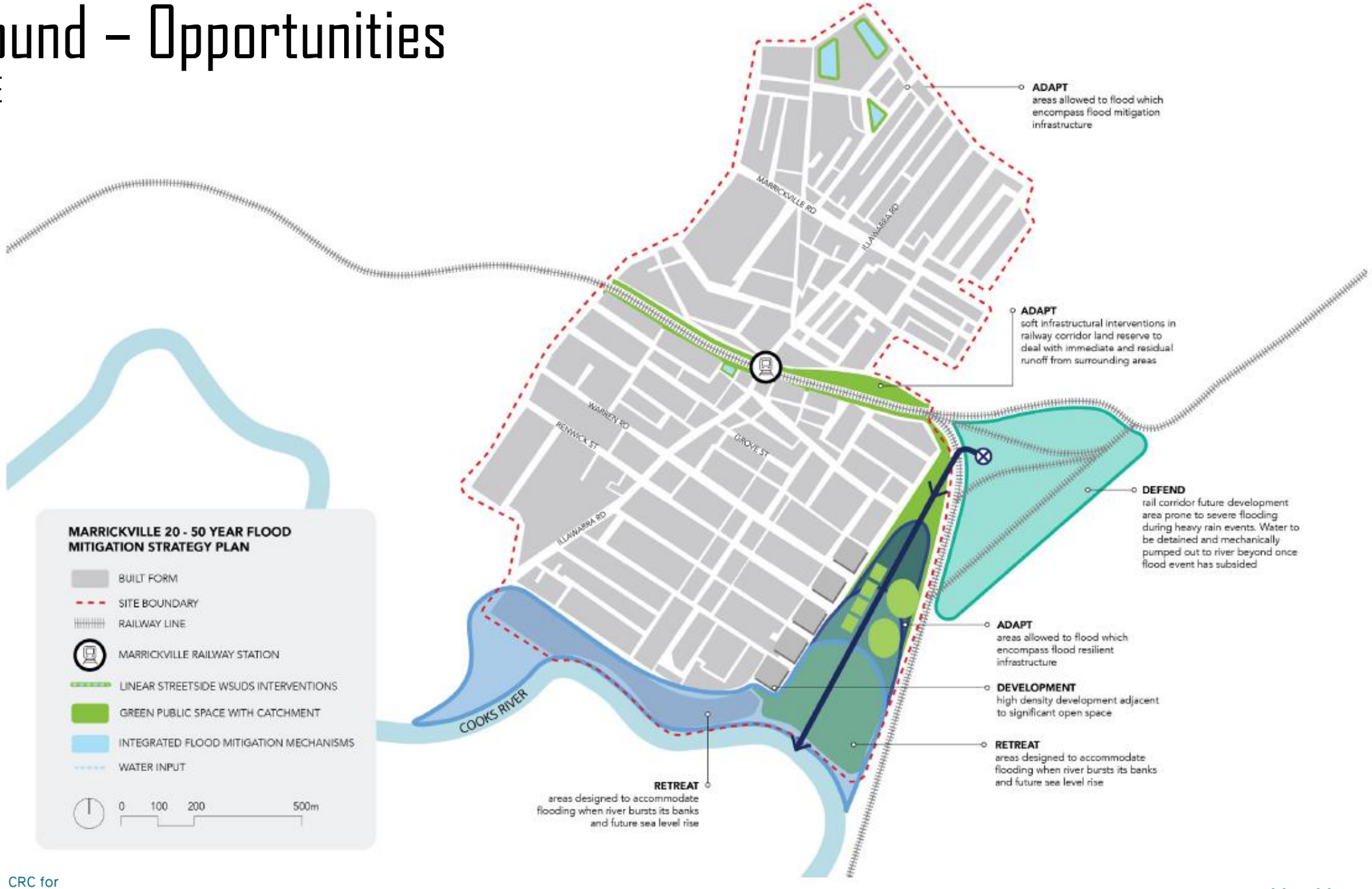
On Ground – Opportunities

MARRICKVILLE

On Ground – Opportunities

MARRICKVILLE



On Ground – Opportunities

MARRICKVILLE

1 RESIDENTIAL: WATER

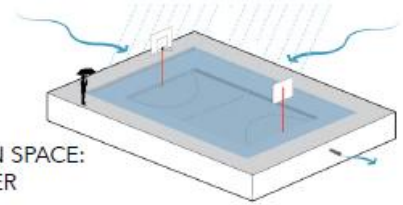
5 HIGH DENSITY: HEAT & AMENITY

2 RESIDENTIAL: HEAT & AMENITY

3 COMMERCIAL: WATER

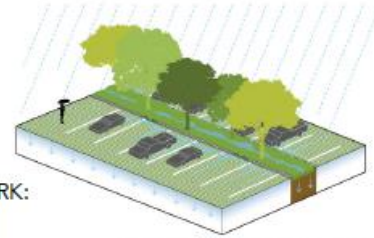
4 COMMERCIAL: HEAT & AMENITY

6 INDUSTRIAL: WATER



7 OPEN SPACE: WATER

8 OPEN SPACE: WATER



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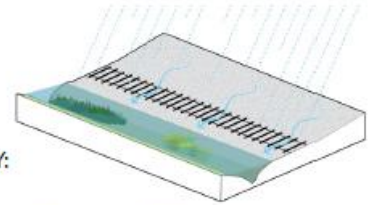

10 RAILWAY: WATER

12 RAILWAY: WATER

11 OPEN SPACE: WATER

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Urban Growth Corridor - Principals

Review Principals against on ground actions

Urban Growth Corridor - Principals

Review Principals against on ground actions

- Circular economy
  1. Measure performance (i.e. targets) of the water cycle, rather than its individual elements
  2. Pursue regenerative design by reframing wastes as resources, co-location of land uses and building design
- Water servicing
  3. Defer future augmentations of centralised water services systems
  4. Preference local scale options; use centralised infrastructure as a last resort
- Green grid
  5. Have the green grid deliver both ecosystem services (amenity, cooling, connectivity) and ecological functions (biodiversity, riparian corridor)
  6. Pursue greening opportunities where strategically important, whether in private (e.g. setbacks, building designs) or public (linear open space) domains
- Waterway health
  7. Prioritise strategic and collaborative waterway and catchment projects
  8. Connect the community to their waterways
- Flooding
  9. Plan for resilience
  10. Balance infrastructure resilience and social resilience to avoid over-reliance on either

Urban Growth Corridor - Principals

Review Principals against on ground actions

- Activate town centres and public realm
  11. Regard streets as key infrastructure to achieve canopy, infiltration and cooling targets
- Buildings
  12. Have all buildings part of the catchment topography of the corridor, to harvest water and increase greening
- Communities
  13. Increase water literacy, and encourage water sensitive behaviours
  14. Enable community interaction with waterways
  15. Make it easy for community to participate
- Governance
  16. Integrate governance across agencies and disciplines to provide integrated solutions
  17. Focus on solutions that are best-for-community rather than best-for-agency
  18. Ensure governance structures are fit-for-purpose.

Urban Growth Corridor - Principals

Review Principals against on ground actions

- Principals for: Communities, governance and planning
  1. Integrate fit-for-purpose governance across agencies and disciplines to provide integrated solutions
  2. Focus on solutions that are best-for-community rather than best-for-agency
  3. Measure performance (i.e. targets) of the water cycle, rather than its individual elements
  4. Pursue regenerative design by reframing waste as a resource, co-location of land uses and building design
  5. Enable community participation and involvement in water sensitive behaviours and connection to waterways

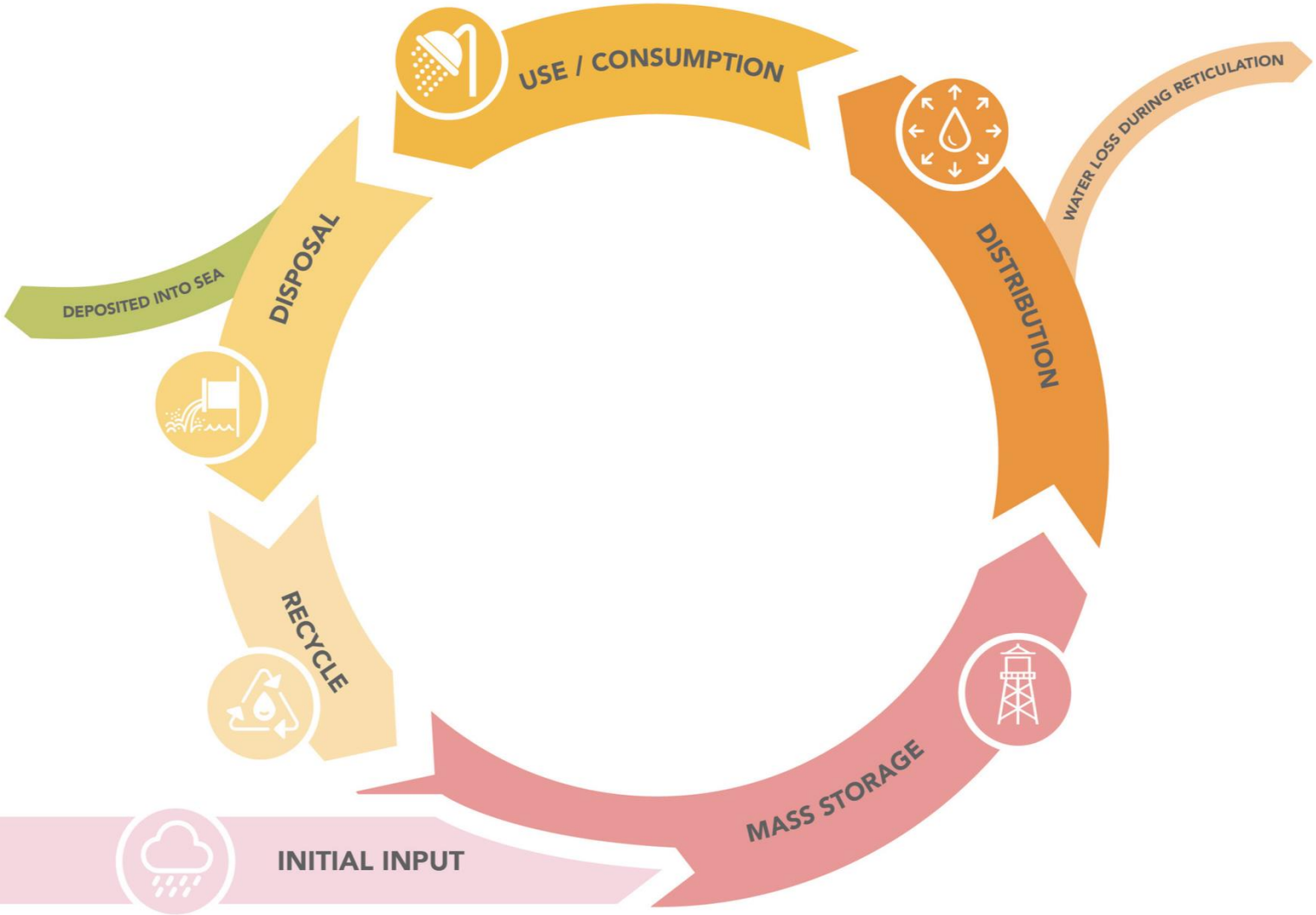
- Principals for: Water cycle management
  6. Reduce impervious area, improve quality and reduce mains water demand through water sensitive approaches to capture, use, filter and slowly release stormwater
  7. Plan for flood resilience, balancing structural and social resilience
  8. Prioritise strategic and collaborative waterway and catchment projects

- Principals for: Urban heat and amenity
  9. Strategically provide for increase in public and private greening to deliver ecosystem services (amenity, cooling, connectivity) and ecological functions (biodiversity, riparian corridor)

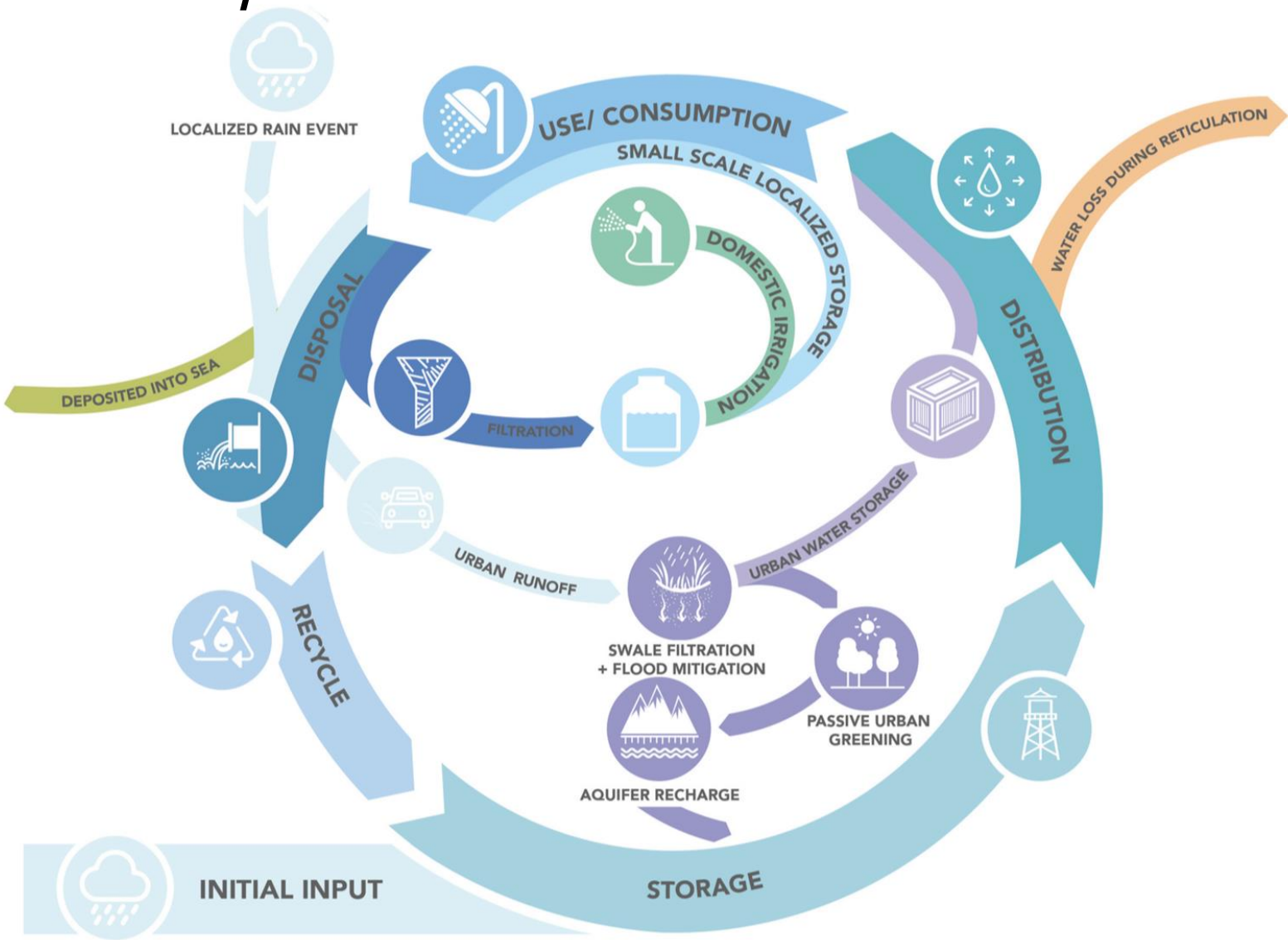
Opportunities - Toolkit

On Ground Actions – Water Sensitive Cities

Circular Economy



Circular Economy

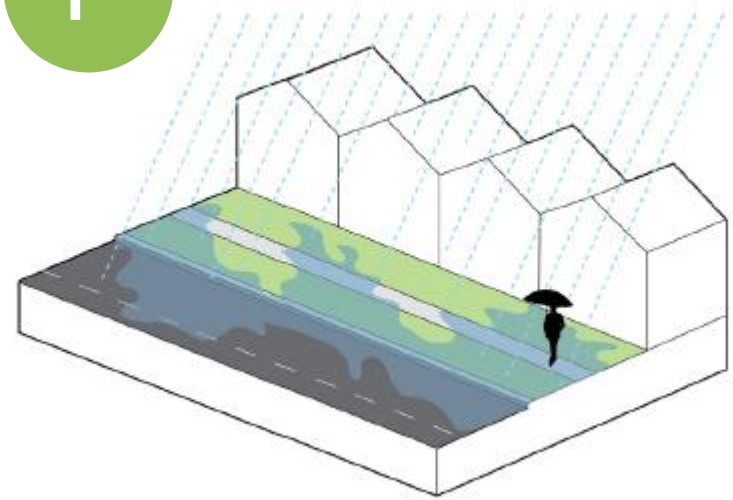


Opportunities – Residential Typology

Opportunities – Residential Typology

Flooding, Water Quality and Water Servicing

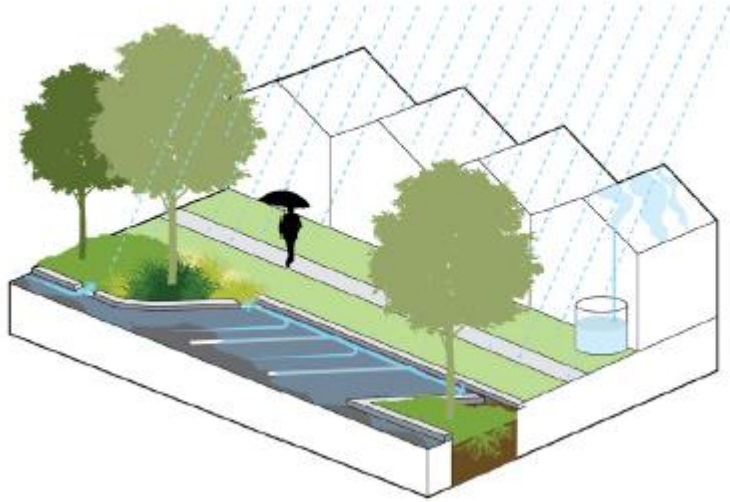
1



Challenges

Flooding, Water Quality & Water Servicing:

- High impervious area made up of roofs, paths, driveways and roads
- Sediment, nutrient, sewerage overflow flow untreated to waterways
- Low drainage conveyance capacity, low lying land
- Increase in rainfall intensity and sea level rise
- Increased demand on waste water and water supply networks



Opportunities

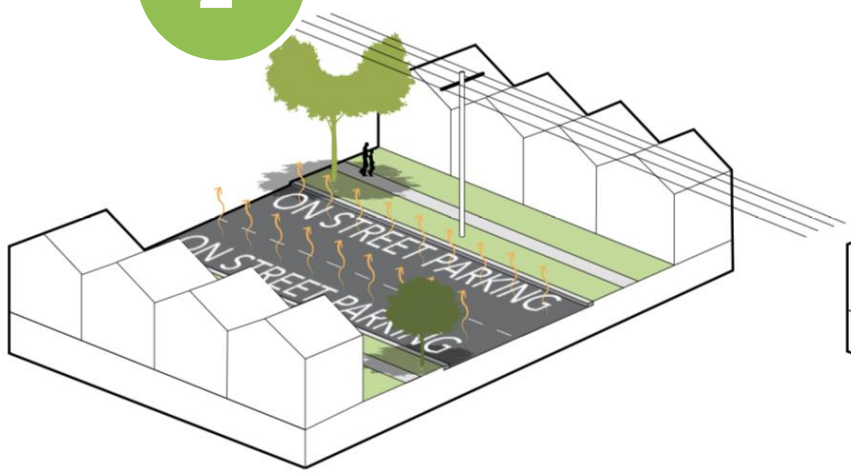
Flooding & Water Quality, Water Servicing:

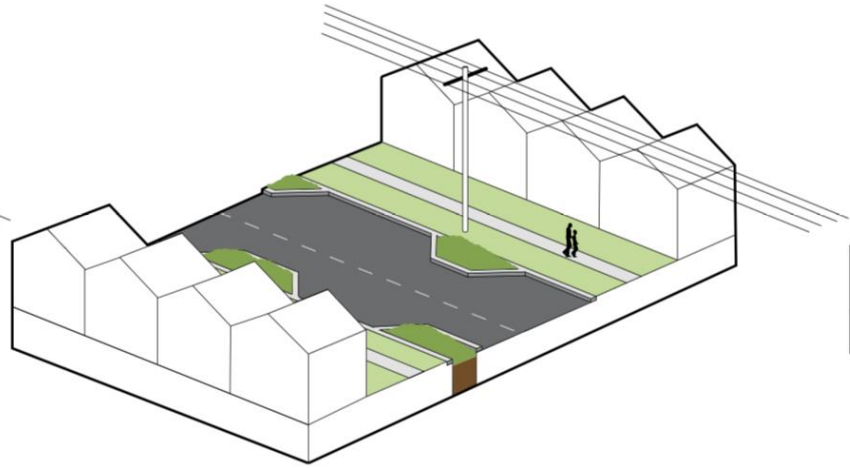
- Reduce run off and improve quality by installing rain tanks raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Limit hard surface area increases
- Retrofit hard surface with rain gardens, permeable surfaces
- Increase water reuse by installing alt supply, rain tanks, grey water systems, passive irrigation and connect to amenities/irrigation

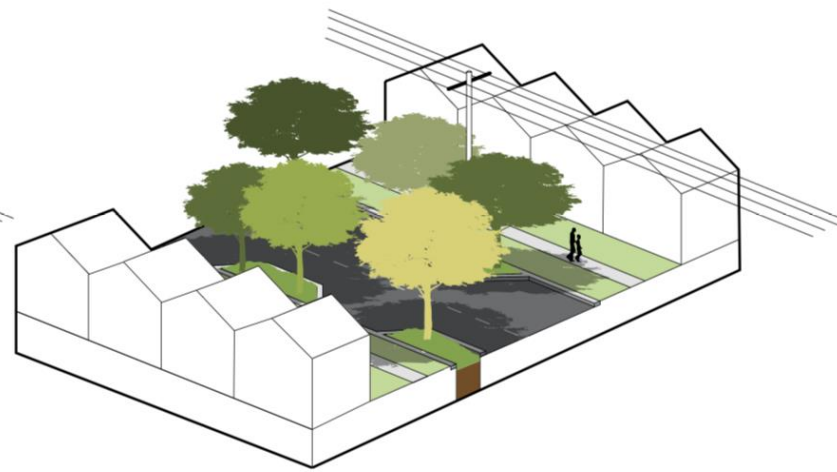
Opportunities – Residential Typology

Urban Heat and Amenity

2







Challenges

Urban Heat & Amenity:

- Heat absorption through abundance of hard surfaces
- Lack of vegetation and diminishing open space
- Lack of shade due to poor tree selection or lack of street trees
- Built form dominance
- Poor visual and physical connectivity to open space & water
- Poor building design and material selection

Opportunities

Urban Heat & Amenity:

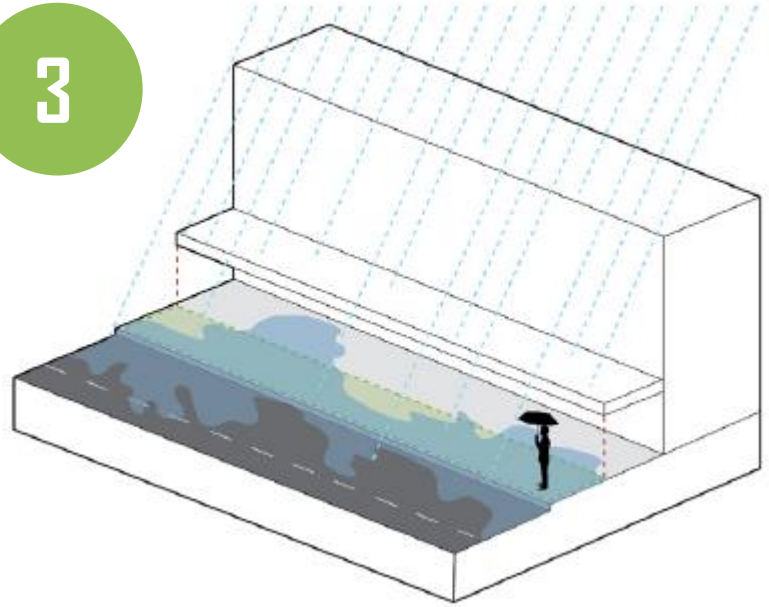
- Reduce heat absorption and increase shade through permeable surfaces and vegetation to replace hard surfaces
- Select appropriate trees for shade and street size
- Break up built form by strategically locating trees

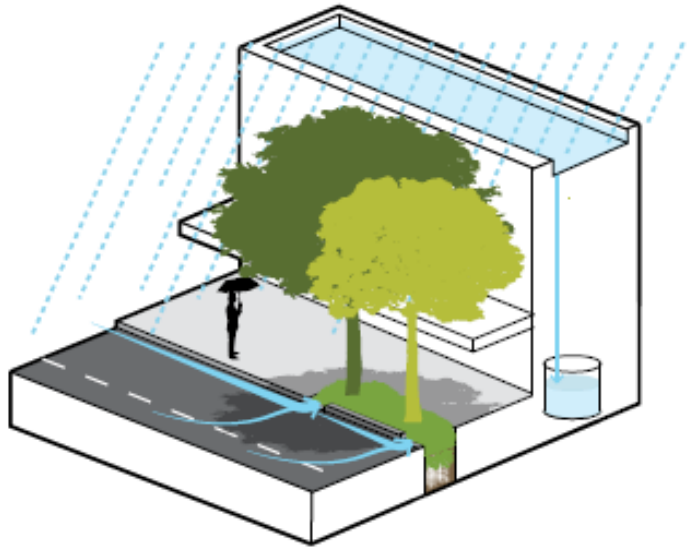
Opportunities – Commercial Typology

Opportunities – Commercial Typology

Flooding, Water Quality and Water Servicing

3





Challenges

Flooding, Water Quality & Water Servicing:

- High impervious area made up of roofs, paths, driveways and roads
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Opportunities

Flooding & Water Quality & Water Servicing:

- Reduce run off and improve quality by installing rain tanks raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Limit hard surface area increases
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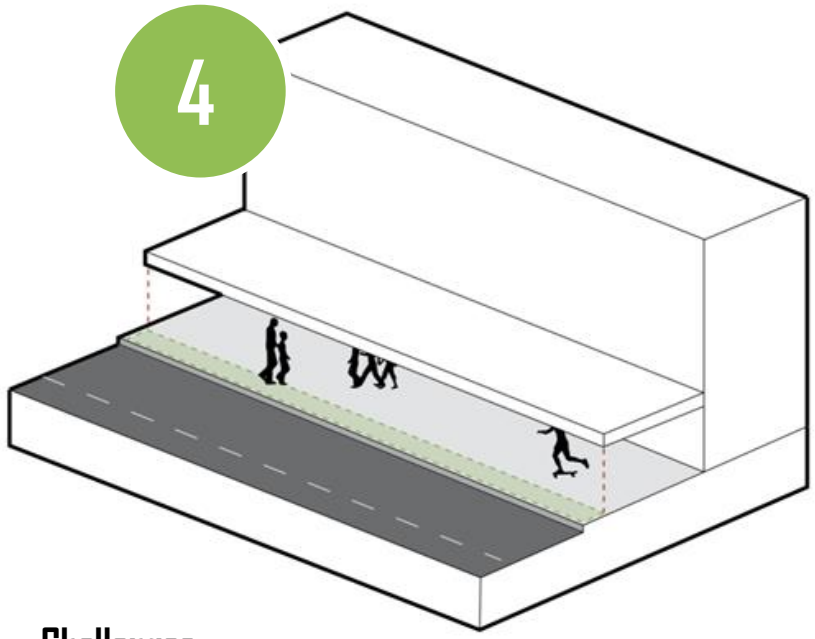
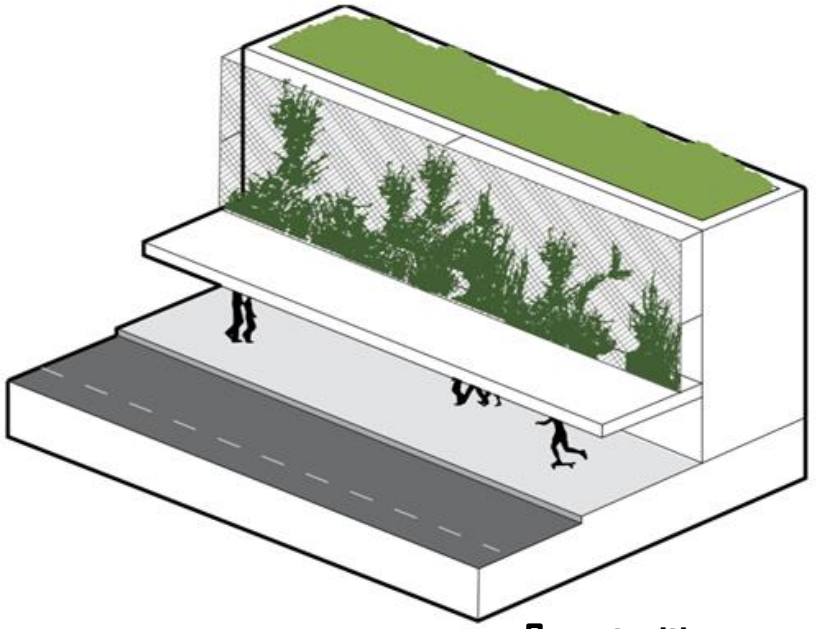
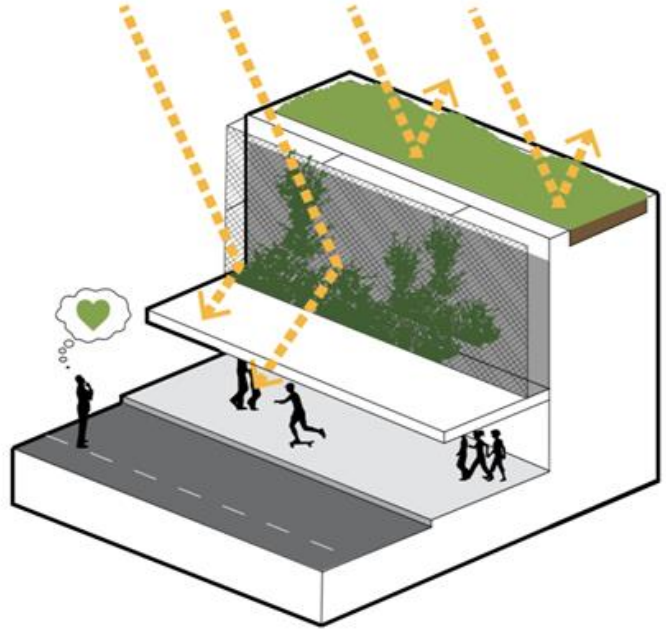
- Increase water reuse by installing alt supply, rain tanks, grey water systems, passive irrigation and connect to amenities/irrigation

Opportunities – Commercial Typology

Urban Heat and Amenity







Challenges

Urban Heat & Amenity:

- Heat absorption through abundance of hard surfaces
- Lack of vegetation and diminishing open space
- Lack of shade due to poor tree selection or lack of street trees
- Built form dominance
- Poor visual and physical connectivity to open space & water
- Solar reflection caused by lack of greenery
- Poor building design and material selection

Opportunities

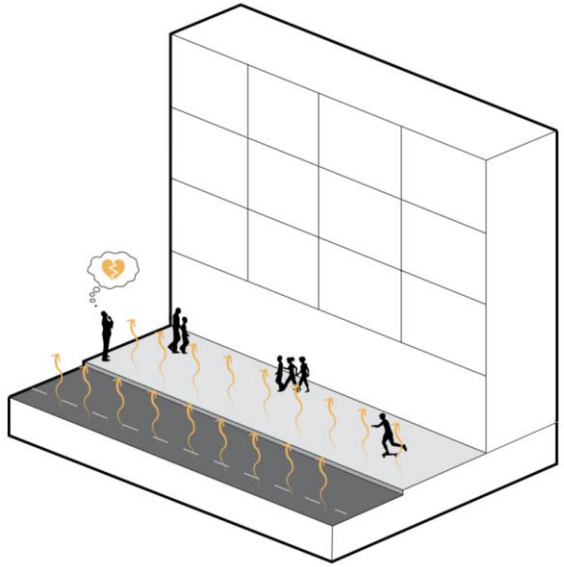
Urban Heat & Amenity:

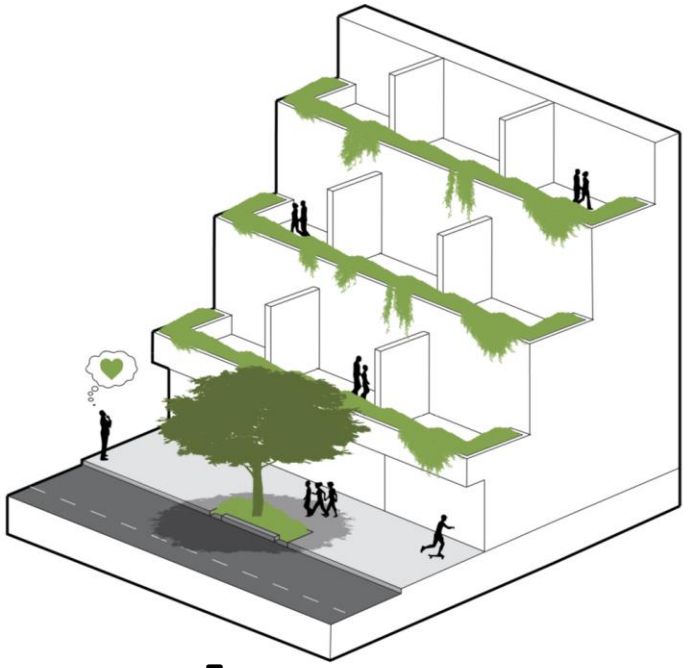
- Reduce heat absorption and increase shade through permeable surfaces and vegetation to replace hard surfaces
- Select appropriate trees for shade and street size
- Break up built form by strategically locating trees
- Set back upper levels of high density buildings
- Reduce solar reflection through installing green walls / roofs and improve building design and material selection

Opportunities – High Density Typology

Urban Heat and Amenity

5





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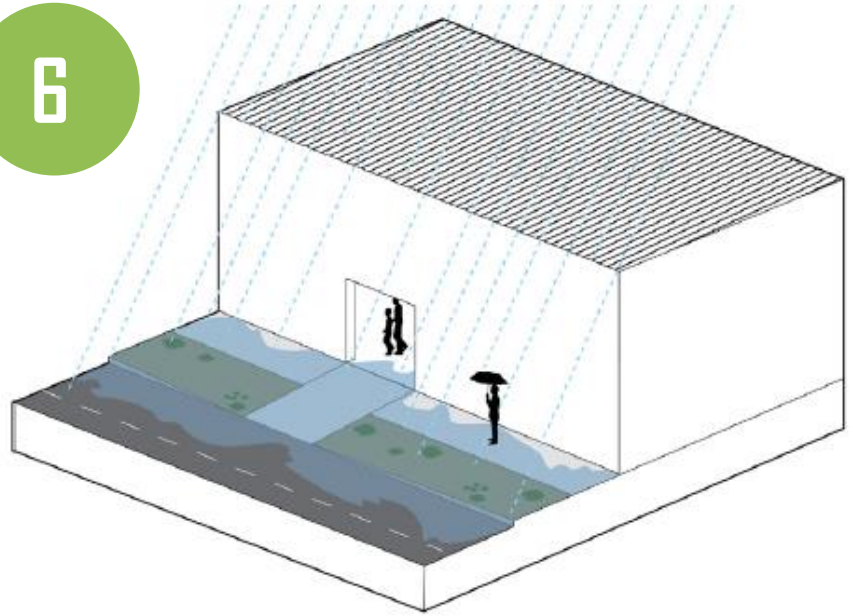
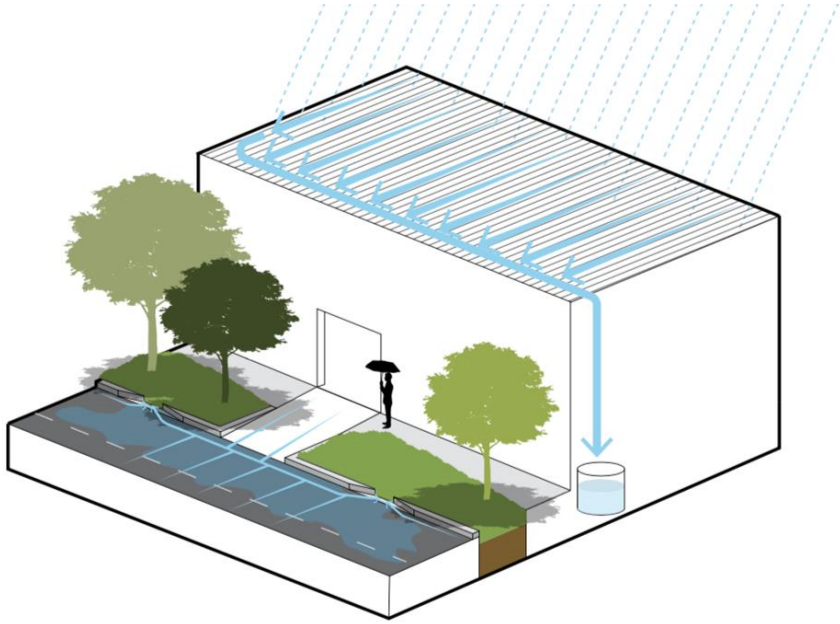
Opportunities – Industrial Typology

Opportunities – Industrial Typology

Flooding, Water Quality & Water Servicing

6





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Opportunities

Flooding & Water Quality & Water Servicing:

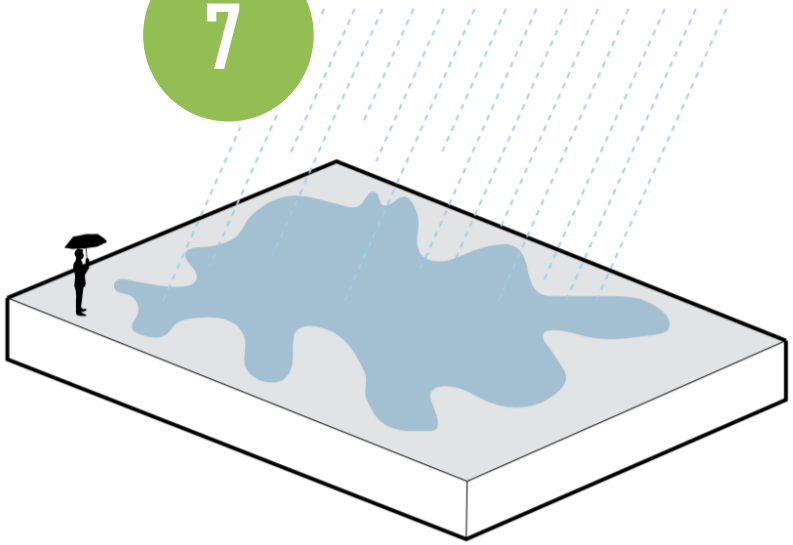
- Reduce run off and improve quality by installing rain tanks raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Limit hard surface area increases
- Retrofit hard surface with rain gardens, permeable surfaces

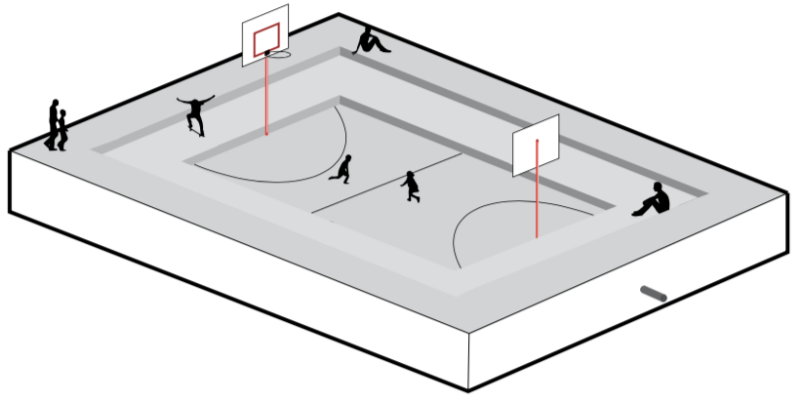
Opportunities – Open Space Typology

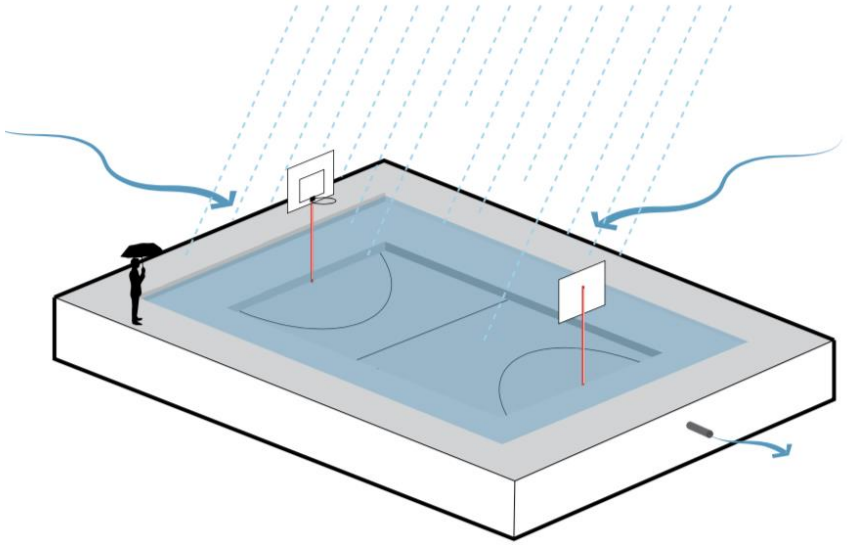
Opportunities – Active Open Space Typology

Flooding

7







Challenges

Flooding:

- Low drainage conveyance capacity, low lying land
- Changing climate causing increase in rainfall intensity and sea level rise
- Poor overland flow conveyance caused by landform

Opportunities

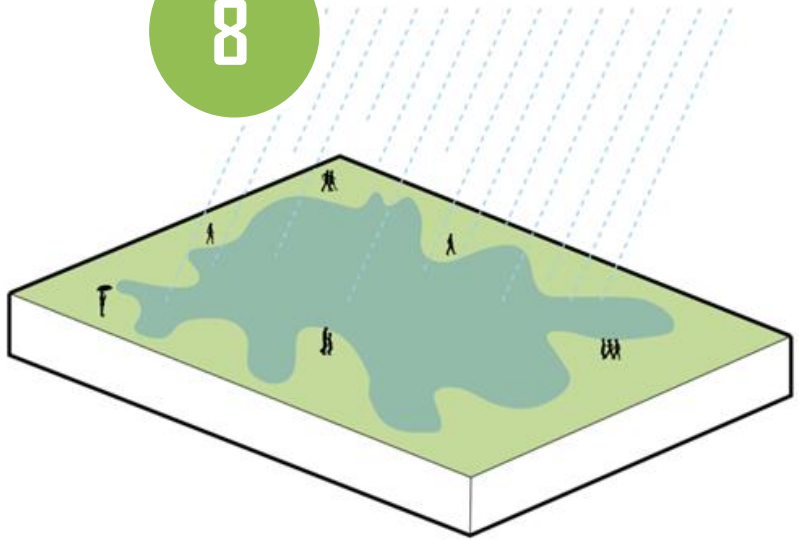
Flooding:

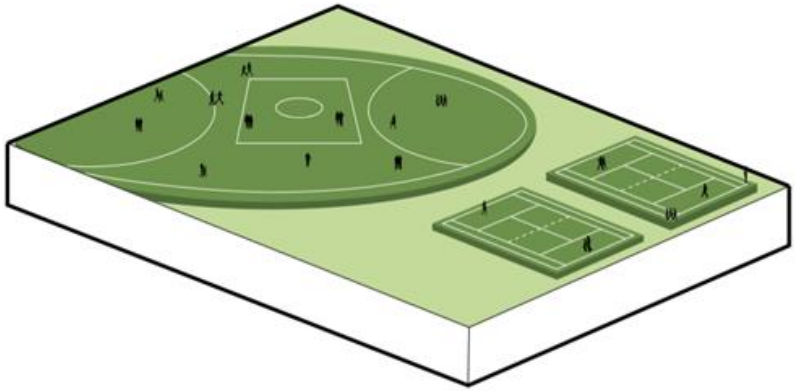
- Create dual function active open space storage basins
- Reduce run off and improve quality upstream by installing rain tanks raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Limit hard surface area increases

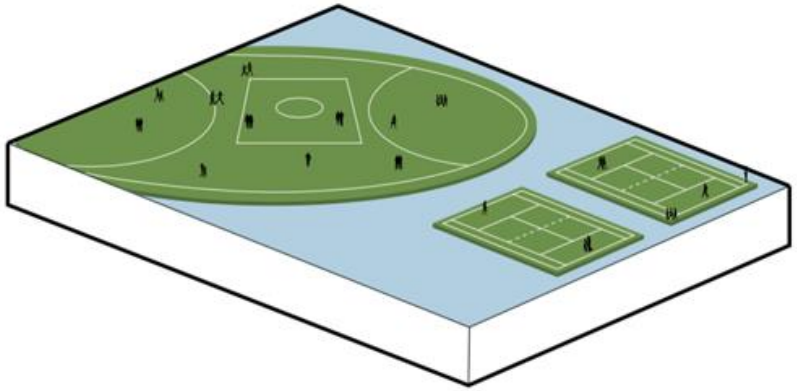
Opportunities – Active Open Space Typology

Flooding

8







Challenges

Flooding:

- Low drainage conveyance capacity, low lying land
- Changing climate causing increase in rainfall intensity and sea level rise
- Poor overland flow conveyance caused by landform

Opportunities

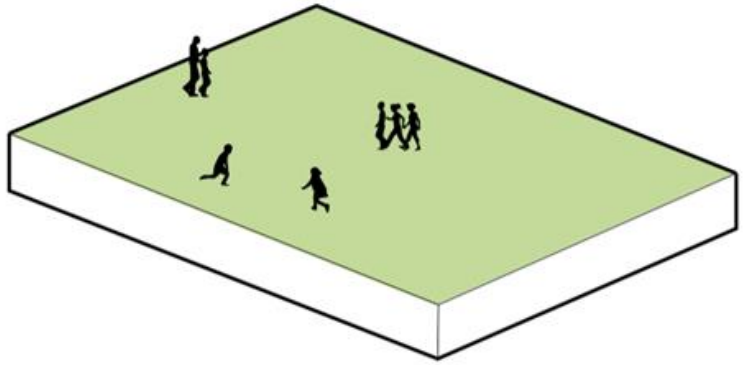
Flooding:

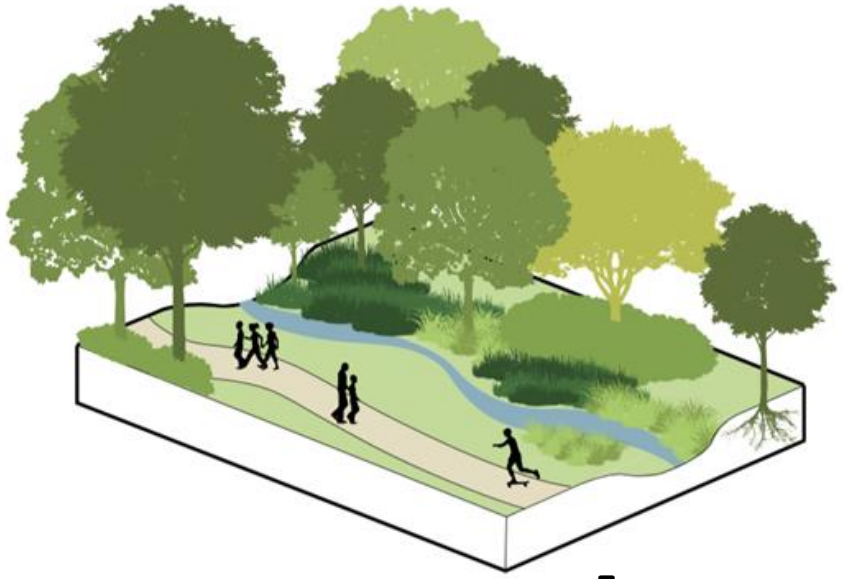
- Create dual function active open space storage basins
- Reduce run off and improve quality upstream by installing rain tanks raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs

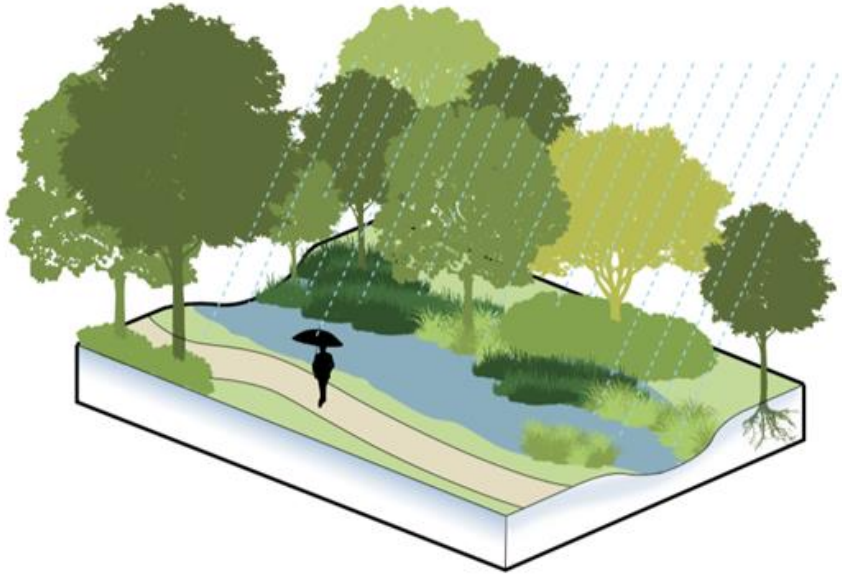
Opportunities – Passive Open Space Typology

Flooding, Water Quality, Urban Heat and Amenity

11







Challenges

Flooding, Water Quality, Urban Heat & Amenity:

- High impervious area made up of roofs, paths, driveways and roads
- Sediment, nutrient, sewerage overflow flow untreated to waterways
- Changing climate causing increase in rainfall intensity and sea level rise
- Lack of vegetation and diminishing open space
- Poor visual and physical connectivity to open space & water

Opportunities

Flooding, Water Quality, Urban Heat & Amenity:

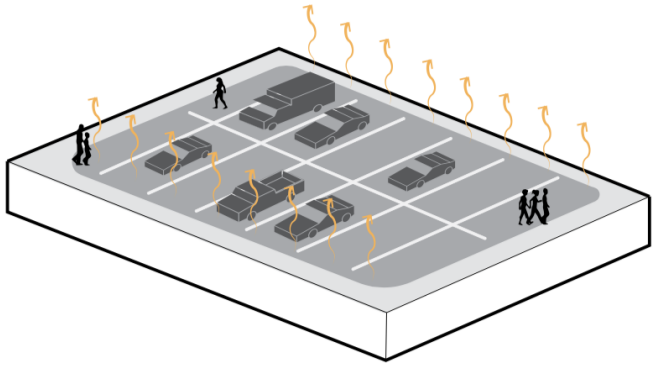
- Create passive open space with ecological functions
- Reduce heat absorption and increase shade through permeable surfaces and vegetation
- Increase access to green open space and water
- Break up built form by strategically locating trees

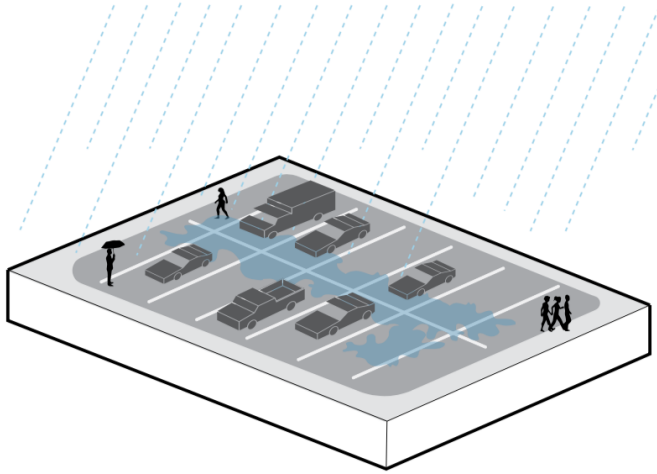
Opportunities – Car Park Typology

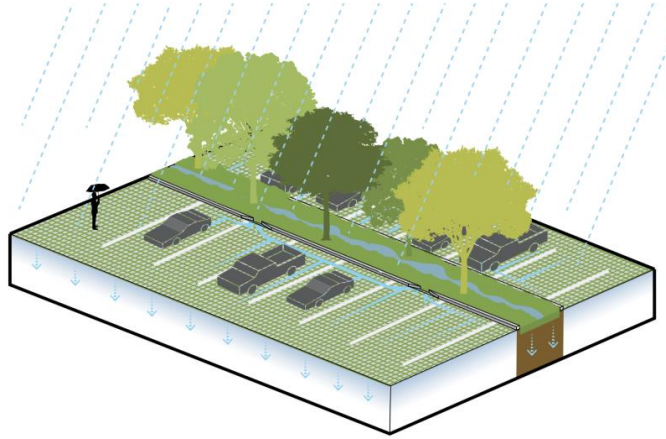
Opportunities – Car Park Typology

Flooding, Water Quality, Urban Heat and Amenity

9







Challenges

Flooding, Water Quality, Urban Heat & Amenity:

- High impervious area causing sediment, nutrient flow untreated to waterways
- Changing climate causing increase in rainfall intensity and sea level rise
- Lack of vegetation and diminishing open space
- Heat absorption through abundance of hard surfaces
- Lack of vegetation and diminishing open space
- Lack of shade due to poor tree selection or lack of street trees

Opportunities

Flooding, Water Quality, Urban Heat & Amenity:

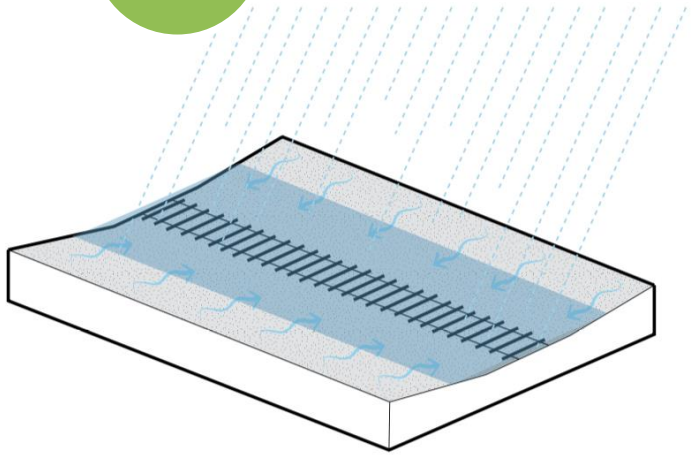
- Reduce run off and improve quality by installing raingardens, swales, wetlands, sedimentation basins, permeable paving, GPTs
- Limit hard surface area increases
- Reduce heat absorption and increase shade through permeable surfaces and vegetation
- Reduce heat absorption and increase shade through permeable surfaces and vegetation to replace hard surfaces

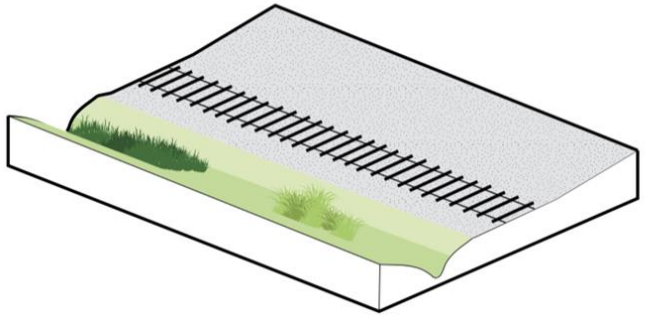
Opportunities – Railway Typology

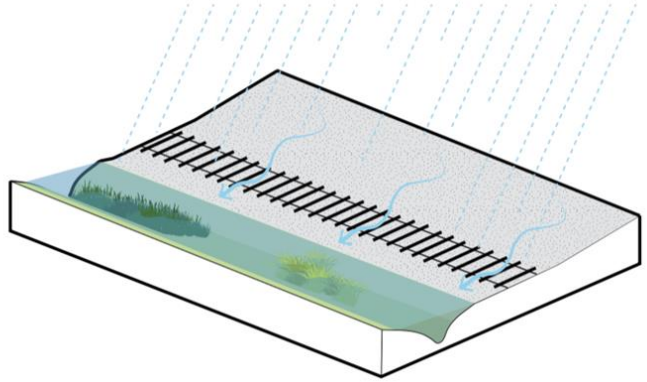
Opportunities – Railway Typology

Flooding and Water Quality

10







Challenges

Flooding & Water Quality:

- Low drainage conveyance capacity, low lying land
- Changing climate causing increase in rainfall intensity and sea level rise
- Poor overland flow conveyance caused by land form

Opportunities

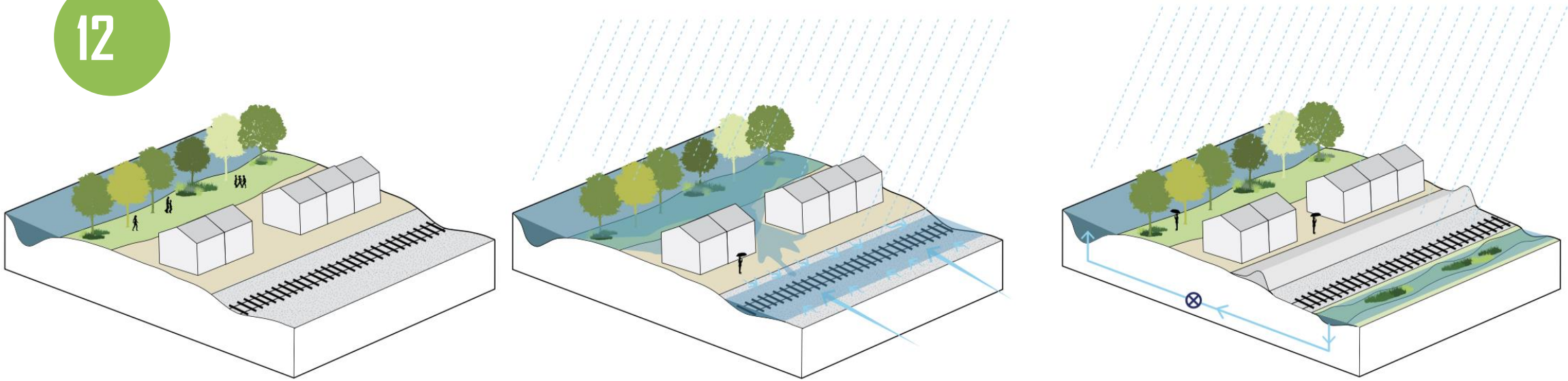
Flooding & Water Quality:

- Reduce run off and improve quality by installing raingardens, swales, wetlands, sedimentation basins
- Improve conveyance through engineered swale design

Opportunities – Railway Typology

Flooding

12



Challenges

Flooding & Water Quality:

- Sediment and nutrient flowing untreated to waterway
- Low drainage conveyance capacity, low lying land
- Changing climate causing increase in rainfall intensity and sea level rise
- Poor overland flow conveyance caused by land form

Opportunities

Flooding & Water Quality:

- Reduce run off and improve quality by installing raingardens, swales, wetlands, sedimentation basins
- Improve conveyance through engineered levee / swale / pump design