Greening the Pipeline
Zone 9 Brooklyn

MASTERPLAN

REALM studios

Contents

Project: Greening the Pipeline - Zone 9 Brooklyn
Authors Jon Shinkfield
Brett Schreurs
Watkin McLennan
Ally Gordey
Dan O'Halloran
Olivia Blair-Holt
Neha Shetty

Client: Melbourne Water
Date: June 2022
Revision: E

Document Issue:

Issue for:	Revision:	Date:
Draft Urban Design Report	A	20/08/2021
Draft Urban Design Report	B	27/08/2021
Revised Urban Design Report	C	01/10/2021
Revised Urban Design Report	D	28/10/2021
Final Urban Design Report	E	28/06/2022

Prepared by:

alluvium REALM studios

1.1 PROJECT OUTLINE

The Greening the Pipeline project is a collaborative project undertaken in partnership between Melbourne Water, Wyndham City Council, Department of Transport, Great Western Water and is supported by Greening the West, Brimbank City Council and Hobsons Bay City Council. The project aims to transform the Main Outfall Sewer (MOS) reserve into a productive, recreational landscape with the following vision:

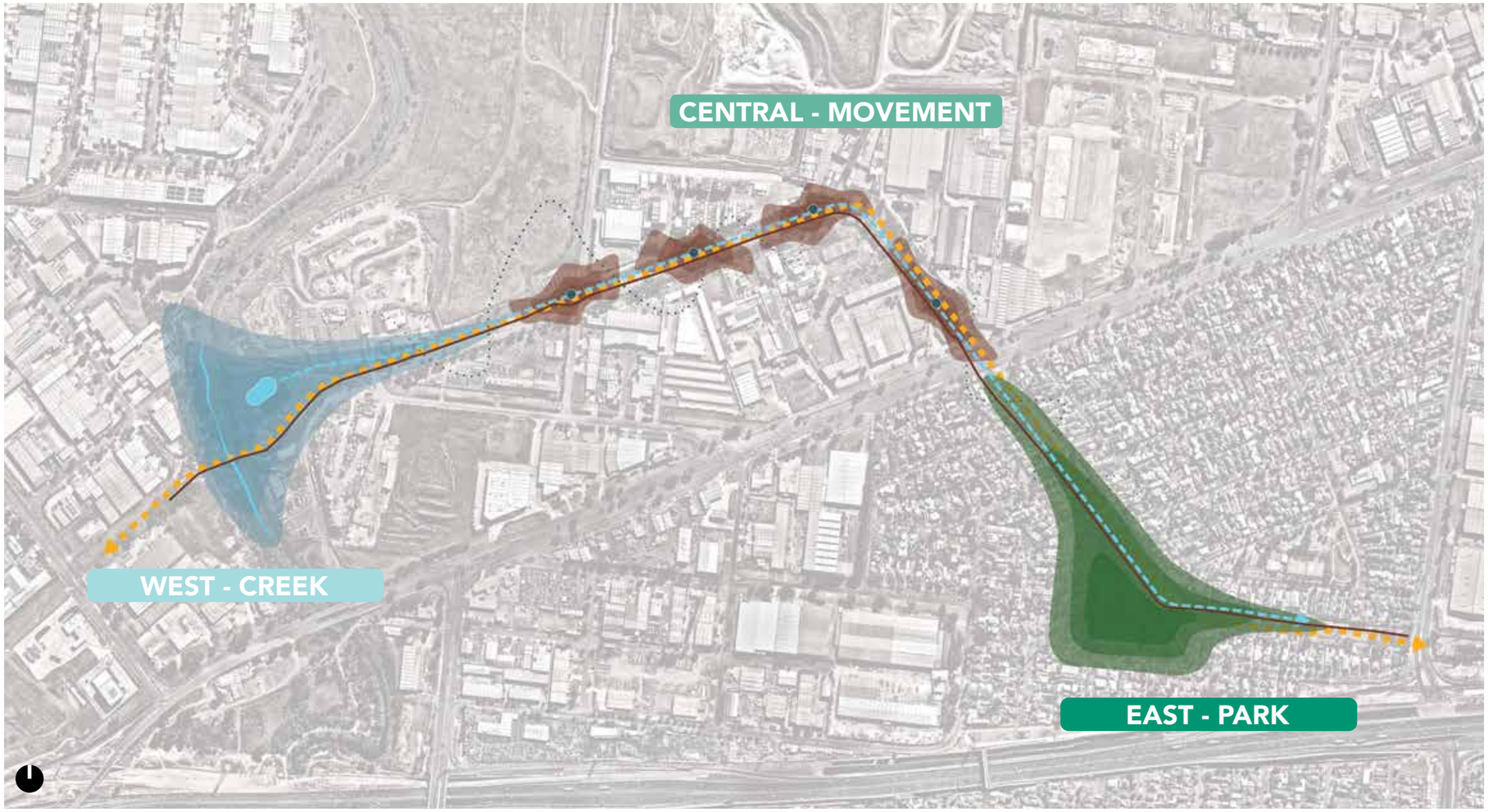
- Connecting communities
- Creating vibrant open space
- Improving health & wellbeing
- Enhancing active transport and green links
- Managing water sensitively through Integrated Water Management (IWM)
- Celebrating heritage

This masterplan focuses on the Zone 9 of the Greening the Pipeline project with a vision to create a vibrant green corridor that reflects the unique character of Brooklyn and celebrates the start/end of the MOS reserve. There are three distinct precincts to be connected (see Concept Framework Diagram opposite) through a landscape and heritage story and active community paths.

Various potential options for incorporating Integrated Water Management (IWM) into the masterplan has been developed, these include:

- Enhanced landscape non irrigated (Section 4.0)
- Enhanced landscape with large scale IWM (Section 5.0)
- Enhanced landscape with medium scale IWM (Section 5.0)

A cost benefit analysis (Section 6.0) has also been undertaken to understand high level feasibility of the different options.



CONCEPT FRAMEWORK DIAGRAM

1.2 SITE IMAGES

WEST - CREEK

CENTRAL

EAST - PARK

AREA OF INTEREST FOR
WYNDHAM CITY COUNCIL

AREA OF INTEREST FOR
BRIMBANK CITY COUNCIL

AREA OF INTEREST FOR
HOBSONS BAY CITY COUNCIL

alluvium REALM studios

2.0 Project Introduction

2.1 BACKGROUND

In the early 1890's the peak of Victoria's economic boom had passed, and a depression had commenced with shrinking economic activity and rising unemployment, particularly within the construction industries. It was in this economic and social context that construction of the MOS commenced in 1892 by the Melbourne Metropolitan Board of Works (now Melbourne Water). At the time it was the largest civil project undertaken in Victoria.

The MOS was part of a broader program to deliver sewerage services to Melbourne and mitigate the risk of typhoid and cholera outbreaks. The sewerage system drained to Spotswood which was the lowest point in the system. At Spotswood sewage pump station four steam pumps pushed sewage up and through wrought iron rising mains to the inlet of the Main Outfall Sewer that flowed freely under gravity to the Werribee Farm (now the Western Treatment Plant).

The construction of the 27km MOS was undertaken between 1892 and 1894, with construction divided into seven contracts delivered by local contractors. 1,300 men using picks and shovels removed 480,000 cubic metres of earth and rock, lining the channel with concrete and brick, that remains today as a tribute to the integrity of its construction. Remarkably, the work (with the exception of the Kororoit Creek aqueduct) was completed in a year at a cost of £240,748 (source: heritagecouncil.vic.gov.au).

Today, the MOS is listed on the Victorian Heritage Register as an artifact of scientific (engineering) significance to the State of Victoria (VHR, Number H1932) signaling Melbourne's growth into a bustling metropolis. It is unique in its visibility, illustrating the vision our forebears had for Melbourne and the remarkable achievement of engineering and workmanship that made that vision a reality.

LORD HOPETOUN TURNS THE FIRST SOD, MAY 1892

2.2 SITE CONTEXT

The Greening the Pipeline project aims to transform the decommissioned, heritage listed MOS and it's associated reserve into a linear parkland to serve the growing population of Melbourne's west. In a broader sense, the MOS reserve will connect west Melbourne to the city via an ecologically diverse, productive, recreational corridor that will grow into a city scale resource over the longer term.

The MOS reserve sits within the traditional lands of the Bunurong peoples of the Kulin Nations. The Recognised Aboriginal party for this section of the MOS is the Bunurong Land Council Aboriginal Corporation.

The 27km length of the MOS reserve has been divided into nine zones for the delivery of the Greening the Pipeline vision. Zone 9 covers the first 2.7km of the MOS alignment running from Millers Road, Brooklyn, to Little Boundary Road, Laverton North, just west of Kororoit Creek, working its way across three local government boundaries.

Each of the nine zones that make up the Greening the Pipeline project respond to a theme. Zone 9 is the "Brooklyn Gateway" with a vision to provide a vibrant green corridor which introduces the start of the pipeline, or celebrates its end.

REGIONAL CONTEXT SHOWING THE BROOKLYN SECTION (ZONE 9) OF THE MOS IN RELATION TO THE MOS, BROOKLYN AND WESTERN TREATMENT PLANT.

2.3 FEDERATION TRAIL

The Federation Trail is a 23km shared path which follows the MOS reserve for a majority of it's length. It is identified as a Strategic Cycling Corridor by the Department of Transport and as a Major Regional Trail within the Western Metropolitan Region Trails Strategic Plan (or West Trails). It provides an essential link to other major trails such as the Skeleton Creek Trail, the Werribee River Trail and the M80 Trail.

It is the most significant existing use of the MOS reserve and is well utilised by commuter, sports and recreational cyclists.

Within Zone 9, the Federation Trail moves from the open areas of residential Brooklyn next to DN Duane Reserve, across Geelong Road into a predominantly industrial landscape where odour and dust is an issue. From here, the path moves west down to Kororoit Creek aqueduct and the recently constructed Melbourne Water sediment basin. The path crosses two major arterial roads; Geelong Road and Jones Road.

The masterplan suggests a number of design treatments to the Federation Trail to allow faster moving cyclists and slower moving cyclists and pedestrians to safely traverse. These include:

- Path separation
- Fast and slow zones
- Widening of the trail in some sections
- A consistent standard of finish

The masterplan proposes to upgrade the Federation Trail to current Austroads and Department of Transport standards. This includes upgrading the path to concrete and providing minimum clear line of sights.

MAJOR REGIONAL TRAILS IN MELBOURNE'S WEST

3.0 Project Analysis

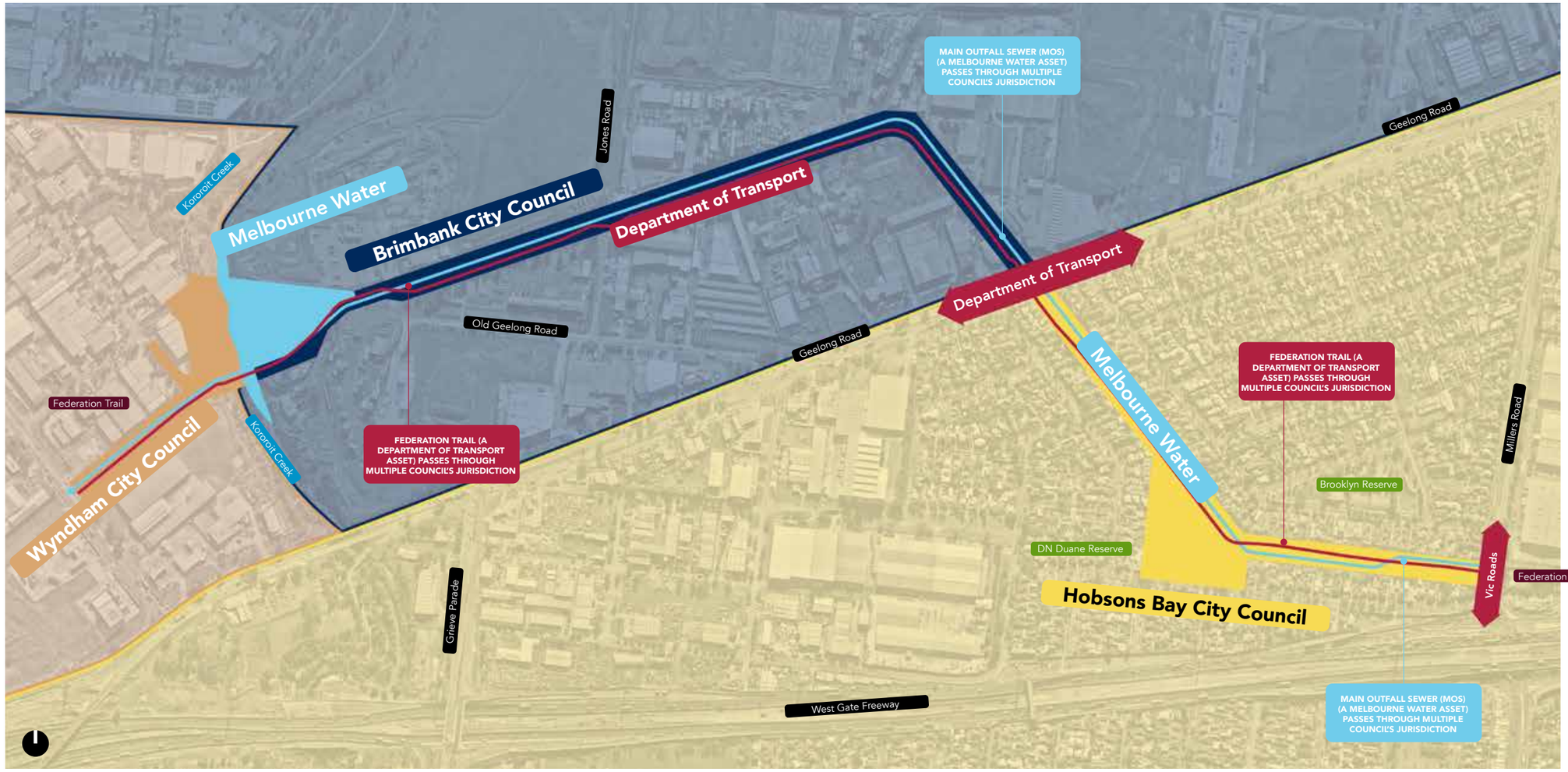
3.1 LAND MANAGEMENT AND OWNERSHIP

Zone 9 has numerous governing bodies that overlay the site area and assets.

This section of the MOS crosses three local municipalities including Hobsons Bay City Council, Brimbank City Council and Wyndham City Council. The Department of Transport is responsible for the Federation Trail and Melbourne Water is responsible for the MOS and Kororoit Creek aqueduct.

The masterplan has explored opportunities to integrate adjacent public open spaces and paths with the MOS reserve. To the west, cycle path connections will provide a link to industrial areas and the Kororoit Creek trail. The existing Melbourne Water sediment basin at Kororoit Creek will be enhanced and integrated into the landscape narrative.

To the east, access paths and playspaces will extend the existing public space network which includes DN Duane Reserve and Brooklyn Reserve.



MAP OF THE LAND MANAGEMENT AND OWNERSHIP ACROSS THE SITE

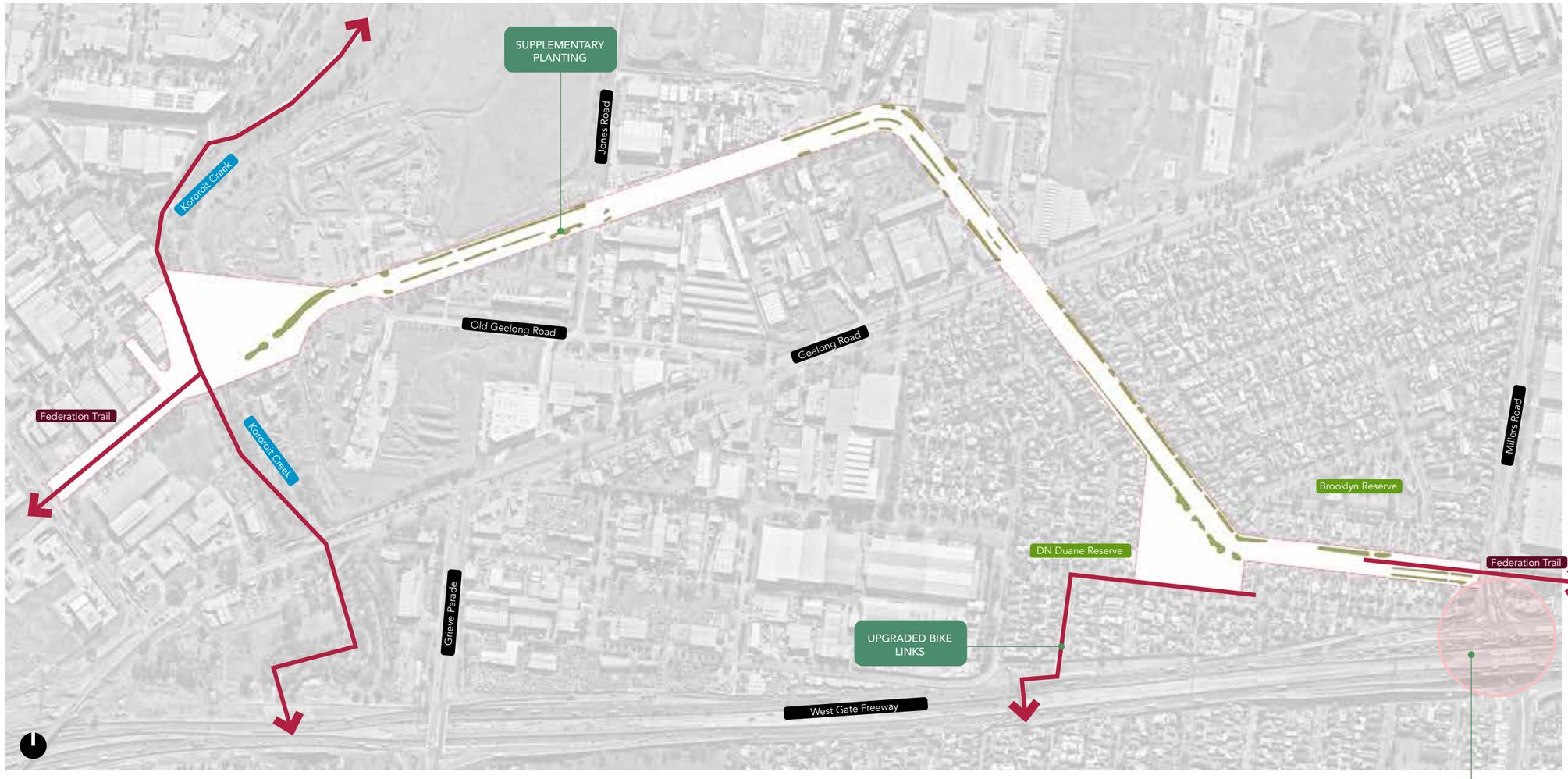
3.2 WEST GATE TUNNEL PROJECT

The West Gate Tunnel project plans to carry out upgrade works along the Zone 9 section.

This includes:
- Supplementary offset planting
- Resurfacing of the Federation Trail
- Upgrades to bike links and crossings of the West Gate Freeway

The completion of the West Gate Tunnel project, will see the Federation Trail connected to the city.

The supplementary planting has been incorporated within the masterplan designs, with additional planting proposed to reinforce and strengthen these areas.



LEGEND

Supplementary planting

MAP OF WESTGATE TUNNEL PROJECT INTERVENTIONS THAT AFFECT THE SITE

3.3 COMMUNITY & STAKEHOLDER ENGAGEMENT

The masterplan design has been developed in collaboration with project partners, Traditional Owners and the local community.

A six week engagement process was undertaken in July/August 2021, which involved feedback via an online map and survey, on-site meetings with Traditional Owners, online meetings with stakeholders and business groups and several community drop in sessions. A summary of the feedback and inputs from the engagement are shown in the adjacent image.

Common themes that emerged during these sessions included safety, access, recreation and landscape. The masterplan aims to deliver on the ground improvements that respond to these key themes including:

- Mitigate the harsh conditions of the site through increased greening, windrows and dust suppression via irrigation.
- Encourage engagement with the MOS reserve and Kororoit Creek through enhanced landscaping, recreation opportunities and restoration works to the historic aqueduct.
- Connect and expand Brooklyn's open space network by improved path linkages and directional signage.
- Improve user safety through upgraded road crossings, increased lighting, shared path upgrades and separation.
- Expression of Indigenous and European history and culture within the landscape through large scale community artworks, interpretive signage and adaptive reuse of the MOS.

MAP OF COMMUNITY AND STAKEHOLDER ENGAGEMENT COMMENTS

4.0 Site Ideation

Enhanced landscape non irrigated

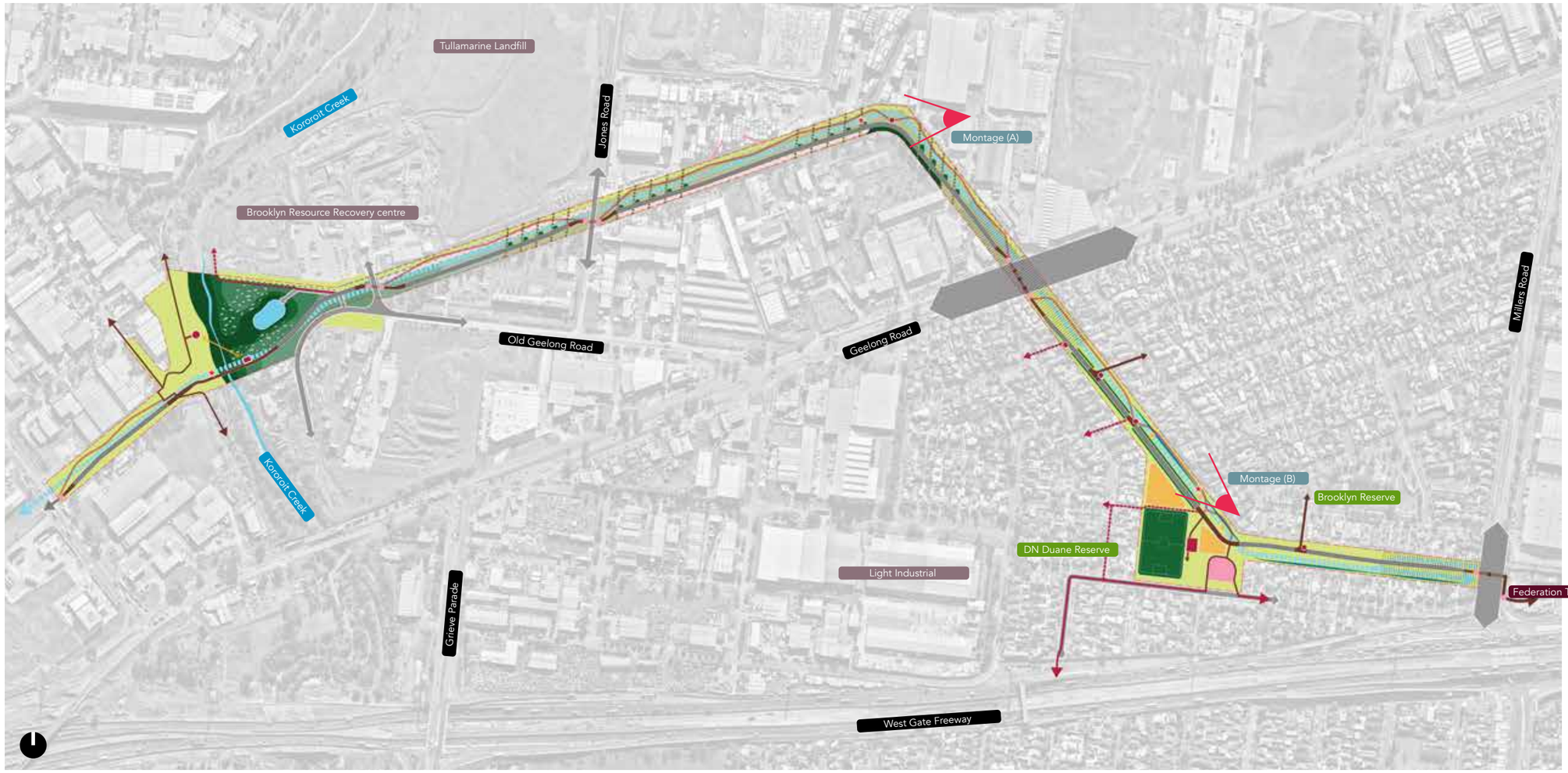
4.1 MASTERPLAN INTENT

The Zone 9 masterplan aims to transforms the Brooklyn section of the MOS reserve into a vibrant, green corridor that:

- Mitigates the harsh conditions of the site.
- Encourages engagement with the MOS reserve and Kororoit Creek.
- Connects and expands Brooklyn's open space network.
- Improves user safety.
- Expresses Indigenous and European history and culture in the landscape.

For the purpose of this masterplan, Zone 9 has been divided into three precincts, overlaid by the different municipalities.

The non irrigated option proposes a passive approach to holding and expressing water in the landscape, using local depressions and soakaways.



CONCEPTUAL MASTER PLAN

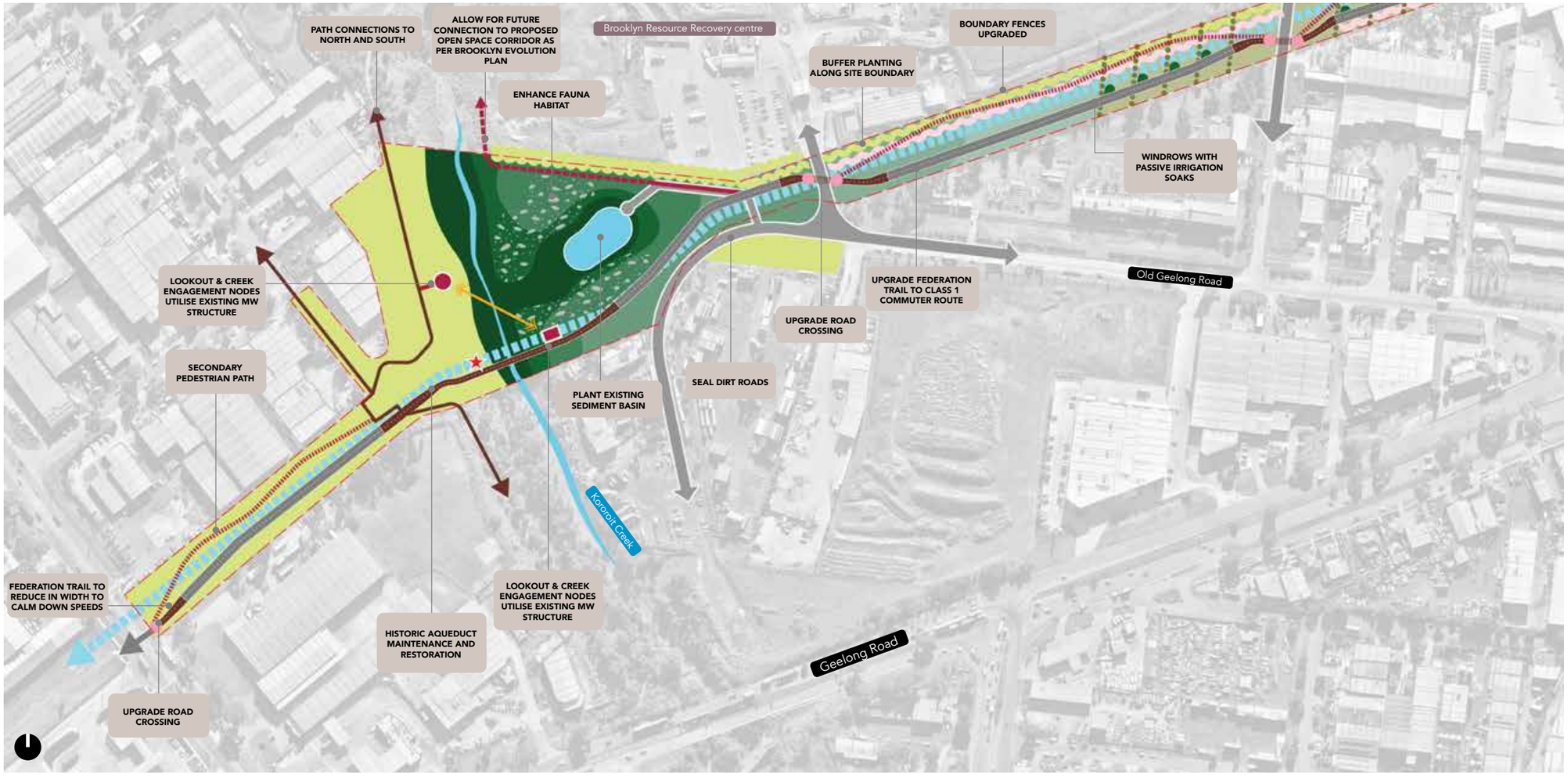
4.2 WEST PRECINCT

The Western Precinct is defined by Kororoit Creek, the historic aqueduct and the neighbouring Brooklyn Resource Recovery Centre which contributes to litter blown across the reserve.

The Melbourne Water sediment pond treats local stormwater runoff before it flows to the creek. The site provides opportunities for enhancing fauna habitat within the remnant natural surface rock.

Lookouts and engagement nodes are proposed to facilitate community participation and engagement with Kororoit Creek. These visually connected features will provide a level of passive surveillance across the site.

It is propose to upgrade the Federation Trail to provide a smoother, more durable riding surface with connections north and south to adjacent open spaces and paths.



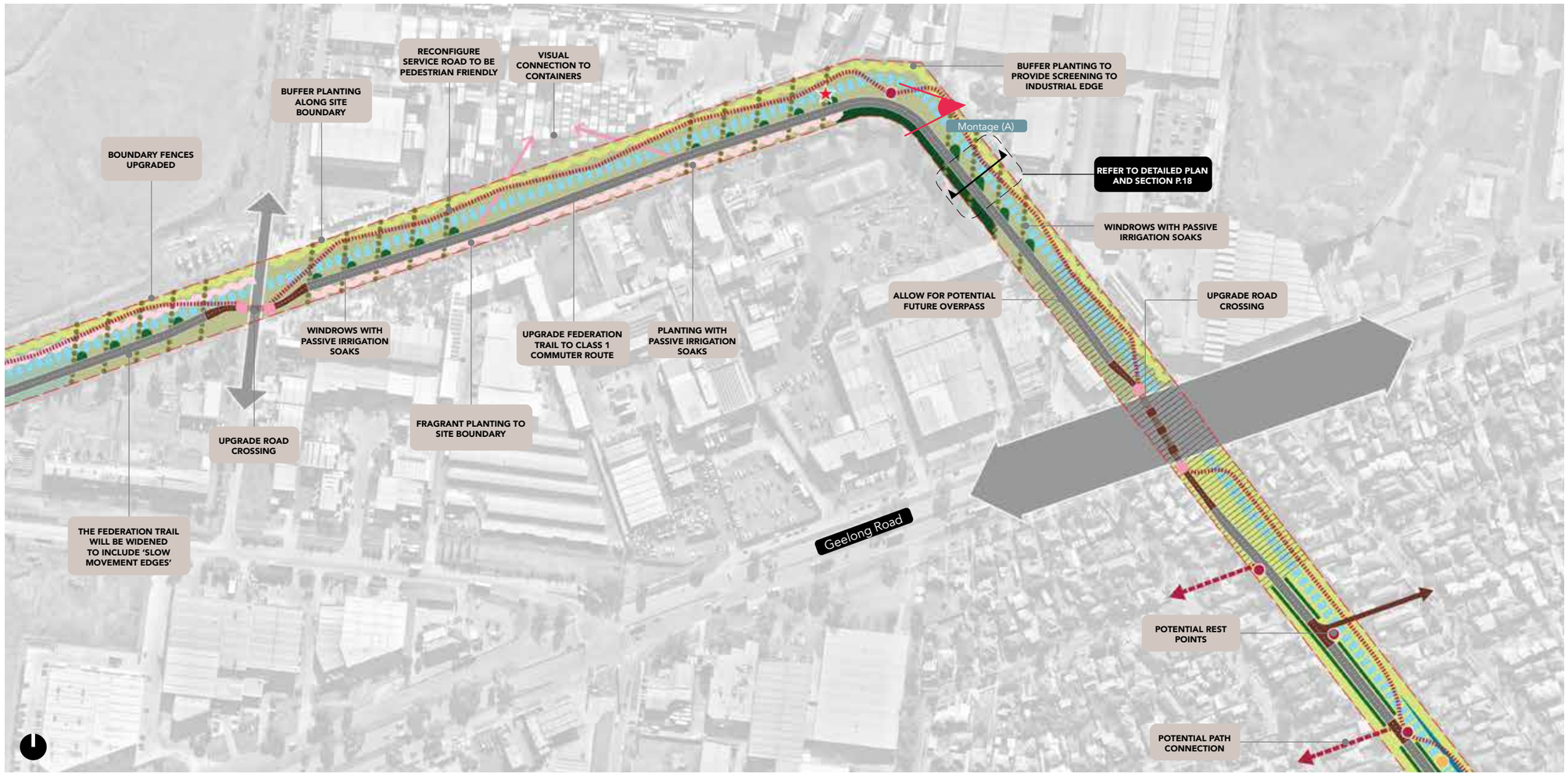
CONCEPTUAL MASTER PLAN - WEST PRECINCT

4.3 CENTRAL PRECINCT

The Central Precinct is neighboured by predominantly industrial areas. The site ideation proposes increased ground cover planting and windrows to mitigate dust and litter migration within the MOS reserve.

Fragrant and buffer planting are located along the site boundaries to provide screening to industrial edges. The Federation Trail will be upgraded and widened to facilitate movement through this section with safer crossing points at Jones and Geelong Road. There is an opportunity to provide an unique visual connection to the shipping containers located to the north of the reserve.

For the non irrigated option, surface water will be retained through localised depressions allowing water to infiltrate into the surrounding ground. Increased tree planting will provide wind protection and improved thermal comfort for cyclists and pedestrians.



LEGEND

- Vegetation planting - species transition
- Upgrade road crossing
- Main Outfall Sewer
- Buffer planting
- Fragrant planting
- Windrows with passive irrigation soaks
- Upgrade Federation Trail commuter
- Pedestrian path
- Sightlines

0m 50m 100m 200m

CONCEPTUAL MASTER PLAN - CENTRAL PRECINCT

4.4 EAST PRECINCT

The East Precinct has a playful, community focus given its connectivity to the adjacent community and open spaces. Increased planting, nature play elements and community nodal points are proposed. A nature walk trail along the edge of the MOS reserve will allow people to engage with the natural environment without venturing down to Kororoit Creek.

The linear nature of the Federation Trail opens up the opportunity for a community pump track or linear skate environment to co-exist alongside the shared path. Increased movements along the Federation Trail will allow passive surveillance of playful spaces.

The existing swale will be refurbished and expanded where possible, to hold water within the landscape and provide opportunities for alternative planting and ecologies. A feature gateway will define and celebrate the start or end of the MOS reserve.

LEGEND

- Vegetation planting - species transition
- Upgrade road crossing
- Main Outfall Sewer
- Buffer planting
- Fragrant planting
- Wind rows with passive irrigation soaks
- Upgrade Federation Trail
- Pedestrian path
- Sightlines

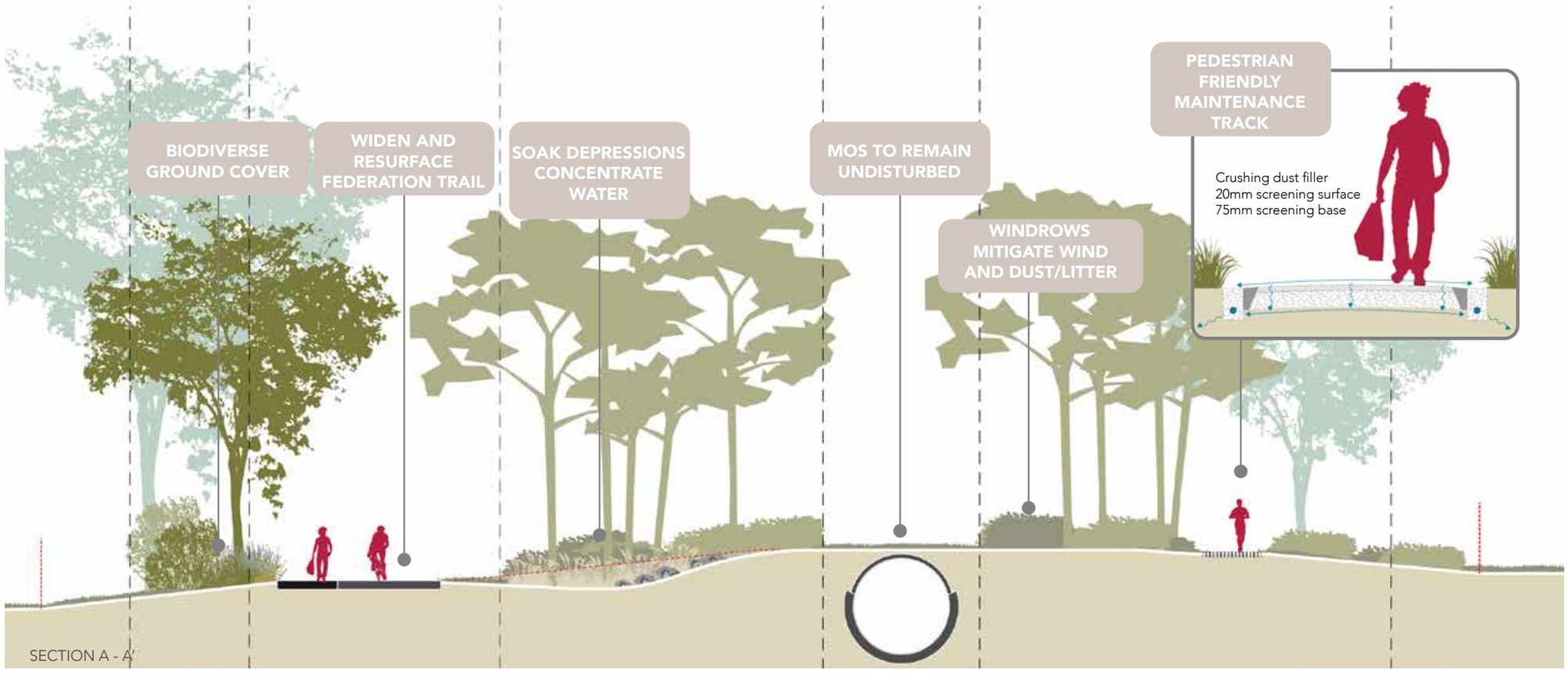
CONCEPTUAL MASTER PLAN - EAST PRECINCT

4.5 CENTRAL DETAIL

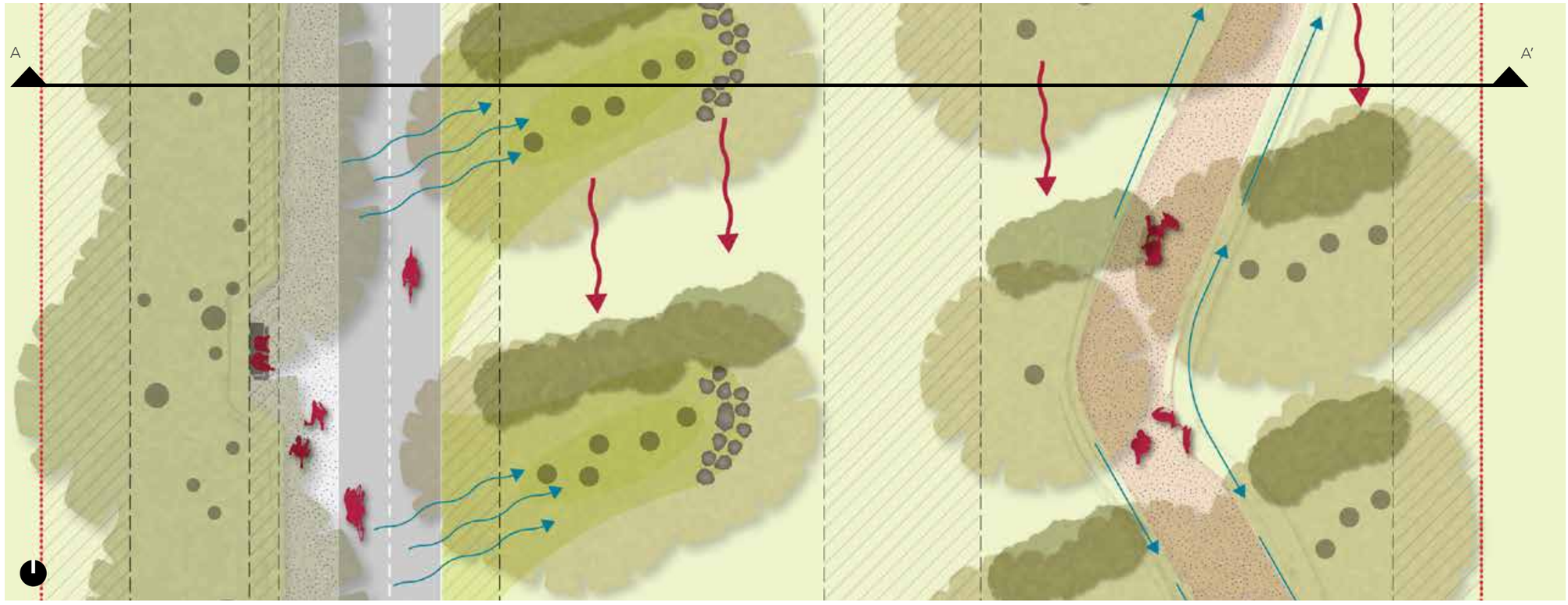
The site ideation proposes increased ground cover planting and windrows to mitigate dust and litter migration and promote biodiversity.

The Federation Trail will be upgraded to a concrete surface with appropriate vegetation clearances to provide clear lines of sight. A slow movement edge of compacted gravel will provide an alternative, more tactile walking experience.

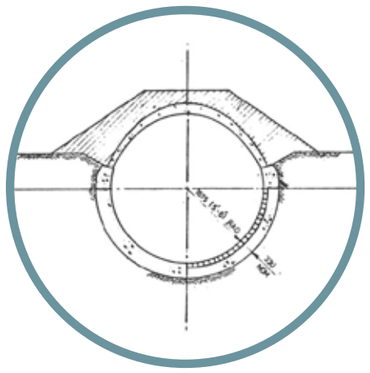
The existing maintenance track will be refurbished to make it more pedestrian friendly, providing an alternative walking path. The MOS will remain undisturbed with appropriate vegetation clearances.



SECTION A - A'



DETAILED PLAN TYPICAL



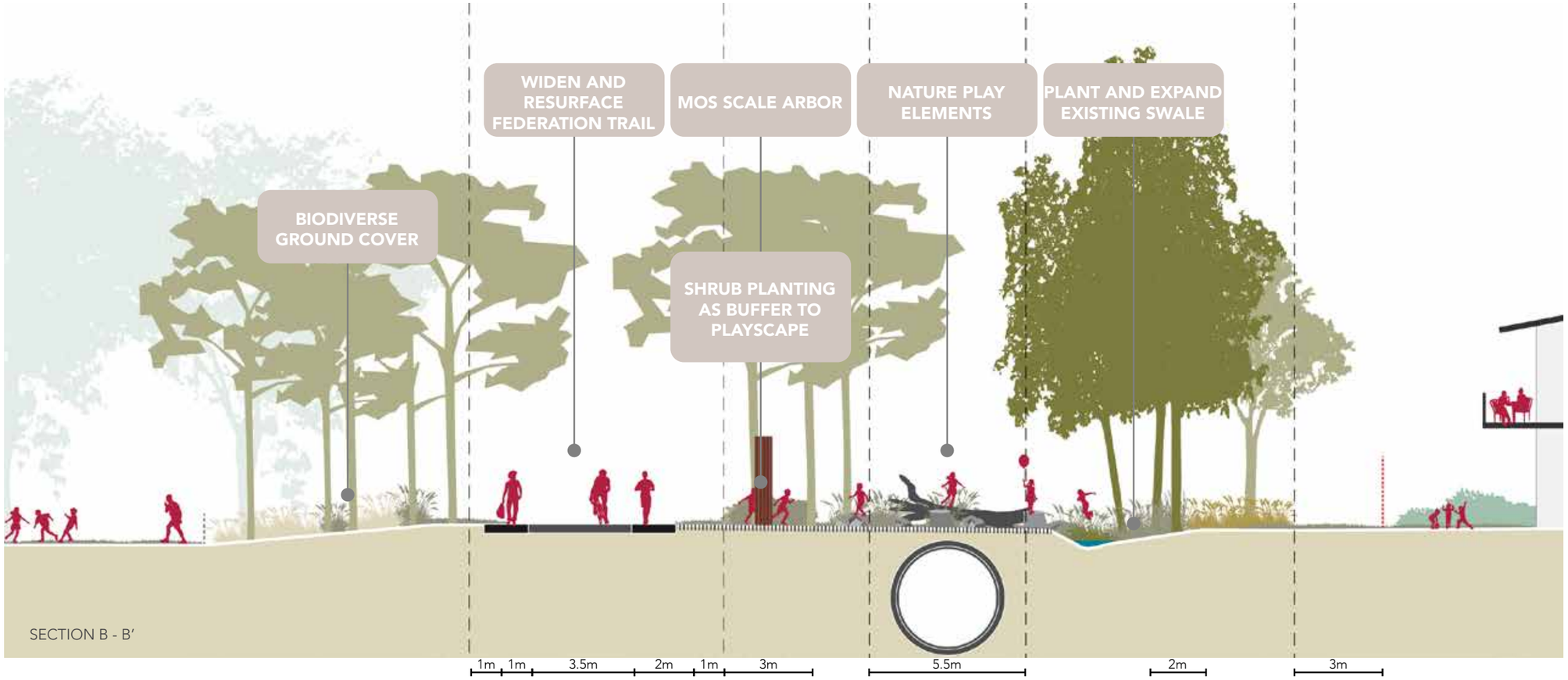
MOS Type G

MOS construction typology at this location

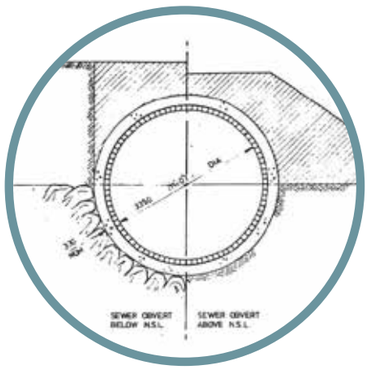
4.6 EAST DETAIL

Nature play elements include large logs, providing opportunities for children to engage with nature whilst also providing habitat for micro-organisms.

An arbor formed in the same shape and scale of the MOS provides a secure entry portal to the nature walk and play spaces whilst also talking to the broader water story and heritage of the site. The MOS will remain undisturbed beneath the parkland.

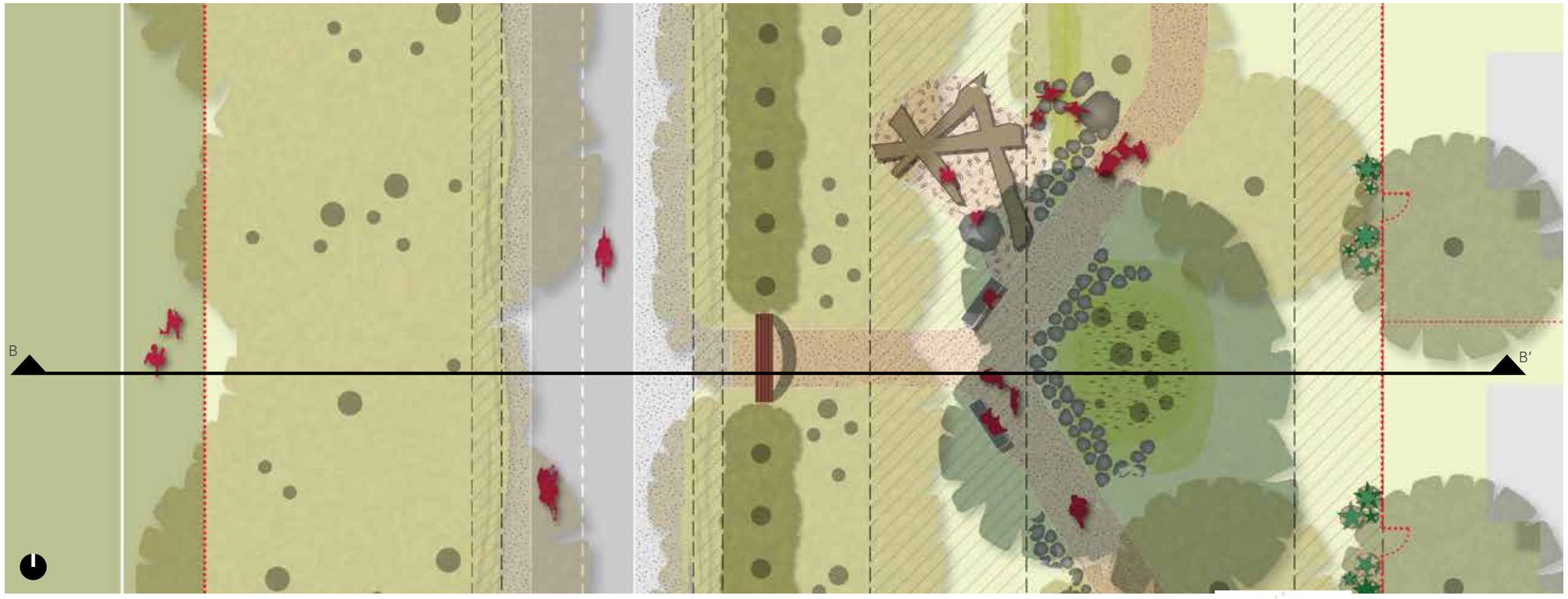


SECTION B - B'



MOS Type B

MOS construction typology at this location



DETAILED PLAN TYPICAL

alluvium REALM studios

4.7 PRECEDENT MATERIALS

The materiality of the project was chosen to reflect the project's vision of high quality open spaces with increased greening and biodiversity, active transport modes and celebration of the site's heritage.

Robust native planting will mitigate the harsh conditions of the site through dust and wind suppression and urban cooling. The Federation Trail will be upgraded to promote movement through the site and connection to adjacent open spaces.

Where possible, materials used should be recyclable and/ or low-impact to celebrate the project's commitment to environmental sustainability.

ROBUST PLANTING

UPGRADED FEDERATION TRAIL

WIND MITIGATION PLANTING

MAINTENANCE TRACKS WITH FUNCTION

PATH WITH PLANTED EDGE

CREEK ENGAGEMENT

4.8 PRECEDENT MATERIALS

Given the linear nature of the MOS there are opportunities for a series of play events, some linear, some not, that are connected in a sequential and rhythmical way.

LINEAR SKATE PARK

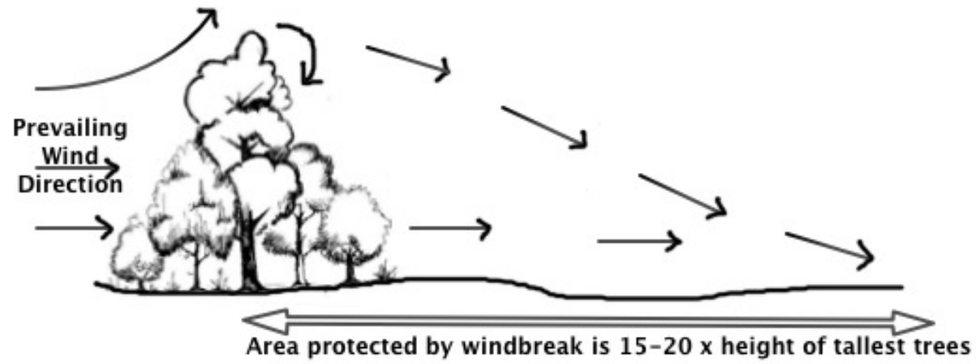
NATURE PLAY

DISCOVERY ZONES

4.9 PRECEDENT LANDSCAPE STRUCTURE

These images show potential node points where users can be slowed down and brought to a position of engaging with the water and the environment

OCCUPATION OPPORTUNITY



WINDROWS

CONNECTION TO THE CREEK

4.10 PRECEDENT PLAY

Play areas are focused around creating opportunities for informal engagement with the planted landscaping. Large logs provide habitat for microorganisms.

There are opportunities for community scale artwork which would connect people with the indigenous culture of the area.

DISCOVERY ZONES

COMMUNITY ACTIVATION

LARGE SCALE GATHERING NODES

OFF TRAIL GATHERING POINTS

COMMUNITY SCALE ART OPPORTUNITIES

SITE IDEATION - NON IRRIGATED

CENTRAL PRECINCT MONTAGE

alluvium REALM studios

SITE IDEATION - NON IRRIGATED

EAST PRECINCT MONTAGE

INCREASED TRAIL ENGAGEMENT

PORTALS TO PLAY

COMMUNITY ENGAGEMENT

4.11 PLANT SELECTION

The plant species for the non irrigated option have been selected from the Victorian Volcanic Plains Ecological Class. These species are particularly well adapted to low rainfall environments.

To ensure good plant establishment, specific measures should be put in place to avoid plant damage via herbivory, vandalism, drought and heat stress. Once plants are established, they should persist and continue to self-propagate given the right management regime. Growth may be slow and dependent on wetter periods.

The plant list attempts to assemble a diverse set of plant habits and functional traits. For example, there are wild flowers, grasses, small shrubs and medium shrubs. This list can be refined and expanded during the next design phases.

TREES

Eucalyptus cladocalyx

Eucalyptus microcarpa

Eucalyptus leucoxylon connata

Acacia implexa

Allocasuarina luehmannii

SHRUBS

Acacia acinacea

Enaedia nutans

Enchylaena tomentosa

Rhagodia parabolica

GROUND COVER

Rytidosperma caespitosa

Dianella longifolia

Dichanthium sericeum

Teucrium racemosum

Austropstipa nodosa

Austrostipa scabra

5.0 Site Ideation

Enhanced landscape with Integrated Water Management

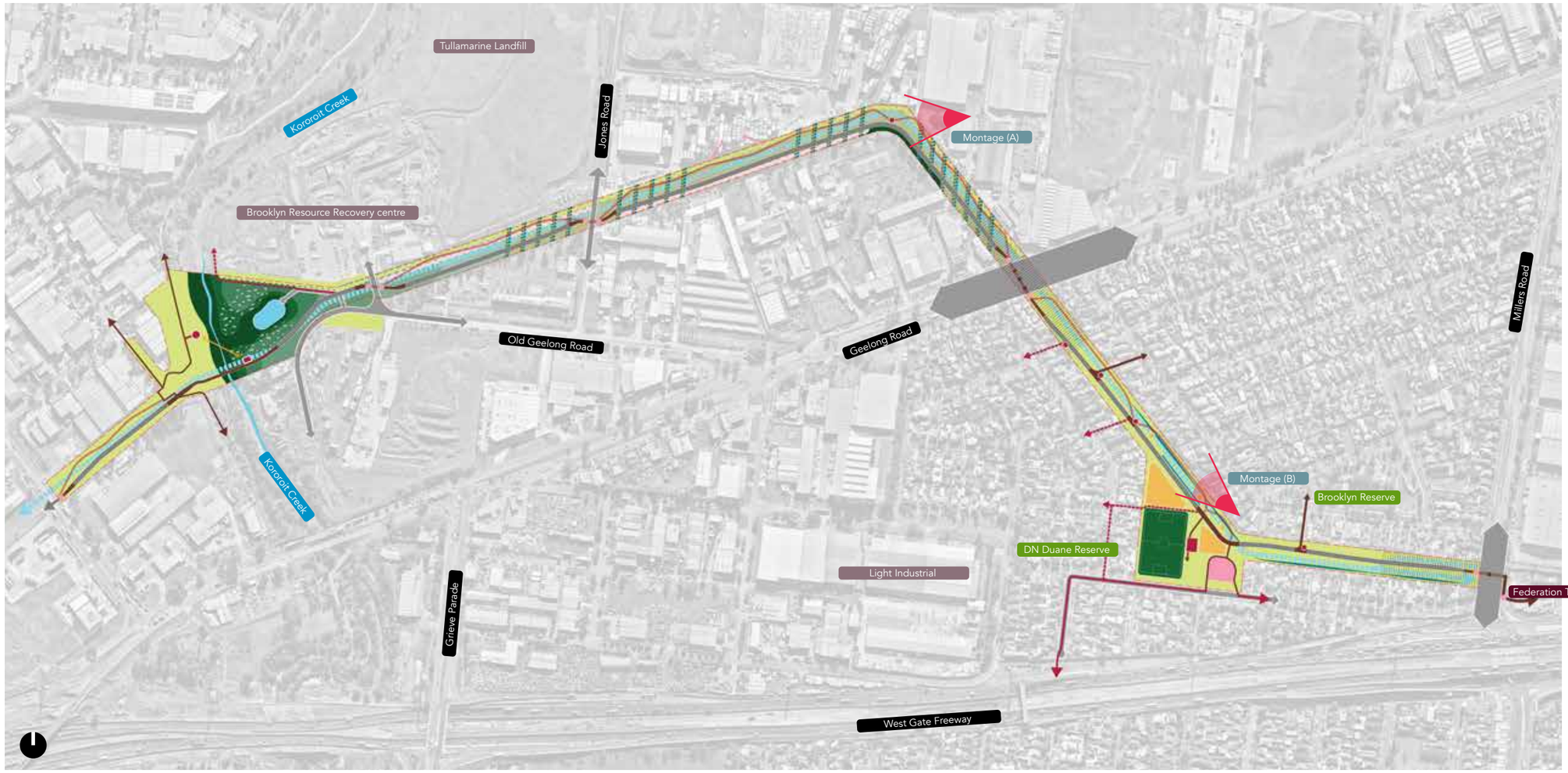
5.1 MASTERPLAN INTENT

Various potential options for incorporating Integrated Water Management (IWM) into the masterplan has been developed to allow flexibility as the project progresses. These options will be developed through future design stages, subject to funding and partner alignment. The options presented in this report include non-irrigated (refer Section 4.0), large scale IWM and medium scale IWM.

The large scale IWM provides the maximum storage and irrigation volumes to the MOS reserve and DN Duane Reserve, but has the greatest capital cost and complexity. The medium scale IWM has a reduced scale of infrastructure and provides similar irrigation savings and water quality benefits to the large scale IWM.

The aim of the IWM approach is to:

- Provide a source of water to support vegetation growth and health and to contribute to dust mitigation.
- Cool the site by increasing moisture in the soil profile as well as supporting increased canopy cover.
- Reduce the volume of stormwater reaching the Kororoit Creek.
- Protect the heritage and value of the MOS through repurpose and integration into the water story of the site.

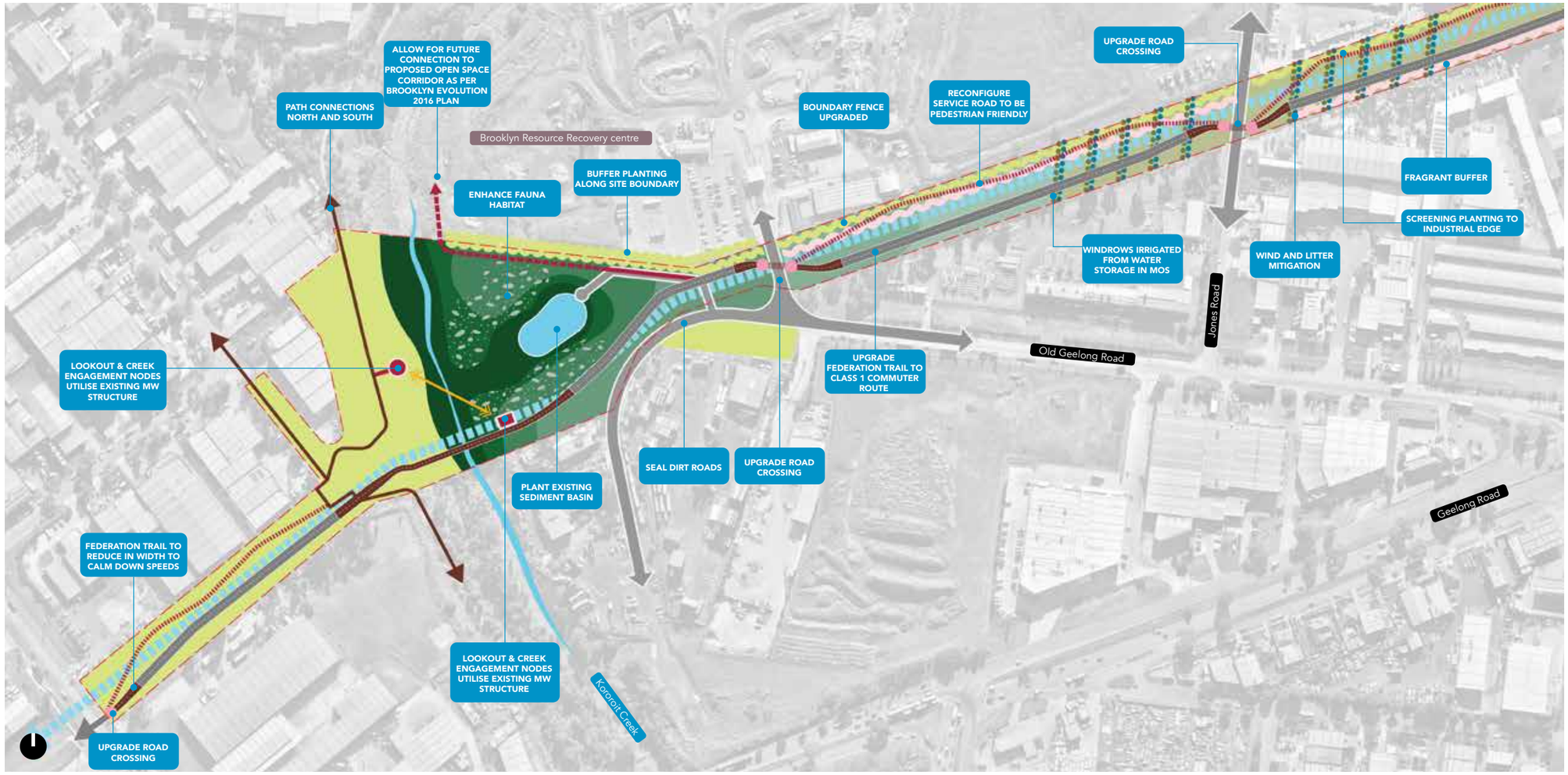


CONCEPTUAL MASTER PLAN

5.2 WEST PRECINCT

The West Precinct is the site of the sediment basin and a source of water for reuse within the Zone 9 landscaping. A pump station would be located in close proximity to the sediment basin and a rising main would extend along the alignment of the MOS toward the biofilter and storage location.

IWM will allow for increased water infiltration and uptake within the landscape, creating a strong vegetation response with increased canopy and foliage development.



LEGEND

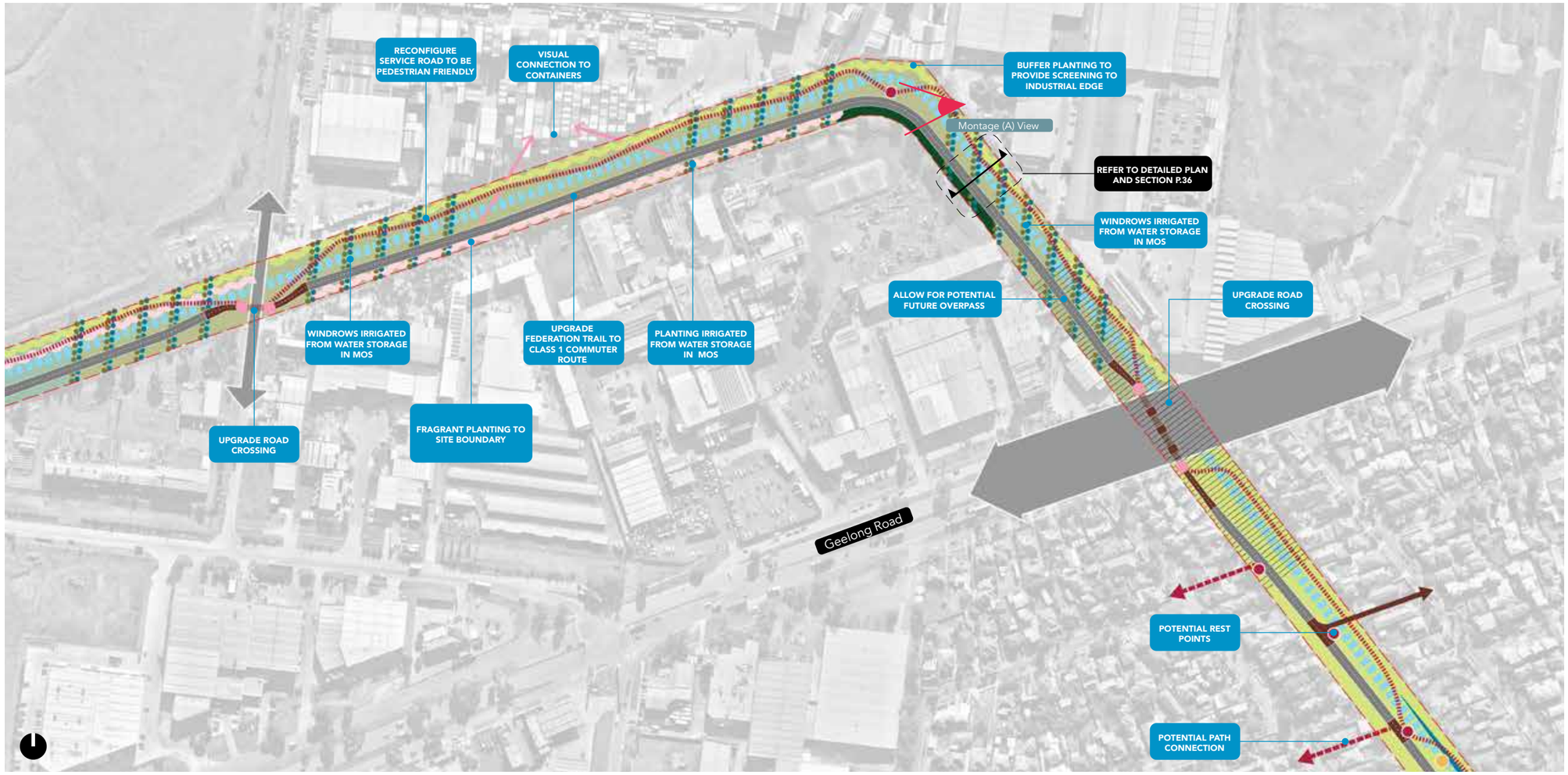
- Vegetation planting - species transition
- Upgrade road crossing
- Main Outfall Sewer
- Buffer planting
- Fragrant planting
- Windrows irrigated from water storage in MOS
- Upgrade Federation Trail
- Pedestrian path
- Sightlines

CONCEPTUAL MASTER PLAN - WEST PRECINCT

5.3 CENTRAL PRECINCT

There is an opportunity to locate the biofilter and storage for the IWM between Geelong Road and the bend in the MOS corridor, within Brimbank City Council area. Further assessments are required to determine the condition of the MOS in this location and what reconstruction works may be required for the installation of a storage system.

Windrows and ground cover planting will experience stronger growth with irrigation increasing their effectiveness. Increased water infiltration and canopy cover will also provide urban cooling, dust suppression and improved thermal comfort for cyclists and pedestrians.



LEGEND

- Vegetation planting - species transition
- Upgrade road crossing
- Main Outfall Sewer
- Buffer planting
- Fragrant planting
- Windrows irrigated from water storage in MOS
- Upgrade Federation Trail
- Pedestrian path
- Sightlines

0m 50m 100m 200m

CONCEPTUAL MASTER PLAN - CENTRAL PRECINCT

alluvium REALM studios

5.4 EAST PRECINCT

There is also an opportunity to locate the biofilter and storage for the IWM south of Geelong Road to DN Duane Reserve, within Hobsons Bay City Council area. Further assessments are required to determine the condition of the MOS in this location and what reconstruction works may be required for the installation of a storage system.

The East Precinct has the nearby DN Duane Reserve that could benefit from a non-potable water source. The biofilter could be used as a buffer between the Federation Trail and the proposed nature walk and play areas.

LEGEND

- Vegetation planting - species transition
- Upgrade road crossing
- Main Outfall Sewer
- Buffer planting
- Fragrant planting
- Planted wind rows with passive irrigation
- Upgrade Federation Trail
- Pedestrian path
- Sightlines

CONCEPTUAL MASTER PLAN - EAST PRECINCT

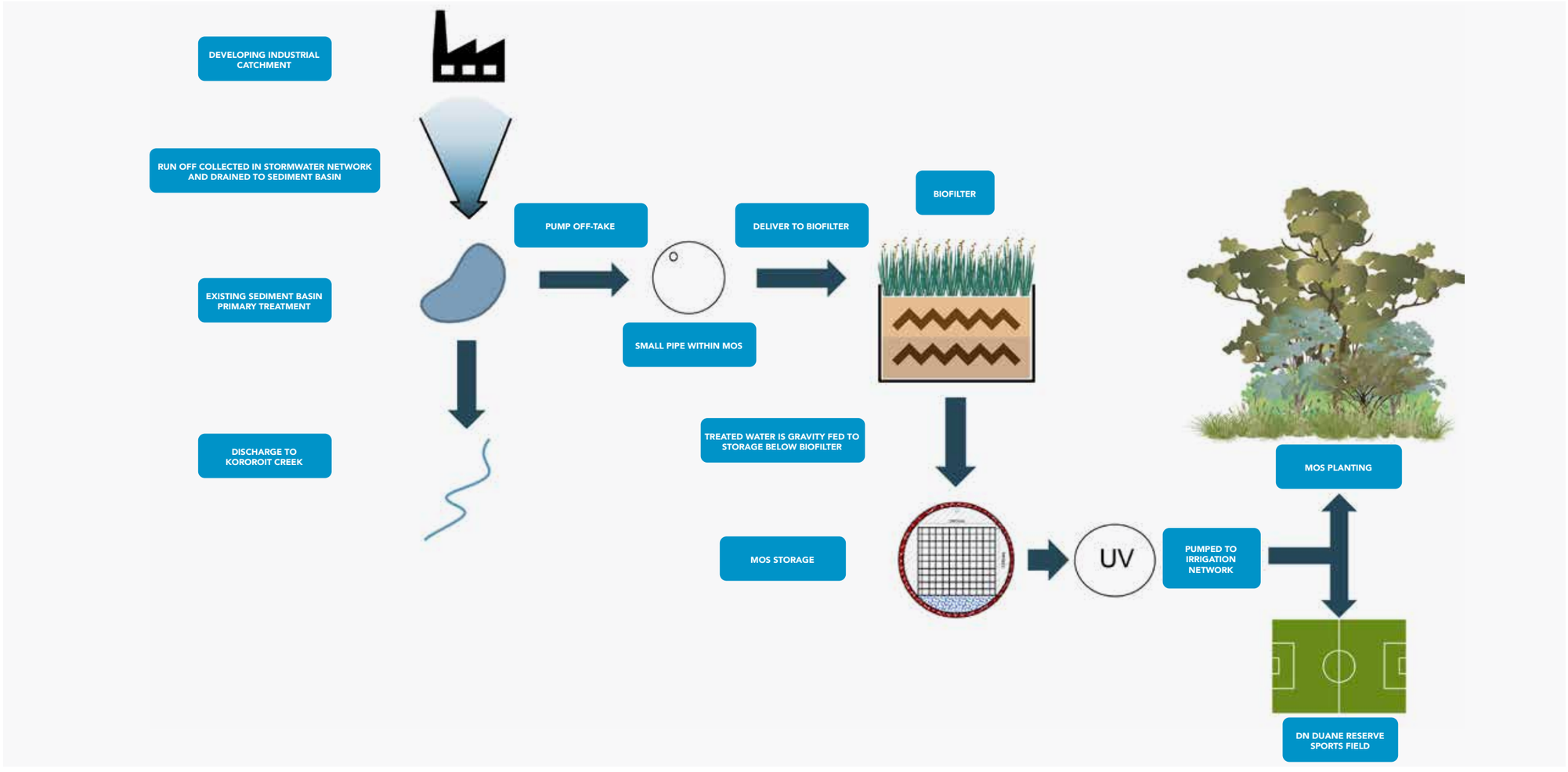
5.5 IWM CONCEPT

Stormwater captured from the Brooklyn industrial area is currently directed to the existing Melbourne Water sediment basin which provides a primary level of treatment, before discharge to Kororoit Creek. The IWM strategy proposes to divert water from the sediment basin to irrigate vegetation in Zone 9, cooling and greening the surrounding area and reducing overflows into the creek.

Water extracted from the sediment basin will be pumped to a biofilter before being stored in a purpose built storage system within the MOS.

The water is likely to require additional UV disinfection prior to being used for the irrigation of grass and vegetation within the MOS reserve and nearby open spaces like DN Duane Reserve. The UV disinfection unit would be co-located with the biofilter.

Two IWM options have been developed for this project which considers a large and medium scale irrigation demand.



5.6 LARGE SCALE IWM OPTION

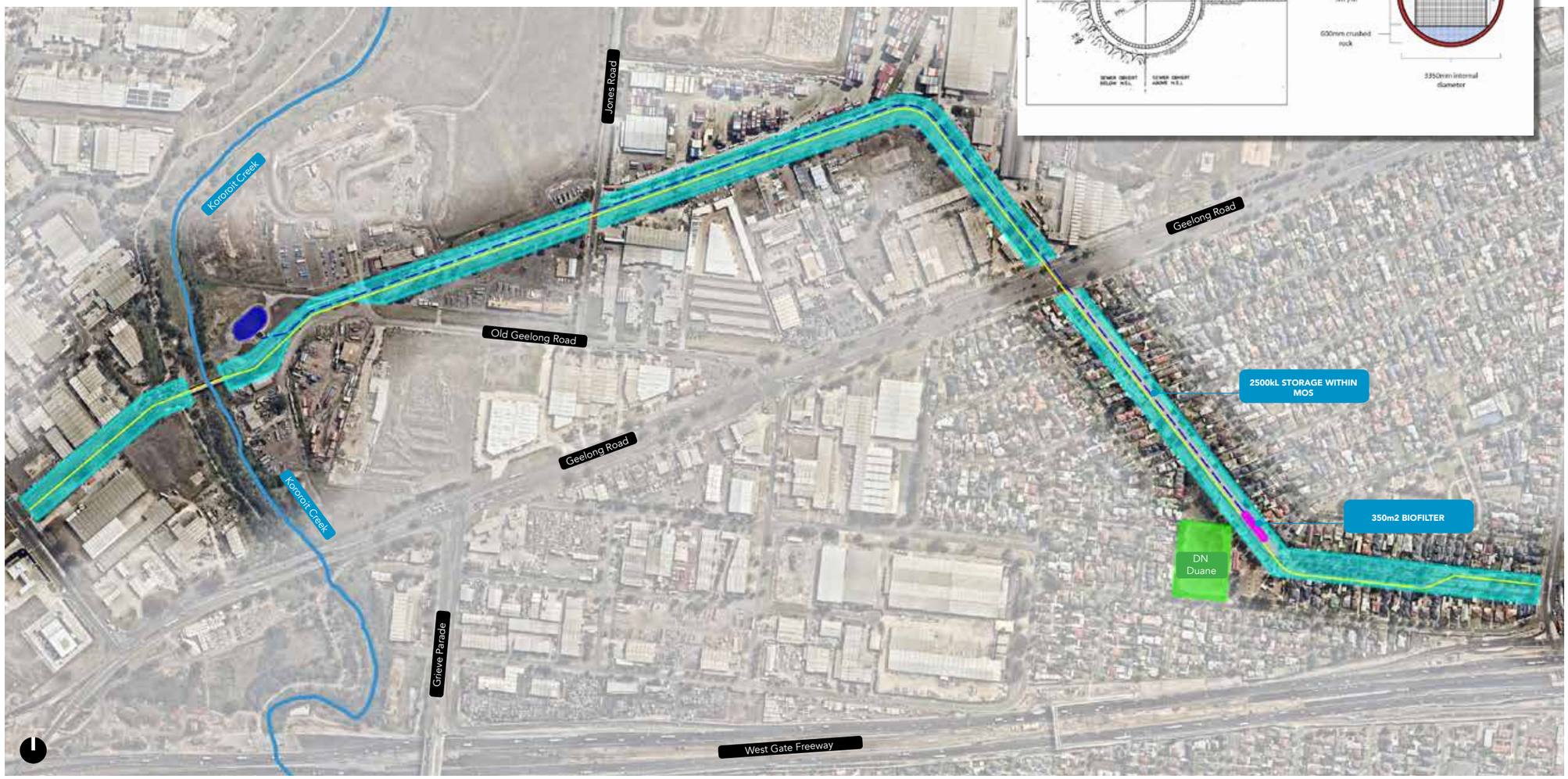
This option provide the maximum storage and irrigation volumes to the MOS reserve and DN Duane Reserve. This has been developed based on the available catchment area, irrigation demand assumptions and the storage available within the MOS.

The option delivers 23 ML/year of a total irrigation demand of 29 ML/year which equates to a 79% reliability. Water from the sediment basin will be pumped to a biofilter located to the south of Geelong Road, within Hobsons Bay City Council area. Water would be treated in a 350m^2 biofilter asset before draining directly to a 2500kL storage system located within the MOS.

Water would be treated via a UV disinfection unit before being distributed to irrigate vegetation with the MOS reserve and DN Duane Reserve.

This option has been designed to irrigate the following vegetation types:

- Grass
- Tree and shrubs
- DN Duane Reserve sports field



5.7 MEDIUM SCALE IWM OPTION

This is an alternative IWM option with a reduced infrastructure size. The storage is located north of Geelong road which avoids the need for multiple crossings of Geelong Road. The key difference of this option is that no grass areas within the MOS reserve are irrigated.

The option delivers 15 ML/year of a total demand of 19 ML/year which equates to a 78% reliability. Water from the sediment basin will be pumped to a biofilter located to the north of Geelong Road, within Brimbank City Council area. Water will be treated in a 275m2 biofilter asset before draining directly to a 1375kL storage system located within the MOS.

Water would be treated via a UV disinfection unit before being distributed to irrigate vegetation with the MOS reserve and DN Duane Reserve.

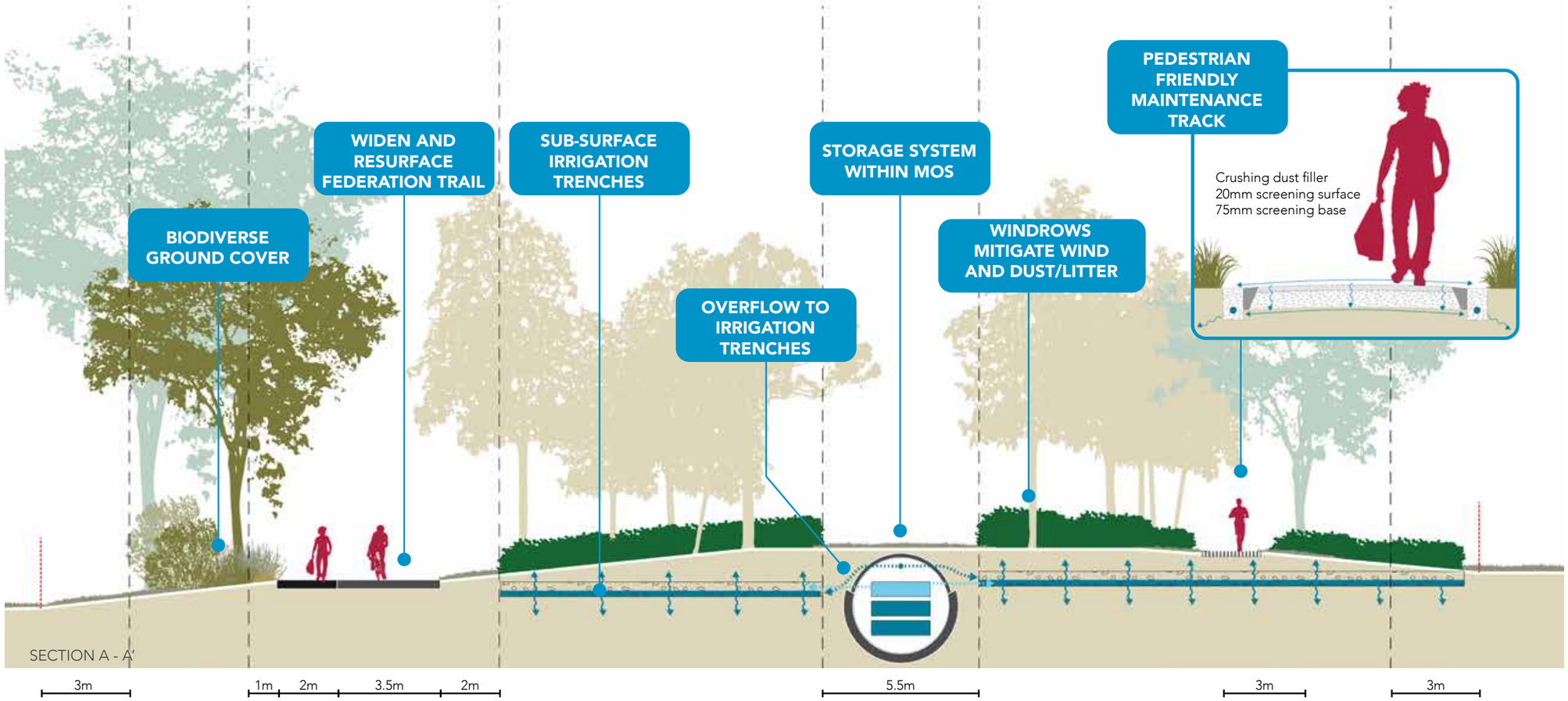
This option has been designed to irrigate the following vegetation types:

- Tree and shrubs
- DN Duane Reserve sports field

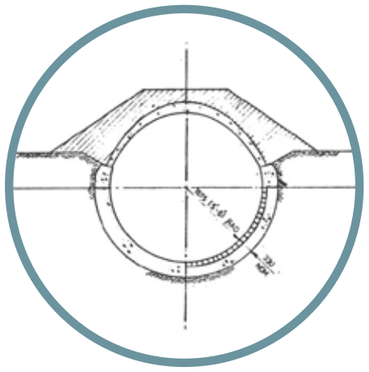
5.8 CENTRAL DETAIL WITH IWM

It is assumed that treated water from the biofilter can be stored within a storage system in the MOS pipeline. Further assessments are required to determine the structural condition of the MOS and what works will be required for the installation of a storage system.

There is potential to passively irrigate areas of the MOS reserve where levels permit through sub-surface infiltration trenches.

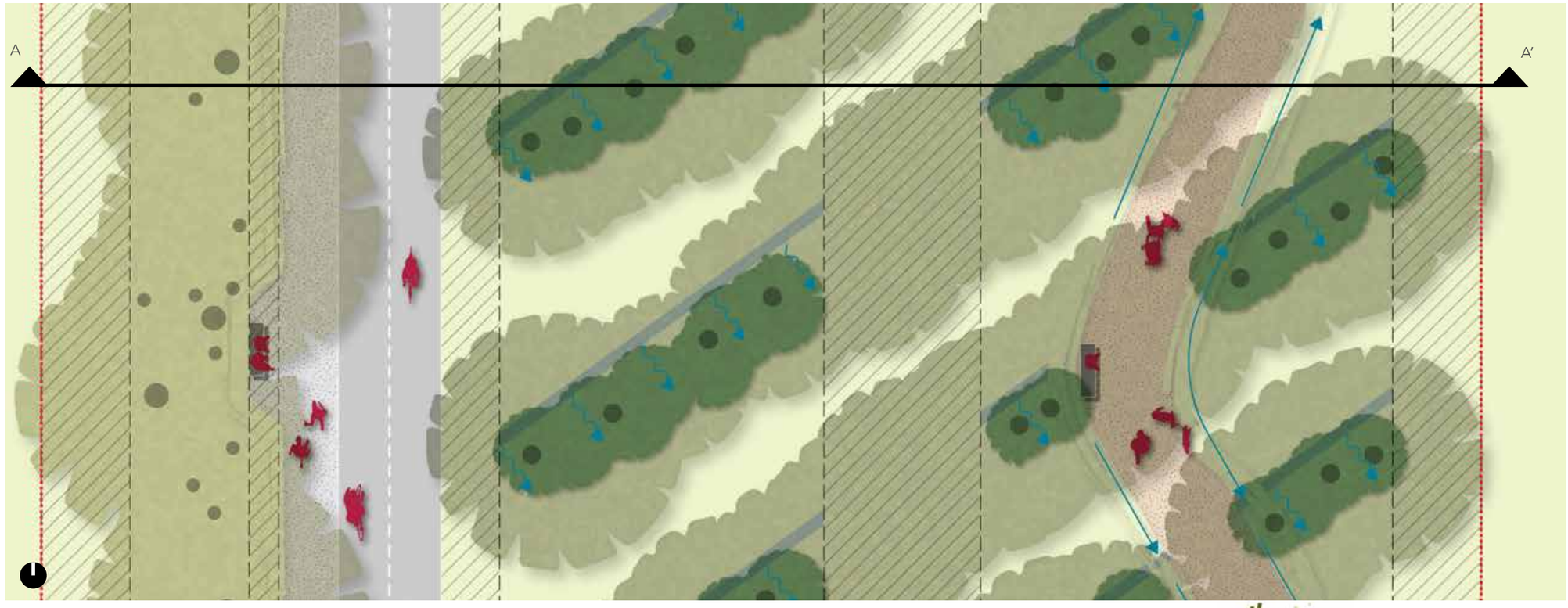


SECTION A - A'



MOS Type G

MOS Sewer construction typology at this location.



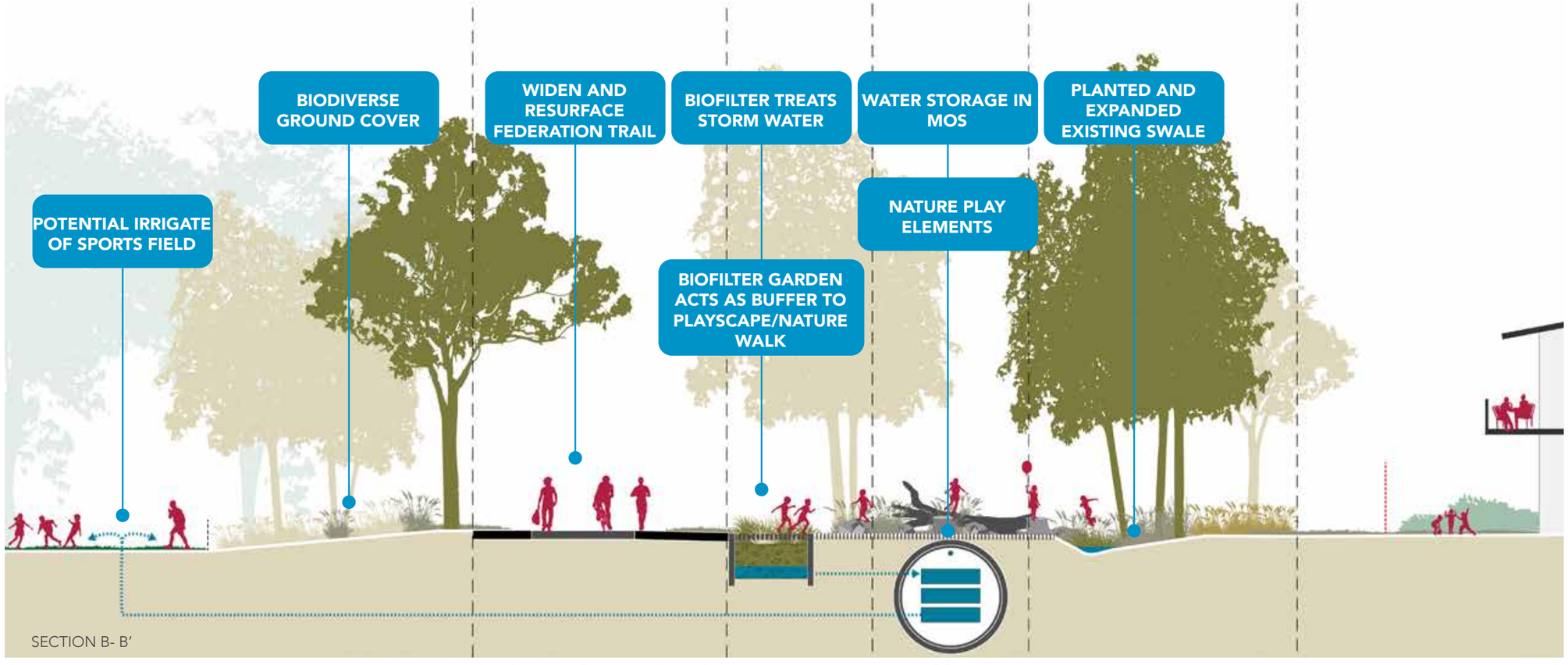
DETAILED PLAN TYPICAL

alluvium REALM studios

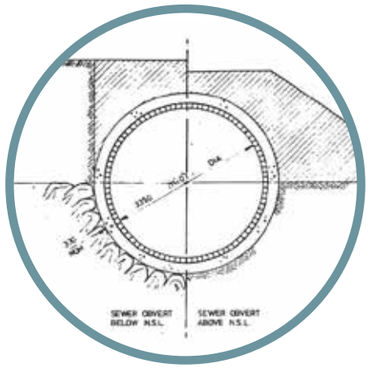
5.9 EAST DETAIL WITH IWM

Water will be pumped from the sediment basin to a biofilter with treated water used to irrigate vegetation and the adjacent sports field.

The biofilter could be located alongside the Federation Trail providing a buffer zone to the play areas and nature trail.

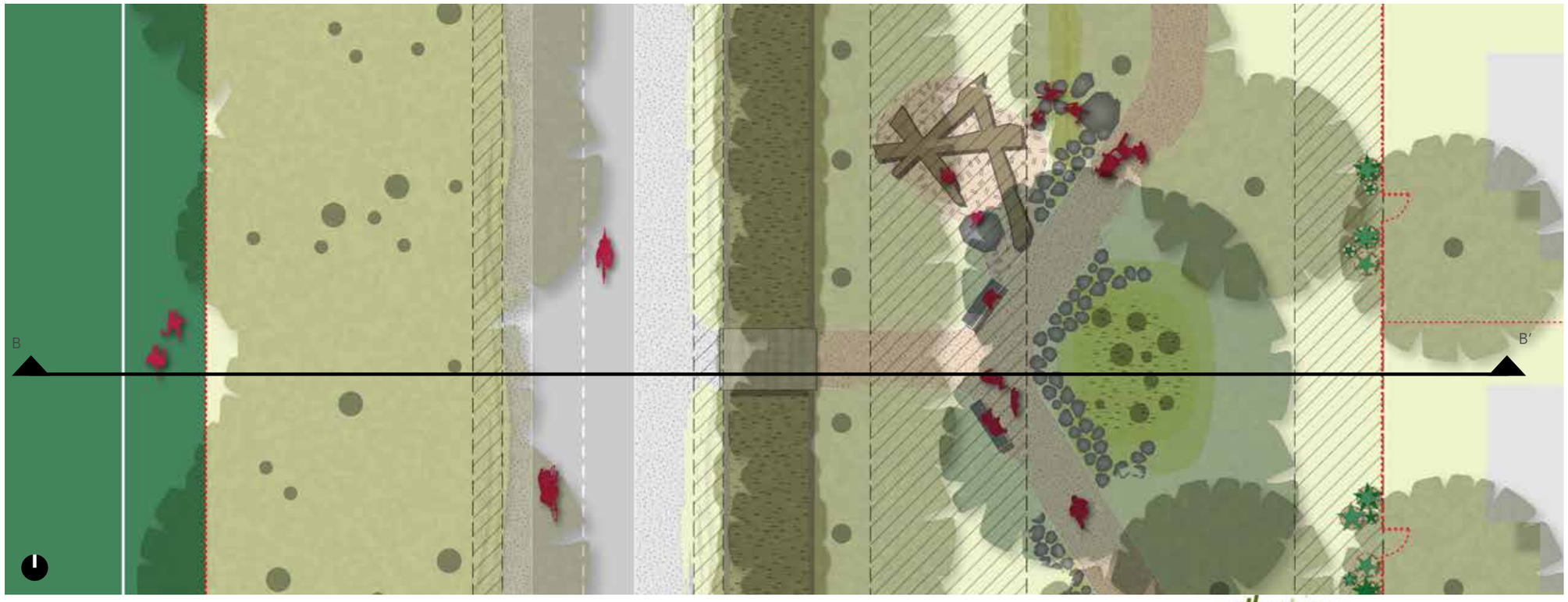


SECTION B- B'



MOS Type B

MOS Sewer construction typology at this location.



DETAILED PLAN TYPICAL

alluvium REALM studios

SITE IDEATION - INTEGRATED WATER MANAGEMENT

CENTRAL PRECINCT MONTAGE

SITE IDEATION - INTEGRATED WATER MANAGEMENT

EAST PRECINCT MONTAGE

INCREASED BIODIVERSITY

MULTI - EXPERIENCE TRAIL

IMAGES DEMONSTRATE INCREASED CANOPY COVERAGE AND WIND MITIGATION ALONG WITH HEALTHIER AND STRONGER BIODIVERSITY.

alluvium REALM studios

5.10 IWM PLANT SELECTIONS

Given some of the unique challenges of the site a particularly robust group of plants have been selected. These plants are derived from the site's local extant ecologies that persist despite the challenges introduced by urbanisation. They are all plants that are local to the low rainfall areas of the Victorian Volcanic Plains, which are characterised by heavy clay soils that poorly drain.

To ensure good plant establishment specific measures should be put in place to avoid plant damage caused by herbivory, vandalism, drought and heat stress. Once these plants are established, they should persist and continue to self-propagate given the right management regime.

Many of the species within this list will survive in a zero irrigation environment once established. But given the presence of irrigation (passive or active) these plants will establish more quickly, appear more healthy and contribute more to urban cooling through a greater rate of transpiration. Some of the species selected are specific to sodden environments and are only applicable to areas where significant amounts of water will be present, for example within the biofilter.

TREES

Acacia melanoxylon

Allocasuarina verticillata

Eucalyptus camaldulensis

Eucalyptus leucoxylon

Eucalyptus microcarpa

Melaleuca ericifolia

SHRUBS

Banksia marginata

Callistemom sieberi

Cassinia arcuata

Goodenia ovata

GROUND COVER

Carex appressa

Poa labillardieri

Lomandra longifolia

Calocephalus citreus

Calocephalus Lacteus

Wahlenbergia stricta

6.0 Cost Benefit Analysis

6.1 COST BENEFIT ANALYSIS

A cost benefit analysis of the options detailed in this report has been prepared.

Several benefits were identified for each of the options. The following benefits were quantified in monetary terms and included in the analysis:

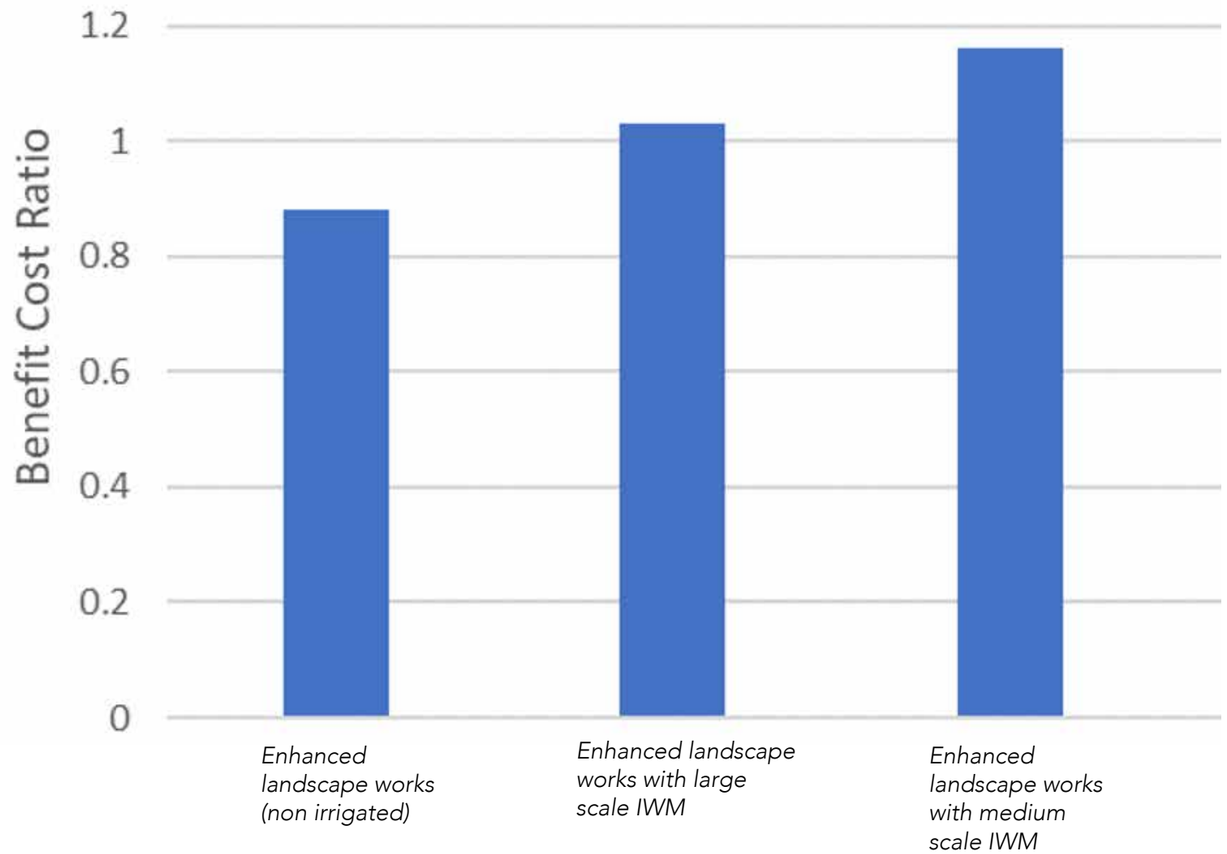
- Improved property values (amenity)
- Increased recreational usage
- Avoided health costs
- Irrigation water cost savings
- Reduced air pollution
- Urban cooling outcomes
- Water quality pollutant reduction

The following benefits were identified but not quantified due to limited/no data availability to establish impact and variation in impacts for the different options:

- Contribution to habitat creation /enhanced biodiversity
- Traffic decongestion
- Social licence to operate
- Enhanced public safety
- Increased community connectedness.

The cost benefit analysis found that:

- Both IWM options were found to have a positive cost benefit ratio with the medium scale IWM having the highest cost benefit ratio.
- The large scale IWM has the greatest water quality and irrigation savings impact. This is offset by greater capital costs.
- The non irrigated option has the lowest capital cost and still provides many positive outcomes related to enhanced amenity, increased recreational value, urban cooling, reduced air pollution and reduced health costs. It may still be a viable option if funds for capital works is limited or maintenance agreements for IWM cannot be resolved.



7.0 Site Infrastructure

7.1 LIGHTING

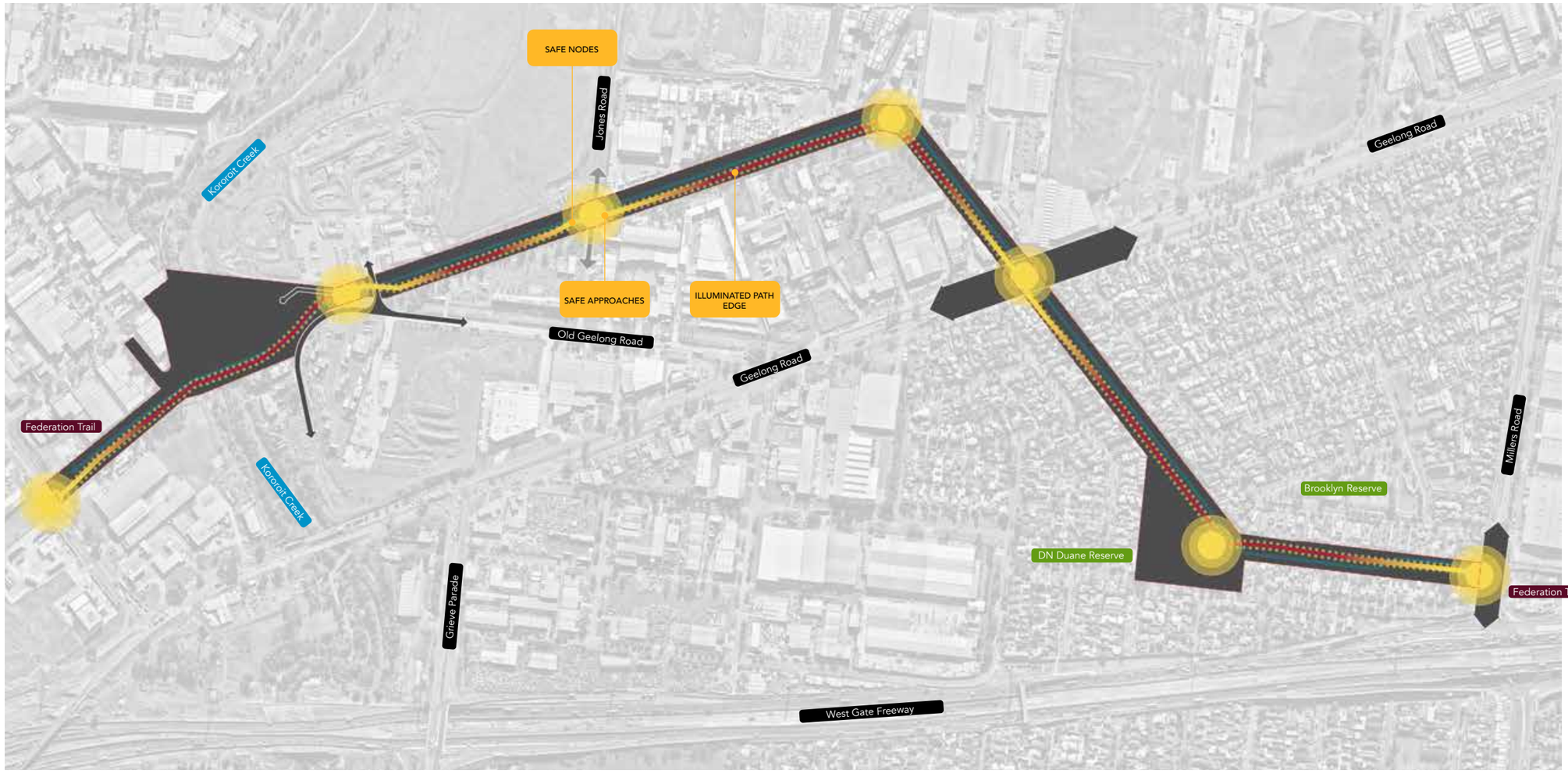
Many respondents, during both the stakeholder and community engagement, voiced their concern for the lack of lighting along Zone 9.

The lighting strategy aims to:

- Mitigate antisocial behaviour
- Mitigate traffic hazards at road intersections
- Illuminate shared use path for a consistent experience
- Manage light pollution and impact to fauna
- Encourage equitable use of the space through providing a safe environment

The lighting concept does this by adopting three different lighting types:

- Illuminated safety nodes
- Approach lighting to intersections
- Illuminated path edge



LIGHTING STRATEGY DIAGRAM

7.2 WAYFINDING AND INTERPRETATION

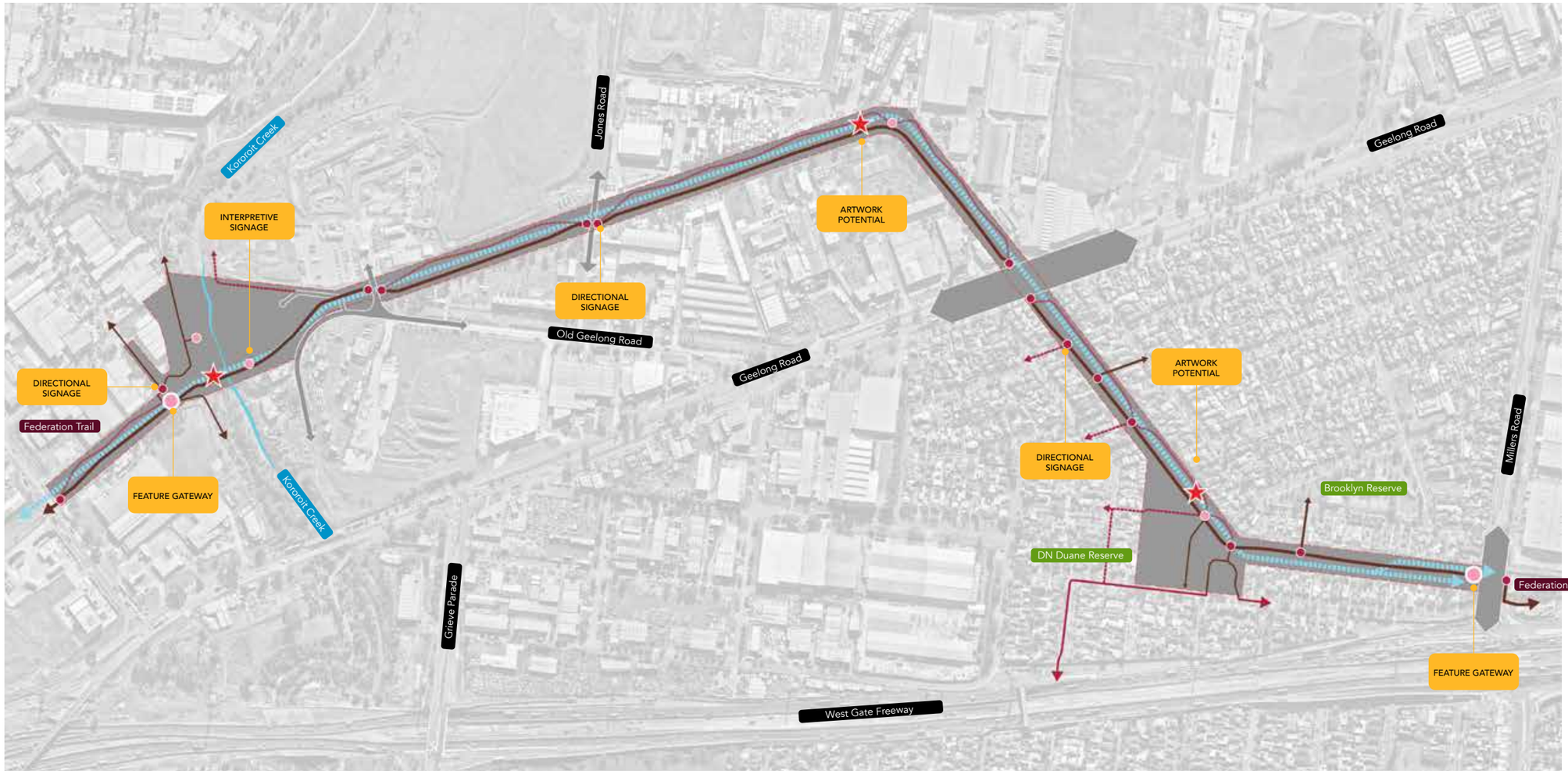
The wayfinding and interpretation strategy aims to provide visible information at a range of scales to educate users on the historic and cultural significance of the site, as well as assuring location and proximity to destinations.

The strategy considers:

- People navigating the site from multiple entry points
- Fast moving cyclists
- Children and people using the slow movement trails

The wayfinding and intepretation concept includes the following:

- Large community scale artworks and feature gateways to provide connection to the indigenous culture and heritage of the site.
- Medium sized interpretive and directional signage provide clarity at decision points along the journey and at entry points.
- Smaller detailed tactile moments to provide opportunity for delight and engagement with the natural environment.



WAYFINDING AND INTERPRETATION STRATEGY DIAGRAM

7.3 WAYFINDING AND INTERPRETATION PRECEDENTS

Wayfinding and interpretation devices will be tactile in nature and embedded into the landscape design where possible.

INCIDENTAL TRAIL SIGNAGE

SENSORY TACTILE SIGNAGE

MOVEMENT - SCREENING ARTWORK

INFRASTRUCTURE AS CANVAS

JOURNEY CREATING WAYFINDING

DYNAMIC SIGNAGE

8.0 Conclusion and Next Steps

8.1 CONCLUSION AND NEXT STEPS

The Zone 9 masterplan sets out a vision for transforming the Brooklyn section of the MOS reserve into a vibrant, green corridor that:

- Mitigates the harsh conditions of the site.
- Encourages engagement with the MOS reserve and Kororoit Creek.
- Connects and expands Brooklyn's open space network.
- Improves user safety.
- Expresses Indigenous and European history and culture in the landscape.

The masterplan explores non irrigated and IWM options which utilises stormwater from the existing Melbourne Water sediment basin for irrigation of the MOS reserve and adjacent open spaces.

The cost benefit analysis suggests that the IWM options are economically viable, due to their water quality and irrigation saving benefits. The non irrigated option has the least capital cost and therefore may be a viable option if funding is limited or maintenance agreements between the municipalities for IWM cannot be resolved in the short term.

Next steps:

Further assessment is required to understand the structural stability of the MOS where internal IWM storage systems are proposed. A key outcome of this assessment will be understanding what works are required to enable a storage to be constructed within the MOS.

Further engagement with project partners and stakeholders to ensure that all proposed works are fully incorporated into the vision for the masterplan. Additionally, further discussions are required to understand the impacts of the IWM options particularly in relation to operation and maintenance arrangements.

Funding for capital works to implement this masterplan are currently being sought. The extent and staging of the masterplan's implementation will be dependent on funding availability.

Further engagement with project partners, Traditional Owners, local community and businesses in relation to future design stages - concept and detailed design.

City making + liveability

REALMstudios Pty Ltd
ABN 39165483330

Enquiries@realmstudios.com

www.**REALM**studios.com