

# Stormwater Management & Water Sensitive Urban Design

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## Purpose of this policy

This policy sets Sydney Olympic Park Authority's requirements for stormwater management associated with development design, planning and construction.

The Authority is obliged and committed to better practice in holistic stormwater management, with a particular emphasis on mitigating the detrimental local and downstream impacts on the environment from poor quality and/or excessive volume of stormwater flowing from developments during and after construction.

The Authority's policy aims to achieve this by:

- Promoting appropriate water sensitive urban design in development
- Optimising local harvesting and on-site utilisation of stormwater
- Requiring proper management of stormwater from construction sites
- Requiring appropriate management of discharge of stormwater from and within development sites post-construction

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## To whom this policy applies

This policy applies to all development design and construction within Sydney Olympic Park including new developments, extensions or alterations to existing developments, public domain infrastructure (including new and altered roads, paths and car park facilities, new and altered sporting facilities, new public domain and public buildings, new and altered infrastructure including utilities and transport infrastructure) and all hard landscape areas.

The policy requirements apply to:

- private developments which alters and/or adds more than 150m<sup>2</sup> of impervious area and/or developments which result in an addition of gross floor area of more than 150m<sup>2</sup>. The policy requirements are to be applied to the whole site area.
- public infrastructure and public asset developments which alters and/or adds more than 150m<sup>2</sup> of impervious area. The policy requirements for public infrastructure and assets is to be applied to the area of altered or new assets only.

The policy will be enforced through commercial agreements and landholders consent procedures for all private property development, and provisions may be adopted as development consent conditions.

Developments smaller than those outlined above are still required to meet the intent of the policy. These developments are to adopt the principles outlined in the Sydney Olympic Park Authority's Environmental Guidelines as well as water sensitive design principles. All works are to minimise runoff, maximise treatment of stormwater by directing stormwater to landscape-based treatment systems, maximise capture and reuse of runoff and ensure there is no impact on receiving waters during construction.

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## Policy statement

Development within Sydney Olympic Park must:

- Comply with best practice water sensitive urban design practices
- Comply with best practice stormwater quality and quantity targets
- Manage stormwater from construction sites to best practice standards

Best practice within Sydney Olympic Park includes allowing for appropriate and innovative offsets in circumstances where there are genuine physical constraints, due to the intrinsic nature of the particular site, which limit an on-site design and control solution (as may be approved by SOPA on a case-by-case basis).

### Policy Requirements

#### 1. Maximise harvest and reuse of roof-water

Locally-harvested rainwater must be the primary source of non-potable water for developments located within a Sydney Olympic Park non-stormwater harvesting catchment (shaded red on Map 1) to minimise the impacts of stormwater quantity on sensitive receiving waters and to conserve potable water supplies.

- (a) At least 90% of roof area shall be connected to rainwater storage(s) which supply non-potable water reuse from this source,
- (b) Rainwater supply schemes must be supplemented with recycled water as a back-up to rainwater supply schemes where connection to the Park's WRAMS recycled water supply is available.
- (c) A minimum of 0.25 kL rainwater storage is to be supplied per dwelling and an additional 1kL of rainwater storage is to be supplied per 100m<sup>2</sup> of non-residential net floor area.

- (d) Refer to accompanying SOPA guidelines for further details on rainwater tank modelling requirements.
- (e) Rainwater tank storage does not contribute to on-site detention volume and cannot be used to offset on site detention requirements
- (f) Where non-potable demand within a development site is low, alternative uses for roof water such as landscaping, roof gardens, as well as off-site re-use, should be considered so as to minimise the volume of stormwater discharged to local waterways.

Developments located within a Sydney Olympic Park stormwater harvesting catchment (shaded blue on Map 1) must meet their non-potable water demand from non-potable water sources, including WRAMS recycled water and/or locally harvested rainwater.

Non potable water demands at Sydney Olympic Park are defined as approved uses of the Sydney Olympic Park recycled water scheme and include irrigation, car washing, toilets, water features, washing machines and cooling towers.

2. Minimise volume and frequency of stormwater discharge from hardstand areas such as paving, driveways, car parks and roofs, and maximise quality of any stormwater discharged.

- (a) All stormwater discharged from the site is to meet
  - water quality pollutant load reduction targets as outlined in Appendix 1.
  - water quantity volume reduction targets and peak flow reduction targets as outlined in Appendix 1.
- (b) Design of landscaped and paved areas must incorporate water sensitive urban design elements and pollution control devices including but not limited to:
  - Appropriate stormwater management measures as detailed in the Sydney Olympic Park Master Plan
  - Retaining a minimum of 20% of the site's open space area as deep soil.
  - Areas included as deep soil are to have a minimum depth of two metres. Consolidate areas of deep soil within sites and between adjacent sites to increase the benefits
  - Minimising impervious areas that are directly connected to the stormwater system. Runoff from impervious areas such as driveways, paving and rainwater tank overflows should be directed onto landscaped areas designed to accept such flows
  - Removal of gross pollutants, sediments and nutrients prior to stormwater discharge to the trunk drainage system, through use of devices such as bioretention systems, wetlands, swales, sand filters, gross pollutant traps, and litter baskets.
  - Installation of oil and grease traps in surface and basement carparks
  - Using plant species native to the Sydney region in water sensitive urban design features and associated landscaping, to avoid spread of weed propagules to downstream wetlands.

### 3. Water conservation

- (a) Connect all new development to Sydney Olympic Park's recycled water system, where available, for all approved uses of recycled water (including supplementation of locally harvested stormwater where required by this policy)
- (b) All residential development must comply with the Building Sustainability Index. (BASIX). Mixed use development must comply with the requirements detailed in the Sydney Olympic Park Master Plan.
- (c) Individual water metering must comply with Sydney Water's "Multi-level individual metering guide"

### 4. Riparian protection

Development within 40 metres of a creek, river, lake or estuary must have regard for the 'Guidelines for riparian corridors on waterfront land' (dated July 2012, or subsequent revisions) issued by NSW Office of Water. Any necessary approvals required under the *NSW Water Management Act 2000* must be obtained, and copies provided to the Authority.

### 5. Offsets

Where genuine physical constraints on site exist on a particular development site, the stormwater policy allows for offsets to be considered. Offsetting:

- Can be applied to meet the water quality, water reuse and/or on-site detention requirements for the site
- Includes substitution of stormwater management measures on the proposed development site to another site and/or substitution of treating the proposed development site to treating an external catchment on the proposed development site
- Requires an alternate sub-catchment (within the same stormwater catchment) to be managed to achieve the same or better outcomes at an alternate site
- Requires that any offsets must be within the same stormwater catchment
- Must achieve the same or better outcomes than if no offset approach was undertaken.
- May be for the whole of, or part of, the requirements for the site
- Requires approval from SOPA
- Requires that all policy requirements are to be met including pollutant load removal objectives, rainwater reuse objectives, reductions in quantity and reductions in peak flow either on site or offset off-site
- Is catchment-based. Developments must meet the requirements for centralised stormwater harvesting catchments (shaded blue in Map 1), and non-water harvesting catchments (shaded red on Map 1)
- Is not allowed for construction management objectives. All sediment and erosion control measures must be undertaken on site.

Any developments considering the use of offsets are encouraged to seek early advice from Sydney Olympic Park Authority on the applicability and suitability of any proposed offset. Approval of any offset is at the discretion of SOPA.

Onsite solutions to stormwater management are generally preferred in non-water harvesting catchments to protect the Park's wetland and waterway habitats. For these catchments any offset must be upstream of the first receiving water downstream of the development.

If the offset is to occur on land that is not owned by the proponent of the development, approval from the landholder is required and must be provided with the development application submission.

#### 6. Stormwater design excellence

To promote the application of innovative and sustainable stormwater management at Sydney Olympic Park design excellence criteria have been developed. The stormwater design excellence criteria are listed at Appendix 3.

#### 7. Construction management

All developments, where the site is disturbed, shall provide appropriate Erosion and Sedimentation Control measures to control runoff, mitigate soil erosion and trap pollutants before they can reach downslope lands and receiving watercourses.

Soil erosion and sediment control measures shall be designed in accordance with the document Managing Urban Stormwater–Soils & Construction Volume 1 (2004) by Landcom.

Development applications must include a Draft construction management plan addressing the requirements set out in Appendix 2. The final Plan must be submitted with an application for a construction certificate.

#### 8. Asset maintenance

All water sensitive design assets must be properly maintained on an ongoing basis. An establishment, handover and operation and maintenance plan must be developed and implemented for all water sensitive design assets and integrated water cycle management, including rainwater reuse assets, for the life of the asset:

- (a) a draft establishment, handover and operation and maintenance plan is to be submitted with the development application.
- (b) the final plan and evidence of a maintenance contract for the maintenance of the stormwater management measures with a reputable and experience maintenance contractor is to be included in any application for an Occupation Certificate.

The draft establishment, handover and operation and maintenance plan is to be prepared by the designer(s) of the system stormwater treatment, detention and reuse systems. The final plan must include a written signoff from the design engineer(s) responsible for the construction drawings of the system that the system has been constructed in accordance with the construction drawings or, where modified, has not adversely affected the performance of the system.

The contract must be an executed contract, and for a minimum of 5 years. Should the contract be terminated for any reason during this five-year period, a new contract covering these works must be established for the remainder of five-year period.

Copies of the plan and maintenance contract must be provided to the Authority:

- (a) The plan must include routine checking, cleaning and servicing of all devices in accordance with the manufacturer's and/or designer's recommendations. Records of all maintenance activities undertaken must be kept and provided to the Authority annually by 30 June each year, and at any other times upon request.
- (b) The maintenance contract must include quarterly maintenance visits. Records of the visits are to be submitted to the Authority
- (c) The maintenance contract must be supplemented by an annual independent audit undertaken by a suitably qualified WSUD professional. The audit is to verify the condition of the treatment system(s), verify and document that the system(s) is working as intended, verify the system(s) has been cleaned adequately, verify there is no excessive build up of material in the system(s) and identify any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function. The Audit Report is to be submitted to the Authority by 30 June each year.
- (d) The pollution retention efficiency of structural stormwater treatment measures must be maintained up to the design discharge and must not decrease with build- up of materials
- (e) Where necessary system components become unavailable, an alternative system is required to be retrofitted into the development to achieve an equivalent pollutant reduction and water management outcome.

All constructed stormwater water quality and quantity assets that will be transferred to SOPA:

- (a) shall be maintained by the developer for a period of no less than 3 years post practical completion.
- (b) Practical completion requires
  - Written approval from the principal certifying authority (PCA).
  - Certification by the PCA requires written sign off from the designer responsible for developing the construction drawings that the system has been constructed in accordance with the designs or if modified from the construction drawings that it has not compromised the performance of the stormwater management system
  - Written confirmation from SOPA that practical completion has been achieved
- (c) Are subject to inspections which may be held during the 3-year maintenance period.
- (d) Are subject to an inspection to be held on completion of the 3-year maintenance period and prior to the transfer of ownership to SOPA.

- (e) If the asset is not of an acceptable standard to SOPA at these inspections, the asset shall be rectified to the satisfaction of SOPA. This will include extension of the maintenance period.
- (f) Require the proponent to submit inspection and asset handover checklists for the assets which are to be based on the Healthy Waterways Guideline Series for Transferring Ownership of Vegetated Assets (latest version)

#### 9. Information to be submitted with a development application:

The following information is to be submitted with a development application:

- (a) Integrated water cycle management plan, including a water balance report. This Plan is to clearly demonstrate how the proposal meets the policy objectives and specifically how the proposal achieves the outcomes required in Appendix 1 and Appendix 2 of this Policy.

The integrated water cycle management plan is to be prepared as early as possible in the design process, by a suitably qualified professional such as a registered civil engineer with a minimum of five years demonstrated professional experience in the field of stormwater management, and where relevant, a suitably qualified professional with a minimum of five years demonstrated professional experience in the field of Water Sensitive Urban Design

Refer to the SOPA stormwater technical guidelines for further details on design, modelling and reporting requirements.

- (b) All calculations, assumptions and modelling used to develop the Integrated Water Cycle Management Plan and water balance report, including items specified in the checklist at Appendix 4 of this Policy, and the following electronic files:

- Electronic copy of MUSIC water quality model and summary of results in report
- Electronic copy of hydraulic model (Drains or equivalent) and summary of results in report
- Electronic dwg file of the sub-catchments and proposed stormwater system including all detention, reuse and treatment elements

- (c) Draft construction management plan addressing the requirements set out in Appendix 2 of this policy

- (d) Draft establishment, handover and operation and maintenance plan that addresses requirements of this policy (clause 8 above).

- (e) A completed checklist (as per Appendix 4) that demonstrates compliance with Policy requirements.

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## Failure to comply with this policy

The policy will be enforced through commercial agreements and landholders consent procedures for all private property development, and provisions may be adopted as development consent conditions.

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## Review timeframe

Urban Renewal & Environment Branch will review this policy no later than 3 years from the date the document is approved. The document may be reviewed earlier in response to post-implementation feedback, changes to legislation, or as necessary.

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## Related documents

Glossary: Terms related to this policy are defined in the glossary at Appendix 5.

Related documents: The Authority has produced a set of technical guidelines to assist in implementation of this Policy. The Policy should be read in conjunction with the Guidelines:

SOPA Stormwater Guidelines 1: Case study – applying WSUD to a development site

SOPA Stormwater Guidelines 2: Water sensitive urban design

SOPA Stormwater Guidelines 3: Rainwater tank guidelines

SOPA Stormwater Guidelines 4: MUSIC modelling

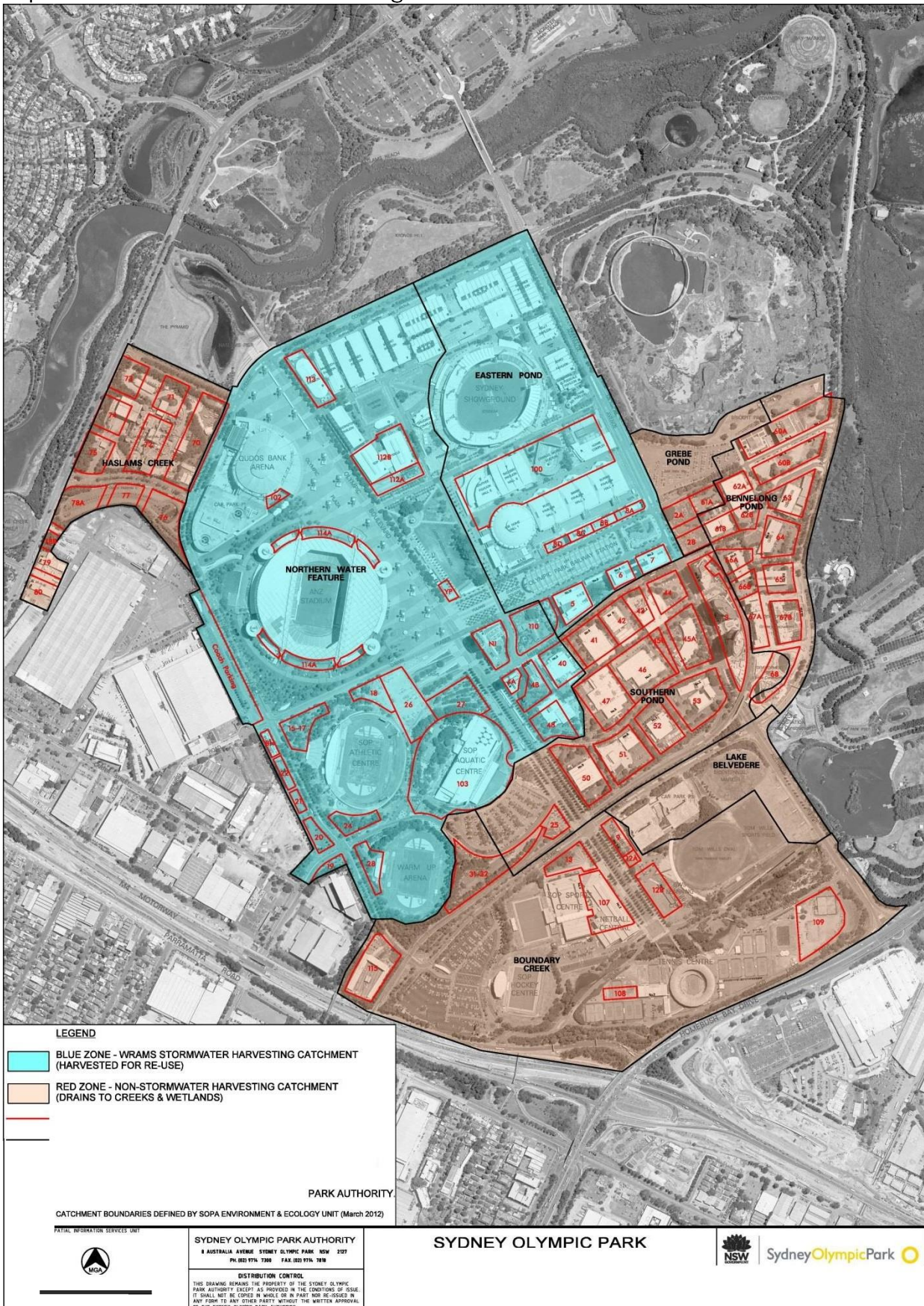
SOPA Stormwater Guidelines 5: Technical manual

Guidelines may be accessed on the website of the Sydney Olympic Park Authority:

<https://www.sydneyolympicpark.nsw.gov.au/about-us/resource-centre>



Map 1: Urban centre stormwater drainage catchments



## Policy metadata

Table 1. Policy metadata

Category	Description
Status	Final
Date of approval	January 2024
Approver	Director Urban Renewal & Environment
Group	Property, Development and Valuation
Division	Sydney Olympic Park Authority
Policy owner	Manager Environment & Ecology
Branch	Urban Renewal & Environment
Document location	SOPHIE (SOPA intranet)
Next review date	January 2027
Associated procedure	
Any additional applicability	
Superseded document	
Further information	Enquiries@sopa.nsw.gov.au
Document Reference	POL13/4

## Version control

Table 2. Version Control

Version	Date issued	Change
1	October 2013	Approved by CEO
2	2016	Approved by CEO following public exhibition
2-2.3	2016 - 2021	Reviewed
3	November 2023	Review & Conversion to DPHI format

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## Appendices

Appendix 1 – Water quality and water quantity targets

Appendix 2 – Construction management plan requirements

Appendix 3 – Stormwater design excellence

Appendix 4 – Policy compliance checklist

Appendix 5 - Glossary

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## Appendix 1 – Water quality & water quantity targets

1. All development must as a minimum meet the following baseline water quality targets:
  - 45% reduction in the mean annual load of Total Nitrogen\*
  - 65% reduction in the mean annual load of Total Phosphorus\*
  - 85% reduction in the mean annual load of Total Suspended Solids\*
  - 90% reduction in the mean annual load of hydrocarbons\*
  - 95% reduction in the mean annual load of gross pollutants\*
2. Development within a Sydney Olympic Park non-stormwater harvesting catchment (shaded red in Map 1) must strive to the maximum extent practicable, to meet the following water quality targets:
  - 65% reduction in the mean annual load of Total Nitrogen\*
  - 85% reduction in the mean annual load of Total Phosphorus\*
  - 90% reduction in the mean annual load of Total Suspended Solids\*
  - 90% reduction in the mean annual load of hydrocarbons\*
  - 95% reduction in the mean annual load of gross pollutants\*
  - 10% reduction in the mean annual runoff volume from the entire site\*

*(\* Note that all targets above are to be measured as a reduction from the developed site without any management measures (treatment, reuse, etc) compared to the developed site with management measures).*

3. A suitable drainage design is to be developed for the site which safely and effectively conveys stormwater through and from the site to the trunk drainage system. Drainage within the development is to be designed to the following standards:
  - (a) All internal piped drainage systems are to be designed to cater for the 1 in 20 year ARI design event and is to discharge to SOPA's drainage system.
  - (b) All Roof drainage is to be designed for the 1 in 100 year ARI event.
  - (c) All surface runoff in the 1 in 100 year ARI event, including any external discharge onto the site, must have a safe passage through the site along an internal pathway, public domain or road system. Depth x velocity for all overland flow paths must be limited to less than 0.4 m<sup>2</sup>/s
  - (d) All habitable floor levels are to have the following minimum freeboard requirements:
    - 0.5m above public drainage infrastructure, creeks and channels
    - 0.3m above internal overland flow paths
  - (e) On site detention is to be provided to attenuate peak flows from the development such that both the:

- 1 in 1 year ARI event post development peak discharge rate is equivalent to the pre development (un-developed catchment) 1 in 1 year ARI event
- 1 in 100 year ARI event post development peak discharge rate is equivalent to the pre development (un-developed catchment) 1 in 100 year ARI event

(f) Note that detention storage is additional to any reuse storage requirements

4. A Drains model is to be submitted with the development application

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## Appendix 2 – Construction management plan requirements

### Erosion and sediment management

(a) All works involving soil disturbance:

Erosion, sediment and dust control measures must be installed and maintained throughout the works in accordance with the provisions of the “Blue Book” Part

1. [Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th edition]

(b) Cleared area 250-2500m<sup>2</sup> OR where soil stockpiles will be in place for over 10 days:

An Erosion and Sediment Control Plan prepared by an appropriately qualified person, must be submitted with an application for development consent, and implemented throughout the works. The Plan must be prepared in accordance with the provisions of the “Blue Book” Part 1. [Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th edition]. The plan must consider likely stages of the works and provide for appropriate control of sediment and erosion for each stage.

The plan must contain a daily and weekly site inspection checklist consistent with IECA Best Practice Erosion and Sediment Control documents.

(c) Cleared area >2500m<sup>2</sup>:

A Soil and Water Management Plan prepared by an appropriately-qualified person must be submitted with an application for development consent, and implemented throughout the works. The Plan must be prepared in accordance with the provisions of the “Blue Book” Part 1. [Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th edition]. The plan must consider likely stages of the works and provide for appropriate control of sediment and erosion for each stage. This Plan shall show:

- location and extent of all necessary sediment and erosion control measures for the site
- catchment plan
- sediment basin(s) locations including details showing how runoff from the entire site will be directed to the sediment basin(s)
- All relevant details and calculations of the sediment basins including sizes, depths, flocculation, outlet design, all relevant sections, pump out systems, and depths
- all details of basement and other excavation pump out and dewatering treatment systems including flocculation and any proposed discharge from the site from dewatering and pump out systems
- identification and management of any stormwater run-on to the site from adjacent sites

- location of any temporary stockpiles (soil, spoil, top soil or otherwise) and accompanying sediment and erosion control measures
- location and details of all vehicle wash down bays and associated erosion and sediment control measures such as earthen bunds
- A daily and weekly site inspection checklist consistent with IECA Best Practice Erosion and Sediment Control documents

A sediment basin is required for every catchment discharging from the site as part of any Soil and Water Management Plan. The sediment basin is to be designed:

- According to the NSW Blue Book (section 6.3.4 and Appendix E). The calculations of the sediment basin size must be submitted with the Development Application.
- Type D soils (unless otherwise demonstrated by an analysis of site soils by a qualified geotechnical consultant and which must be submitted with the development application).
- For all events up to the peak flow rate from the 1 in 10 year ARI event for the site for the 5 day rainfall event
- A gypsum flocculent is to be added to the sediment basin in accordance with Appendix E of the Blue Book (note that Alum is not to be used as a flocculent at Sydney Olympic Park).

In accordance with the Blue Book, some small flat sites or sites with minimal stormwater discharge from the site during construction, may not require a sediment basin. If a sediment basin is not being proposed it must be demonstrated that the average annual soil loss from the total area of land disturbance is less than 150 cubic metres per year. Soil loss must be calculated in accordance with Appendix A of the Blue Book. In such circumstances, alternate measures must be employed to protect the receiving waters.

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## Appendix 3 – Stormwater design excellence

To achieve design excellence the development must as a minimum achieve the following:

1. Water quality targets

- 65% reduction in the mean annual load of Total Nitrogen\*
- 85% reduction in the mean annual load of Total Phosphorus\*
- 90% reduction in the mean annual load of Total Suspended Solids\*
- 90% reduction in the mean annual load of hydrocarbons\*
- 95% reduction in the mean annual load of gross pollutants\*
- Landscape based treatment system

2. Water quantity reduction targets

- 10% reduction in the mean annual runoff volume from the entire site\*

3. Water conservation targets

- Minimum of 0.5kL of rainwater storage per apartment/dwelling and 1L per 100 sqm of net residential floor area connected as the priority supply to
- the non-potable demands for the development
- Connection to WRAMS as a back-up for non-potable water demand

*\* Note that all targets above are to be measured as a reduction from the developed site without any management measures (treatment, reuse, etc) compared to the developed site with management measures.*

Offsetting may be used to meet the stormwater design excellence criteria.



## Appendix 4 – Policy compliance checklist

Policy requirement	Policy requirement met? – yes/no	Notes
<b>1. Maximise harvest and reuse of roof-water</b>		
a) Locally-harvested rainwater must be the primary source of non-potable water for developments located within a Sydney Olympic Park non-stormwater harvesting catchment (shaded red on Map 1)		
b) At least 90% of roof area shall be connected to rainwater storage(s) which supply non-potable water reuse from this source,		
c) Rainwater supply schemes must be supplemented with recycled water as a back-up to rainwater supply schemes where connection to the Park's WRAMS recycled water supply is available.		
d) A minimum of 0.25 kL rainwater storage is to be supplied per dwelling and an additional 1 kL of rainwater storage is to be supplied per 100m <sup>2</sup> of non-residential net floor area.		
e) Refer to accompanying SOPA guidelines for further details on rainwater tank modelling requirements.		
f) Rainwater tank storage does not contribute to on site detention volume and cannot be used to offset on site detention requirements		
g) Where non-potable demand within a development site is low, alternative uses for roof water such as landscaping, roof gardens, as well as off-site re-use, should be considered so as to minimise the volume of stormwater discharged to local waterways.		
h) Developments located within a Sydney Olympic Park stormwater harvesting catchment (shaded blue on Map 1) must meet their non-potable water demand from non-potable water sources, including WRAMS recycled water and/or locally harvested rainwater.		
<b>2. Minimise volume and frequency of stormwater discharge from hardstand areas such as paving, driveways and car parks, and roofs and maximise quality of any stormwater discharged.</b>		
a) All stormwater discharged from the site is to meet the <ul style="list-style-type: none"> <li>water quality pollutant load reduction targets as outlined in Appendix 1.</li> <li>water quantity volume reduction targets and peak flow reduction targets as outlined in Appendix 1.</li> </ul>		
b) (b) Design of landscaped and paved areas must incorporate water sensitive urban design elements and pollution control devices including but not limited to:		
<ul style="list-style-type: none"> <li>Appropriate stormwater management measures as detailed in Master Plan 2030</li> </ul>		

Policy requirement	Policy requirement met? – yes/no	Notes
<ul style="list-style-type: none"> <li>Retaining a minimum of 20% of the site’s open space area as deep soil. Areas included as deep soil are to have a minimum depth of two metres. Consolidate areas of deep soil within sites and between adjacent sites to increase the benefits</li> </ul>		
<ul style="list-style-type: none"> <li>Minimising impervious areas that are directly connected to the stormwater system. Runoff from impervious areas such as driveways, paving and rainwater tank overflows should be directed onto landscaped areas designed to accept such flows</li> </ul>		
<ul style="list-style-type: none"> <li>Removal of gross pollutants, sediments and nutrients prior to stormwater discharge to the trunk drainage system, through use of devices such as bioretention systems, wetlands, swales, sand filters, gross pollutant traps, and litter baskets.</li> </ul>		
<ul style="list-style-type: none"> <li>Installation of oil and grease traps in surface and basement carparks</li> </ul>		
<ul style="list-style-type: none"> <li>Using plant species native to the Sydney region in water sensitive urban design features and associated landscaping, to avoid spread of weed propagules to downstream wetlands.</li> </ul>		
<b>3. Water conservation</b>		
<p>a) Connect all new development to Sydney Olympic Park’s recycled water system, where available, for all approved uses of recycled water (including supplementation of locally harvested stormwater where required by this policy)</p>		
<p>b) All residential development must comply with the Building Sustainability Index (BASIX). Mixed use development must comply with the requirements detailed in Master Plan 2030.</p>		
<p>c) Individual water metering must comply with Sydney Water’s “Multi-level individual metering guide”</p>		
<b>4. Riparian protection</b>		
<p>Development within 40 metres of a creek, river, lake or estuary must have regard for the ‘Guidelines for riparian corridors on waterfront land’ (dated July 2012, or subsequent revisions) issued by NSW Office of Water. Any necessary approvals required under the NSW Water Management Act 2000 must be obtained.</p>		
<b>5. Offsets</b>		
<p>Where genuine physical constraints on site exist on a particular development site, the stormwater policy allows for offsets. Offsetting:</p>		
<p>a) Can be applied to meet the water quality, water reuse and/or on-site detention requirements for the site</p>		
<p>b) Includes substitution of stormwater management measures on the proposed development site to another site and/or substitution of treating</p>		

Policy requirement	Policy requirement met? – yes/no	Notes
the proposed development site to treating an external catchment on the proposed development site		
c) Requires an alternate sub-catchment (within the same stormwater catchment) to be managed to achieve the same or better outcomes at an alternate site		
d) Requires that any offsets must be within the same stormwater catchment		
e) Must achieve the same or better outcomes than if no offset approach was undertaken.		
f) May be for the whole of, or part of, the requirements for the site		
g) Requires approval from SOPA		
h) Requires that all policy requirements are to be met including pollutant load removal objectives, rainwater reuse objectives, reductions in quantity and reductions in peak flow either on site or offset off-site		
i) Is catchment-based. Developments must meet the requirements for centralised stormwater harvesting catchments (shaded blue in Map 1), and non-water harvesting catchments (shaded red on Map 1)		
j) Is not allowed for construction management objectives. All sediment and erosion control measures must be undertaken on site.		
<b>6. Stormwater design excellence</b>		
Outline whether and how the development meets design excellence criteria		
<b>7. Construction management</b>		
All developments, where the site is disturbed, shall provide appropriate Erosion and Sedimentation Control measures to control runoff, mitigate soil erosion and trap pollutants before they can reach downslope lands and receiving watercourses.		
Soil erosion and sediment control measures shall be designed in accordance with the document Managing Urban Stormwater–Soils & Construction Volume 1 (2004) by Landcom.		
Development applications must include a draft construction management plan addressing the requirements set out in Appendix 2. The final Plan must be submitted with an application for a construction certificate.		
<b>8. Asset maintenance</b>		
All water sensitive design assets must be properly maintained on an ongoing basis. An establishment, handover and operation and maintenance plan must be developed and implemented for all water sensitive urban design assets and integrated water cycle management, including rainwater reuse assets, for the life of the asset.		
a) Draft establishment, handover and operation and maintenance plan is to be submitted with the development application.		

Policy requirement	Policy requirement met? – yes/no	Notes
The final plan and evidence of a maintenance contract for the maintenance of the stormwater management measures with a reputable and experience maintenance contractor is to be included in any application for an Occupation Certificate.		
b) The Draft establishment, handover and operation and maintenance plan is to be prepared by the designer(s) of the system stormwater treatment, detention and reuse systems.		
c) The final plan must include a written signoff from the design engineer(s) responsible for the construction drawings of the system that the system has been constructed in accordance with the construction drawings or, where modified, has not adversely affected the performance of the system.		
d) The plan must include routine checking, cleaning and servicing of all devices in accordance with the manufacturers and/or designer’s recommendations. Records of all maintenance activities undertaken must be kept and provided to the Authority annually by 30 June each year, and at any other times upon request.		
e) The maintenance contract must include quarterly maintenance visits. Records of the visits are to be submitted to the Authority		
f) The maintenance contract must be supplemented by an annual independent audit undertaken by a suitably qualified WSUD professional. The audit is to verify the condition of the treatment system(s), verify and document that the system(s) is working as intended, verify the system(s) has been cleaned adequately, verify there is no excessive build up of material in the system(s) and identify any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function. The Audit Report is to be submitted to the Authority by 30 June each year.		
g) The pollution retention efficiency of structural stormwater treatment measures must be maintained up to the design discharge and must not decrease with build-up of materials		
h) Where necessary system components become unavailable, an alternative system is required to be retrofitted into the development to achieve an equivalent pollutant reduction and water management outcome.		
i) All constructed stormwater water quality and quantity assets that will be transferred to SOPA shall be maintained for a period of no less than 3 years post practical completion by the developer.		
<b>9. Information to be submitted with a development application:</b>		
A. Integrated Water Cycle Management Plan including a water balance report, developed in accordance with this Policy, and all calculations, assumptions and modelling used to develop this Plan, including:		

Policy requirement	Policy requirement met? – yes/no	Notes
a) Clearly demonstrate how the proposal meets the policy objectives and specifically how the proposal achieves the outcomes required in Appendix 1 of the Policy		
b) Provide a description of how all stormwater generated on the site will be managed and include a water balance report.		
c) Assessment of the impact of flows on the receiving environment, the capacity of downstream infrastructure to manage such flows, and any required enhancement works proposed to be implemented		
d) Show all stormwater catchments for the site including an assessment of whether the site is in a SOPA stormwater harvesting or non-stormwater harvesting catchment as per Map 1		
e) Include a site layout and drainage plan showing the location of each element of the proposed stormwater system and treatment train		
f) Show all stormwater drainage system elements for the site including long sections for all drainage elements including hydraulic grade line calculations		
g) Show all elements of the detention system including sufficient sections and details demonstrating how the system is to operate.		
h) Confirm the entire site is included in the detention sizing calculations, including land to be dedicated to SOPA (such as future public roads, community facilities and the like)		
i) Show all elements of the stormwater treatment system including sufficient sections and details demonstrating how the system is to operate and the diversion flow rate into the treatment system.		
j) Confirm the entire site is included in the water quality sizing calculations including land to be dedicated to SOPA (such as future public roads, community facilities, and the like)		
k) Confirm on site detention systems are not to be included in the calculations for water quality		
l) Provide justification of why each element of the treatment system has been selected over alternate approaches.		
m) Provide details of all stormwater connections to the existing SOPA stormwater system, including the capacity of downstream infrastructure to manage such flows and any upgrades required.		
n) Provide details of the overland flow system and calculations to demonstrate the capacity to safely convey flow through the site including DxV calculations		
o) Provide all calculations showing how the intent of the SOPA Stormwater Management and Water Sensitive Urban Design Policy is met		

Policy requirement	Policy requirement met? – yes/no	Notes
p) Impervious percentages for all catchments and justification for the adoption of these impervious percentages using measurements off the concept plan		
q) All details of the treatment system as entered into MUSIC (e.g. low flow and high flow bypass, filter size, extended detention, infiltration rate, hydraulic conductivity, rate, etc.). All parameters need to be consistent with the MUSIC modelling guideline including;		
<ul style="list-style-type: none"> <li>For rainwater tanks and reuse schemes the user demand profile that has been adopted and the size of the rainwater tank (kL)</li> </ul>		
<ul style="list-style-type: none"> <li>Summary of the results (Flow, TSS, TP and TN) without any treatment measures (“Do Nothing”)</li> </ul>		
<ul style="list-style-type: none"> <li>Summary of the results (Flow, TSS, TP and TN) with proposed treatment measures for each option tested</li> </ul>		
<ul style="list-style-type: none"> <li>Summary of the results (Flow, TSS, TP and TN) with proposed treatment measures for proposed preferred option including comparison of results with the “Do Nothing” option including a total summary of the treatment (kg/yr and % reduction) and for each component of the treatment system (kg/yr and % reduction)</li> </ul>		
<ul style="list-style-type: none"> <li>For any parameter which deviates from the default recommended value as outlined in the MUSIC modelling guideline documentation of the values adopted and justification for the values adopted</li> </ul>		
<ul style="list-style-type: none"> <li>Electronic copy of the MUSIC water quality model and summary of results in report</li> </ul>		
r) Electronic copy of the hydraulic model (Drains or equivalent) and summary of results in report		
s) Plans showing all of the proposed management measures to meet the objective including building hydraulics, drainage, contours and catchments		
t) An electronic dwg file of the sub-catchments and proposed stormwater system including all detention, reuse and treatment elements		
B. Description and justification of any proposed offsets and how the proposed approach meets the outcomes required in Appendix 1 (only required if offsets are proposed)		
C. Draft construction management plan addressing the requirements set out in Appendix 2 of this policy. This is to include either an Erosion and Sediment Control Plan or Soil and Water Management Plan (as applicable, and based on the NSW ‘Blue Book’.) The Plan is to contain the following information:		
a) Sediment and erosion control calculations based on the NSW “Blue Book” and summary of results in report		

Policy requirement	Policy requirement met? – yes/no	Notes
b) The sediment and erosion control plan includes calculation of average slopes of disturbed areas		
c) The sediment and erosion control plan includes calculation soil classification group		
d) The sediment and erosion control plan includes calculation of Emerson Class Number		
e) The sediment and erosion control plan includes calculation of duration and area of soil disturbance		
f) The sediment and erosion control plan includes assessment of potential waterway and receiving water impact		
g) The sediment and erosion control plan includes documentation of any external catchments entering the site		
h) The sediment and erosion control plan includes calculation worksheet for sediment basins and justification for sizing of basins		
i) The sediment and erosion control plan includes the following as a minimum <ul style="list-style-type: none"> <li>• location and direction of temporary drainage showing flows into the sediment basin</li> <li>• Identification of any problematic soils including acid sulphate soils</li> <li>• Identification of key environmental values on site (e.g. existing trees to be retained, habitat areas and/or existing drainage lines of value)</li> <li>• Construction access points and control measures at those locations</li> <li>• Site contour map including existing, and proposed contours</li> <li>• Location of temporary stockpiles</li> </ul>		
D. Draft establishment, handover and operation and maintenance plan that addresses requirements of Clause 8 of this policy and applies to all stormwater management devices including water quality, detention and reuse components		
E. A completed copy of this checklist		

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## Appendix 5 – Glossary

### Best practice

Structural and planning measures used to manage urban stormwater runoff to mitigate the impacts of urban development on the environment. These measures are the most effective proven measures currently available and when used singly or in combination are able to achieve stormwater pollutant and/or quantity reductions to meet or exceed regulatory requirements.

### Bioretention systems

Bioretention systems are vegetated systems that filter polluted stormwater through a soil media. To treat stormwater bioretention systems use traditional filtration processes as well as uptake of pollutants by plants. Bioretention systems are also referred to as raingardens.

### Blue Book

Blue book is the common name used to refer to (the former) Landcom's "*Managing urban stormwater: soils and construction Volume 1*" 4th Edition, 2004. The Blue Book provides guidance on mitigating the impacts of land disturbance activities on soils, landforms and receiving waters by focussing on erosion and sediment control.

### Capture and reuse of runoff

Refer "harvesting"

### Cleared area

Cleared area refers to the removal of the existing surface (whether vegetated or urban development) such that the underlying natural soils, fill material or waste material are exposed. Cleared areas also refers to any construction works to any areas that expose any materials which are able to then be entrained in stormwater and discharged from the site in runoff.

### Deep soil

Deep soil zones are areas of natural ground with relatively natural soil profiles within a development. Deep soil zones should be designed in such a way that is free of conflicts with infrastructure, services and drainage pipes.

### Directly connected

A directly connected stormwater system is when runoff from an impervious surface area drain from a collection point (pit, grate, gutter etc) to a stormwater conveyance system consisting of pipes and culverts to a stormwater receiving water without any buffer between the impervious catchment area and the receiving water.

### Frequency of stormwater discharge

Frequency of stormwater discharge refers to the number of times that stormwater runoff leaves the site. It is commonly expressed as number of days of stormwater runoff from a site per year.

### Gross pollutants



Gross pollutants refers to large particles (e.g. gravel, large sand particles), anthropogenic litter, and organic debris (leaf litter, etc).

### Harvesting

Harvesting refers to the capture of roofwater (also referred to as rainwater) or stormwater in a storage system and treatment of the captured water for reuse to substitute potable water.

### Hydraulic grade line

A line representing the pressure head along a pipeline, corresponding to the effective water surface elevation in the piped portions of the stormwater drainage systems.

### Impervious area

The area within a drainage catchment that does not allow water to enter into natural ground and includes roof surfaces, concrete surfaces, asphalt surfaces, paved surfaces. Permeable paving is not considered impervious area in this context.

### Independent audit

An independent audit is an examination of the maintenance records, maintenance practices, and maintenance processes of the maintenance contractor. "Independent" refers to the fact that the auditor is not an employee or have any vested interest in the asset or the maintenance contractor undertaking the maintenance and hence is "independent."

### Landscaped areas

Landscaped areas in the context of this policy refers to areas which include planting and soils to support the planting and which are permeable and allow water to enter into the ground.

### Landscape based treatment systems

A landscape based treatment system is one which is in a landscaped area and includes a stormwater management measure which reduces stormwater pollutants, or stormwater runoff volumes, or stormwater runoff peak flow rates or a combination of these. A landscape based treatment system is planted and contains a soil media to support the planting.

### Locally harvested rainwater

Locally harvested rainwater in the context of this policy refers to the capture of runoff from roofs which are on the subject development site and which retain the rainwater in a storage for subsequent reuse for non-potable uses.

### Mean annual load

The long term average yearly amount of pollutants discharged from a defined area, typically a catchment, expressed as kg/yr.

### Mean annual runoff

The long term average yearly runoff discharged a defined area, typically a catchment, expressed as ML/yr (or kL/yr for small sites).

## Net floor area

Net floor area means the sum of the areas of each floor of a building where the area of each floor is taken to be the area within the inside face of the external walls, excluding:

- Columns, fin walls, sun control devices, awnings, and any other elements, projections or works outside the general lines of the outer face of the external wall;
- lift towers, cooling towers, machinery and plant rooms and ancillary space and vertical air-conditioning ducts;
- car-parking and any internal access thereto;
- Space for loading and unloading of goods;
- Internal public arcades and thoroughfares, terraces, balconies with outer walls less than 1400 millimetres high and the like.

## Non-potable demand

Non potable demands at Sydney Olympic Park are defined as approved uses of the Sydney Olympic Park recycled water scheme and include irrigation, car washing, toilets, water features, washing machines and cooling towers.

## Non-potable water sources

Non potable water sources in the context of this policy refer to recycled water from WRAMs or on-site harvested rainwater.

## Non-water harvesting catchments:

The non stormwater harvesting catchments are defined as those areas shown on the map in Appendix 1. They are catchments within SOPA

that do not contribute to the current supply of stormwater to the WRAMS scheme. These catchments drain directly to the receiving water without any interception and diversion into the WRAMS storage.

## On-site

Within the boundary of the development site that is the subject of the approval application

## On site detention

The temporary detaining of stormwater on the development site to ensure that there is no increase in runoff peak flow rates due to impervious surfaces.

## Paved areas

Paved areas are areas at the ground level (such as courtyards, plazas, footpaths, etc) which include 'hard landscaping' and are impermeable and prevent rainfall from entering natural ground. For the purpose of this policy permeable pavers are not considered paved areas.

## Pollution retention efficiency

Pollution retention efficiency is the ability of a treatment measure to capture and store pollutants within the treatment system as intended. For example a gross pollutant trap which captures pollutants in a sump, has no capacity for pollution capture and storage if the sump is full and hence is unable to perform as per its design intent.

## Post construction:

Post construction is the period once construction has been completed and the

development site is being used for its intended purpose. For a dwelling, office, retail area and other similar development type post construction commences at the point when an occupation certificate is issued. For development types which do not require an occupation certificate, such as a road, carpark, etc this is when the facility is used for its intended purpose.

### Practical completion

Practical completion” means when the relevant stormwater management works are complete except for minor omissions and defects that do not prevent the stormwater management works from being reasonably capable of being used for their intended purpose. Practical completion requires written agreement from SOPA.

### Rainwater

Rainfall which drains from a surface area such as a roof, road, paved area, etc.

### Rainwater supply schemes

Systems which use stored rainwater to different non-potable end uses (e.g. toilet flushing, irrigation)

### Rainwater storage Refer storage Recycled water

In the context of SOPA recycled water refers to the supply of treated stormwater and wastewater supplied by the WRAMS water reuse scheme for non-potable end uses.

### Runoff

The portion of precipitation on a drainage area or surface that is discharged from the drainage area to drainage.

### Receiving waters

A waterway (creek, river, stream etc.), lake, pond, wetland, estuary, ocean or other water body into which stormwater or wastewater is discharged.

### Sediments

Sediments are soil particles consisting of sands, silts and clay particles. Sediments also contain other pollutants bound to the sediment particles such as nutrients and heavy metals.

### Sensitive receiving waters

Highly valued receiving waters, which have significant ecological values. These ecological value of sensitive receiving water can be significantly impacted by changes in their upstream catchments due to urban development during or after construction.

### Storage

Tanks used to collect and store rainfall from household roofs for subsequent reuse.

### Stormwater

Rainfall which drains from a surface area such as a roof, road, paved area, etc.

### Treatment train

A series of stormwater treatment measures located in a catchment to provide a staged approach to removal of stormwater pollutants from runoff

### Trunk drainage

The trunk drainage system includes kerbs and channels, roadside channels, inlets, underground drainage, junction pits or access chambers and outlets designed to fully contain and convey a design minor stormwater flow of specified Average Recurrence Interval (ARI).

### Water balance

A water balance is a mass balance accounting for water entering, accumulating and exiting a system. It includes rainwater, potable mains water, evapotranspiration and infiltration, wastewater and stormwater.

### WRAMS

Water Reclamation and Management Scheme (WRAMS) collects, stores and treats stormwater and wastewater for reuse for non-potable uses for urban development and irrigation within SOPA and adjacent areas.