



**NORTHERN
MIDLANDS
COUNCIL**



STORMWATER SYSTEM MANAGEMENT PLAN

AUGUST 2022

DATE	NATURE OF REVISION	REVISION NUMBER	Author	Reviewed	Approved
28/09/2020	Draft	0	CO	LMcC	
16/08/2022	FINAL	1	CO	LMcC	DJ

CONTENTS

1. EXECUTIVE SUMMARY	1
2. LEGISLATION & CONTEXT	2
3. CORE PRINCIPLES	3
4. OVERVIEW OF PLAN CONTEXT	4
5. URBAN AREA	5
6. URBAN STORMWATER SYSTEMS.....	6
7. STORMWATER MANAGEMENT	6
8. IDENTIFICATION OF RISKS, ISSUES AND OPPORTUNITIES	6
9. REVIEW	7
APPENDIX A – MUNICIPALITY-WIDE URBAN STORMWATER ACTIONS	A1
APPENDIX B – SPECIFIC URBAN STORMWATER ACTIONS.....	B1

1. EXECUTIVE SUMMARY

The *Urban Drainage Act 2013* requires Northern Midlands Council (NMC) to provide and manage appropriate stormwater systems within its municipality. This requires NMC to identify and manage potential risks associated stormwater conveyance in its urban areas.

The municipality of NMC contains urban areas within the following townships:

- Avoca
- Campbell Town
- Cressy
- Evandale
- Longford
- Perth
- Ross
- Western Junction/Translink

In order to comply with the *Act* NMC must provide adequate public stormwater systems that are necessary to effectively drain its urban areas. This requires NMC to understand its stormwater systems, identify the risks associated with them, and plan for the provision and maintenance of such services.

The potential risks impacting on these urban areas may affect the people and infrastructure within them in different ways. In general, these risks can be categorised as coming from the following sources:

1. Localised flooding directly from public stormwater networks, including pipes, pits and roadways;
2. Overland flows resulting from stormwater runoff; and
3. Riverine flooding.

There are a variety of risks, issues and opportunities that are common across all of the urban areas, or relate to responsibilities of NMC associated with the management of stormwater. These are registered in Appendix A – Municipality Wide Urban Stormwater System Actions.

Stormwater System Flood and Risk Studies (SSFRSs) were prepared for each specific urban area in order to determine the performance of the urban public stormwater networks. These studies were based on detailed flood modelling and resulted in the identification of risks to people, vehicles and buildings from localised flooding and

runoff. These studies determined actions which are presented collated in Appendix B – Specific Urban Stormwater Actions.

In addition to the stormwater SSFRSs additional studies have been undertaken to assess the risk of riverine flooding on urban catchments and to generate flood maps. Riverine flooding is not directly related to urban stormwater systems as it is the result of runoff from very large rural catchments. Therefore, this urban Stormwater System Management Plan (SSMP) and associated SSFRSs consider local rainfall, runoff and flooding, rather than that from rivers over which NMC has no responsibility for management.

This urban Stormwater System management Plan (SSMP) is a living document that is to be updated as new studies are undertaken, as knowledge of the system improves, and as risks are identified and mitigated. It provides an overview of issues identified at the time of writing.

2. LEGISLATION & CONTEXT

The current legislative framework for urban stormwater management is the *Urban Drainage Act 2013*. Under the Act NMC is a stormwater service provider who operates and maintains the public stormwater system in the municipal area.

The objectives of the Act are as follows:

- a) to protect people and property by ensuring that stormwater services, infrastructure and planning are provided so as to minimise the risk of urban flooding due to stormwater flows; and
- b) to provide for the safe, environmentally responsible, efficient and sustainable provision of stormwater services in accordance with the objectives of the resource management and planning system of Tasmania, as set out in Schedule 1 of the Act.

The following legislation, policies, guidelines and plans are also relevant to stormwater system management in Tasmania:

- *Urban Drainage Act 2013*
- *Northern Midlands Interim Planning Scheme 2013*
- *Local Government By-Laws*
- *Local Government Act 1993*
- *Land Use Planning and Approvals Act 1993*
- *Northern Tasmania Regional Land Use Strategy 2018*
- *Local Government (Building and Miscellaneous Provisions) Act 1993*

- *Environmental Management & Pollution Control Act 1994*
- *Plumbing Regulations 2014*
- *Weed Management Act 1999*
- *Building Act 2016*
- *Building Regulations 2016*
- *State Policy on Water Quality Management 1997*
- Tasmanian Subdivision Guidelines (LGAT, 2013)
- State Stormwater Strategy (DPIPWE, 2010)
- Stormwater System Management Planning; A Guide for Local Government in Tasmania (IPWEA, 2016)
- Australian Rainfall and Runoff Guidelines 2019
- Waterways and Wetlands Works Manual (DPIWE, 2003)
- Weed Action Plan (NRM, 2006)
- Australian Disaster Resilience Handbook Collection Handbook 7, Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017)
- Australian Building Codes Board Standard: Construction of buildings in flood hazard areas (ABCB, 2019)
- Climate Action 21: Tasmania's Climate Change Action Plan 2017 - 2021 (State of Tasmania, 2017)
- Tasmanian Stormwater Policy Guidance and Standards for Development (Derwent Estuary Program, 2021)
- Australian Standards

3. CORE PRINCIPLES

The primary aim of an urban stormwater management system is to minimise economic, environmental and social impacts of flooding and water quality degradation caused by stormwater runoff in our communities (IPWEA, 2016). *Stormwater System Management Planning; A Guide for Local Government in Tasmania* (IPWEA, 2016) provides a template for developing SSMPs with consideration given to following core principles:

1. Understand the level of risk in its public stormwater system within the urban area
2. Apply a risk management framework for flood mitigation and stormwater renewal works based on analysis of defined flood events

3. Ensure stormwater systems are planned, designed and built with appropriate consideration of stormwater management principles by making better use of the statutory development and planning system
4. Build resilience and consider climate change impacts to address future demands on the urban stormwater system
5. Integrate stormwater management into the urban water cycle to achieve the goals of social, environmental and economic sustainability
6. Enhance community awareness of, and participation in, the appropriate management of stormwater.

The approach taken by NMC in creating this first iteration of the SSMP generally follows that suggested in the IPWEA framework for the first two principles listed above. Flood studies for each urban area were undertaken in order to understand the public stormwater system in each of those areas, and the level of risk associated with them. A risk management framework was applied to determine an action plan which feeds into (CAPEX) renewals and replacements, and maintenance (OPEX) plans and budgets to address the risks identified in the studies.

Water quality, environmental and sustainability issues are touched upon in this plan, however the current understanding of these issues within the urban catchments remains limited. Work needs to be undertaken in order to understand how NMCs stormwater system impacts upon water quality within in the municipality's natural systems in order to identify risks and future actions.

4. OVERVIEW OF PLAN CONTEXT

Stormwater System Management Plans are to contain the following (IPWEA, 2016):

- An identification of objectives and outcomes for management of stormwater in the designated urban area/s;
- A description of the catchment to which the plan applies, including a definition of the urban area;
- A description of the existing public stormwater system, including identification of current condition and ownership of assets where known;
- An identification of stormwater management problems and opportunities for achieving outcomes for public and environmental benefit in the urban areas/s;
- An identification of strategies to meet specified management objectives for the urban area/s;

- Determination of capital and maintenance (including recurring) costs associated with identified management strategies;
- An assessment of the benefits to be derived by implementation of proposed management strategies;
- Prioritisation of the strategies and a timeframe for implementation;
- Assignment of responsibilities for implementing the strategies and meeting any costs; and
- A communication / consultation strategy for the Plan.

While this current document addresses the key essentials, it is acknowledged in some areas that ongoing progress needed to build upon the foundations that this existing plan has laid.

5. URBAN AREA

The *Urban Drainage Act 2013* specifies that each Council must develop a SSMP for the urban areas within the municipality, however no definition of 'urban' is specified within the Act. The areas nominated by NMC as urban are the following townships which generally consist of land zoned 'general residential', 'low-density residential', 'industrial' and 'commercial'. The areas immediately surrounding these townships is often zoned 'rural use' and has often been included in the SSFRSs as these are likely areas of future growth and/or are areas from which immediate runoff may affect infrastructure:

- Avoca
- Campbell Town
- Cressy
- Evandale
- Longford
- Perth
- Ross
- Western Junction/Translink

6. URBAN STORMWATER SYSTEMS

A summary of the stormwater system's assets in the 8 urban areas are as follows:

Asset Category	Dimension
Pipelines	95.4 km
Stormwater nodes (manholes, side-entry pits, gully pits etc)	2575
Stormwater Detention Basins	5
Maintained drains and urban waterways	Unknown
Gross-pollutant traps	2

7. STORMWATER MANAGEMENT

NMC manage stormwater assets through the Stormwater Asset Management Plan (adopted by Council 16 May 2022 (min. ref. 22/164)). Its procedures integrate proactive operational maintenance, renewals and capital upgrades, as well as reactive responses to customer enquiries or unforeseen issues. Risks and opportunities identified in the flood studies are being incorporated into these programs.

The maintenance programs incorporate the following activities:

- Stormwater side-entry and gully pit cleaning
- GPT cleaning and maintenance
- Stormwater detention basin inspections and maintenance
- Waterway and open drain clearing and maintenance
- Reactive investigations and maintenance resulting from issues identified by Council staff or reported by customers

Maintenance response levels of services are presented in Appendix A of the Stormwater Asset Management Plan.

Capital works are either asset renewals/replacements, upgrades or new projects. Section 6 of the Stormwater Asset Management Plan shows that stormwater asset renewal rates are currently appropriate and sustainable.

8. IDENTIFICATION OF RISKS, ISSUES AND OPPORTUNITIES

There are a variety of risks, issues and opportunities that are common across all of the urban areas, or relate to responsibilities of NMC associated with the management of

stormwater. These are registered in Appendix A – Municipality Wide Stormwater System Actions.

Stormwater System Flood and Risk studies were undertaken in order to identify and document the risks, issues and opportunities within NMC's urban areas. The list of SSFRS's is as follows:

- Avoca Stormwater System Flood and Risk Study
- Breadalbane Stormwater System Flood and Risk Study
- North Campbell Town Stormwater System Flood and Risk Study
- South Campbell Town Stormwater System Flood and Risk Study
- Cressy Stormwater System Flood and Risk Study
- Evandale Stormwater System Flood and Risk Study
- North-West Longford Stormwater System Flood and Risk Study
- North-East Longford Stormwater System Flood and Risk Study
- South-West Longford Stormwater System Flood and Risk Study
- South-East Longford Stormwater System Flood and Risk Study
- West Perth Stormwater System Flood and Risk Study
- East Perth Stormwater System Flood and Risk Study
- Ross Stormwater System Flood and Risk Study

The 10% AEP and 1% AEP flood events were modelled, with the performance of the pipe and pit network considered against the 10% AEP flood, and overland flows considered against the 1% AEP. Flood hazards were assessed in accordance with ARR2019.

The actions derived from the SSFRSs are provided in Appendix B – Specific Urban Stormwater System Actions.

9. REVIEW

This revision SSMP is the first iteration of the document. It has been prepared based on the relevant available documentation at the time of writing.

The planned review cycle for the Stormwater System Management Plan is four years and as such should be completed in 2024.

**APPENDIX A – MUNICIPALITY-WIDE URBAN STORMWATER
ACTIONS**

Risk / Issue / Opportunity	Discussion	Risk	Responsibility	Mitigation	Priority High – 1 year Medium – 1 to 3 years Low – 3+ years
Resources to manage stormwater infrastructure	Appropriate resources must be made available so that Council is able to manage its responsibilities under the <i>Urban Drainage Act</i> , and implement the actions identified in this Urban Stormwater System Management Plan	Council not able to meet its legal obligations and unable to meet commitments made in this document	NMC Works & Infrastructure	Ensure appropriate funding is in place for day to day obligations and seek additional funding or grants to enable to implementation of identified actions	Medium
Design Standards & Guidelines	Council's transition from the Interim Planning Scheme to the Tasmanian Planning Scheme is imminent. The TPS does not include a Stormwater Code Council currently uses Tasmanian Subdivision Guidelines and LGAT Standard Drawings	No control or consistency as to how stormwater for developments is dealt with	DC W & I & Planning	A stormwater working group was set up by a group of stakeholders to address the issue and provide guidance and clarity for Councils. This has resulted in the creation of the <i>State Stormwater Policy Guidance and Standards for Development</i> document, guidance from LGAT regarding developer contributions to stormwater infrastructure, and also a legal opinion of the powers Council has applied appropriate stormwater conditions Council should understand these powers and have all appropriate policies and systems in place prior to the TPS being adopted. This will also provide opportunity to review existing design and subdivision standards	High
Climate change	Increase in rainfall intensity and frequency of severe flood events	Existing infrastructure was not designed to accommodate these changes	NMC Works & Infrastructure, Planning	Review potential climate change in stormwater system catchment studies	Medium Medium

				Consider impacts of climate change against proposed infrastructure, development and zoning/rezoning	
Stormwater Assets	<p>Stormwater asset plans/GIS not current and does not capture all assets (e.g., open drains). Where assets have been captured information is often missing (e.g., manhole invert levels)</p> <p>Condition of assets unknown</p>	<p>A low quality of information upon which to base decisions and provide advice</p> <p>Creates uncertainty about extent and NMC's responsibility and current/future maintenance requirements</p> <p>Assets not contained in Stormwater Asset Management Plan and future liabilities are therefore not considered</p>	NMC Works & Infrastructure, IT	<p>Update stormwater asset plans/GIS with most recent and complete data. Consider undertaking rolling asset survey/data collection program</p> <p>Ensure accurate As Built information is received for NMC capital and operational works as well as external developments (subdivisions etc.) and promptly added to the asset plans/GIS</p> <p>Undertake audit of open drains and waterways to determine extent of assets and NMC responsibility</p> <p>Consider undertaking rolling CCTV program to assess condition and projected life of assets if cost/ benefit is demonstrable</p>	<p>Medium</p> <p>High</p> <p>Medium</p> <p>Low</p>
Development within existing urban areas or expansion of urban areas	<p>Additional and infill development increases runoff and impacts the stormwater system</p> <p>Expansion of urban areas may require stormwater system connectivity through the older areas</p>	<p>Systems designed on the basis of less density or lower levels of service are impacted</p> <p>Development may occur in areas subject to stream flooding or in overland flow paths</p> <p>Overland flow paths not allowed for within new development</p> <p>Piping of overland flow paths, causing flooding of encroaching infrastructure when pipe capacity is exceeded</p>	NMC Works & Infrastructure, Planning	<p>Ensure the impacts of proposed developments on the stormwater system are considered</p> <p>Refer to the relevant Stormwater System and Flood Risk studies and flood maps or undertake new studies to understand the impacts of additional development</p> <p>Review proposed designs and design criteria (e.g., detention requirements) and input into the development approvals process</p> <p>Develop flood prone area/inundation maps</p> <p>Develop policies</p>	<p>High</p> <p>High</p> <p>High</p> <p>High</p>

					Medium
Riverine flooding	<p>Council has no direct control or responsibility for river management although flooding from them can impact on urban areas</p> <p>In particular the South Esk River, the Macquarie River and Back Creek at Longford, and the Elizabeth River at Campbell Town, and Sheepwash Creek at Perth have historically flooded urban areas</p>	<p>Riverine flooding has the potential to flood properties and roads, and loss of life</p> <p>Development may occur in areas subject to riverine flooding</p> <p>Bridges, roads and culverts provide barriers to flows and some of these waterways have been piped to allow development in close-proximity to the historical flow path</p> <p>Challenges exist in balancing reduced flooding through improved hydraulics against improving their natural values and water sensitivity of the waterways</p> <p>Waterways are degraded in many locations and prone to weeds</p>	State Government, NMC, SES, Police	<p>Review emergency management procedures and work with the State Government to help develop and maintain flood protection</p> <p>Develop flood awareness, education and community resilience</p> <p>Consider providing prospective property owners with information on flood risk areas in the 337-certificate process</p> <p>The Interim Planning Scheme and the <i>Drainage Act</i> protects waterways and requires permits for works (other than maintenance) in waterways</p> <p>For locations that are frequently affected by flood water, and flood water poses a risk to pedestrians or vehicles consider the installation of flood warning signs. These locations could include overland flow paths, roadways, and detention basins</p>	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>
Infrastructure gaps	<p>Infrastructure gaps exist within the stormwater system, particularly in once rural townships which have become or are becoming increasingly urbanised</p>	<p>Limited ability of properties zoned residential to connect to the system. This results stormwater which discharges to ground or to streets which have limited connectivity to the piped network</p> <p>This results in concentrated flow being passed to neighbouring properties, or roads becoming the primary drainage asset</p>	NMC Works & Infrastructure, Plumbing	<p>Audit existing and future urban/development areas to document where infrastructure gaps exist. Cross reference against System Flood and Risk Studies to determine projects for inclusion in future works programs identifies locations where infrastructure gaps exist</p> <p>Plumbing controls for new works</p>	<p>Medium</p> <p>High</p>

		<p>Onsite disposal of stormwater within urban areas (e.g., via soakage trenches) is problematic</p> <p>Potential flooding of properties and roads. Inadequate roadside drainage</p>			
Cross-connections	<p>Interconnections between the sewer and stormwater systems</p> <p>These have occurred through illegal plumbing works, lack of stormwater or sewer services, and from emergency overflows from the sewage network (e.g., pump stations)</p>	Inflow of sewage into the stormwater network creates health and environmental risks	NMC Works & Infrastructure, Plumbing, TasWater	<p>Discuss with NMC Plumbing and TasWater. Consider undertaking an investigation program to identify illegal connections</p> <p>Plumbing regulations provide legislative framework to address non-compliances</p>	Low
Flood maps	Flood maps have been generated through modelling undertaken in the Stormwater System Flood and Risk Studies and through other flood studies	<p>Flood maps/layers not transferred to NMC GIS or planning systems/layers, meaning knowledge transfer has not occurred between departments</p> <p>Developments may be allowed to occur without consideration to flooding or the appropriate controls being implemented</p> <p>Existing and future development may be flooded</p>	NMC Works & Infrastructure, Planning, IT	<p>Consolidate flooding mapping into a GIS flood prone area layer/s. Information can be used for assessment of developments in accordance with the Planning Scheme Flood Prone Areas Code</p> <p>Identify riverine catchments for which additional flood studies are needed. Seek grant and funding opportunities to produce them.</p>	<p>Medium</p> <p>Medium</p>
Water Sensitive Urban Design (WSUD), water quality management, and soil & water management	<p>Water quality from existing and proposed urban stormwater systems have the potential to impact the receiving environment</p> <p>Natural waterways have been modified and degraded</p>	<p>Poor water quality impacts the health of natural systems</p> <p>Pollution degrades the natural environment, reduces human enjoyment, and impacts health and safety</p>	NMC Works & Infrastructure, NRM	<p>Consider adopting the water quality elements contained in the <i>State Stormwater Policy Guidance and Standards for Development</i></p> <p>Liaise with NRM to assess waterway health. Determine key values from which to determine specific actions to improve water</p>	<p>Medium</p> <p>Low</p>

	<p>Waterways may have inputs resulting from insufficiently treated onsite wastewater disposal and from illegal sewer connections, due to poor soil and water management practices at developments</p> <p>The quality of the water in the systems remains largely unknown</p>	<p>Loss of flora and fauna</p> <p>Potential impacts on human health and potential uses of the systems (e.g., irrigation, recreation etc.)</p> <p>Bulk unsightly litter and contaminants entering the systems from commercial, residential and developing areas</p>		<p>quality in the natural systems. Include in this SSMP and forward budgets</p> <p>Audit of the natural system to understand the existing state of these waterways including a review of the natural values atlas (https://www.naturalvaluesatlas.tas.gov.au/) to identify areas of important natural values that require protection</p> <p>Seek grant and funding opportunities to reduce pollutants entering waterways from existing areas to identify areas of important natural values that require protection</p> <p>Ensure permit conditions state soil and water management requirements and ensure compliance</p>	<p>Low</p> <p>Medium</p> <p>Medium</p>
--	--	--	--	--	---

APPENDIX B – SPECIFIC URBAN STORMWATER ACTIONS

Avoca

Falmouth Street

Actions	Priority	ID
Confirm whether flooding near the war memorial and no. 2 St Pauls Place has occurred (check with operations staff and nearby residents). Consider additional SEPs and/or raising naturestrips to the backside of kerbs	Low	A01
Inspect and consider upgrading road pits in sag locations in St Pauls Place and Blenheim Street to LGAT standard SEPs	Medium	A02
The potential flooding of no. 2 St Pauls Place needs to be considered if a proposal for development on the property is submitted to Council	Low	A03

Churchill Street

Consider installing additional pits and/or pipe capacity for the system at the intersection of Falmouth Street and Churchill Street	Low	A04
Consider raising the naturestrip at the back of kerb on Churchill Street, near the intersection	Low	A05

St. Pauls Place

Formalise flow paths and/or extend pipework through nos. 12a St Pauls Place and 2352 Esk Main Road	Low	A06
--	-----	-----

Breadalbane

Translink Avenue (north)

Actions	Priority	ID
Consider undertaking model calibration to better align modelled results with real-world measurements and observations. Such improvements will give confidence in the model and surety that proposed upgrades to the stormwater system are well targeted and provide value for money	Medium	B01
Construct an open drain between the northern corner of Statewide to Evandale Road in order to control flows and remove flooding on the Evandale Road industrial lots. Ensure driveways and driveway culverts off Evandale Road are suitably designed to prevent flooding from the Evandale Road drain pushing back into the private properties. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i> and drawing <i>TRANSLINK-1 rev A (HDNA, 25/09/2016)</i>	Low	B02
Undertake additional model runs to determine whether spilling of the basin occurs during the 5% and 2% AEPs. Reconstruct detention basin lip and spillway to prevent spilling during the 1% AEP. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i>	Low	B03
Discuss the flooding of Evandale Road with State Growth to determine potential solutions. Consider upgrading culvert and constructing associated pipework on Evandale Road and Translink Avue as per drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i> and drawing <i>TRANSLINK-1 rev A (HDNA, 25/09/2016)</i>	Low	B04

Richard Street

Consider removing the kerb and/or upgrading the side entry pit (SEP) and/or shaping the flow path between the road and open drain at the northern end of Richard Street	Low	B05
Review and update model as vacant land is developed to ensure service levels remain adequate and consider upgrading network if necessary	Low	B06

Johns Street

Consider undertaking model calibration to better align modelled results with real-world measurements and observations. Such improvements will give confidence in the model and surety that proposed upgrades to the stormwater system are well targeted and provide value for money	Medium	B07
Undertake additional model runs to determine whether spilling of the basin occurs during the 5% and 2% AEPs	Low	B08
Update the model to include LGAT SEPs and pipework in the vicinity of the crossover to no.16 Johns Street. Rerun the model to determine the impact of these pit additions	Low	B09
Check the levels of the crossover and driveway to no. 16 Johns Street. Consider raising the crossover/driveway to provide freeboard above the Johns Street channel	Low	B10
Consider diverting the upper stormwater network from Translink Avenue to a new detention basin south-west of the upper end of Boral Road. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i> and drawing <i>TRANSLINK-6 rev A (HDNA, 25/09/2016)</i>	Low	B11
Consider making the Johns Street basin redundant and piping flows north-east to a new culvert under Evandale Road. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i> and drawings <i>TRANSLINK-1 to 5 rev A (HDNA, 25/09/2016)</i>	Low	B12
Consider upgrading pipework and pits in the sag of Boral Road approximately 50m west of Evandale Road and/or adjust levels from the sag to the intersection and open drain. This may reduce potential flooding in Boral Road to a low risk	Low	B13

Boral Road

Consider construction of a new detention basin south-west of the upper end of Boral Road. This can control rural runoff, and the future adjacent expansion of the industrial precinct between Translink Avenue north and Munroe Street. It could also accept flows diverted from the upper Johns Street catchment as discussed in Section 8.3.3 of this document. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2 (SAS/HDNA 14/07/2015)</i> and drawings <i>TRANSLINK-5 and 6 rev A (HDNA, 25/09/2016)</i>	Medium	B14
Inspect the cut-off drain above no. 23 Boral Road. Determine Council ownership/liabilities	Medium	B15
Update the model to include private network at no. 11 Boral Road (Haywards) and/or to confirm with owners whether predicted flooding has occurred	Medium	B16
Check levels of the crossover and driveway to no. 11 Boral Road. Consider raising the crossover to provide freeboard above the Boral Road channel	Medium	B17
It may be possible to better enable flows to be passed from Boral Road to Evandale Road. Results show some shallow flooding is passed to Evandale Road. Adjusting the transition between Boral Road and the shallow drain on Evandale Road may reduce flooding of Boral Road and the carpark at no. 11. Evandale Road and its drainage is the responsibility of State Growth. As such, negotiation with State Growth may be necessary to make such changes	Low	B18

Hudson Fysh Drive

Consider undertaking model calibration to better align modelled results with real-world measurements and observations. Such improvements will give confidence in the model and surety that propose upgrades of stormwater assets in the area re well targeted	Medium	B19
Upgrade cut-off drain above nos. 3 and 5 Gatty Street	Low	B20
Undertake additional model runs to determine whether spilling of the basin occurs during the 5% and 2% AEPs	Low	B21
Consider the installation of a detention basin above Gatty Street. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2</i> (SAS/HDNA 14/07/2015), concept drawing <i>TRANSLINK-9 rev A</i> (HDNA, 25/09/2016), and detailed design drawings 0125.008-C01 to C03 (HDNA, 01/2020).	Low	B22
Consider augmenting the existing detention basin behind no. 7 Hudson Fysh Drive and divert rural flows from the south into it. Refer to drawing <i>2014016 NMC-Translink Concept Stormwater Designs for Grant Application rev 2</i> (SAS/HDNA 14/07/2015), concept drawing <i>TRANSLINK-8 rev A</i> (HDNA, 25/09/2016).	Medium	B23
Consider upgrading the existing road pits to LGAT standards. Consider providing addition pit and pipe capacity and/or raising of nature strips and crossovers to prevent flooding through to private property	Low	B24

Campbell Town

West Street (North)

Actions	Priority	ID
Update model to include new development in Bond Street. Conduct additional assessment on flood risks. Work to better define the open drain to the rear of these properties may be required	Low	NCT01
Update the model to include missing culverts in Pedder Street and West Street	Low	NCT02
Inspect and assess culvert inlets. Consider headwalls to prevent blockages and upgrades to network to reduce flood footprints. Ensure flood footprints are transferred to NMC Intramaps.	High	NCT03

East Street

Consider the potential for flooding of the high school. Connections to the public network from school buildings may need to be determined and the model updated	Low	NCT04
Investigate the effectiveness of drainage pipes/pits and the eastern end of Church Street. Ensure the potential for road flooding is limited to <300mm flood depth	Medium	NCT05
Consider the potential for flooding of no. 68 High Street and the adjacent carpark in Church Street. Verify whether flooding has occurred in the past and consider upgrading pipes, pits and/or open drain	Low	NCT06
Update model to include the rail culvert in the vicinity of East Street to determine impacts on East Street	Medium	NCT07

William Street

Update model to include William Street and East Street culverts to confirm the risks of flooding to no. 1 William Street	Low	NCT08
--	-----	-------

King Street (east)

Consider installing an additional road pit on the northern side of the road at the sag in Queen Street. Remodel the effects to ensure overflows are not passed to Bridge Street private properties	Low	NCT08
Consider raising driveways of nos. 18 and 20-30 King Street and 140 Bridge Street and installing additional pits in the sag in King Street	Low	NCT09
Provide additional pits or upgrade existing SEPs on the eastern side of the King and Bridge Street intersections	Low	NCT10

Franklin Street

Update model to include culvert under Bedford Street, north of the Franklin Street intersection. Remodel and update this study to reflect results	Low	SCT01
Confirm the capacity of the culvert under Franklin Street in the vicinity of the rail line is appropriate. Consider upgrading culvert to ensure flooding of No.11 Franklin Street is safe. This will require further modelling and analysis	Medium	SCT02

Montagu Street (east)

Confirm the existence of additional culverts near the intersection of Montagu Street and the rail line. If they do, collect asset data and include in the model. Update this study to include any revised modelling results	Medium	SCT03
Inspect the Bedford Street open drains. Consider upgrades and/or raising of driveway crossings as required	Low	SCT04

Montagu Street (west)

Inspect the High Street open drains to determine suitability and state of repair. Consider upgrading to add capacity if required	Low	SCT05
--	-----	-------

Forster Street

Inspect the Montagu Street and Forster Street open drains and culverts in order to determine suitability and state of repair. Consider upgrading to add capacity if required	Low	SCT06
--	-----	-------

Cressy

Jetson Court

Actions	Priority	ID
Consider the installation of additional road capacity at the western end of Jetson Court	Low	CR01
Ensure the unmade road levels north of no. 8 Main Street to ensure overland flooding is directed to the open drain	Low	CR02

William Street

Consider providing additional stormwater pipes and pits, particularly at the intersection of William Street and Archer Street. Upgrade existing side-entry pit (SEP) to LGAT standard	Low	CR03
Consider upgrading open drain in unmade Archer Street and the drain running along the boundaries of nos. 8-10 Main Street and 4-12 William Street to ensure carriage of 1% AEP flows	Low	CR04

Wilson Street

Update the model to include the William Street and East Street culverts to confirm the risks of flooding to no. 1 William Street	Low	CR05
Consider upgrading road pits to LGAT standard and increasing the capacity of the DN225 pipe downstream of the manhole at the south-west corner of no. 18 Archer Street	Low	CR06

Archer Street (south)

Check the existence and extent of an open drain downstream outlet. Update the model. Define and upgrade open drain if necessary	Low	CR07
Consider upgrading the SEP to LGAT standards and/or construct additional pits to reduce road flooding, the system has spare capacity to accept additional flows from the road during the 10% AEP	Low	CR08

King Street

Undertake survey of the stormwater system to asset information. Update model and rerun as required	High	CR09
Consider raising kerb and crossovers in Gatenby Street, Main Street and King Streets to maximise storage capacity of the roadways	Low	CR10
Consider upgrading the DN600 pipeline through 8a King Street. Consider the installation of an open drain on the southern side of no. 8a King Street to accommodate overland flow	Low	CR11
Consider upgrading road pits in the sags of Gatenby, Main and King Streets to LGAT standards. Google Street View shows that all of the existing pits are non-standard	Low	CR12

Murfett Street

Consider the provision of additional pipe and pits to remove road flows and intersections during the major AEP. Consider raising kerbs and crossovers to mitigate flooding of private properties.	Low	CR13
Consider arrangements for the open drain north of no. 2 Charles Street. Ensure the drain is properly catered for as it is intercepted by Murfett Street. Update the model as required. Consider directing flows from the drain straight through to no. 4 Elphinstone Road, rather than into the Murfett Street kerb and channel	Low	CR14
Consider extending Church Street pipework from the Charles Street intersection connect to the bubble-up pit on the western side of the Main Street intersection	Low	CR15

Saundridge Road

Consider upgrading road pits at intersection of Saundridge Road and Charles Street to LGAT standard pits. Ensure Saundridge Road roadside drain and culvert inlet are fit for purpose. Consider better defining drain to provide developed depths for the culvert inlet	Low	CR16
Consider upgrades to the stormwater system and flood path through Cressy District High School to ensure no surcharge from the system during the minor AEP	Medium	CR17
Inspect the DN375 outlet and open drain within High School grounds. Consider improvements and upgrades as required	Low	CR18
Inspect open drain south of Cressy District High School. Consider adding the culvert crossings to the model. Determine Councils requirements for exiting culverts to be maintained or removed	Low	CR19

Main Street (south)

Consider defining the open drain along the southern side of no. 136 Main Street, or extending outlet pipe to the major drainage channel at the western end of the property	Low	CR20
Consider upgrading road pits to LGAT standard and/or direct road overflows to shaped drain commencing at the south-east boundary of no. 136 Main Street	Medium	CR21

Evandale

Cambock Lane West

Actions	Priority	ID
Ensure the stormwater system is catered for during the upcoming development of No. 43 Cambock Lane East	Low	EV01

Cambock Lane East

Consider the provision of additional SEPs on High Street as necessary. The downstream system to the outlet has capacity to accept additional inflow	Low	EV02
---	-----	------

Collins Street

Undertake survey of pits and pipelines from Collins Street to the northern extent of Murray Street. Update model and GIS data as necessary. Add missing SEP located near the Murray Street and Rodgers Lane intersection. Rerun the model and update this document	Low	EV03
Consider upgrading the pipe network to ensure it does not flood during the 10% AEP, and reduces flooding during the 1% AEP. This will require additional modelling and analysis	Low	EV04

Logan Road

Consider upgrading the stormwater system between Coachmans Road and Stockmans Road to prevent surcharge from it during the minor event, and to allow capacity for intensification of the area's development	Low	EV05
Upgrade the inlets and system downstream of Saddlers Reserve to ensure the overland flows produced during the major AEP are contained and not passed through private property. Consider the installation of a detention basin within Saddlers Reserve	Low	EV06
Provide additional capacity to pipes and inlets within Drovers Court and Stockmans Road. Upgrade existing pits within the system, particularly in Drovers Court and Stockmans Road, to LGAT standard SEPs	Medium	EV07

Longford

Gay Street

Actions	Priority	ID
<p>Determine the best way to prevent flooding within Nos. 9 and 11 Gay Street. This may include:</p> <ul style="list-style-type: none"> · Extend open drain to the kerb, and allow overtopping of roadway via a new crossover arrangement · Raising the kerb and/or easement · Improving the capacity of inlet pits and downstream pipework · Increase the capacity of the rail culvert <p>Currently the open drain is acting as part of NMC's stormwater system. If water is prevented from entering it could be decommissioned</p>	Low	NWL01

Hay Street

Determine whether upgrades to the network should be considered to prevent surcharging from the system	Low	NWL02
---	-----	-------

High Street (west)

Verify whether flooding of No. 31 Smith Street and the Longford Recreation Ground is an issue and consider upgrading the system. The pipes downstream of the recreation ground have capacity available to accept additional flows from upstream	Low	NWL03
---	-----	-------

Paton Street

Consider upgrading road pipes and pits in Davis Crescent to LGAT standards	Medium	NWL04
--	--------	-------

Hobhouse Street (west)

Undertake survey of pipes and pits and verify capacity of DN150 pipeline behind Nos. 104 & 110 Marlborough Street. Consider whether an upgrade is necessary. Aerial imagery shows Nos. 102 and 104 as vacant land which, once developed will increase the likelihood of flooding.	Low	NWL05
Consider upgrades to in the sags of Hobhouse Street, Marlborough Street and Catherine Street.	Low	NWL06

Bulwer Street

Ensure road pits in Lach Dar Court are LGAT standard side entry pits (SEPs)	Low	SWL01
---	-----	-------

Lewis Street (west)

Ensure the roadside drain on the western side of Catherine Street has sufficient capacity to pass flows to the headwall and the intersection of Lewis Street West	Low	SWL02
Ensure the roadside drain on the western side of Cressy Road has sufficient capacity to pass flows to the inlet adjacent No. 1 Cressy Road	Low	SWL03

Cracraft Street (west)

Update the model to include road pits in Equus Court and Mews Court. Rerun the model and revise the risk assessment and action plan as required	Medium	SWL04
---	--------	-------

Catherine Street (south)

Ensure overland flow paths between Anstey Street and Catherine Street are maintained and considered in any development in the surrounding land	Medium	SWL05
Consider upgrading culvert crossings	Medium	SWL06
Consider the overall stormwater system requirements and layout as development occurs in the area. The roadside drains appear to hold water	Low	SWL07

Union Street

Consider upgrades to the stormwater network at the intersection of Union and Wellington Streets. Given the location of the intersection near a busy shopping precinct a higher priority may be appropriate for this work.	Low	NEL01
Consider improvements to the roadside drainage and inlet to alleviate flooding within No. 5 Union Street	Low	NEL02
Confirm the levels and functionality of the stormwater network linking the land adjacent to Union Street and No. 3 Union Street with the open drain in No. 7 Wellington Street. Confirm the functionality of the open drain in No. 7. Update the model and consider improvements as necessary	Low	NEL03

Smith Street

Confirm the diameter and levels of the cross connections in Smith Street and Latour Street. Update the model, risk assessment and action plan as required	Medium	NEL04
Confirm whether there is real-world evidence of surcharging (popping of manhole lids) occurring in Smith Street, between Wellington and George Streets. These manholes are within the westbound carriageway and could pose a danger to traffic if the lids are forced off	Low	NEL05

Lyttleton Street

Confirm ownership which assets within No. 8a Lyttleton Street (TasWater) and No. 73 Wellington Street are private and which are public. Remove private assets from the database or provide notation and that they are private	Low	NEL06
Confirm levels and functionality of cross-connection and ensure the network and swale in the vicinity of No. 17 Latour Street are fir for purpose	Low	NEL07

Swan Avenue

Consider upgrading the Gosling Gove sag pit inlet capacity and downstream pipework	Medium	SEL01
--	--------	-------

Longford Close

Confirm whether flooding of No.13 Country Field Court has occurred and consider upgrading the SEPS to LGAT standard pits if required. Consider increasing driveway freeboard to No. 13 and increasing pipe capacity as needed	Low	SEL02
Install raised grates on the Cracroft Street open drain pits to help prevent blockage and ensure functionality is maintained	Low	SEL03
Investigate the Longford Racecourse private pump station. Incorporate information relative to the racecourse drainage into the Longford model and liaise with racecourse management if corrective action is required	Medium	SEL04

Wellington Street (south)

Consider upgrading existing road pit adjacent the south-western corner of No. 2 Bulwer Street to LGAT standards. Check channel levels and if necessary, install and new pit in the low point. Consider increasing kerb and/or naturestrip freeboard levels and the capacity of the downstream as required	Low	SEL05
Install raised grates on Cracroft Street open drain pits to help prevent blockage and maintain functionality	Low	SEL06
Approach the operators of the Longford Racecourse to obtain information about their stormwater drainage, pumps/wet-well and procedures. Failure of the racecourse to control their concentrated flows needs to be addressed. Incorporate information relative to the racecourse drainage into the hydraulic model	Low	SEL07
Inspect open drain and headwall within No. 3 Lewis Street. Ensure the inlet is well maintained and clear of blockages. Consider upgrading inlet headwall if required	Low	SEL08

Perth

Actions	Priority	ID
Undertake an assessment of the open drain and DN900 inlet in No. 64-80 Fairtlough Street. Undertake works as necessary to minimise bypass flooding through to Zircon Place.	Medium	EP01
Consider upgrading the road pit and pipework from Onyx Court, or reducing the depth required for spilling to occur to the adjacent overflow path	Low	EP02
Consider the implication of high hazard flows within the overland flow path between Seccombe Street and Arthur Street. Review modelled roughness of this zone	Medium	EP03
Consider upgrading the overland flow path adjacent Nos. 50 and 52 Arthur Street. Consider the installation of a plinth wall to ensure flooding is contained within the flow path	Low	EP04
Consider the creation of an overland flow path linking Arthur Street to the western rail line and culvert. An upgrade of the pipes and pits may be needed - if additional stormwater can be directed to the rail easement No. 41-43 Arthur Street may be protected. An additional rail culvert may also help, although additional flow to the southern side of the line may adversely impact properties downstream of that point	Medium	EP05
Ensure the open drain and potential wider flow path within No. 48 George Street is protected. This includes ensuring the DN900 culvert inlet adjacent to Fairtlough Street is protected and maintained. Blockage of this culvert would contribute a significant additional risk of flooding of properties downstream of No. 48	Medium	EP06
Consider the construction of a detention basin within No. 48 George Street. The property may have sufficient size to hold a detention basin. A basin could reduce downstream overland flows and provide a buffer for the future intensification of development likely within the catchment	Medium	EP07
Inspect the road pit adjacent to No. 143 Fairtlough Street. Blockage of this pit could contribute to private property flooding between Fairtlough Street and Clarence Street. Consider upgrading the stormwater main within No. 143 from DN750 to DN900 or DN1050	Low	EP08
Consider conversion of the manholes within Nos. 24A and 24B George Street to grated inlets in order to capture flooding within the natural gully	Low	EP09
Inspect the pits in the sag of Clarence Street. Consider upgrading the pits and downstream pipework as necessary	Low	EP10
Inspect open drain within No. 1-3 George Street. Consider the acquisition of a formal easement, remove barriers as necessary, and undertake regular maintenance	High	EP11
Consider the provision of additional pit/pipe capacity in Fairtlough Street, adjacent Perth Football Club	Low	EP12

Arthur Street

Consider linking the stormwater system at the intersection of Clarence Street and Arthur Street either to the eastern end of Arthur Street, or southwards to the sag pits adjacent No. 16 George Street in Clarence Street	Low	EP13
Consider upgrading the Samclay Court sag pit to an LGAT standard grated SEP. Consider providing additional pits and raising the highpoint of the driveway of No. 8 if necessary	Low	EP14

Affleck Court

Update the model with new DEM information as it becomes available. Confirm overland flooding is contained within the drainage easement. Check the status and repair of Elizabeth Street open drain and ensure flows entering it from the adjacent outlets are conveyed east towards William Street	Low	EP15
--	-----	------

Old Bridge Road

Consider upgrading existing pits, or providing additional SEPs at the southern end of Clarence Street	Low	EP16
Confirm the size of the pipeline in front of Nos. 17 and 19 Old Bridge Road. Update the asset data and remodel if necessary	Low	EP17
Consider upgrading the ungrated side-entry pit (SEP) at the southern end of Old Bridge Road with an LGAT standard grated SEP	Low	EP18

Seccombe Street West

Obtain As-Built drawings and/or undertake survey to determine any changes to the stormwater system as a result of highway works and cul-de-sac. Update Council asset and GIS data and the model as required. Update the ground model and 2D mesh when new LiDAR is available. Rerun the model and updated this report in due course	Low	WP01
Update model to include the Muirton Way 2D components, and Seccombe Street kerb and channel. Review the potential for flooding between no. 82 Seccombe Street and no. 4 Muirton Way. Rerun the model and updated the report as necessary	Medium	WP02

Cootamundra Drive

Consider the upgrade of the Cootamundra Drive and Acacia Court road pits to LGAT standard grated SEPs	Low	WP03
---	-----	------

Youl Road

Clean out and survey pits adjacent to no. 1 Main Street. Update model as and USSFRS as required	Low	WP04
---	-----	------

Phillip Street (west)

Confirm the existence of a gully pit adjacent to no. 5 Napoleon Street and add data to the GIS and the model. Re-run the model and review impacts. Update USSFRS as necessary	Low	WP05
--	-----	------

Tatiara Court

Inspect and consider upgrading the pit/inlet at the bowl of the cul-de-sac to ensure road flooding is minimised	Low	WP06
---	-----	------

Napoleon Street

Inspect the headwalls on the western side of Napoleon Street. Ensure they are effective and well maintained. Consider upgrades to these inlets (e.g., installation of headwalls to LGAT standards) and ensure open drains are maintained	Low	WP07
Consider the effects of increase stormwater on the downstream system from any proposed development on the western side of Napoleon Street	High	WP08

Edward Street

Consider upgrades to pipe network on the northern side of Edward Street in conjunction with any infill development. Require detention for new development where possible. It may be possible to link this network to the pipeline on the southern side of the road to provide relief	Medium	WP09
--	--------	------

Cromwell Street

Complete programmed capital works to replace the Cromwell Street culverts with a box culvert. Realignment of the drain upstream of the new culvert will improve efficiency. Update model to reflect upgrades and update USSFRS if necessary	Low	WP10
Ensure any development of no. 1-13 Cromwell Street considers potential breakout from the dam and the interaction between Sheepwash Creek flows, and the flows from the direction of Cromwell Street	High	WP11

Effra Court

Consider upgrades to the DN150 which collects the western side of Effra Court	Low	WP12
---	-----	------

Norfolk Street

Consider upgrades to King Street stormwater system to provide capacity for infill development. Request onsite detention to prevent increased flows from new developments	Medium	WP13
--	--------	------

Norfolk Street

Consider upgrades to the Fredrick Street gully pits to standard LGAT SEPs. Currently the road pits are gully pits only with capacity for side-entry. Consider adding additional capacity to service flooding at the sag in Norfolk Street adjacent to no. 69 Frederick Street	Medium	WP14
Consider directing kerb connections in Frederick Street directly to the adjacent pipelines where possible	Medium	WP15

Drummond Crescent

Consider upsizing the pipe network on the eastern side of Drummond Crescent. It is noted that the topography in this area is very flat and the outfall is restricted by the depth of the open drain on the southern side of Drummond Street	Low	WP16
Undertake an investigation to determine options, if any, to alleviate the internal flooding of the properties at no. 58 Drummond Street. This may include the installation of additional kerb and channel, better collection and diversion of flows from the Drummond Crescent intersection, and upsizing or lowering the DN225 culvert	Low	WP17
Assess options for upgrading the roadside drain on Drummond Street	Medium	WP18
Upgrade stormwater system between Scone and Drummond Streets	Medium	WP19