Civil Engineering & Infrastructure Report

Stage 3D: Jordan Springs East

89914020

Prepared for
Maryland Development Corporation

15 June 2018

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Shaping the Future

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Executive Summary

Cardno has been engaged by Maryland Development Corporation to provide Lead Engineering services for the Jordan Springs East (previously Central Precinct) project.

Jordan Springs East is located within the Penrith City Council Local Government Area and covers an area of approximately 135 hectares. Under the Central Precinct Plan, 135 hectares of land will be developed for residential and employment uses.

The development of the Jordan Springs East will be staged. This report addresses the Civil Engineering and Infrastructure components associated with Stage 3D of Jordan Springs East.

Stage 3D covers an area of approximately 2.0 hectares and is proposed to deliver 1 superlot totalling approximately 11,100 m^2 in area, intended for future development as a town centre. In addition, Stage 3D will require the following infrastructure to be delivered:

- Approximately 450 metres of a local road network including
- Stormwater drainage infrastructure
- Utility infrastructure reticulation

This report documents the processes undertaken to prepare Development Application design documentation for the Stage 3D civil works. The report aims to outline how the required infrastructure will be delivered in accordance with the Central Precinct Plan, State Regional Environmental Plan 30, the future requirements of Jordan Springs East and relevant authority design guidelines and technical requirements.

Where required, this report also identifies and references relevant background studies that have assisted in the development of the *Jordan Springs East Stage 3D Development Application* (Cardno, June 2018) drawings set. This drawing set is provided in Appendix A.

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Appendices

Tables

Figures

1 Introduction

Cardno has been engaged by Maryland Development Corporation to prepare documentation in support of a Development Application (DA) for Stage 3D of Jordan Springs East. Stage 3D of Jordan Springs East are located within the Penrith City Council (Council) Local Government Area (LGA).

1.1 Jordan Springs East Overview

Jordan Springs East forms part of the St Marys development site and covers an area of approximately 135 hectares. Jordan Springs East is bounded by Regional Park to the north and west, South Creek to the east and existing urban development to the south. A site locality plan for Jordan Springs East (formerly known as Central Precinct) is included as **Figure 1-1**.

Figure 1-1 Jordan Springs East Site Locality Plan

Jordan Springs East has been subject to a number of background studies that have been consolidated into *Central Precinct Plan*, JBA, May 2009. A number of DAs have been submitted to Council to cover the early components of the proposed development.

Summaries of the key DAs submitted to date are included in **Table 1-1**.

Table 1-1 Previously Lodged Development Applications

Development Application	DA Reference Number	Description	Current Status
Demolition & Remediation	DA14/0411	Demolition of existing structures, roads and hard surfaces and remediation of land	Approved
Haul Road	DA14/0766	Construction of a temporary haulage road and associated infrastructure upgrades to facilitate the movement of trucks associated with future works	Approved
Hoop Antenna Removal	DA14/0990	Demolition of hoop antenna and surrounding hard stand area	Approved
Earthworks	DA14/1228	Bulk earthworks, interim stormwater infrastructure, landscaping, tree removal and environmental management works including realignment of an existing riparian corridor	Approved
Stage 1	DA15/0299	Proposed road, stormwater and utility servicing infrastructure for Stage 1 development	Approved
Stage 2	DA15/1216	Proposed road, stormwater and utility servicing infrastructure for Stage 2 development	Approved
Stage 3A	DA16/0113	Proposed road, stormwater and utility servicing infrastructure	Approved
Stages 4A & 4B	DA17/0491	Proposed road, stormwater and utility servicing infrastructure	Approved
Stage 3B1	DA17/0675	Proposed road, stormwater and utility servicing infrastructure	Approved
Stage 3B2	DA17/0889	Proposed road, stormwater and utility servicing infrastructures	Under Assessment
Stage 5A	DA17/0920	Proposed road, stormwater and utility servicing infrastructure	Under Assessment

1.2 Jordan Springs East Stage 3D Overview

The development of Jordan Springs East will be staged. An indicative staging plan for the delivery of civil works and lots is included on Drawing Number ST03D-1041 (refer **Appendix A**).

Stage 3D covers an area of 2.0 hectares. It generally borders the eastern boundary of the Jordan Springs East, adjacent to road 001. The extent of Stage 3D is illustrated in **Figure 1-2**. It is expected that Stage 3D will yield approximately 1 superlot, designated for future development as a village centre as part of a separate development application.

Being the eighth stage of a development, Stage 3D adjoins the Stage 3B2 works, meaning the majority of the works are contained within the Jordan Springs East boundary.

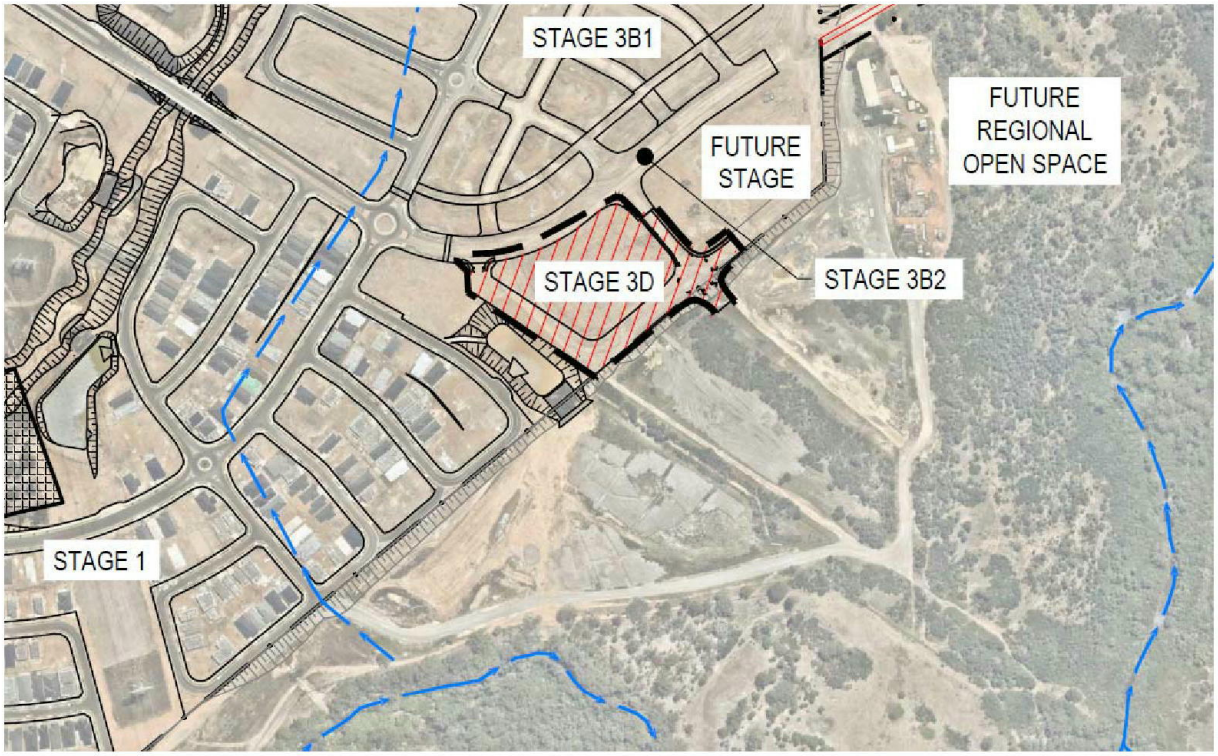
Works to which this report relates are defined by the following:

- Earthworks

- Boxing out of roads
- Minor lot grading, although the majority of the site has already been graded under the previously approved bulk earthworks application (DA14/1228).
- Landscape shaping
- Boundary interfaces

- Roads
  - Internal road network consistent with the Jordan Springs East Masterplan connecting to Stage 1 and Stage 3B1 road network
- Drainage
  - Construction of a piped drainage network
- Utility Infrastructure
  - Reticulation of utility services (i.e., sewer, water, electricity, telecommunications and gas)
- Sub-division
  - Establishment of lot boundaries for future registration and sale

Figure 1-2 Stage 3D Extent



1.3 Construction Program

Prior to the commencement of construction activities for Stage 3D, filling activities within Jordan Springs East (under DA14/1228) as well as construction activities within the Stage 1 area (under DA15/0299) and Stage 2 area (under DA15/1216), Stage 3A (under DA16/0113), Stage 4A& 4B and Stage 3B1 will have been completed.

Key dates within the current Jordan Springs East program are provided in **Table 1-2**.

Table 1-2 Jordan Springs East Construction Program Key Dates

Description	Anticipated Start Date	Anticipated End Date
Fill	June 2015	July 2017
Stage 1 Civil Works	May 2016	May 2017
Stage 1 Lot Registration	May 2017	July 2017
Stage 1 Occupation	February 2018	-
Stage 2 Civil Works	December 2016	May 2017
Stage 2 Lot Registration	July 2017	July 2017
Stage 2 Occupation	March 2018	-
Stage 3A Civil Works	July 2017	October 2017
Stage 3A Lot Registration	November 2017	December 2017
Stage 3A Occupation	October 2018	
Stage 4A & 4B Civil Works	October 2017	April 2018
Stage 4A & 4B Lot Registration	May 2018	June 2018
Stage 4A & 4B Occupation	March 2019	
Stage 3B1 Civil Works	November 2017	May 2018
Stage 3B1 Lot Registration	May 2018	June 2018
Stage 3B1 Occupation	March 2019	
Stage 3B2 Civil Works	July 2018	September 2018
Stage 3B2 Lot Registration	October 2018	November 2018
Stage 3B2 Occupation	N/A	
Stage 3D Civil Works	January 2019	April 2019
Stage 3D Lot Registration	May 2019	May 2019
Stage 3D Occupation	N/A	

2 Existing Site Conditions

2.1 Pre-development Conditions

Jordan Springs East covers an area of approximately 135 hectares. The existing topography at the site is noticeably flat. Elevations vary between approximately 18 – 40 mAHD (excluding stockpiles). A number of natural and constructed water courses drain the site to South Creek which is located to the east of Jordan Springs East.

The southern boundary of Jordan Springs East is shared with existing residential dwellings.

Previous studies undertaken for the Precinct Plan map indicate that two soil units are located within the site, namely the Luddenham and South Creek soil landscapes.

Previous geotechnical investigations undertaken at Jordan Springs East identified a shallow and deep aquifer system. The outcomes of this assessment are documented within *St Marys Central Precinct Water Soils and Infrastructure Report*, SKM, May 2009.

A significant portion of the Jordan Springs East site is inundated by rising flood waters within South Creek.

Two existing urban catchments discharge through the southern boundary of Jordan Springs East. Runoff from these catchments is conveyed via natural and constructed drainage corridors into South Creek.

The site is largely clear of vegetation. However there were pockets of existing trees across Jordan Springs East. The extent of existing trees is documented within the drawing set *Central Precinct Bulk Earthworks Development Application*, Cardno, July 2014.

Under pre-development conditions, the site contained two storage warehouses and a remnant sealed and unsealed road network. The two warehouses have been demolished under DA14/0411.

Jordan Springs East contains a series of stockpiles towards its northern boundary. These stockpiles contain material generated by previous demolition and remediation work undertaken in the Eastern Precinct (i.e., Ropes Crossing), Western Precinct (i.e., Jordan Springs) and Jordan Springs East. The stockpiled material is likely to be processed and re-used on site as part of future road construction.

Remediation Action Plans and Site Audit Statements for the stockpiled material and the majority of Jordan Springs East have been issued to qualify that the site has been remediated. Site Audit Statements for regions under existing buildings, hardstand areas and stockpiles are currently being prepared and rely upon the demolition of existing assets and structures as well as the relocation of the aforementioned stockpiles.

Jordan Springs East is burdened by four utility services and associated easements, including:

- 500 kV transmission lines owned and operated by Transgrid;
- 600 mm Werrington Carrier sewer main owned and operated by Sydney Water;
- 600 mm recycled water main owned and operated by Sydney Water; and,
- 450 mm sewer main owned and operated by Sydney Water.

All of the above services are external to Stage 3D, although it is noted that the Werrington carrier sits immediately adjacent to the boundary of Stage 3D. Drawing ST03D-1051 in Appendix A shows the location of some of the transmission lines and the 600 mm Werrington Carrier sewer main.

3 Flooding

3.1 Regional Flood Impact Assessment

Jordan Springs East is located on the western banks of South Creek and under pre-development conditions was subject to periodic inundation from rising water levels associated with South Creek. Jacobs (SKM) has been responsible for undertaking appropriate studies to predict the flood behaviour of South Creek to inform the design constraints associated with the urbanisation of Jordan Springs East.

The most recent 1% AEP peak water surface level estimates calculated by SKM are documented within Jordan Springs East *Flood Assessment Report, Final*, Jacobs, February 2015. The 1% AEP water surface profile gradually rises from 19.4 mAHD at the northern extent of Jordan Springs East to 21.0 mAHD at the southern extents of Jordan Springs East.

As part of the Bulk Earthworks DA (DA14/1228) approval was granted for the elevation of the existing natural surface within Jordan Springs East such that future lot levels are a minimum of 500 mm above the predicted 1% AEP South Creek water surface profile. These earthworks have now been completed under DA 14/1228 within the footprint of Stage 3D and hence the surface levels through these stages is now above the 1% AEP water surface level.

The 1% AEP South Creek flood level adjacent to is Stage 3D is about 20.5mAHD. The minimum road centreline level is 21.64m giving a freeboard of about 1.1m.

3.2 Local Flooding

There are no external catchments discharging into Stage 3D. Stage 3D collects run-off partly generated from Stages 3B1 and 3B2. Local flooding is therefore not expected.

Overland flow will occur when the capacity of the piped drainage network is exceeded. This overland flow will be conveyed safely within the road network. It will be managed as described in Section 6.1.

4 Earthworks & Grading

4.1 Site Grading

The site grading has largely been dictated by the requirement to elevate the site above the regional 1% AEP peak water surface level and the need to evacuate the site for events greater than the 1% AEP flood. Accordingly, all roads along creeks, drainage channels and basins have been set above the estimated 1% AEP peak water surface profile and are then graded in a continually rising manner until road levels are above the predicted PMF water surface level.

A site grading strategy for Jordan Springs East was documented and approved in the Bulk Earthworks DA (DA14/1228). These Bulks Earthworks within the Stage 3D area are now complete.

Accordingly, there is minimal additional earthworks required to form Stage 3D. There will be boxing out of the roads and some minor lot regrading to assist with drainage. Any fill generated is proposed to be stockpiled and used as part of residual fill requirements within future stages. Drawing ST03D-1101 in Appendix A shows the stockpile location.

4.2 Retaining Walls

Retaining wall construction is not required within Stage 3D.

5 Roads

The proposed road layout within Stage 3D of Jordan Springs East is consistent with *Central Precinct Concept Plan*, JBA, 2009.

5.1 Design Vehicles

The road layout for Stage 3D of Jordan Springs East has taken into to account two design vehicles as follows:

- 14.5 m bus along roads designated as a bus route under the Central Precinct Concept Plan
- 12.5 m SU Truck along all other internal roads.

Parameters for the design vehicles were adopted from *Guide to Road Design,* Austroads, 2006.

Design turning paths were used to determine where local increases in pavement width were required to ensure that the design vehicle could satisfactorily negotiate turns and bends without striking or mounting the kerb. Where necessary, 'No Stopping' signs will be provided to ensure that required turning areas are free of parked vehicles.

5.2 Road Geometry and Width

Road geometry design has generally been undertaken in accordance with the *Central Precinct Plan*, JBA, 2009 and *Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments*, Penrith City Council, November 2013.

There are four proposed road cross sections within Stage 3D of Jordan Springs East. Details of the road cross sections are summarised in **Table 5-1**. The proposed street cross sections are generally consistent with the works undertaken as part of the neighbouring Jordan Springs development.

Table 5-1 Road Cross Sections

Road Type	Road Reserve Width (m)	Pavement Width (m)
V1 Village Centre Local Street	16.60	8.00
V2-V6 Village Centre Local Street	21.5	7.4
V7 Village Centre Local Street	18.4	7.4

All roads, will be provided with kerb and gutter on both sides.

Kerb returns have been set at a 7.5 metre radius along the face of kerb in accordance with *Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments*, Penrith City Council, November 2013.

Typical road cross sections are presented on Sheet ST03D-1251 of the drawing set entitled *Jordan Springs East Stage 3D –Civil Works Development Application, Cardno, June 2018* in Appendix A

5.3 Road Grading

Roads have generally been graded to ensure that parameters as presented within *Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments*, Penrith City Council, November 2013 are met. Road grades range from a minimum of 0.7% to a maximum 3%. All roads, except for the accessways have generally been designed with 3% cross fall.

5.4 Road Pavement

Preliminary flexible road pavement designs have been prepared and presented on sheet 1251 of the drawing set entitled *Jordan Springs East Stage 3D - Civil Works Development Application, Cardno, June 2018* in Appendix A. It should be noted that the preliminary road pavement designs are subject to detailed design pending additional geotechnical investigations and confirmation of sub-grade properties during construction.

Table 5-2 presents a summary of design criteria and overall pavement thicknesses nominated throughout Stage 3D of Jordan Springs East. The designs presented below have been based on the outcomes of geotechnical analysis completed as part of previous stages of the Jordan Springs East development.

Table 5-2 Pavement Design Summary

	Local Roads	Roundabout
Applicable road cross sections	Village Centre Local Street	Roundabout
Assumed CBR	3%	3%
ESA	2×10^6	2×10^6
Wearing Coarse	50 mm	75 mm
Base	150 mm	200 mm
Sub-base	410 mm	175 mm
Total Pavement Thickness	610 mm	450 mm

5.5 Intersections

Assessment of the future operation of the Stage 3D intersections was undertaken with results indicating that they will operate satisfactorily during both AM and PM peak traffic periods relating to the 2016 and 2026 modelling scenarios. Details of the calculations are presented in a Traffic Impact Assessment prepared by WSP (June 2018).

5.6 Footpaths

Footpaths will generally be constructed in accordance with Penrith City Council's standard drawing *Standard Footpath Details Plan No: SD1001*.

Road verges will generally be graded at 4% cross fall except in the instance where a concrete footpath is present. Concrete footpaths will contain a maximum 2% cross fall.

6 Stormwater Drainage

6.1 Drainage Standards

The stormwater drainage network has been designed to comply with *Design Guidelines for Engineering Works for Subdivisions and Developments*, November 2013, Penrith City Council and *Australian Rainfall and Runoff, Volume 1*, 1987, Institution of Engineers.

The proposed drainage network has been designed to safely convey major and minor flows to basins or open channels before discharging from Jordan Springs East into a suitable existing downstream watercourse. Design rainfall intensities have been adopted as follows:

- Minor System 20% AEP
- Major System 1% AEP.

Stormwater pits have been positioned to suit the proposed road geometry and generally maintain a maximum flow width of 2.5 metres from the face of kerb during the design storm event. Some exception to this flow width may occur at sags which drain to the riparian corridor

Where practical, overland flow paths have been subject to preliminary design to accommodate the 1% AEP storm event by maintaining a velocity-depth product of 0.3 m^2/s or less and a maximum flow depth equal to or less than 300 millimetres. If there are locations where these parameters are exceeded, strategies such increasing the pipe size or localised regrading will be included in the detailed design in accordance with Section 3.6 of Penrith Council's *Design Guidelines for Engineering Works*.

6.2 Catchment Areas

Catchments that have been accommodated within the Stage 3D drainage network are documented on drawing ST03D-2301 within the *Jordan Springs East Stage 3D - Civil Works Development Application, Cardno, June 2018* (refer **Appendix A**).

6.3 Pipe Sizes

Preliminary pipe sizes are nominated within the *Jordan Springs East Stage 3D - Civil Works Development Application, Cardno, June 2018* drawing set (refer **Appendix A**).

6.4 Hydrology Calculations

Detailed hydrologic and hydraulic analysis will be carried out at the detailed design stage using the dynamic drainage component within the 12D software package. The model represents all catchments collected via a pit and pipe network designed to cater for the minor flows with consideration of major design storms. All areas are gravity drainage with overland flows in excess of pipe capacity safely directed to bio-filtration basins, open spaces, the drainage corridor or existing watercourses.

The 12D software package uses the ILSAX model for hydrologic calculations. The following parameters will used in the model:

- Bureau of Meteorology IFD coefficients (refer **Table 6-1**) based on the geographical location of Jordan Springs East
- Depression storage:
    - 1 mm for paved (i.e., impervious) areas
    - 5 mm for grassed (i.e., pervious) areas
- Antecedent moisture condition 3
- Catchments, including roads are assumed to be 80% impervious in accordance with Council's design guidelines.

- Times of Concentration to be calculated based on catchment size, catchment slope and roughness. Minimum Times of Concentration of 2 minute and 10 minutes for impervious and pervious areas have been adopted respectively.

Table 6-1 Adopted IFD Coefficients

	2 Year (mm/h)	50 Year (mm/h)
1 hour rainfall intensity	29.4	59.8
12 hour rainfall intensity	6.6	12.8
72 hour rainfall intensity	1.9	4.3
Geographical Coefficients	Adopted Value	
G	0.02	
F2	4.3	
F50	15.8	

7 Detention

7.1 Detention Strategy for Jordan Springs East

The Detention Strategy for Jordan Springs East is outlined in the *Central Precinct Stormwater Detention Strategy Report* Cardno, January 2017. The objective of the Detention Strategy is that “stormwater flows for all events up to and including the 1% ARI from the development site will have no adverse impact upon the downstream properties and existing waterbodies”.

This Strategy considers the hydrologic impact of all parts of Jordan Springs East including the following:

> The majority of Jordan Springs East that drains directly to South Creek;

> Those parts of Jordan Springs East that drain to the western tributary such as Stage 2 and the northern section of Jordan Springs East; and

> Increasing the waterway area of the culverts under the Wianamatta Parkway.

Under the Strategy agreed with Council, the potential downstream impacts of Jordan Springs East development are to be off-set by the provision of a suitable stormwater detention volume within one of the regional water quality basins known as ‘Basin I’ located within the Regional Park to west of Jordan Springs East and south of Jordan Springs. Until Basin I is constructed, an interim detention basin is to be provided in the central drainage corridor.

7.2 Stage 4 Detention Basin

Jordan Springs East *Stormwater Detention Strategy Report* proposed that the interim detention basin would be constructed as part of the Stage 4 development. As Stage 4A has been constructed prior to Stage 3D, the interim detention basin is likely to be in place when Stage 3D is completed. Although Stage 3D does not drain to the interim basin, the *Detention Strategy Report* indicates that the interim basin is able to provide sufficient compensatory storage so that there is no net increase in peak flows to South Creek from the Central Precinct.

8 Stormwater Quality

8.1 St Marys ADI Objectives

The stormwater management strategy for Jordan Springs East cannot be considered in isolation. Rather, the strategy needs to take into account the regional objectives outlined within SREP30 for the Central and Western Precincts. The regional objectives seek to preserve the condition of the receiving waters by matching existing stormwater pollutant concentrations at key locations along South Creek.

The regional stormwater management strategy has been prepared by SKM (Jacobs) and incorporates a number of strategically located basins within the Regional Park.

8.2 Jordan Springs East Stormwater Quality Management Strategy

Council has advised that in addition to the requirements of SREP30, the stormwater quality performance is to meet the requirements of the Penrith Development Control Plan. In order to meet Council's objectives Cardno has developed a water quality strategy for the entire precinct. This strategy is documented in the *Jordan Springs East Precinct Stormwater Quality Management Report* (Cardno January 2017).

Jordan Springs East Stormwater quality management strategy includes the follow stormwater quality improvement devices:

- Rainwater tanks on residential lots
- 7 bio-retention basins
- Gross Pollutant Traps within each urban catchment
- Riparian corridor.

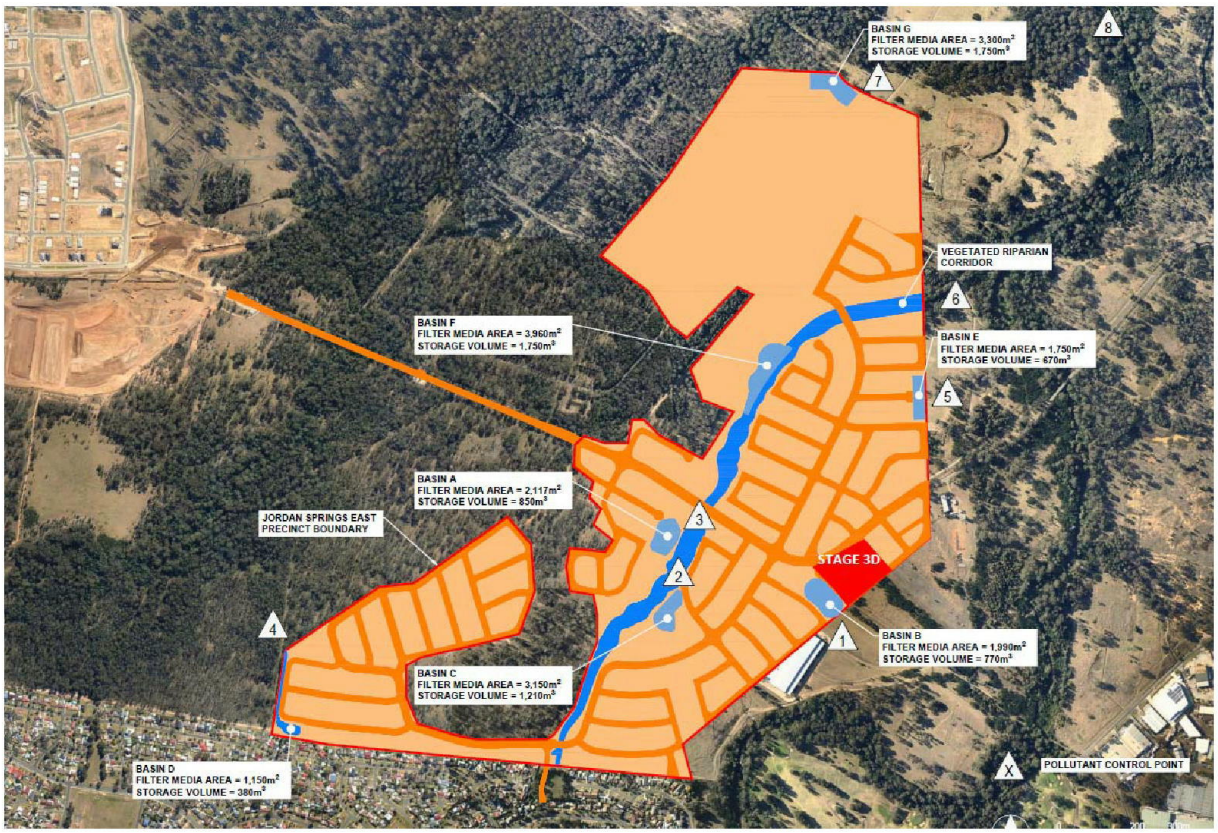
An overview of Jordan Springs East stormwater quality management strategy is provided in **Figure 8-1**.

The *Jordan Springs East Precinct Stormwater Quality Management Report* included MUSIC modelling of the stormwater quality management masterplan. The modelled treatment efficiencies are given in **Table 9-1** (excludes credits for treating existing upstream catchments).

Table 8-1 Jordan Springs East Stormwater Quality Treatment Train Effectiveness

Pollutant	Sources	Residual Load	Percentage Reduction	Council DCP Reduction Target
Gross Pollutants (kg/year)	19,200	308	**98%**	90%
Total Suspended Solids (kg/year)	119,000	15,600	**87%**	85%
Total Phosphorus (kg/year)	223	81.7	**63%**	60%
Total Nitrogen (kg/year)	1,460	755	**48%**	45%

Figure 8-1 Jordan Springs East Stormwater Quality Management Strategy



8.3 Stage 3D Stormwater Quality Management Strategy

The stormwater quality management infrastructure proposed for Stage 3D is consistent with the strategy in the *Jordan Springs East Precinct Stormwater Quality Management Report.* Rainwater tanks are proposed on all residential lots created upon further development of the Stage 3D superlots.

Treatment of stormwater runoff will occur in Bio-retention Basin B as identified in Figure 8-1. Basin B will be constructed as part of the village park civil works. At present Basin E functions as a sediment basin. A temporary channel is proposed to convey runoff to Basin B is proposed until a permanent stormwater pipe connection is provided as part of the village park civil works.

9 Sediment & Erosion Control

Erosion and sediment control will be installed and maintained in accordance with Council's requirements and Landcom's Managing Urban Stormwater, Soils and Construction (i.e., the Blue Book).

As part of the bulk earthworks phase, sediment and erosion control was managed via a temporary sediment basin positioned within the central corridor. This arrangement is proposed to be maintained as part of the subdivision civil works. Additional temporary basins may be incorporated within the stages where required.

Construction stockpile areas will be located near areas of minimal cut and fill. Stockpiles will be protected above by local diversion drains and below by sediment fences.

The full sedimentation and erosion control strategy is presented within the Cardno drawing set *Jordan Springs East Stage 3D - Civil Works Development Application, Cardno, July 2017*(refer **Appendix A**).

10 Utility Servicing Strategy

10.1 Potable Water

Sydney Water will be the primary potable water supplier for Jordan Springs East. As part of the Stage 1 works two water main extensions, from Lakeside Parade, Jordan Springs and Henry Lawson Avenue Werrington County, have been constructed.

The potable water reticulation network within Jordan Springs East will be situated below ground within the verge of the public road reserve. The network will be installed in accordance with the Shared Trenching Agreement or the *Guide to Codes and Practises for Streets Opening*, July 2009, NSW Street Opening Conference Guideline.

Discussions are currently in progress with Sydney Water through an accredited Water Services Coordinator in accordance with Sydney Water's Section 73 process. A detailed potable water plan for Stage 3D of Jordan Springs East will be prepared as part of the Construction Certificate design process.

10.2 Wastewater

Sydney Water will be the supplier of wastewater infrastructure for Jordan Springs East via a connection to the existing Werrington Carrier which traverses the Jordan Springs East site in an east-west orientation.

The Central Precinct will require the construction of a sewer pumping station and rising main to service a proportion of the site that is unable to drain via gravity to existing wastewater infrastructure. It is important to note that Stage 3D will drain via gravity to the Werrington Carrier and as such does not rely upon the construction and operation of a sewer pumping station or rising main

All wastewater works will be designed and constructed in accordance with Sydney Water standards. Discussions are currently in progress with Sydney Water through an accredited Water Services Coordinator in accordance with Sydney Water's Section 73 process.

A detailed sewer plan for Stage 3D of Jordan Springs East will be prepared as part of the Construction Certificate design process.

10.3 Electricity

The primary electricity supplier to the Jordan Springs East will be Endeavour Energy.

Jordan Springs East is serviced via the extension of two 11 kV feeders from Werrington County. Lead-in works have been constructed as part of the Stage 1 development. Current advice from Endeavour Energy suggests that a separate HV lead-in originating from the Jordan Springs development will be required for part of Stage 3D, which is currently being delivered as part of the Stage 3A subdivision works.

A Level 3 Endeavour Energy Accredited Service Provider will undertake the design and documentation of the electrical reticulation network. Street lighting will be installed in accordance with Endeavour Energy and Council standards.

10.4 Telecommunications

Communication infrastructure has been provided to Jordan Springs East by extending the existing network from Jordan Springs along the road corridor that links Jordan Springs East to Jordan Springs.

Telecommunications pits and pipes will be designed by OptiComm personnel and will be installed by certified contractors. The design of the network will be undertaken as part of the detailed design process.

All telecommunications infrastructure will be aligned within the road verges in the alignment allocated for telecommunications under the Road Clear Ways Act (1991).

10.5 Gas

The primary natural gas supplier to the Jordan Springs East will be Jemena. Jemena has extended the existing gas main reticulation from Lakeside Parade along the road corridor that links Central Precinct to Jordan Springs.

Internal gas reticulation will be installed throughout Stage 3D of Jordan Springs East in accordance with the Shared Trenching Agreement or the *Guide to Codes and Practises for Streets Opening*, July 2009, NSW Street Opening Conference Guideline.

11 Conclusion

A preliminary civil design for Stage 3D of the Jordan Springs East Precinct has been undertaken. The civil design has been developed in accordance with the relevant Council and authority guidelines as well as the requirements of SREP30.

The key outcomes documented within this report include:

- Suitable site grading and drainage infrastructure has been provided to accommodate stormwater flows generated within the Stage 3D extent of works
- Stage 3D will be located at least 2000mm above the 1% AEP peak water surface level estimated for South Creek
- The proposed road network and grading within Stage 3D will provide suitable flood evacuation routes
- Overland flow paths within Stage 3D have been subject to preliminary assessment for events up to the 1% AEP to assess flow characteristics and flood hazard
- Roads have been designed generally in accordance with:
    - *Guide to Road Design*, Austroads, 2006
    - *Central Precinct Plan*, JBA, 2009
    - *Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments*, Penrith City Council, November 2013
- Design vehicles used to assess the proposed road network included a 14.5 m bus and an 8.8 m SU Truck
- The minimum longitudinal road grades within Stage 3D is 0.7%
- A preliminary drainage network has been designed in accordance with *Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments*, Penrith City Council, November 2013
- A merit based assessment has been presented to Council representatives for the removal of the requirement to provide on-site detention within Jordan Springs East. Concurrence for the approach was provided in January 2017. A temporary basin will be provided as an interim measure as Part of the Stage 4 works until permanent basins are constructed.
- A stormwater quality management strategy has been prepared for the Jordan Springs East development which demonstrates the capacity to align with the region stormwater management strategy prepared previously for both the Jordan Springs East (Central) and Jordan Springs (Western) Precincts
- Sediment and erosion control measures have been included as required to protect downstream receiving waters from sediment laden runoff during construction activities
- Liaison with utility providers has confirmed that there is suitable capacity within existing networks to service Stage 3D of Jordan Springs East
- Lead-in Utility infrastructure for potable water, electricity, gas and telecommunications has been provided as part of the previous stage works. It is likely that the future development of Stage 3d as a town centre, as part of a separate DA, will require additional HV. This will be subject to a separate application.

12 References

- *St Marys Central Precinct Water Soils and Infrastructure Report*, SKM, May 2009
- *Central Precinct Bulk Earthworks Development Application*, Cardno, July 2014
- *Central Precinct of St Mary's Project Development Flood Assessment Report Final,* Jacobs, February 2015
- *Central Precinct Stormwater Detention Strategy,* Cardno January 2017
- *Jordan Springs East Precinct Stormwater Quality Management Report*, Cardno January 2017
- *Floodplain Development Manual,* NSW Department of Infrastructure, Planning & Natural Resources, April 2005
- *Central Precinct Plan*, JBA 2009
- *Guide to Road Design*, Austroads, 2006
- *Penrith City Council Design Guidelines for Engineering Works for Subdivision and Developments*, Penrith City Council, November 2013
- *Central Precinct Stage 1 Traffic Impact Assessment*, Cardno, December 2014
- *Central Precinct Landscape Master Plan*, JMD Design, February 2015
- *Guidelines for Riparian Corridors on Waterfront Land*, NSW Department of Primary Industries Office of Water, July 2012
- *Bushfire Emergency Evacuation Plan, Central Precinct, St Marys ADI Development*, Molino Stewart, September 2014
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Stage 3D: Jordan Springs East

APPENDIX

A

JORDAN SPRINGS EAST STAGE 3D
DEVELOPMENT APPLICATION DRAWING SET

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