23rd January 2013

The General Manager
Penrith City Council
601 High Street
PENRITH NSW 2760

Attention: Schandel Jefferys

Dear Schandel,

DEVELOPMENT APPLICATION (DA)
PROPOSED RIPARIAN CORRIDOR LANDSCAPE EMBELLISHMENT WORKS, JORDAN SPRINGS, WESTERN PRECINCT, ST MARYS

1.0 INTRODUCTION

This Statement of Environmental Effects (SEE) is submitted to Penrith City Council (PCC) in support of a Development Application (DA) for the proposed landscape embellishment of the Riparian Corridor within Jordan Springs, Western Precinct, St. Marys, including the following:

- Construction of passive recreation facilities, including shared concrete pedestrian / cycle paths and shelters; and
- Associated planting, trees and ground cover.

This report has been prepared by the Applicant, Lend Lease (LL) as agent for Maryland Development Company.

This report should be read in conjunction with the following:

- DA form and application fees;
- Location Plan, prepared by Lend Lease (**Appendix A**);
- Neighbour Notification Plan, prepared by Lend Lease (**Appendix B**);
- Jordan Springs Concept Plan, prepared by Lend Lease (**Appendix C**);
- Existing Conditions Plans, prepared by Lend Lease (**Appendix D**);
- Previously lodged Plans of Subdivision, prepared by Whelans Insites (**Appendix E**);
- Riparian Corridor Landscape Concept Plan, prepared by Environmental Partnership (**Appendix F**);
- Riparian Corridor Landscape Plans, prepared by Environmental Partnership (**Appendix G**);
- Western Precinct Vegetation Management Plan, prepared by Environmental Partnership, December 2012 (**Appendix H**).

This report describes the site and its environs, the proposed development and includes an assessment of the proposal in terms of the matters for consideration as listed under Section

79C(1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Within this report, references to the 'subject site' mean the land to which this DA relates.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Background

The St Marys site was endorsed by the NSW Government for inclusion on the Urban Development Program (UDP) in 1993. The St Marys site is located approximately 45km west of the Sydney CBD, 5km north-east of the Penrith City Centre and 12km west of the Blacktown City Centre.

The St Marys site has an area of approximately 1,545ha and is approximately 7km east to west and 2km north to south. The site is bounded by Forrester Road and Palmyra Avenue in the east, The Northern Road in the west, Ninth Avenue and Palmyra Avenue in the north and the Dunheved Industrial Area, Dunheved Golf Club and Cambridge Gardens, Werrington Gardens and Werrington County residential estates in the south.

The St Marys site, which has been rezoned for a variety of uses, comprises 6 development precincts – Western, Central, North and South Dunheved, Ropes Creek and Eastern Precincts. Developable areas within these Precincts are shown on **Figure 1**.

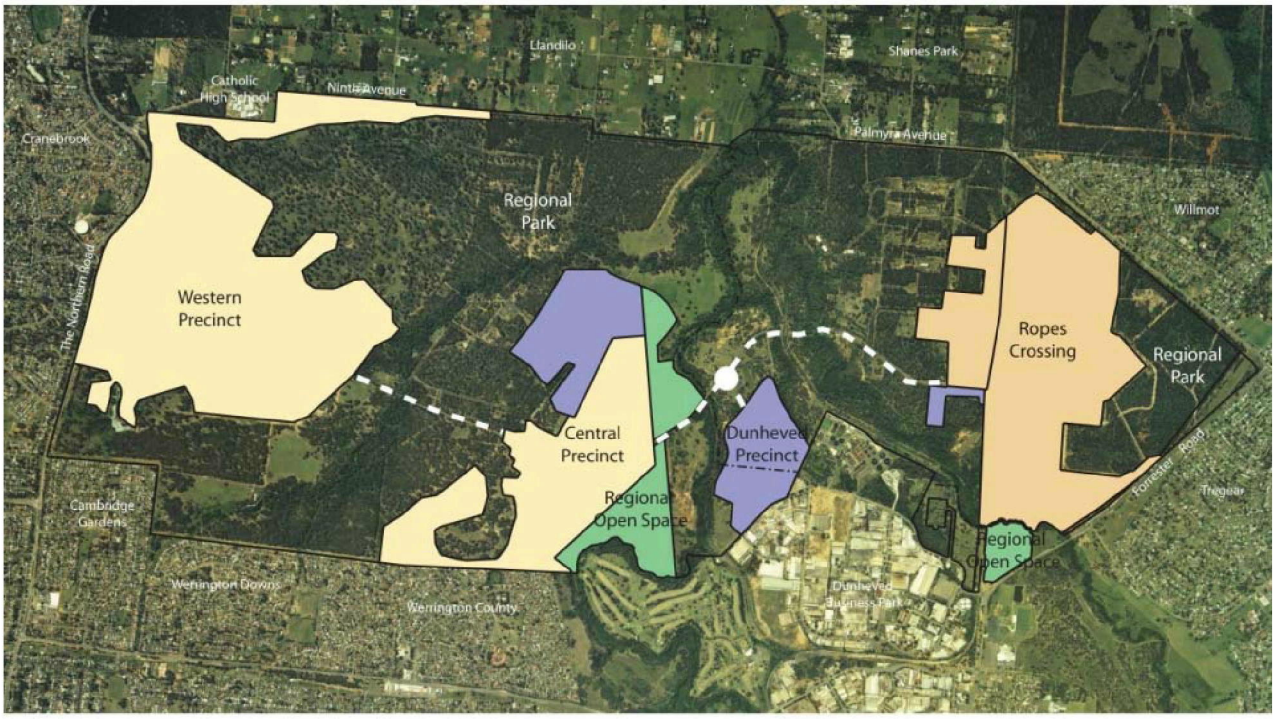

Figure 1 – St Marys Development Precincts

On 16 June 2003 the Minister for Infrastructure, Planning and Natural Resources announced the "release" of the Eastern, North and South Dunheved Precincts. Subsequently, on 29 September 2006, the Minister released the remaining precincts, allowing "Precinct Plans" to be released for each area.

A Precinct Plan for the Western Precinct (the WPP) and accompanying Development Control Strategy (DCS) were adopted by Penrith City Council on 23rd March 2009. Construction of roads, services, landscaping and housing has been undertaken. The WPP required the preparation and adoption by Council of a Concept Plan prior to the approval of any subdivision proposal within the Western Precinct. The Concept Plan provides the next level of specificity of detail in relation to the matters addressed in the WPP and is intended for use by Council as an assessment tool for the consideration of future DAs.

2.2 Site Description and Ownership

The land to which this DA refers is the suburb of Jordan Springs which comprises the Western Precinct of the St Mary's development. The site is owned by St Marys Land Limited and is being developed by Lend Lease under the name of Maryland Development Company.

The subject land of this DA is currently located in the following allotments:

- Part lot 19 in a subdivision of lot 8 in DP 1176874
- Part lot 19 in proposed lot 1 in a subdivision of proposed lot 3996, in a proposed further subdivision of lot 11 in DP1176163
- Lot 3995 in a proposed subdivision of lot 11 in DP1176163
- Lot 4000 in a proposed subdivision of lot 11 in DP1176163

These allotments have been created in previous Development Applications to subdivide the parent lot into the subject lots. The previously lodged Plans of Subdivision are included at **Appendix E**.

For site context, refer to **Appendix A** for the Site Location Plan.

2.3 Relevant Western Precinct Subdivision DAs

This DA will require consideration within the context of previous DAs lodged adjacent to the subject site (refer **Table 1**). The scope of each DA and its status is provided.

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Table 1- Associated Western Precinct subdivision DAs

Development Application	Proposal	Status
Stage 2A subdivision application (DA11/0514)	• 75 Residential lots, 1 public reserve, 5 residue lots and public roads	Approved 11th April 2012
Stage 2B subdivision application (DA11/0515)	• 70 Residential lots, 1 residue lot and public roads	Approved 11th April 2012
Stage 2C subdivision application (DA11/0516)	• 111 Residential lots, 1 residue lot and public roads	Approved 11th April 2012
Stage 2D subdivision application (DA11/0517)	• 102 Residential lots and public roads	Approved 11th April 2012
Stage 3A subdivision application (DA11/0511)	• 139 Residential lots, 7 residue lots and public roads	Approved 15th August 2011
Stage 3B subdivision application (DA11/0512)	• 138 Residential lots, 1 public reserve, 3 residue lots and public roads	Approved 15th August 2011
Retail Site subdivision application (DA11/1047)	• 3 residue lots	Approved 19th December 2011
Childcare Centre and CRH subdivision application (DA11/1360)	• 1 Childcare Centre site, 1 Community Resource Hub site and 1 residue allotment	Approved 2nd March 2012
Stage 1H subdivision application (DA11/1333)	• 29 residential lots	Approved 3rd April 2012
Riparian Corridor subdivision application (DA11/1088)	• 5 residue lots	Approved 13th November 2012
Living Street subdivision application (DA11/1094)	• 22 residential lots and public roads	Approved 10th October 2012
Mixed Use site 4-lot subdivision application (DA12/0101)	• 1 Mixed Use Development site, 1 future road reserve and 2 residue allotments	Approved 15th May 2012
Temporary Builders Display Village Car Park (DA12/0291)	• 1 temporary car park for the Builders Display Village	Approved 26th June 2012
Stage 4 subdivision application (DA12/0897)	• 292 lots, 1 public reserve and public roads	Approved 10th December 2012
Permanent Trunk Sewer EIS (DA12/0910)	• Construction of Sewer Main infrastructure	Approved 10th December 2012

3.0 DESCRIPTION OF PROPOSAL

This section of the report provides a detailed description of the proposed development. Specifically, the proposed landscape works are detailed as follows:

- Groundcover planting and scattered tree planting within the designated riparian channel;
- Lower embankment landscaping, incorporating groundcover and scattered tree planting;
- Upper embankment and buffer zone landscaping, incorporating groundcover, shrubs, canopy and midstorey plantings; and
- Shared paths, footpaths connecting to adjacent development areas and shelter construction located within the buffer zone and outside the 1 in 100 year flood level.

An additional DA is to be submitted concurrently with this subject DA for the channel construction and associated earthworks within the Riparian Corridor. Therefore, this subject DA will not provide comprehensive details for these works to be undertaken in the Riparian Corridor prior to the embellishment works.

3.1 Location of subject site

The subject site is located in the Central to South Eastern corner of the Western Precinct. It is encased by development areas on each boundary.

Refer to the Site Location Plan at **Appendix A**.

3.2 Existing site conditions

The Existing Site Conditions plan (refer **Appendix D**) illustrates that the proposed channel follows the natural gradient of the land in its existing condition.

There are existing trees on the subject site, as detailed on the Existing Site Conditions plan. Some trees will require removal as part of the construction of the channel. Details of the tree removal are included in the construction DA.

3.3 Consultation with Authorities

A pre-lodgement meeting was held between Lend Lease and Penrith City Council on Thursday 27th September 2012. Minutes from that meeting are yet to be provided by Council. The matters discussed are summarised below with an appropriate response provided in italics.

- Clarification is required for whether the areas will be dedicated as reserve or drainage reserve, and how this suits the planning agreement.

The correct title for the Riparian Corridor is drainage reserve. The land will be dedicated accordingly at a later stage through a linen plan to be lodged with Council.

- The footpath is required to be higher than the 1 in 100 year flood level.

The channels have been designed to cater for the 1 in 100 year flood level within the engineered banks. All footpaths are located above the banks, and therefore outside the flood level.

- If trees are to be retained in the Southern section of the North / South Riparian Corridor, water pooling is to be avoided.

The trees are earmarked for retention. Drainage of the site will occur through the retention of a small existing swale and a small drain to divert water into the channel. Refer to the Landscape Plans included at ***Appendix G****.*

- Retained trees must be adequately protected during construction.

Noted. Adequate separations and protection will be put in place prior to construction and landscape embellishment works.

- The links across the proposed channels must be above the 1 in 100 flood level.

Earthworks and culverts in the channels will ensure that the crossings are above the 1 in 100 level. Details are included in the channel construction DA.

- Play areas are to be avoided in the Riparian Corridor.

Noted. The overall inclusion of structures within the Riparian Corridor has been limited to some picnic tables, which are located on the east-west section, generally at the widest points of the Corridor.

- The shared path is to comply with the standard specifications.

The construction of the shared path is standard for Jordan Springs. The path is concrete, 2.5m wide and not linemarked.

- Planting densities will need to be provided in the Development Application.

Detailed information on vegetation types and planting densities are included in the Landscape Plans included at ***Appendix G****, and also in the Vegetation Management Plan at* ***Appendix H****.*

- Council will require a landscape Maintenance Manual prior to Construction Certificate.

The Vegetation Management Plan includes maintenance details for the Riparian Corridor, and is included at ***Appendix H****.*

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Consultation has also been undertaken with Greg Brady from NSW Office of Water (NOW) in relation to the Riparian Corridors and proposed channels, and its relationship with the future proposed East Lake, which will be the detention basin ultimately for all stormwater in the catchment prior to entering the Regional Park.

The Vegetation Management Plan (VMP) has been developed in consultation with NOW in relation to the construction and maintenance of the Riparian Corridors and associated stormwater treatment basins. The VMP is included at **Appendix H** for final endorsement and approval from both PCC and NOW.

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4.0 ASSESSMENT OF PLANNING ISSUES

Section 79C(1) of the Environmental Planning and Assessment Act 1979 declares that the Consent Authority, in assessing a DA, must take into account a range of issues relevant to the proposal, including the suitability of the site, and the impacts of the site and surrounds imposed by the proposal.

The following matters are reviewed in accordance with the proposed subdivision.

4.1 Flooding and Stormwater Drainage

The Water, Soils and Infrastructure Report that forms part of the WPP and prepared by SKM contains an analysis of the existing water, drainage and soil characteristics of the Western Precinct. The report establishes that the site is not affected by the Probably Maximum Flood level from the Hawkesbury Nepean River system, or the 100 year ARI level in South Creek, located to the west of the subject site.

The design details of the channels within the Riparian Corridor are provided in a separate DA, specifically for the channel construction and earthworks. The channels have been designed to contain a 100 year Average Recurrence Interval (ARI) rainfall event with a minimum of 500mm freeboard. Refer to the channel construction and earthworks DA for details.

4.2 Earthworks and Ground Contouring

Earthworks are not proposed as part of this DA. Bulk earthworks are proposed as part of the channel construction DA.

4.3 Erosion and Sediment Control

In accordance with the standard requirements of the NSW Office of Water, the composition of proposed landscape species and densities will achieve fast vegetative cover and root mass to maximise bed and bank stability along the corridor. Jute matting will be installed in addition to the planting to the 1 in 5 year flood event to stabilise the bank until the vegetation becomes established. The proposed plant species are specified in the VMP included at **Appendix H** and Landscape Plans at **Appendix G**.

4.4 Soil Salinity

The Soil and Water Management Plan contained within the Western Precinct Plan includes possible measures to address potential soil salinity issues, should they occur.

A salinity review has previously been undertaken for the entire Western Precinct by Geotech Testing Pty Ltd. This has been endorsed by Penrith City Council as part of previous DAs.

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4.5 Explosive Ordnance Material

In accordance with the Contamination Management Plan (CMP), processes are in place for when potential ordnance material is uncovered. These processes have previously been approved as part of the Western Precinct Plan by Penrith City Council.

4.6 Access

Footpaths and shared pedestrian / bicycle paths are proposed along the Riparian Corridor to provide important links throughout the subdivision. The proposed paths will connect with footpaths and street network within the adjacent residential areas, and across the east-west channel with a culvert crossing for pedestrians and cyclists.

The culvert crossing will increase accessibility between Village 4 and the proposed bus stop on Road 21. Additionally, the proposed paths will provide direct links between the adjacent residential areas and the town centre.

Shared paths will be 2.5m wide in accordance with the Development Control Strategy. The path gradients have been designed to comply with DDA standards where required.

4.7 Landscaping and Maintenance

The proposed species mix for the Riparian Corridor is detailed in Table 3.3 in the VMP, included at **Appendix H**. Proposed landscaping will comprise the following species:

- **Canopy and Midstorey –** Grey (swamp) sheoak (*Casuarina glauca)*, Cabbage Gum (*Eucalyptus amplifolia)*, Broad Leafed Apple (*Angophora subvelutina)*, Prickly-Leaved Tea Tree (*Melaleuca styphelioides)*, Snow-in-summer (*Melaleuca linariifolia)* and Blue Box (*Eucalyptus baueriana)*;

- **Shrub Layer –** Sydney Green Wattle (*Acacia parramattensis)*, Blackthorn (*Bursaria spinosa)*, Scarlet Bottlebrush (*Callistemon citrinus)*, Old Man's Beard (*Clematis aristata)*, Common Hop Bush (*Dodonea triquetra)*, Prickly Grevillea (*Grevillea juniperina)*, Neddlebush (*Hakea teretifilia)*, Tick Bush (*Kunzea ambigua)*, Lemon Scented Tea Tree (*Leptospermum polygalifolium)* and Native Peach (*Trema aspera)*;

- **Riparian Edge Planting (to top of bank) –** Common Rush (*Juncus usitatus)*, Tall Sedge (*Carex appressa)*, Tall Flat Sedge (*Cyperus exaltatus)*, Gahnia (*Gahnia sieberiana)* and Spiny-Headed Mat Rush (*Lomandra longifolia)*; and

- **Terrestrial Batter Grass Mix –** Scented-top Grass (*Cappillipedium spicigerum)*, Tall Sedge (*Carex appressa)*, Barbed Wire Grass (*Cymbopogon refractus)*, Long Leaved Wallaby Grass (*Danthonia longifolia)*, Lavender Grass (*Eragrostis elongata)*, Spiny-Headed Mat Rush (*Lomandra longifolia)*, Weeping Grass (*Microlaena stipoides)* and Tussock Grass (*Poa labillardierii)*.

The location, density and mix of species in different zones of the Riparian Corridor is detailed on the Landscape Plans, prepared by Environmental Partnership, and included at **Appendix G**.

The VMP contains the proposed maintenance regimes for the vegetation within the proposed Riparian Zones. It is intended that the regimes specified in the VMP will be implemented in perpetuity to ensure the health of the Riparian Corridor as a diverse vegetation community. Refer to section 7 at **Appendix H**.

The banks of the channels will have a gradient of no greater than 1 in 4 to ensure ease of maintenance. Details are provided in the channel construction DA lodged concurrently with the subject DA.

4.8 Tree Removal

Tree removal is not proposed as part of this DA. The Riparian Corridor channel construction and earthworks DA includes tree removal as part of the proposed associated works.

4.9 Ecology

The Vegetation Management Plan (VMP) prepared by Environmental Partnership applies to the riparian Corridor and associated drainage and vegetation corridors in the Western Precinct, and is included at **Appendix H**. The VMP details the revegetation and management strategies for the Riparian Zones. The aims of the strategies are to:

- emulate the indigenous plant community that would have existed on the site prior to the modification of the land;
- provide fast surface coverage and root mass to stabilise the banks and bed of the channel to provide sufficient erosion and sediment control;
- restore the ecosystem and promote genetic diversity and integrity within the corridors; and
- reduce the proliferation of weeds to manageable and sustainable levels.

A Species Impact Statement (SIS) for the Riparian Corridor has been prepared by Cumberland Ecology and is included in the channel construction and earthworks DA.

4.10 Heritage

There are 4 European Heritage items located within the Western Precinct, as listed under SREP30. The subject site is not located in the vicinity of any of these heritage items.

An Aboriginal Heritage Assessment has previously been undertaken by Jo McDonald Cultural Heritage Management Pty Ltd, and an associated report produced in 2008 titled *Archaeological assessment of Indigenous Heritage values in the Western Precinct of the St. Marys Site, St*

Marys. Subsequently, an Aboriginal Heritage Impact Permit (AHIP) has been granted for the whole of the Western Precinct. The AHIP includes the subject development site.

4.11 Contamination

The St Marys Precinct has been subject to extensive investigation and remediation to ensure that the land is suitable for development. The Environmental Protection Agency (EPA), now DECCW, has been involved in the process of preparing the Site Audit Statements (SAS) for the Precinct. The specific SAS which encompasses the subject site is CHK001/1. A copy of this SAS has been submitted to Penrith City Council previously.

4.12 Crime Prevention through Environmental Design (CPTED)

The proposal has been designed with CPTED principles in mind. Opportunities for passive surveillance have been incorporated into all facets of the design to maximise safety and security in the Riparian Corridor for all users by maximising natural and passive surveillance opportunities.

The Riparian Corridor is in close proximity to future adjacent residential allotments within Stage 4 and adjoining road networks. In this regard, these locations will provide good natural surveillance of the space and those using the space. This level of visibility is expected to reduce the incidence of vandalism of fixtures and landscape elements, and reduce the potential for other crime in this openly visible area.

In addition, the Riparian Corridor will be affected by light spill from street lighting to ensure visibility and adequate sightlines along the shared paths.

The embellishments and associated street buffer planting will be of high quality such that it is expected to be frequently visited by residents and visitors, and therefore provide a pleasant and vibrant place for residents and visitors.

A further assessment of CPTED principles is included in Section 5 below.

4.13 Site Suitability

The proposed development is considered suitable and within the interest of the public in that it:

- Is permissible within the Urban Zone;
- Provides a high level of amenity for the future residents within Jordan Springs and the surrounding areas;
- Provides access links through shared paths to interconnect with adjacent residential areas;
- Provides an attractive character contributing to the identity of Jordan Springs;

- Provides high quality embellished open space for the use of residents of both Jordan Springs and the adjoining residential areas; and

- Promotes Jordan Springs as a pleasant, attractive, vibrant and safe place to live and visit.

4.14 Social and Economic Impacts

The proposed development will provide an important recreational open space asset to the wider community, in addition to the residents of Jordan Springs. It will provide the positive flow on effects within the area that a well-designed public space can create, including an increased sense of community, sense of place and a healthy and active community.

The proposal is in accordance with the development framework established under SREP 30 for the Precinct, which, on the whole, is delivering economic development and employment opportunities. Further, the proposed development will continue the utilisation of construction jobs as well as longer term economic benefits associated with flow on effects from establishing a new residential community.

4.15 The public interest

The proposed development is consistent with the Development Control Strategy and Western Precinct Plan. These documents have been subject to public exhibition and assessment by Penrith City Council, leading to its subsequent adoption. The proposal represents Council's planning objectives for the Western Precinct.

5.0 DEVELOPMENT ASSESSMENT UNDER RELEVANT PLANNING INSTRUMENTS AND CONTROLS

Section 79C(1) of the Environmental Planning and Assessment Act states that the consent authority must take into account a range of matters relevant to the development in determining an application, and specifically the provisions of environmental planning instruments.

The following planning instruments and documents are relevant to the proposed development:

- St Marys Development Agreement and St. Marys Penrith Planning Agreement (The Deed);
- Sydney Regional Environmental Plan No. 30 – St Marys (SREP 30);
- St Marys Environmental Planning Strategy (St Marys EPS);
- Western Precinct Plan (including Development Control Strategy and Concept Plan); and
- Penrith Development Control Plan 2006 (DCP).

The following assessment of these instruments only includes those matters under Section 79C(1) that are relevant to the proposal. These planning instruments have been used to determine the social, economic and natural and built environmental impacts.

5.1 St. Marys Development Agreement and St Marys Penrith Planning Agreement

The St Marys Penrith Planning Agreement details the local contributions and obligations as agreed with Penrith City Council which need to be addressed in the development proposal.

The proposal is compliant with the requirements under the St. Marys Penrith Planning Agreement in that it:

- Is consistent with the Open Space Master Plan, which identifies the location of the Riparian Corridor; and

- Contains a 2.5m wide off-road shared path network consistent with the pedestrian and cycle network plan.

The St Marys Development Agreement details the State contributions as agreed with the State Government which need to be addressed in the development proposal. There are no requirements which are relevant to this specific proposal.

5.2 Sydney Regional Environmental Plan No. 30 – St Marys (SREP 30)

SREP 30 contains planning objectives, principles and provisions to control development within the Precincts shown in figure 1. Overall, the proposal is not inconsistent with the achievement of the performance or zone objectives, and reflects the aims of the development control strategies of SREP 30.

The site is zoned Urban under DREP 30. The proposed embellishments to the Riparian Corridor are ancillary development to the permissible uses of parks. The proposal is consistent with the performance objectives prescribed within Part 5 of SREP 30 in that it:

- Contributes to the range of facilities provided for passive open space and recreation;
- Supports the provision of open space in areas that are highly accessible by the surrounding community;
- Retains stands of significant trees within the Riparian Corridor where possible;
- Does not impact the heritage significance of items of environmental heritage and their settings; and
- Utilises effective erosion and sediment control measures in accordance with industry standards.

5.3 St Marys Environmental Planning Strategy (St Marys EPS)

The St Marys EPS establishes guidelines and strategies for the future development of land under SREP 30, specifically in relation to matters of conservation, cultural heritage, water cycle and soils, transport, urban form, energy and waste, human services, employment and contamination.

Section 8 in the EPS identifies the urban form objectives for the St. Marys site. In accordance with these objectives, the proposal will:

- Result in an attractive and safe environment which satisfies the need for community recreational facilities;
- Protect stands of significant and native vegetation on site where practicable;
- Define the boundary of villages and development areas, rather than dissect the community; and
- Includes existing mature trees which do not prevent surveillance from nearby residences.

5.4 St Marys Western Precinct Plan (WPP)

The Western Precinct Plan (WPP) identifies the distribution of major land uses including the location and function of open space and public facilities within the Western Precinct.

The proposal is generally compliant with the objectives specified in the WPP, specifically Section 4.11 *Water Cycle and Soils*, in that it:

- Provides shared pedestrian and cycle paths linking with the town centre and key community facilities;
- Provides a linkage to the broader path network and commuter cycle networks beyond Jordan Springs;
- Increases accessibility to the bus stop on Road 21 for residents in Village 4;
- Utilises local native plant species in the landscape design to emulate the native vegetation communities in the area;
- Reduces the existing weed populations, and minimises the potential for weeds and exotic vegetation infestation through management and monitoring as detailed in the VMP;
- Provides a high amenity, high quality passive recreation space in accordance with the Open Space Masterplan;
- Proposes a vegetated buffer to protect the environmental integrity of the Core Riparian Zone; and
- Proposes a limited scope of works which relates only to the creation of the Riparian Corridor.

The WPP states that the Open Space and Landscape Masterplan prepared by Environmental Partnerships sets the direction for the landscaping of public domain areas of the Western Precinct. This Masterplan forms part of the WPP and contains guidelines for the provision of landscaping and streetscape embellishments. The guidelines contained in Section 3.0 of the Landscape Masterplan are of relevance to the proposed development and are addressed below.

In accordance with Section 3.2(h) of the Landscape Masterplan, the proposed works will:

- Provide an area of passive recreation for adjoining residential areas;
- Optimise use of existing tree canopy; and
- Provide a natural / suburban presentation with Bushland landscape character which reflect the natural vegetation systems of the Regional Park.

Further to providing a quantum of quality open space for the adjacent residential areas, the proposed embellishments support integrated access routes by providing shared 2.5m wide concrete path for shared pedestrian / cycleway access.

In light of the above, the proposed development is consistent with the relevant sections of the Precinct Plan and Landscape Masterplan.

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5.5 Western Precinct Development Control Strategy (DCS)

The DCS contains specific development standards for urban design, built form and environmental management to ensure the implementation of the development principles as specified in the WPP.

In accordance with the requirements in the DCS, the proposal will:

- Be consistent with the Landscape Character as defined in Section 5.3.1;
- Incorporate CPTED principles in accordance with Penrith City DCP 2006 (refer to Section 5.6 below);
- Maintain adequate sight lines for vehicles on public roads, particularly around the corners of the subject site;
- Maximise actual and perceived safety in the Riparian Corridor through the use of specific vegetation types and planting around the edges to ensure surveillance from the adjacent residential areas; and
- Enhance the character and appearance of the public domain, whilst minimising ongoing maintenance requirements.

5.6 Penrith Development Control Plan 2006 (DCP)

The 2006 DCP was amended in 2010, however the subject site is located on land which was excluded from the Penrith Development Control Plan 2010. Where the Precinct Plan does not specify development objectives, the DCP will provide guiding principles.

A review of the relevant criteria of the Penrith Development Control Plan 2006 confirms that the proposed development is consistent with the relevant controls and objectives of all Parts in the 2006 DCP. In accordance with the CPTED principles defined in Section 2.2, the proposal will:

- Ensure clear sight lines between the public realm and the private homes adjacent to the Riparian Corridor;
- Avoid the creation of hiding places for offenders with direct paths and visually permeable landscaping;
- Include a number of access points to the Riparian Corridor for pedestrians; and
- Provide a landscaped area which is both attractive and low maintenance.

Additionally, the proposal is consistent with the landscape principles stated in Section 2.6, particularly as follows:

- Use of native species to identify with the local area;
- Use of quality and long lasting materials to minimise maintenance;
- Providing equal access in accordance with DDA requirements for paths; and
- Undertaking landscape works in accordance with Council's guidelines.

The proposal also demonstrates compliance with Section 2.4 of the DCP by providing detailed landscape information for the site in order to rehabilitate the Riparian Corridor after construction of the channels, and prevent sedimentation and erosion of the waterways downstream.

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6.0 Conclusion

The proposed development is consistent with the objectives and controls within the planning instruments relevant to this site.

The proposal is in accordance with the Development Control Strategy and Western Precinct Plan, and represents Council's planning objectives for the Western Precinct. Under SREP 30 objectives, the proposal is permissible with consent according to clause 40, and is consistent with the Urban Zone objectives.

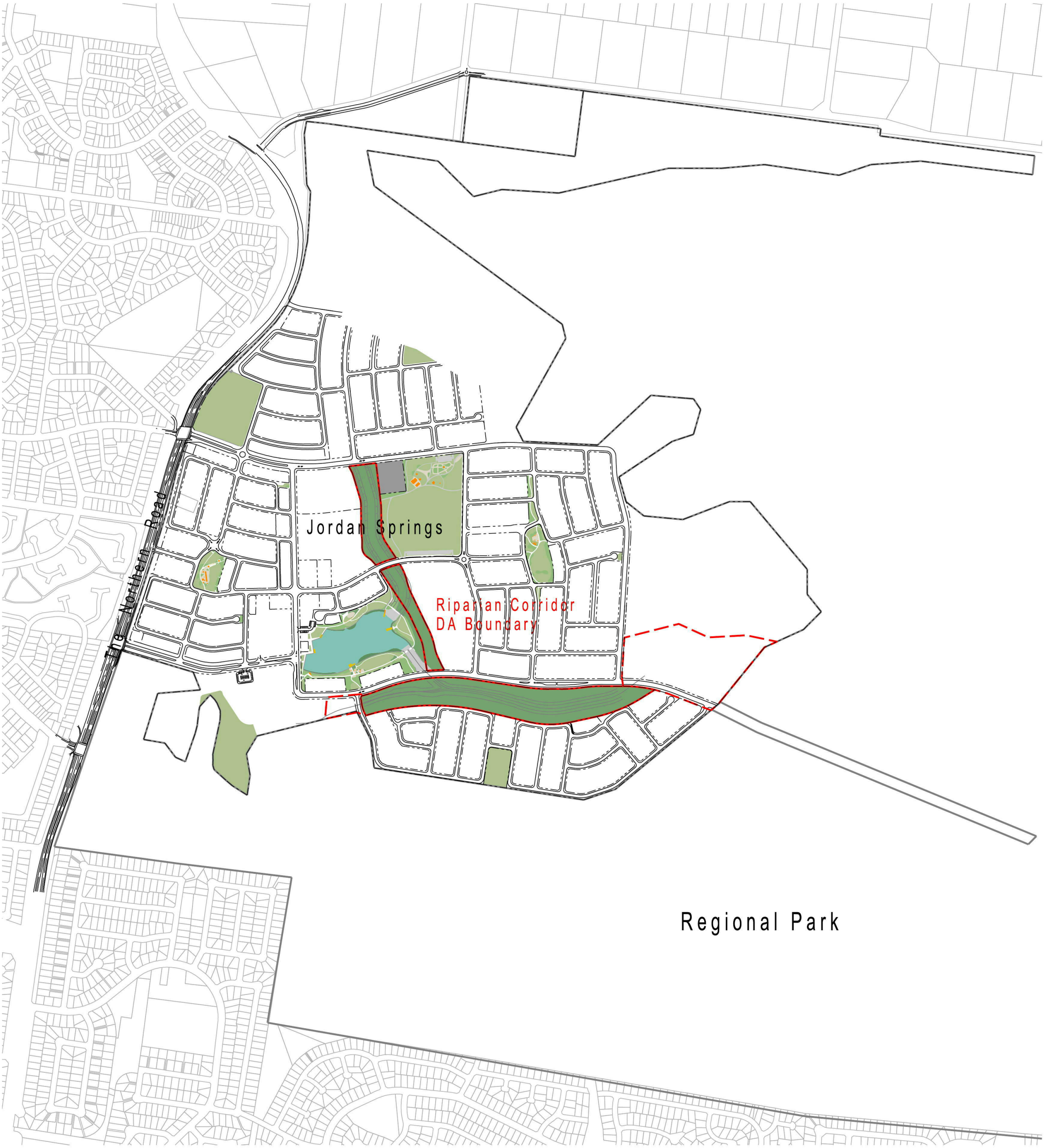
In light of the merits of the proposal, and in absence of any significant adverse environmental, social or economic impacts, we request that the application be approved, subject to appropriate conditions of consent.

Should you require further clarification on any of the above items or require additional plans or documentation, please do not hesitate to contact me on 0439 094 730.

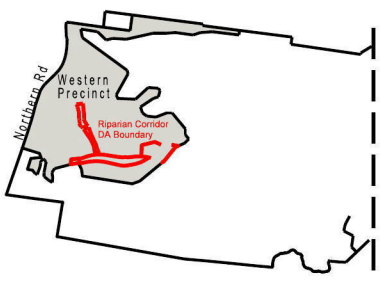
Yours faithfully,

Angus Fulton
Statutory Planner
COMMUNITIES

Appendix A
Location Plan, prepared by Lend Lease



KEY PLAN



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NOTES

Issue	Amendment	Date
A	Council Lodgement Issue	11.01.13

LEGEND

DA Boundary

Developer

Lend Lease

Cnr Jordan Springs Blvd and Lakeside Pde
Jordan Springs NSW 2747
PO Box 1870, Penrith NSW 2751
p.02 8016 6500

ABN 19 087 876 864

Development Manager: Lend Lease Development Pty Ltd

Project

JORDANSPRINGS

Drawing Title

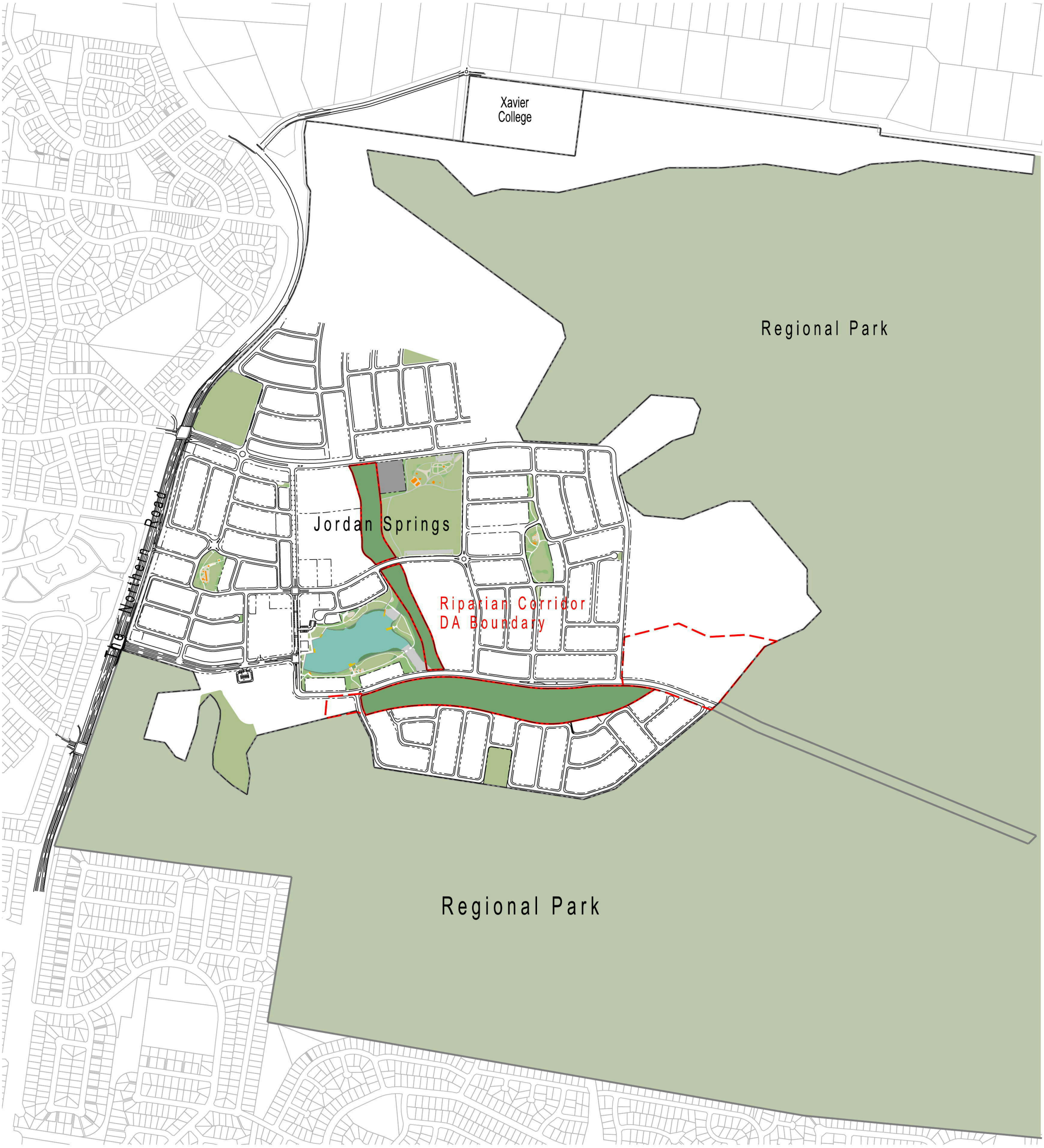
Riparian Corridor DA Location Plan

Scale AT A3	1:10000
Drawn by	RS/LM
Drawing No.	WP TNROval Loc

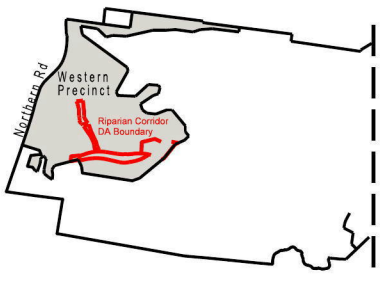
Issue A

Lend Lease

Appendix B
Neighbour Notification Plan, prepared by Lend Lease



KEY PLAN



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NOTES

Issue	Amendment	Date
A	Council Submission Issue	11.01.13

LEGEND

DA Boundary

Developer

Lend Lease

Cnr Jordan Springs Blvd and Lakeside Pde
Jordan Springs NSW 2747
PO Box 1870, Penrith NSW 2751
p.02 8016 6500

ABN 19 087 876 864

Development Manager: Lend Lease Development Pty Ltd

Project

JORDANSPRINGS

Drawing Title

Riparian Corridor DA

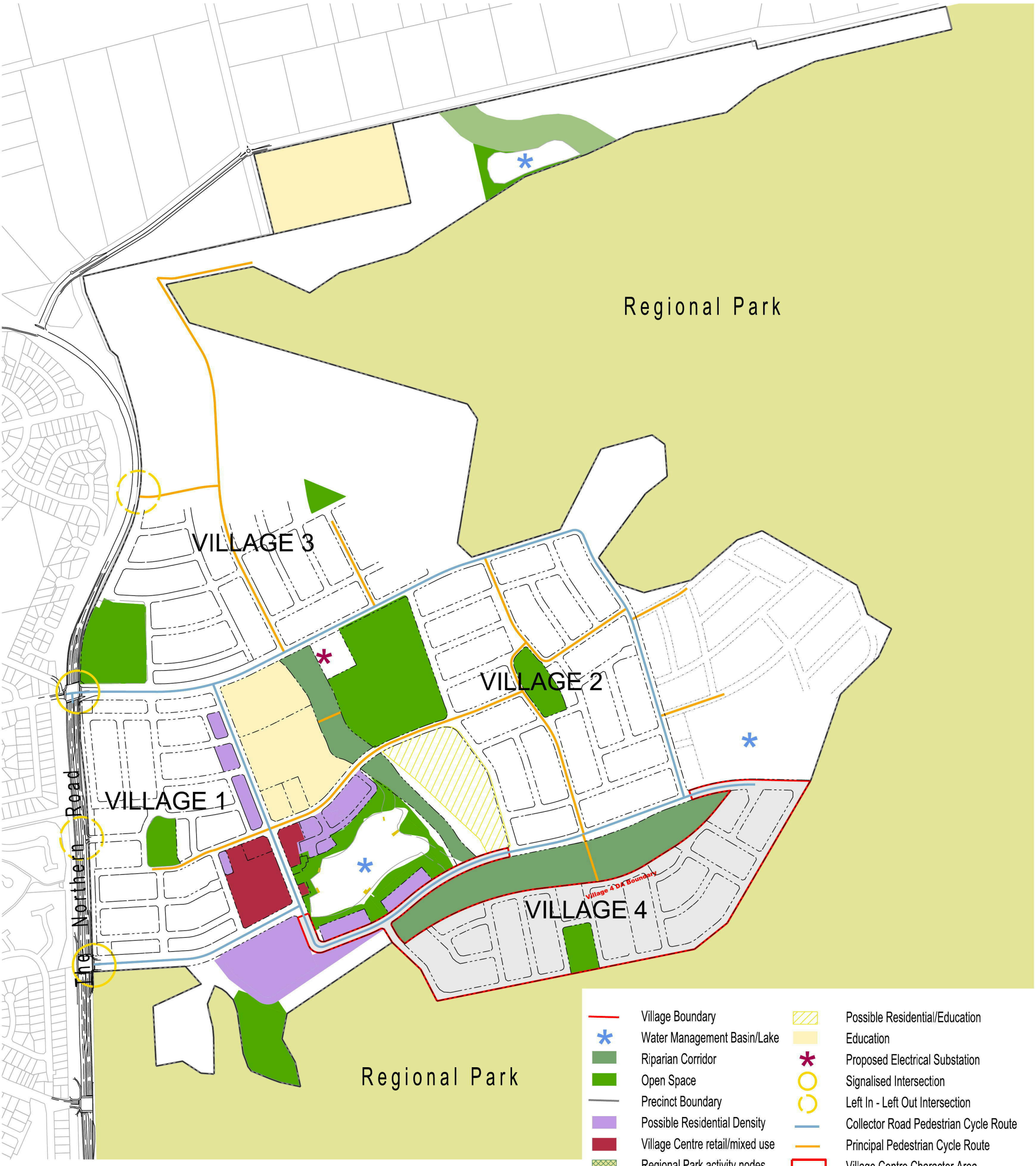
Neighbour Notification Plan

Scale AT A3	1:10000
Drawn by	RS/LM
Drawing No.	WP OA Rip Notification

Issue A

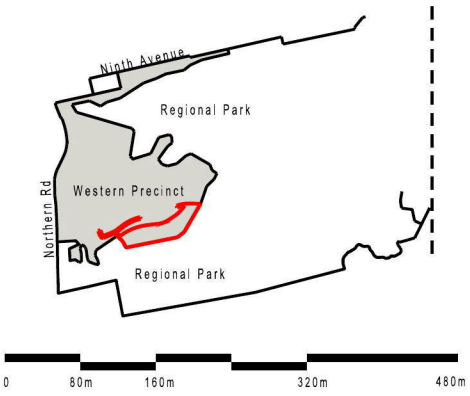
Lend Lease

Appendix C
Jordan Springs Concept Plan, prepared by Lend Lease



Note: Plan indicative only subject to change at DA Stage.

KEY PLAN



NOTES

Issue	Amendment	Date
A	Council Submission Issue	11.09.12
B	Council Submission Issue - AMENDED	10.01.13

LEGEND

DA Boundary

Developer

Lend Lease

Cnr Jordan Springs Blvd and Lakeside Pde
Jordan Springs NSW 2747
PO Box 1870, Penrith NSW 2751
p.02 8016 6500
ABN 19 087 876 864

Development Manager: Lend Lease Development Pty Ltd

Project

JORDANSPRINGS

Drawing Title

Village 4 DA

Concept Plan

Scale AT A3	1:8000
Drawn by	RS/LM
Drawing No.	WP Concept for SIS

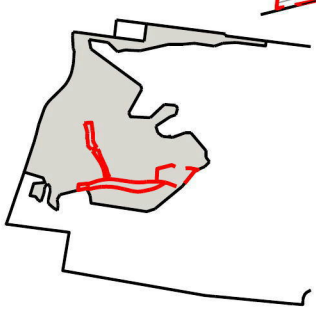
Issue B

Lend Lease

Appendix D
Existing Conditions Plans, prepared by Lend Lease

Riparian Corridor DA Boundary

KEY PLAN



0 20m 40m 80m 120m

NOTES

Issue	Amendment	Date
A	Council Lodgement	14.12.12

NOTES

DA Boundary

Existing tree

35.0 Existing contour

Top of bank

Bottom of bank

Existing structure/road

Developer

Lend Lease

Ropes Crossing Boulevard,
Ropes Crossing NSW 2760
p.02 9673 8800 f.02 9673 8888

ABN 88 000 966 085 ©

Development Manager: Lend Lease Development Pty Ltd

Project

JORDANSPRINGS

Drawing Title

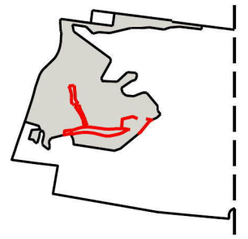
Riparian Corridor DA (N/S)

Existing Conditions Plan

Scale AT A3	1:2000
Drawn by	RAS
Drawing Number	WP OA RiparianNS EC

Issue A

KEY PLAN



Issue	Amendment	Date
A	Council Lodgement	11.01.13

NOTES

DA Boundary

Existing tree

35.0 Existing contour

Top of bank

Bottom of bank

Existing structure/road

Developer

Lend Lease

Ropes Crossing Boulevard,
Ropes Crossing NSW 2760
p.02 9673 8800 f.02 9673 8888

ABN 88 000 966 085 ©

Development Manager: Lend Lease Development Pty Ltd

Project

JORDANSPRINGS

Drawing Title

Riparian Corridor (E/W)

Existing Conditions Plan

Scale AT A3	1:3000
Drawn by	RAS
Drawing Number	WP OA RiparianEW EC

Issue A

0 10m 20m 40m 60m

Lend Lease

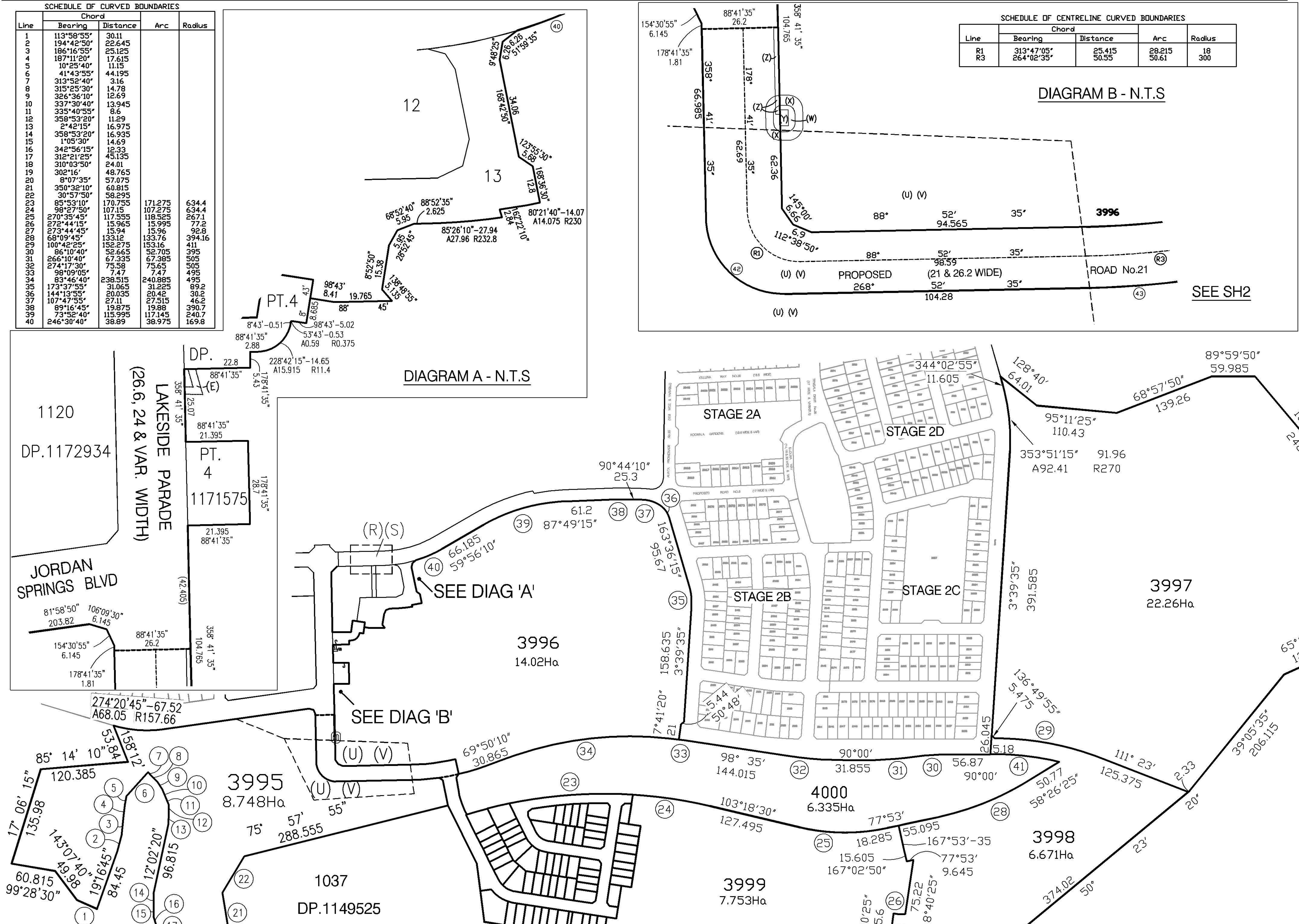
Appendix E
Previously lodged Plans of Subdivision, prepared by Whelans Insites

SCHEDULE OF CURVED BOUNDARIES

Line	Chord Bearing	Chord Distance	Arc	Radius
1	113°58′55″	30.11		
2	194°42′50″	22.645		
3	186°16′55″	25.125		
4	187°11′20″	17.615		
5	10°25′40″	11.15		
6	41°43′55″	44.195		
7	313°52′40″	3.16		
8	315°25′30″	14.78		
9	326°36′10″	12.69		
10	337°30′40″	13.945		
11	335°40′55″	8.6		
12	358°53′20″	11.29		
13	2°42′15″	16.975		
14	358°53′20″	16.935		
15	1°05′30″	14.69		
16	342°56′15″	12.33		
17	312°21′25″	45.135		
18	310°03′50″	24.01		
19	302°16′	48.765		
20	8°07′35″	57.075		
21	350°32′10″	60.815		
22	30°57′50″	58.295		
23	85°53′10″	170.755	171.275	634.4
24	98°27′50″	107.15	107.275	634.4
25	270°35′45″	117.555	118.525	267.1
26	272°44′15″	15.965	15.995	77.2
27	273°44′45″	15.94	15.96	92.8
28	68°09′45″	133.12	133.76	394.16
29	100°42′25″	152.275	153.16	411
30	86°10′40″	52.665	52.705	395
31	266°10′40″	67.335	67.385	505
32	274°17′30″	75.58	75.65	505
33	98°09′05″	7.47	7.47	495
34	83°46′40″	238.515	240.885	495
35	173°37′55″	31.065	31.225	89.2
36	144°13′55″	20.035	20.42	30.2
37	107°47′55″	27.11	27.515	46.2
38	89°16′45″	19.875	19.88	390.7
39	73°52′40″	115.995	117.145	240.7
40	246°30′40″	38.89	38.975	169.8

SCHEDULE OF CENTRELINE CURVED BOUNDARIES

Line	Chord Bearing	Chord Distance	Arc	Radius
R1	313°47′05″	25.415	28.215	18
R3	264°02′35″	50.55	50.61	300



(E) EASEMENT TO DRAIN WATER 2.5 WIDE D.P. 1176163
(W) RESTRICTION ON THE USE OF LAND D.P. 1155647
(X) RESTRICTION ON THE USE OF LAND D.P. 1155647
(Y) EASEMENT FOR PADMOUNT SUBSTATION 2.85 WIDE D.P. 1155647
(Z) EASEMENT FOR UNDERGROUND CABLES 1.5 WIDE D.P. 1155647
(R) RESTRICTION ON THE USE OF LAND D.P. 1149528
(S) POSITIVE COVENANT D.P. 1149528
(U) RESTRICTION ON THE USE OF LAND D.P. 1149525
(V) POSITIVE COVENANT D.P. 1149525

KEY PLAN

Issue	Amendment	Date
A	AMEND LOTS 4040 TO 4082	4-9-12
B	ADD ACCESS EASMTS	8-9-12
C	AMEND HEADING	27-9-12

NOTES

NO BOUNDARY SURVEY HAS BEEN UNDERTAKEN. DIMENSIONS AND AREA(S) SHOWN ARE APPROXIMATE ONLY AND ARE SUBJECT TO CONFIRMATION BY BOUNDARY SURVEY

LOT NUMBERING IS SUBJECT TO CHANGE ON PREPARATION OF FINAL DEPOSITED PLAN.
ORIGIN OF MGA BASED SITE CO-ORDINATES FROM PM 147113 AND PLANE DISTANCES HAVE BEEN USED.
CO-ORDINATES FOR PM 147113 WERE DEDUCED BY WHELANS FROM SUROUNDING SSM & PM'S ON PUBLIC RECORD. CO-ORDINATES FOR PM 147113 HAVE BEEN ADOPTED AS 292202.160E 6266005.820N

Developer
Lend Lease

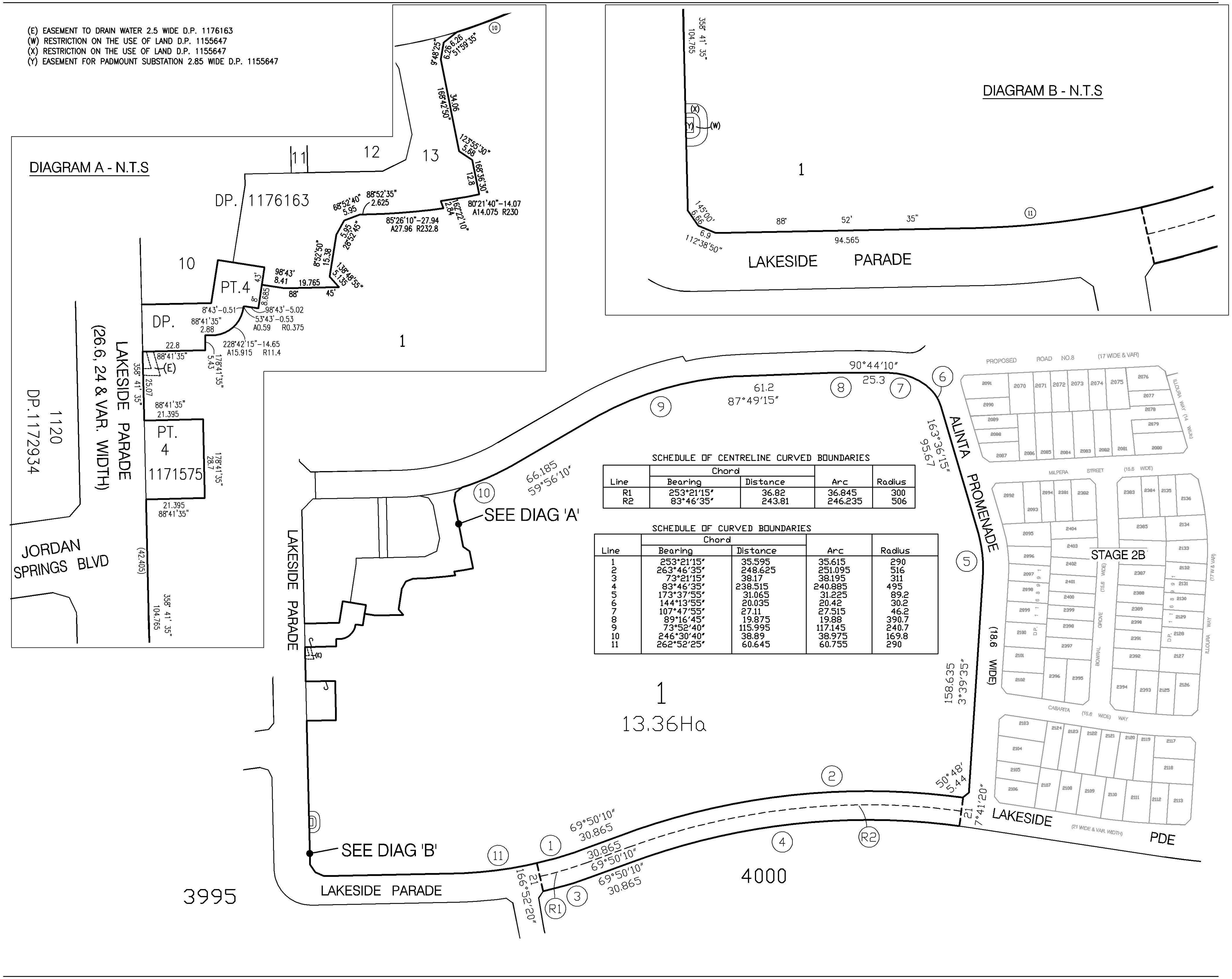
Prepared by
WHELANS INSITES
D646-V4-001c.dwg

Project
St Marys Development
Western Precinct - VILLAGE 4 STG A

Drawing Title
PLAN OF SUBDIVISION OF LOT 11 IN DP. 1176163

0 10m 20m 50m 100m

CCAD REF: D646-V4 — SHEET 1 OF 2
Scale 1:2500 @ A1 — DATE: 24-8-12
Drawn: LAS
Checked: JMcW
Job No: D646
Drawing Number: D646-V4-001c
Project Web DCR No.: W
Issue: C



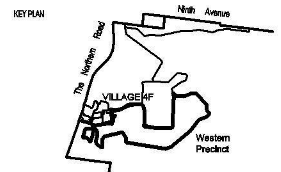
SCHEDULE OF CENTRELINE CURVED BOUNDARIES

Line	Chord		Arc	Radius
	Bearing	Distance		
R1	253°21′15″	36.82	36.845	300
R2	83°46′35″	243.81	246.235	506

SCHEDULE OF CURVED BOUNDARIES

Line	Chord		Arc	Radius
	Bearing	Distance		
1	253°21′15″	35.595	35.615	290
2	263°46′35″	248.625	251.095	516
3	73°21′15″	38.17	38.195	311
4	83°46′35″	238.515	240.885	495
5	173°37′55″	31.065	31.225	89.2
6	144°13′55″	20.035	20.42	30.2
7	107°47′55″	27.11	27.515	46.2
8	89°16′45″	19.875	19.88	390.7
9	73°52′40″	115.995	117.145	240.7
10	246°30′40″	38.89	38.975	169.8
11	262°52′25″	60.645	60.755	290

KEY PLAN



Issue	Amendment	Date
-		
B	AMEND HEADING	27-9-2012

NOTES

NO BOUNDARY SURVEY HAS BEEN UNDERTAKEN. DIMENSIONS AND AREA(S) SHOWN ARE APPROXIMATE ONLY AND ARE SUBJECT TO CONFIRMATION BY BOUNDARY SURVEY

LOT NUMBERING IS SUBJECT TO CHANGE ON PREPARATION OF FINAL DEPOSITED PLAN.
ORIGIN OF MGA BASED SITE CO-ORDINATES FROM PM 147113 AND PLANE DISTANCES HAVE BEEN USED.
CO-ORDINATES FOR PM 147113 WERE DEDUCED BY WHELANS FROM SUROUNDING SSM & PM'S ON PUBLIC RECORD. CO-ORDINATES FOR PM 147113 HAVE BEEN ADOPTED AS 292202.160E 6266005.820N

Developer

Lend Lease

St Marys NSW 2760

Prepared by

WHELANS INSITES Rapes Crossing

D646-V4-006b.dwg

Project

St Marys Development
Western Precinct - VILLAGE 4 STG F

Drawing Title

PLAN OF SUBDIVISION OF LOT 3996
A SUBDIVISION OF LOT 11
IN DP. 1176163

0 10m 20m 50m 100m

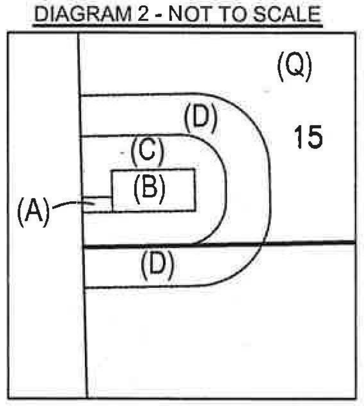
CCAD REF: D646-V4 | SHEET 1 OF 1
Scale 1:2500 @ A1 | DATE: 4-9-12
Drawn LAS
Checked JMcW
Job No D646
Drawing Number D646-V4-006b
Project Web DCR No. W
Issue B

Issue	Amendment	Date
A	ADD [illegible]	
B	REMOVE [illegible] LOTS FROM SUBDIVISION	[illegible]

SCHEDULE OF CURVED BOUNDARIES

Line	Chord Bearing	Chord Distance	Arc	Radius
1	79°21'20"	95.925	96.37	290
2	220°42'15"	14.14	15.355	11
3	76°59'25"	120.525	120.86	516
4	246°30'40"	30.89	30.975	169.8
5	70°34'52"	55.495	55.815	150.2
6	93°37'25"	73.68	73.745	516
7	359°00'55"	13.01	13.015	206.5
8	62°21'35"	20.365	20.37	240.7
9	61°52'25"	17.605	17.605	260.3
10	162°59'25"	34.355	34.465	125
11	332°39'20"	30.315	31.5	33
12	131°50'20"	11.37	11.395	50
13	86°50'15"	40.47	40.49	516
14	342°17'40"	25.17	25.235	100
15	71°41'30"	57.895	58.035	240.7
16	175°59'55"	13.955	13.97	100
17	161°09'35"	58.185	58.395	200
18	70°27'05"	60.2	60.335	260.3
19	348°30'55"	36.505	36.57	175
20	355°47'25"	26.46	26.48	200
21	157°07'10"	49.725	49.965	152.5
22	77°39'50"	5.195	5.195	260.3
23	83°12'35"	30.7	30.74	240.7
24	343°00'15"	44.515	45.14	70
25	83°10'05"	41.62	41.665	256.5
26	103°56'25"	11.445	11.475	49
27	171°30'	19.365	19.425	70
28	267°40'35"	76.92	77	401
29	89°16'45"	19.075	19.08	390.7
30	89°16'45"	20.60	20.60	406.5
31	173°37'55"	31.065	31.225	89.2
32	107°47'55"	27.11	27.515	46.2
33	93°31'	19.405	19.41	200
34	144°13'55"	20.035	20.42	30.2
35	233°20'20"	19.715	21.675	14.5

DIAGRAM 2 - NOT TO SCALE



(A) EASEMENT FOR UNDERGROUND CABLES 1 WIDE (D.P. 1168994)
(B) EASEMENT FOR PADMOUNT SUBSTATION 2.75 WIDE (D.P. 1168994)
(C) RESTRICTION ON THE USE OF LAND (D.P. 1168994)
(D) RESTRICTION ON THE USE OF LAND (D.P. 1168994)
(E) POSITIVE COVENANT (DP. 1158660)
(JJ) POSITIVE COVENANT (DP. 1168994)
(KK) POSITIVE COVENANT (DP. 1168995)
(Q) RESTRICITION ON THE USE OF LAND (DP. 1149528)

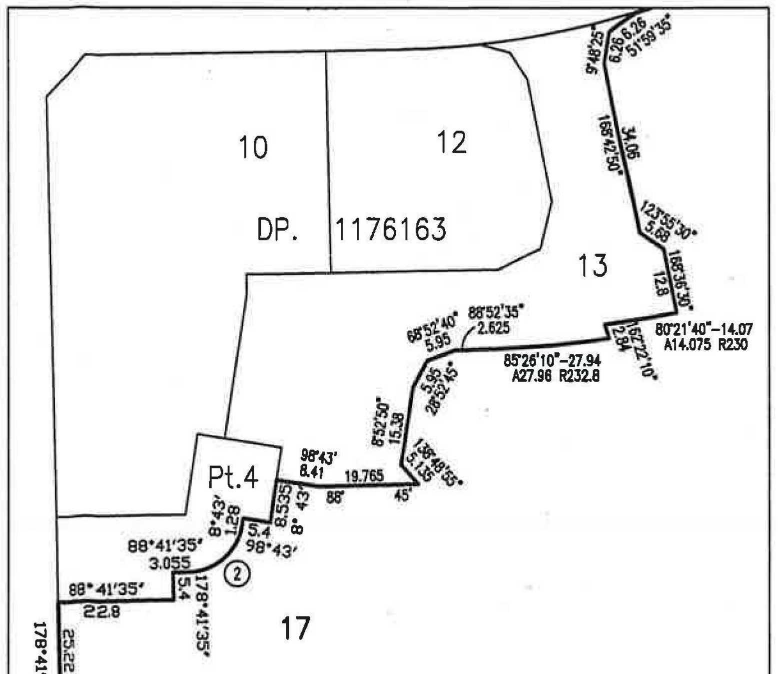
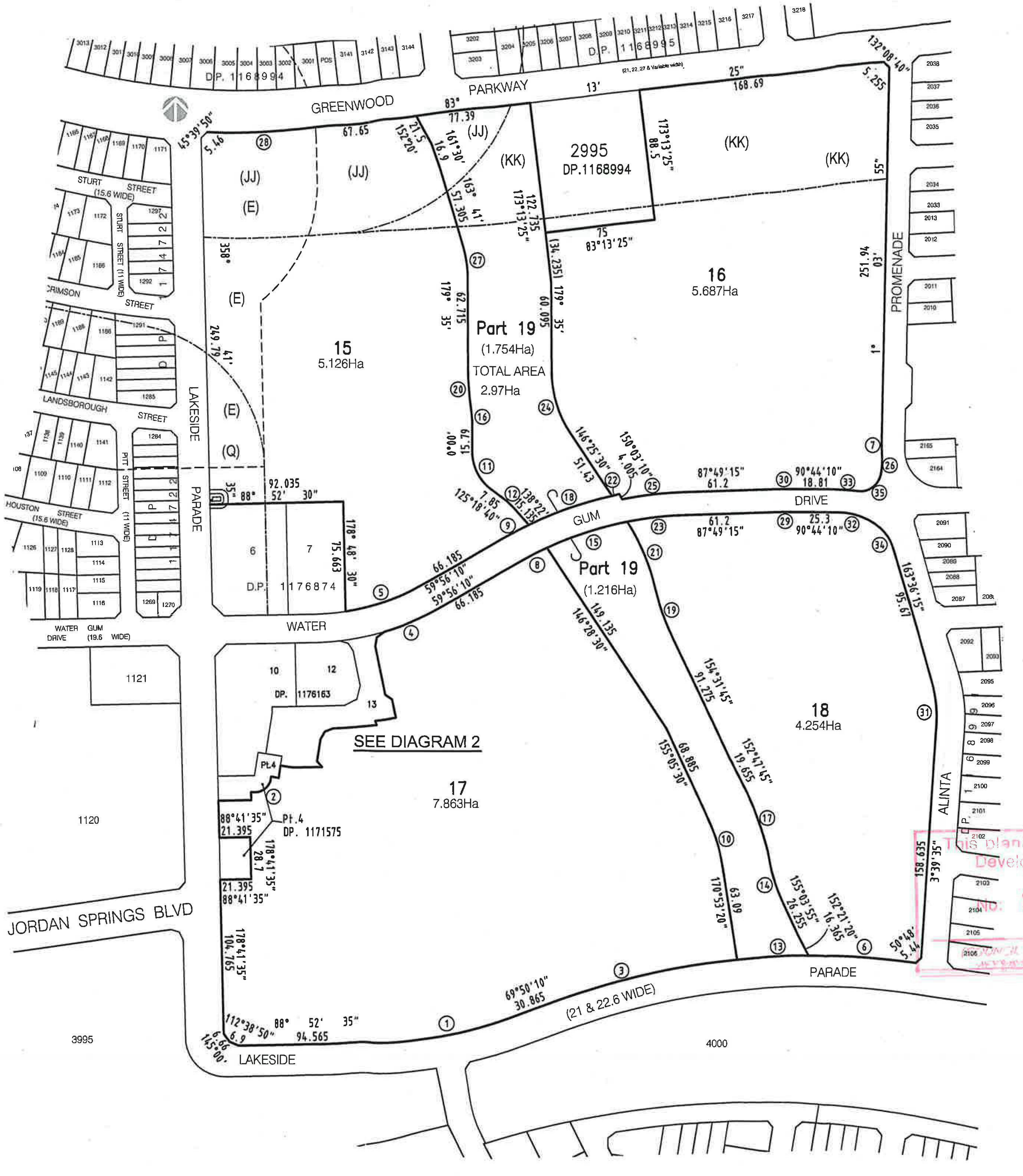


DIAGRAM 2 - NOT TO SCALE



Project
St Marys Development
Jordan Springs
RIPARIAN CORRIDOR

Drawing Title
Plan of subdivision of Lot 8 in DP. 1176874 & Lot 1 in a subdivision of Lot 3996 a proposed subdivision of Lot 5 in DP. 1176163

Developer
Lend Lease

Prepared by
WHELANS INSITES
CAD REF: D646-RIP-001b.dwg
DATE OF PLAN: 21-9-11

NOTE
NO BOUNDARY SURVEY HAS BEEN UNDERTAKEN. DIMENSIONS AND AREA(S) SHOWN ARE APPROXIMATE ONLY AND ARE SUBJECT TO CONFIRMATION BY BOUNDARY SURVEY
LOT NUMBERING IS SUBJECT TO CHANGE ON PREPARATION OF FINAL DEPOSITED PLAN.
ORIGIN OF MGA BASED SITE CO-ORDINATES FROM PM 147113 AND PLANE DISTANCES HAVE BEEN USED
CO-ORDINATES FOR PM 147113 WERE DEDUCED BY WHELANS FROM SURROUNDING SSM & PM'S ON PUBLIC RECORD. CO-ORDINATES FOR PM 147113 HAVE BEEN ADOPTED AS [illegible]

DIAGRAM - 1:1500 @ A1

Scale	1:1500		SHEET 1 OF 1
Drawn			LAS
Checked			JWW
CAD file No	D646RIP	Job No	D646
Drawing Number		D646-RIP-001b.dwg	
Project Wide DCR No.		00-000-0-000A	Issue B

Lend Lease

Appendix F
Riparian Corridor Landscape Concept Plan, prepared by Environmental Partnership

Zone Substation

Indicative Pedestrian and Cycle Crossing

Legend

- Native tree canopy
- Revegetation area
- Riparian embankment
- Sandstone boulders retaining wall
- DA boundary for riparian corridor
- Turf open space
- Concrete pathways
- Picnic shelter / facilities
- Adjoining open space
- Existing 1m contours
- Proposed Engineers riparian 1m design contours

Key

1. East West Riparian Corridor
2. North South Riparian Corridor
3. Village Lake
4. Remnant Farm Dam Open Space
5. East Lake Park

Environmental Partnership (NSW)

DATE: DECEMBER 2012

CLIENT: LEND LEASE

TITLE: Riparian Corridor
Landscape Concept

PROJECT: Jordan Springs Riparian Corridor

SCALE: 1:2500 @ A1 / 1:5000 @ A3
Issue B

DRAWING NO.: 2914.RCC.01

N

Lend Lease

Appendix G
Riparian Corridor Landscape Plans, prepared by Environmental Partnership

RIPARIAN CORRIDOR

Jordan Springs Openspace Development

Landscape Drawings

prepare for

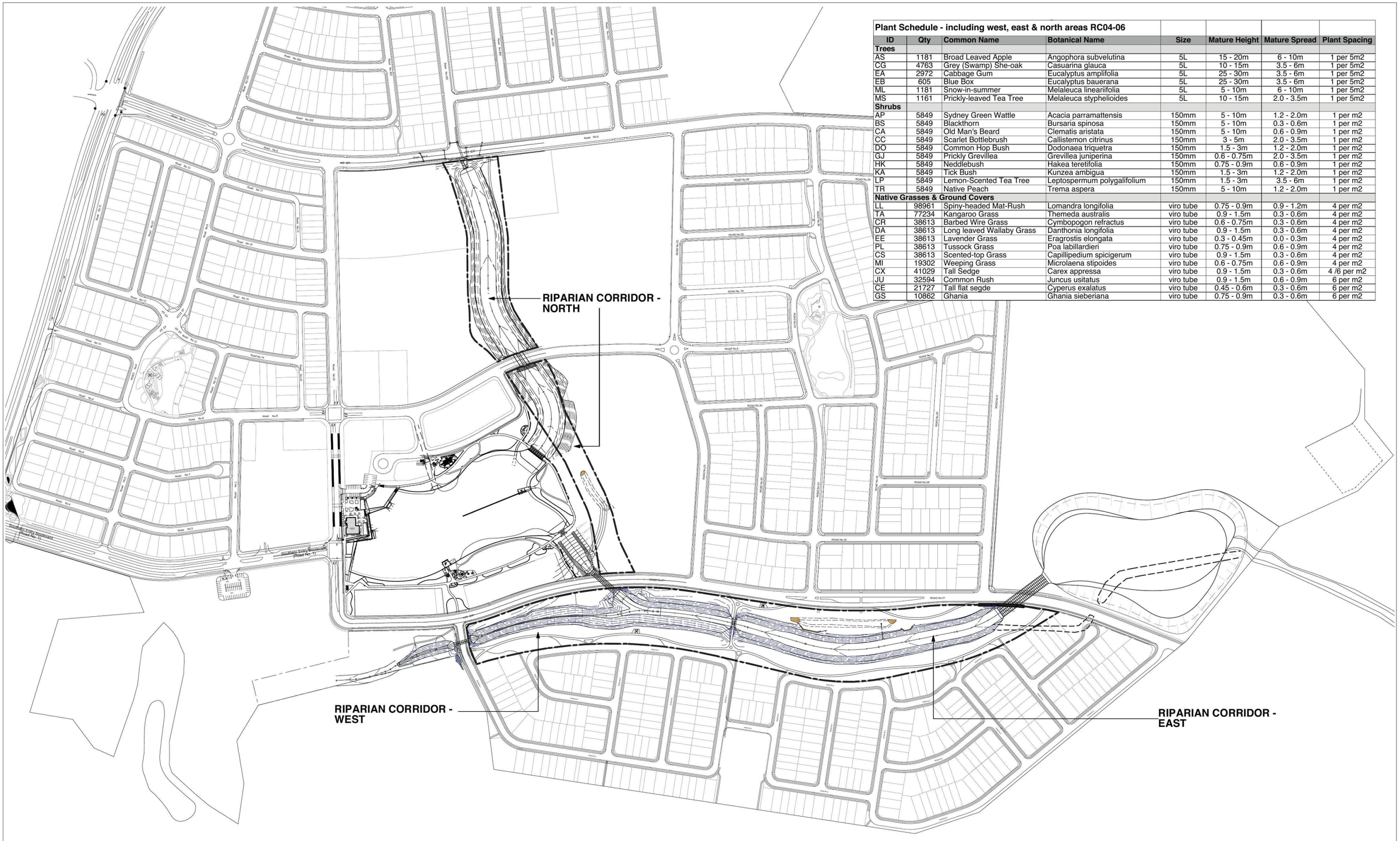
Lend Lease

prepare by

Environmental Partnership
Suite 3:01 22-36 Mountain St Ultimo NSW 2007
Ph: (02) 9281 7007 Fax: (02) 9281 7222
Email: admin@epnsw.com.au
ABN 53 088 175 437

DRAWING SCHEDULE JAN 13

Drawing	Title	Issue
	Riparian Corridor	
3196-RC01	Key Plan	3
3196-RC02	Revegetation Plan - Riparian Corridor West	3
3196-RC03	Revegetation Plan - Riparian Corridor East	3
3196-RC04	Revegetation Plan - Riparian Corridor North	3
3196-RC05	Typical Cross Sections A & B	3
3196-RC06	Typical Cross Sections C & D	3
3196-RCD01	Riparian Corridor Details - sheet 1	3
3196-RCD02	Riparian Corridor Details - sheet 2	3



Plant Schedule - including west, east & north areas RC04-06

ID	Qty	Common Name	Botanical Name	Size	Mature Height	Mature Spread	Plant Spacing
Trees							
AS	1181	Broad Leaved Apple	Angophora subvelutina	5L	15 - 20m	6 - 10m	1 per 5m2
CG	4763	Grey (Swamp) She-oak	Casuarina glauca	5L	10 - 15m	3.5 - 6m	1 per 5m2
EA	2972	Cabbage Gum	Eucalyptus amplifolia	5L	25 - 30m	3.5 - 6m	1 per 5m2
EB	605	Blue Box	Eucalyptus bauerana	5L	25 - 30m	3.5 - 6m	1 per 5m2
ML	1181	Snow-in-summer	Melaleuca linearifolia	5L	5 - 10m	6 - 10m	1 per 5m2
MS	1161	Prickly-leaved Tea Tree	Melaleuca styphelioides	5L	10 - 15m	2.0 - 3.5m	1 per 5m2
Shrubs							
AP	5849	Sydney Green Wattle	Acacia parramattensis	150mm	5 - 10m	1.2 - 2.0m	1 per m2
BS	5849	Blackthorn	Bursaria spinosa	150mm	5 - 10m	0.3 - 0.6m	1 per m2
CA	5849	Old Man's Beard	Clematis aristata	150mm	5 - 10m	0.6 - 0.9m	1 per m2
CC	5849	Scarlet Bottlebrush	Callistemon citrinus	150mm	3 - 5m	2.0 - 3.5m	1 per m2
DO	5849	Common Hop Bush	Dodonaea triquetra	150mm	1.5 - 3m	1.2 - 2.0m	1 per m2
GJ	5849	Prickly Grevillea	Grevillea juniperina	150mm	0.6 - 0.75m	2.0 - 3.5m	1 per m2
HK	5849	Neddlebush	Hakea teretifolia	150mm	0.75 - 0.9m	0.6 - 0.9m	1 per m2
KA	5849	Tick Bush	Kunzea ambigua	150mm	1.5 - 3m	1.2 - 2.0m	1 per m2
LP	5849	Lemon-Scented Tea Tree	Leptospermum polygalifolium	150mm	1.5 - 3m	3.5 - 6m	1 per m2
TR	5849	Native Peach	Trema aspera	150mm	5 - 10m	1.2 - 2.0m	1 per m2
Native Grasses & Ground Covers							
LL	98961	Spiny-headed Mat-Rush	Lomandra longifolia	viro tube	0.75 - 0.9m	0.9 - 1.2m	4 per m2
TA	77234	Kangaroo Grass	Themeda australis	viro tube	0.9 - 1.5m	0.3 - 0.6m	4 per m2
CR	38613	Barbed Wire Grass	Cymbopogon refractus	viro tube	0.6 - 0.75m	0.3 - 0.6m	4 per m2
DA	38613	Long leaved Wallaby Grass	Danthonia longifolia	viro tube	0.9 - 1.5m	0.3 - 0.6m	4 per m2
EE	38613	Lavender Grass	Eragrostis elongata	viro tube	0.3 - 0.45m	0.0 - 0.3m	4 per m2
PL	38613	Tussock Grass	Poa labillardieri	viro tube	0.75 - 0.9m	0.6 - 0.9m	4 per m2
CS	38613	Scented-top Grass	Capillipedium spicigerum	viro tube	0.9 - 1.5m	0.3 - 0.6m	4 per m2
MI	19302	Weeping Grass	Microlaena stipoides	viro tube	0.6 - 0.75m	0.6 - 0.9m	4 per m2
CX	41029	Tall Sedge	Carex appressa	viro tube	0.9 - 1.5m	0.3 - 0.6m	4 /6 per m2
JU	32594	Common Rush	Juncus usitatus	viro tube	0.9 - 1.5m	0.6 - 0.9m	6 per m2
CE	21727	Tall flat segde	Cyperus exalatus	viro tube	0.45 - 0.6m	0.3 - 0.6m	6 per m2
GS	10862	Ghania	Ghania sieberiana	viro tube	0.75 - 0.9m	0.3 - 0.6m	6 per m2

GENERAL NOTES:

1. Do not scale of drawings. Follow written dimensions. If in doubt obtain written advice from the Superintendent.
2. Verify all dimensions on site.
3. Refer to legend for all symbol and code keys.
4. Read in conjunction with the specifications.
5. Read in conjunction with all associated drawings

ISSUE	AMENDMENT	DRAWN	DATE
3	FOR APPROVAL	BL	09.01.13
2	FOR REVIEW	BL	22.08.12
1	FIRST DRAFT	BL	27.01.11

DESIGNED: EP DATE: JAN 11 APPROVED:
DRAWN: BL DATE: JAN 11 APPROVED:
CHECKED: AH DATE: JAN 11 APPROVED:

PREPARED FOR: Lend Lease

LANDSCAPE ARCHITECTS AND URBAN DESIGNERS:
Environmental Partnership
Suite 3.01 22-36 Mountain St Ultimo NSW 2007
Ph: (02) 9281 7007 Fax: (02) 9281 7222
Email: admin@ponsw.com.au
ABN 53 088 175 437

PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Key Plan

0 50 100 M

DATE: **JANUARY 2013**
SCALE: 1:2500 (@A1)
ISSUE: **3**
DRAWING NO: **3196.RC01**

LEGEND

Soft Landscape Elements

- Existing trees to be protected
- Existing trees to be removed

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Refer plan labels for plant species

Refer Key Plan RC.01 for Plant Schedule

Built Elements / General

- Proposed shared concrete path
- Sandstone boulders retaining wall
- Post & cable fencing
- Existing 1m contours
- Proposed riparian 1m design contours
- Energy dissipation area - Refer Engineers drawings
- Picnic shelter / facility
- Cross sections Refer drawing RC.05-06
- DA Boundary

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(677)	*Casuarina glauca*	40%
(423)	*Eucalyptus amplifolia*	25%
(169)	*Angophora subvelutina*	10%
(169	*Melaleuca stypheliodes*	10%
(169)	*Melaleuca linariifolia*	10%
(84)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(847)	*Acacia parramattensis*	10%
(847)	*Dodonea triquetra*	10%
(847)	*Bursaria spinosa*	10%
(847)	*Grevillea juniperina*	10%
(847)	*Hakea teretifolia*	10%
(847)	*Kunzea ambigua*	10%
(847)	*Callistemon citrinus*	10%
(847)	*Clematis aristata*	10%
(847)	*Leptospermum polygalifolium*	10%
(847)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(6808)	*Themeda australis*	20%
(6808)	*Lomandra longifolia*	20%
(3404)	*Cymbopogon refractus*	10%
(3404)	*Danthonia longifolia*	10%
(3404)	*Eragrostis elongata*	10%
(3404)	*Poa labillardieri*	10%
(3404)	*Capillipedium spicigerum*	10%
(1702)	*Microlaena stipoides*	5%
(1702)	Carex appressa	5%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(259)	*Casuarina glauca*	40%
(162)	*Eucalyptus amplifolia*	25%
(64)	*Angophora subvelutina*	10%
(64)	*Melaleuca stypheliodes*	10%
(64)	*Melaleuca linariifolia*	10%
(32)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(324)	*Acacia parramattensis*	10%
(324)	*Dodonea triquetra*	10%
(324)	*Bursaria spinosa*	10%
(324)	*Grevillea juniperina*	10%
(324)	*Hakea teretifolia*	10%
(324)	*Kunzea ambigua*	10%
(324)	*Callistemon citrinus*	10%
(324)	*Clematis aristata*	10%
(324)	*Leptospermum polygalifolium*	10%
(324)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(2586)	*Themeda australis*	20%
(2586)	*Lomandra longifolia*	20%
(1293)	*Cymbopogon refractus*	10%
(1293)	*Danthonia longifolia*	10%
(1293)	*Eragrostis elongata*	10%
(1293)	*Poa labillardieri*	10%
(1293)	*Capillipedium spicigerum*	10%
(646)	*Microlaena stipoides*	5%
(646)	*Carex appressa*	5%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(9)	*Casuarina glauca*	40%
(6)	*Eucalyptus amplifolia*	25%
(2)	*Angophora subvelutina*	10%
(2)	*Melaleuca stypheliodes*	10%
(2)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(2988)	*Themeda australis*	20%
(2988)	*Lomandra longifolia*	20%
(1494)	*Cymbopogon refractus*	10%
(1494)	*Danthonia longifolia*	10%
(1494)	*Eragrostis elongata*	10%
(1494)	*Poa labillardieri*	10%
(1494)	*Capillipedium spicigerum*	10%
(747)	*Microlaena stipoides*	5%
(747)	Carex appressa	5%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(9)	*Casuarina glauca*	40%
(5)	*Eucalyptus amplifolia*	25%
(2)	*Angophora subvelutina*	10%
(2)	*Melaleuca stypheliodes*	10%
(2)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(2821)	*Themeda australis*	20%
(2821)	*Lomandra longifolia*	20%
(1410)	*Cymbopogon refractus*	10%
(1410)	*Danthonia longifolia*	10%
(1410)	*Eragrostis elongata*	10%
(1410)	*Poa labillardieri*	10%
(1410)	*Capillipedium spicigerum*	10%
(705)	*Microlaena stipoides*	5%
(705)	Carex appressa	5%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(576)	*Casuarina glauca*	40%
(360)	*Eucalyptus amplifolia*	25%
(144)	*Angophora subvelutina*	10%
(144)	*Melaleuca stypheliodes*	10%
(144)	*Melaleuca linariifolia*	10%
(72)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(717)	*Acacia parramattensis*	10%
(717)	*Dodonea triquetra*	10%
(717)	*Bursaria spinosa*	10%
(717)	*Grevillea juniperina*	10%
(717)	*Hakea teretifolia*	10%
(717)	*Kunzea ambigua*	10%
(717)	*Callistemon citrinus*	10%
(717)	*Clematis aristata*	10%
(717)	*Leptospermum polygalifolium*	10%
(717)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(5752)	*Themeda australis*	20%
(5752)	*Lomandra longifolia*	20%
(2876)	*Cymbopogon refractus*	10%
(2876)	*Danthonia longifolia*	10%
(2876)	*Eragrostis elongata*	10%
(2876)	*Poa labillardieri*	10%
(2876)	*Capillipedium spicigerum*	10%
(1438)	*Microlaena stipoides*	5%
(1438)	*Carex appressa*	5%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(17)	*Casuarina glauca*	40%
(11)	*Eucalyptus amplifolia*	25%
(4)	*Angophora subvelutina*	10%
(4)	*Melaleuca stypheliodes*	10%
(4)	*Melaleuca linariifolia*	10%
(2)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(5358)	*Themeda australis*	20%
(5358)	*Lomandra longifolia*	20%
(2679)	*Cymbopogon refractus*	10%
(2679)	*Danthonia longifolia*	10%
(2679)	*Eragrostis elongata*	10%
(2679)	*Poa labillardieri*	10%
(2679)	*Capillipedium spicigerum*	10%
(1339)	*Microlaena stipoides*	5%
(1339)	Carex appressa	5%

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(8)	*Casuarina glauca*	40%
(5)	*Eucalyptus amplifolia*	25%
(2)	*Angophora subvelutina*	10%
(2)	*Melaleuca stypheliodes*	10%
(2)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Riparian channel planting *6 per m2*

(3777)	*Juncus usitatus*	30%
(2518)	*Carex appressa*	20%
(2518)	*Cyperus exaltatus*	20%
(2518)	*Lomandra longifolia*	20%
(1259)	*Gahnia sieberiana*	10%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(150)	*Casuarina glauca*	40%
(94)	*Eucalyptus amplifolia*	25%
(37)	*Angophora subvelutina*	10%
(37)	*Melaleuca stypheliodes*	10%
(37)	*Melaleuca linariifolia*	10%
(18)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(188)	*Acacia parramattensis*	10%
(188)	*Dodonea triquetra*	10%
(188)	*Bursaria spinosa*	10%
(188)	*Grevillea juniperina*	10%
(188)	*Hakea teretifolia*	10%
(188)	*Kunzea ambigua*	10%
(188)	*Callistemon citrinus*	10%
(188)	*Clematis aristata*	10%
(188)	*Leptospermum polygalifolium*	10%
(188)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(1492)	*Themeda australis*	20%
(1492)	*Lomandra longifolia*	20%
(746)	*Cymbopogon refractus*	10%
(746)	*Danthonia longifolia*	10%
(746)	*Eragrostis elongata*	10%
(746)	*Poa labillardieri*	10%
(746)	*Capillipedium spicigerum*	10%
(373)	*Microlaena stipoides*	5%
(373)	Carex appressa	5%

Adjoins RC.04

Adjoins RC.03

Existing creekline to remain

Provide diverted drain from existing creek to riparian corridor

ROAD No.25

ROAD No.40

ROAD No.21

ROAD No 1

ROAD No 2

ROAD No 4

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GENERAL NOTES:
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5. Read in conjunction with all associated drawings

ISSUE	AMENDMENT	DRAWN	DATE
3	FOR APPROVAL	BL	09.01.13
2	FOR REVIEW	BL	22.08.12
1	FIRST DRAFT	BL	27.01.11

	DESIGNED:	DATE:	APPROVED:
	EP	JAN 11	
	DRAWN:	DATE:	APPROVED:
	BL	JAN 11	
	CHECKED:	DATE:	APPROVED:
	AH	JAN 11	

PREPARED FOR: Lend Lease

LANDSCAPE ARCHITECTS AND URBAN DESIGNERS:
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PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Revegetation Plan - West

0 10 20 30 M

DATE: **JANUARY 2013**

SCALE: 1:1000 (@A1)

ISSUE: **3**

DRAWING NO: **3196.RC02**

LEGEND

Soft Landscape Elements

Existing trees to be protected

Existing trees to be removed

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Refer plan labels for plant species

Refer Key Plan RC.01 for Plant Schedule

Built Elements / General

Proposed shared concrete path

Sandstone boulders retaining wall

Post & cable fencing

Existing 1m contours

Proposed riparian 1m design contours

Energy dissipation area - Refer Engineers drawings

Picnic shelter / facility

Cross sections Refer drawing RC.05-06

DA Boundary

ROAD No.40

ROAD No.33

ROAD No.35

ROAD No.38

ROAD

ROAD No.21

Adjoins RC.02

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(520)	*Casuarina glauca*	40%
(325)	*Eucalyptus amplifolia*	25%
(130)	*Angophora subvelutina*	10%
(130)	*Melaleuca styphelioides*	10%
(130)	*Melaleuca linariifolia*	10%
(65)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(650)	*Acacia parramattensis*	10%
(650)	*Dodonea triquetra*	10%
(650)	*Bursaria spinosa*	10%
(650)	*Grevillea juniperina*	10%
(650)	*Hakea teretifolia*	10%
(650)	*Kunzea ambigua*	10%
(650)	*Callistemon citrinus*	10%
(650)	*Clematis aristata*	10%
(650)	*Leptospermum polygalifolium*	10%
(650)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(5197)	*Themeda australis*	20%
(5197)	*Lomandra longifolia*	20%
(2598)	*Cymbopogon refractus*	10%
(2598)	*Danthonia longifolia*	10%
(2598)	*Eragrostis elongata*	10%
(2598)	*Poa labillardieri*	10%
(2598)	*Capillipedium spicigerum*	10%
(1299)	*Microlaena stipoides*	5%
(1299)	Carex appressa	5%

Provide SW pit and drainage pipe connection to riparian corridor

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(15)	*Casuarina glauca*	40%
(9)	*Eucalyptus amplifolia*	25%
(3)	*Angophora subvelutina*	10%
(3)	*Melaleuca styphelioides*	10%
(3)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(4758)	*Themeda australis*	20%
(4758)	*Lomandra longifolia*	20%
(2379)	*Cymbopogon refractus*	10%
(2379)	*Danthonia longifolia*	10%
(2379)	*Eragrostis elongata*	10%
(2379)	*Poa labillardieri*	10%
(2379)	*Capillipedium spicigerum*	10%
(1189)	*Microlaena stipoides*	5%
(1189)	Carex appressa	5%

Provide pedestrian / cycle path with safety handrail on both sides over the proposed culvert crossing

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(669)	*Casuarina glauca*	40%
(418)	*Eucalyptus amplifolia*	25%
(167)	*Angophora subvelutina*	10%
(167)	*Melaleuca styphelioides*	10%
(167)	*Melaleuca linariifolia*	10%
(83)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(839)	*Acacia parramattensis*	10%
(839)	*Dodonea triquetra*	10%
(839)	*Bursaria spinosa*	10%
(839)	*Grevillea juniperina*	10%
(839)	*Hakea teretifolia*	10%
(839)	*Kunzea ambigua*	10%
(839)	*Callistemon citrinus*	10%
(839)	*Clematis aristata*	10%
(839)	*Leptospermum polygalifolium*	10%
(839)	*Trema aspera*	10%

Terrestrial Batter Grass Mix *4 per m2*

(6761)	*Themeda australis*	20%
(6761)	*Lomandra longifolia*	20%
(3380)	*Cymbopogon refractus*	10%
(3380)	*Danthonia longifolia*	10%
(3380)	*Eragrostis elongata*	10%
(3380)	*Poa labillardieri*	10%
(3380)	*Capillipedium spicigerum*	10%
(1690)	*Microlaena stipoides*	5%
(1690)	*Carex appressa*	5%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(21)	*Casuarina glauca*	40%
(13)	*Eucalyptus amplifolia*	25%
(5)	*Angophora subvelutina*	10%
(5)	*Melaleuca styphelioides*	10%
(5)	*Melaleuca linariifolia*	10%
(2)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(6304)	*Themeda australis*	20%
(6304)	*Lomandra longifolia*	20%
(3152)	*Cymbopogon refractus*	10%
(3152)	*Danthonia longifolia*	10%
(3152)	*Eragrostis elongata*	10%
(3152)	*Poa labillardieri*	10%
(3152)	*Capillipedium spicigerum*	10%
(1576)	*Microlaena stipoides*	5%
(1576)	Carex appressa	5%

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(25)	*Casuarina glauca*	40%
(16)	*Eucalyptus amplifolia*	25%
(6)	*Angophora subvelutina*	10%
(6)	*Melaleuca styphelioides*	10%
(6)	*Melaleuca linariifolia*	10%
(3)	*Eucalyptus baueriana*	5%

Riparian channel planting *6 per m2*

(11578)	*Juncus usitatus*	30%
(7718)	*Carex appressa*	20%
(7718)	*Cyperus exaltatus*	20%
(7718)	*Lomandra longifolia*	20%
(3859)	*Gahnia sieberiana*	10%

ROAD No.1

ROAD No.3

ROAD No.4

ROAD No.5

ROAD No.7

ROAD No.8

ROAD No.9

ROAD No.10

GENERAL NOTES:
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ISSUE	AMENDMENT	DRAWN	DATE
3	FOR APPROVAL	BL	09.01.13
2	FOR REVIEW	BL	22.08.12
1	FIRST DRAFT	BL	27.01.11

DESIGNED:	DATE:	APPROVED:	
EP	JAN 11		
DRAWN:	DATE:	APPROVED:	
BL	JAN 11		
CHECKED:	DATE:	APPROVED:	
AH	JAN 11		

PREPARED FOR: Lend Lease

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ABN 53 088 175 437

PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Revegetation Plan - East

0 10 20 30 M

DATE: **JANUARY 2013**

SCALE: 1:1000 (@A1)

ISSUE: **3**

DRAWING NO: **3196.RC03**

LEGEND

Soft Landscape Elements

Existing trees to be protected

Existing trees to be removed

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Refer plan labels for plant species

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Refer plan labels for plant species

Refer Key Plan RC.01 for Plant Schedule

Built Elements / General

Proposed shared concrete path

Sandstone boulders retaining wall

Post & cable fencing

Existing 1m contours

Proposed riparian 1m design contours

Energy dissipation area - Refer Engineers drawings

Picnic shelter / facility

Cross sections Refer drawing RC.05-06

DA Boundary

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(8)	*Casuarina glauca*	40%
(5)	*Eucalyptus amplifolia*	25%
(2)	*Angophora subvelutina*	10%
(2)	*Melaleuca styphelioides*	10%
(2)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(2584)	*Themeda australis*	20%
(2584)	*Lomandra longifolia*	20%
(1292)	*Cymbopogon refractus*	10%
(1292)	*Danthonia longifolia*	10%
(1292)	*Eragrostis elongata*	10%
(1292)	*Poa labillardieri*	10%
(1292)	*Capillipedium spicigerum*	10%
(646)	*Microlaena stipoides*	5%
(646)	Carex appressa	5%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(314)	*Casuarina glauca*	40%
(196)	*Eucalyptus amplifolia*	25%
(78)	*Angophora subvelutina*	10%
(78)	*Melaleuca styphelioides*	10%
(78)	*Melaleuca linariifolia*	10%
(39)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(398)	*Acacia parramattensis* 10%
(398)	*Dodonea triquetra* 10%
(398)	*Bursaria spinosa* 10%
(398)	*Grevillea juniperina* 10%
(398)	*Hakea teretifolia* 10%
(398)	*Kunzea ambigua* 10%
(398)	*Callistemon citrinus* 10%
(398)	*Clematis aristata* 10%
(398)	*Leptospermum polygalifolium* 10%
(398)	*Trema aspera* 10%

Terrestrial Batter Grass Mix *4 per m2*

(3161)	*Themeda australis*	20%
(3161)	*Lomandra longifolia*	20%
(1580)	*Cymbopogon refractus*	10%
(1580)	*Danthonia longifolia*	10%
(1580)	*Eragrostis elongata*	10%
(1580)	*Poa labillardieri*	10%
(1580)	*Capillipedium spicigerum*	10%
(790)	*Microlaena stipoides*	5%
(790)	*Carex appressa*	5%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(99)	*Casuarina glauca*	40%
(62)	*Eucalyptus amplifolia*	25%
(24)	*Angophora subvelutina*	10%
(24	*Melaleuca styphelioides*	10%
(24)	*Melaleuca linariifolia*	10%
(12)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(124)	*Acacia parramattensis* 10%
(124)	*Dodonea triquetra* 10%
(124)	*Bursaria spinosa* 10%
(124)	*Grevillea juniperina* 10%
(124)	*Hakea teretifolia* 10%
(124)	*Kunzea ambigua* 10%
(124)	*Callistemon citrinus* 10%
(124)	*Clematis aristata* 10%
(124)	*Leptospermum polygalifolium* 10%
(124)	*Trema aspera* 10%

Terrestrial Batter Grass Mix *4 per m2*

(1026)	*Themeda australis*	20%
(1026)	*Lomandra longifolia*	20%
(513)	*Cymbopogon refractus*	10%
(513)	*Danthonia longifolia*	10%
(513)	*Eragrostis elongata*	10%
(513)	*Poa labillardieri*	10%
(513)	*Capillipedium spicigerum*	10%
(256)	*Microlaena stipoides*	5%
(256)	*Carex appressa*	5%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(3)	*Casuarina glauca*	40%
(2)	*Eucalyptus amplifolia*	25%
(0)	*Angophora subvelutina*	10%
(0)	*Melaleuca styphelioides*	10%
(0)	*Melaleuca linariifolia*	10%
(0)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(1094)	*Themeda australis*	20%
(1094)	*Lomandra longifolia*	20%
(547)	*Cymbopogon refractus*	10%
(547)	*Danthonia longifolia*	10%
(547)	*Eragrostis elongata*	10%
(547)	*Poa labillardieri*	10%
(547)	*Capillipedium spicigerum*	10%
(273)	*Microlaena stipoides*	5%
(273)	*Carex appressa*	5%

Channel Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(10)	*Casuarina glauca*	40%
(6)	*Eucalyptus amplifolia*	25%
(2)	*Angophora subvelutina*	10%
(2)	*Melaleuca styphelioides*	10%
(2)	*Melaleuca linariifolia*	10%
(1)	*Eucalyptus baueriana*	5%

Riparian channel planting *6 per m2*

(4970)	*Juncus usitatus*	30%
(3313)	*Carex appressa*	20%
(3313)	*Cyperus exaltatus*	20%
(3313)	*Lomandra longifolia*	20%
(1656)	*Gahnia sieberiana*	10%

Lower Embankment / Buffer Riparian Zone
- Groundcovers at 6 / m2
- Scattered tree planting at 1/100m2
- Plant lists applicable:

Canopy and midstorey *1 per 100 m2*

(4)	*Casuarina glauca*	40%
(2)	*Eucalyptus amplifolia*	25%
(1)	*Angophora subvelutina*	10%
(1)	*Melaleuca styphelioides*	10%
(1)	*Melaleuca linariifolia*	10%
(0)	*Eucalyptus baueriana*	5%

Terrestrial Batter Grass Mix *6 per m2*

(1380)	*Themeda australis*	20%
(1380)	*Lomandra longifolia*	20%
(690)	*Cymbopogon refractus*	10%
(690)	*Danthonia longifolia*	10%
(690)	*Eragrostis elongata*	10%
(690)	*Poa labillardieri*	10%
(690)	*Capillipedium spicigerum*	10%
(345)	*Microlaena stipoides*	5%
(345)	Carex appressa	5%

Upper Embankment / Buffer Riparian Zone
- Groundcovers at 4 / m2
- Shrub layer at 1/m2
- Canopy & Midstorey at 1/5m2
- Plant lists applicable:

Canopy and midstorey *1 per 5 m2*

(167)	*Casuarina glauca*	40%
(104)	*Eucalyptus amplifolia*	25%
(41)	*Angophora subvelutina*	10%
(41)	*Melaleuca styphelioides*	10%
(41)	*Melaleuca linariifolia*	10%
(20)	*Eucalyptus baueriana*	5%

Shrub layer *1 per m2*

(208)	*Acacia parramattensis* 10%
(208)	*Dodonea triquetra* 10%
(208)	*Bursaria spinosa* 10%
(208)	*Grevillea juniperina* 10%
(208)	*Hakea teretifolia* 10%
(208)	*Kunzea ambigua* 10%
(208)	*Callistemon citrinus* 10%
(208)	*Clematis aristata* 10%
(208)	*Leptospermum polygalifolium* 10%
(208)	*Trema aspera* 10%

Terrestrial Batter Grass Mix *4 per m2*

(1674)	*Themeda australis*	20%
(1674)	*Lomandra longifolia*	20%
(837)	*Cymbopogon refractus*	10%
(837)	*Danthonia longifolia*	10%
(837)	*Eragrostis elongata*	10%
(837)	*Poa labillardieri*	10%
(837)	*Capillipedium spicigerum*	10%
(418)	*Microlaena stipoides*	5%
(418)	*Carex appressa*	5%

Road No.9 · Road No.15 · Road No.14 · Road No.12 · Road No.18 · Road No.20 · Road No.8 · No.3 · ROAD No.28 · ROAD No.30 · ROAD No.25 · ROAD No. 34 · ROAD No.8 · ROAD No.36 · ROAD No.25 · ROAD No.40 · Zone Substation · DA Boundary · D · Adjoins RC.02

GENERAL NOTES:
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3. Refer to legend for all symbol and code keys.
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ISSUE	AMENDMENT	DRAWN	DATE
3	FOR APPROVAL	BL	09.01.13
2	FOR REVIEW	BL	22.08.12
1	FIRST DRAFT	BL	27.01.11

DESIGNED: EP	DATE: JAN 11	APPROVED:
DRAWN: BL	DATE: JAN 11	APPROVED:
CHECKED: AH	DATE: JAN 11	APPROVED:

PREPARED FOR: Lend Lease

LANDSCAPE ARCHITECTS AND URBAN DESIGNERS:
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ABN 53 088 175 437

PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Revegetation Plan - North

DATE: **JANUARY 2013**

SCALE: 1:1000 (@A1)

ISSUE: **3**

DRAWING NO: **3196.RC04**

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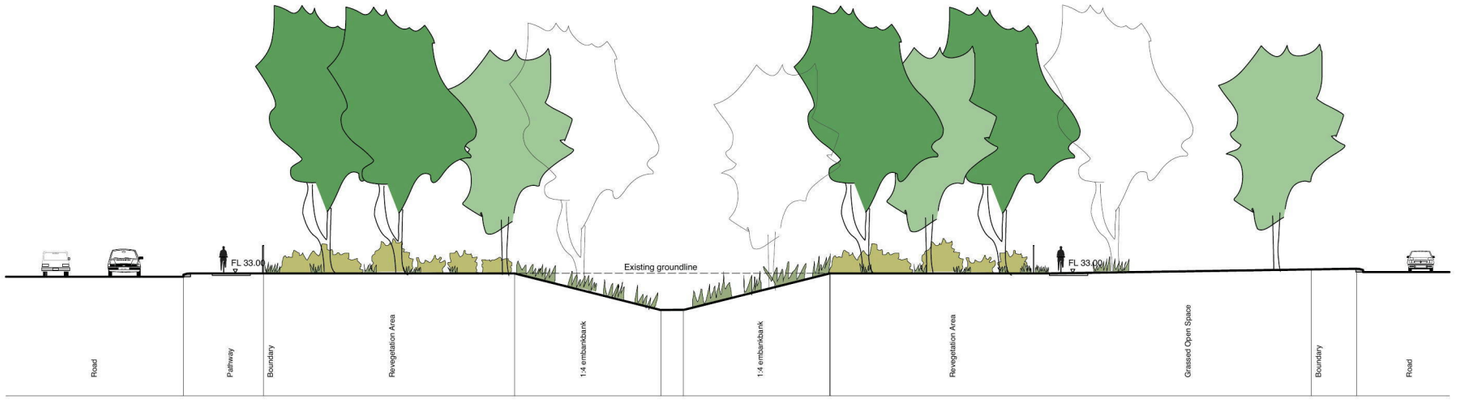
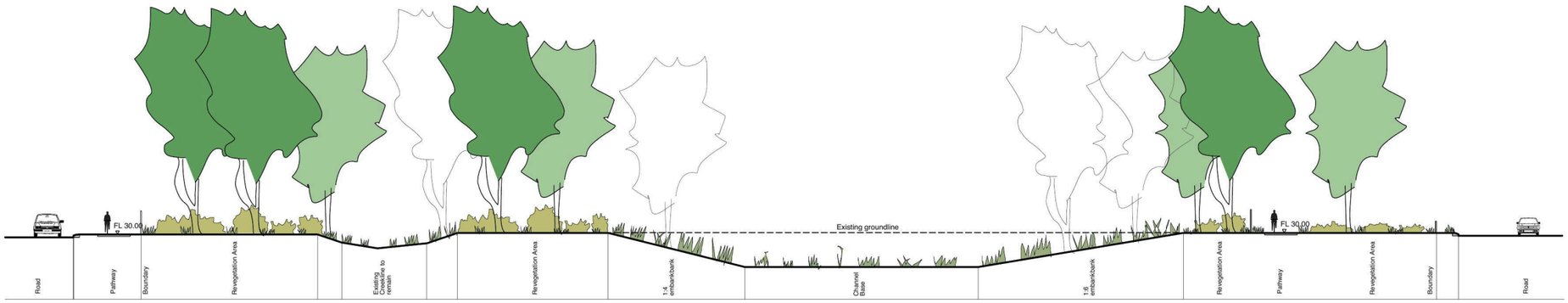


Section A-A



Section B-B

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DRAWN: BL	DATE: JAN 11	APPROVED:
CHECKED: AH	DATE: JAN 11	APPROVED:

PREPARED FOR: Lend Lease

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PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Indicative Cross Sections A & B

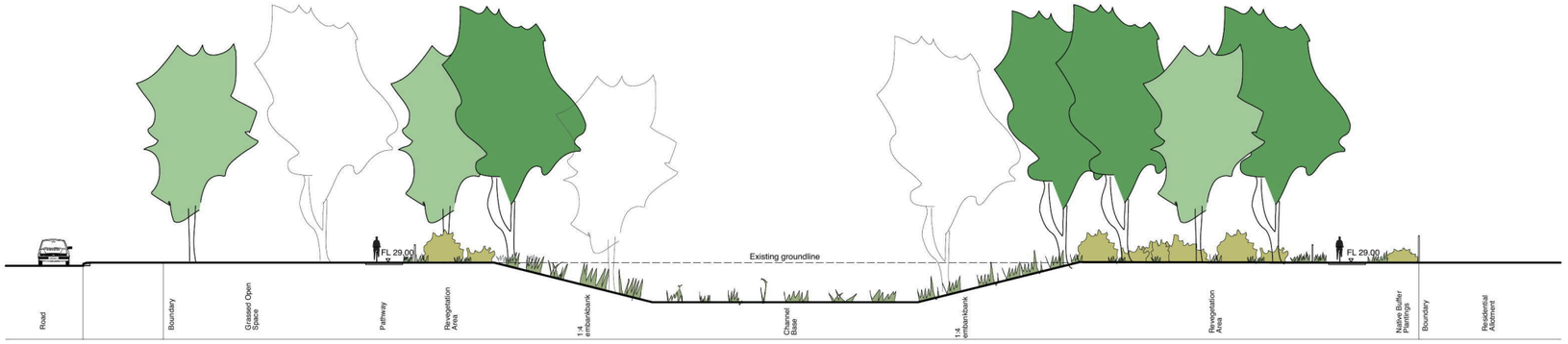
0 5 10 M

DATE: **JANUARY 2013**

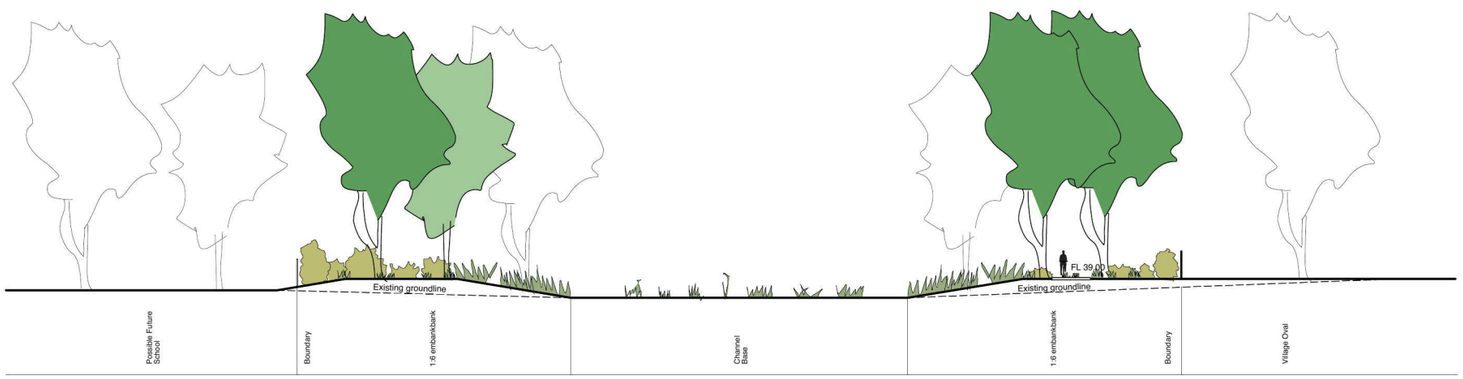
SCALE: 1:200 (@A1)

ISSUE: **3**

DRAWING NO: **3196.RC05**



Section C-C



Section D-D

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3	FOR APPROVAL	BL	09.01.13
2	FOR REVIEW	BL	22.08.12
1	FIRST DRAFT	BL	27.01.11

DESIGNED: EP	DATE: JAN 11	APPROVED:
DRAWN: BL	DATE: JAN 11	APPROVED:
CHECKED: AH	DATE: JAN 11	APPROVED:

PREPARED FOR: Lend Lease

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PROJECT:
Riparian Corridor
Jordan Springs Openspace Development

JORDAN SPRINGS

DRAWING TITLE:
Indicative Cross Sections C & D

0 5 10 M

DATE: **JANUARY 2013**

SCALE: 1:200 (@A1)

ISSUE: **3**

DRAWING NO: **3196.RC06**

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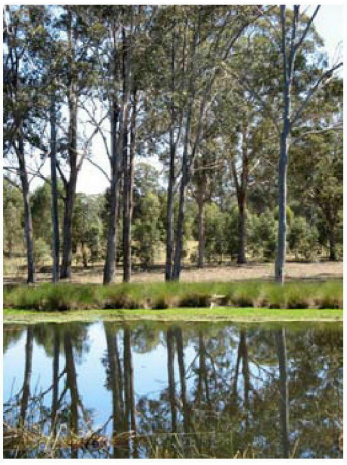
Appendix H
Western Precinct Vegetation Management Plan, prepared by Environmental Partnership, December 2012

ST MARYS

WESTERN PRECINCT(Jordan Springs)

Vegetation Management Plan



January 2013

Maryland Development Company

JORDAN SPRINGS
WESTERN PRECINCT

Proposed riparian corridor and
associated drainage and vegetation corridors

VEGETATION MANAGEMENT PLAN

January 2013

Prepared for:
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Prepared by:
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Issue / Revision	Date	Description	By	Chk	App
1	30.07.08	Preliminary		BG	AH
2	06.08.10	DA - Planting list revision		BG	AH
3	22.12.11	Issue for CC		BG	AH
4	09.01.13	Re-Issue for DA		BL	AH

Table of contents

List of Figures

1.0 Introduction

1.1 Background

The St Marys Development is one of the State's major Urban Development Programmes and has been subject to detailed environmental investigation and rigorous planning and policy development culminating in the Sydney Regional Environmental Plan No.30 - St Marys (SREP), and the accompanying St Marys Environmental Planning Strategy 2000 (EPS). These documents formed the basis for the preparation of the Western Precinct - Precinct Plan which developed in further detail the key principle of a sustainable urban development located in the context of a Regional Park and flora and fauna conservation area.

The overall St Marys site has an area of 1,545ha, and stretches roughly 7 kilometres from east to west and 2 kilometres from north to south, from Forrester Road, St Marys in the east to The Northern Road, Cranebrook in the west, and is bounded by Llandilo and Wilmot in the north and Cambridge Gardens/ Werrington County and the Dunheved Industrial Area in the south. Figure 1.1 illustrates the overall site.

The goal of this report is to meet the requirements for Controlled Activity application under the Water Management Act and to provide concise practical direction to ongoing improvement of riparian corridors through the St Marys development Western Precinct (Jordans Springs). The works area is to be subject to bulk earthworks to achieve stormwater management, weed management, bank stabilisation works where appropriate and a revegetation programme characteristic of the catchment prior to development. It is aimed that the successful implementation of these proposals will create in the medium to long term, riparian corridors which are relatively low maintenance, self perpetuating, and as ecologically diverse as possible.

The report contains a summary description of the stormwater strategy for the site and its relationship to the drainage/ vegetation corridors (refer section 4.0). Detailed information on site Stormwater Management Strategy is covered in the separate trunk drainage report. The Stormwater Strategy and related detailed design is ongoing.

This Vegetation Management Plan (VMP) will be included as part of the tender and contract documentation for works implementation related to the drainage /vegetation corridors. It is intended that performance requirements as set out in the VMP become fundamental project management criteria for these contracts.

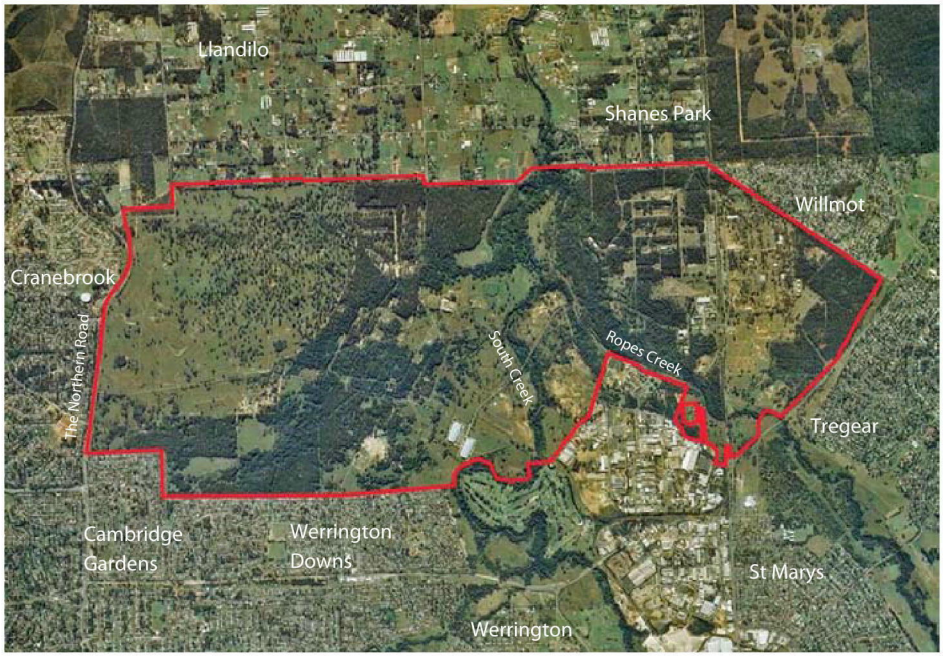

Figure 1.1 Location Plan of St Marys Development

1.0 Introduction (cont.)

1.2 Report Format

This report is presented in six components;

Section 2 - Site Review
Outlines the present characteristics of the site and identifies constraints and opportunities to be considered.

Section 3- Vegetation Management Plan
Describes the vegetation management strategies for the riparian corridors within the development area. Includes a description of the approach to specific areas including:

- Objectives
- Constraints
- Extent of work zones
- Species for revegetation and plant densities
- Works and performance criteria
- Actions and techniques
- Additional notes - considerations and planning issues

Section 4.0 - Stream Works
Outlines stream works related to the riparian vegetation management exercise. Stream works are detailed in the Stormwater Strategy Plan attached in Appendix 10.3 of this report.

Section 5.0 - Revegetation Works
Details revegetation works tasks

Section 6.0 - Maintenance
Describes the proposed maintenance regime and acceptable criteria for measuring performance

Section 7.0 - Monitoring and Review
Outlines an approach of programme for ongoing monitoring and review procedures under which this is to be carried out.

Section 8.0 - Costing
Outline of anticipated costs for vegetation management implementation.

Section 9.0 - Appendices
Revegetation diagrams

1.3 Liaison

Liaison has been undertaken in the preparation of this Vegetation Management Plan with the NSW Office of Water (NOW), with feedback from a site walkover and separate presentation with Greg Brady integrated to VMP proposals.

1.4 Acknowledgements

The St Marys site and Western Precinct in particular has been the subject of numerous investigations and detailed studies . This report has drawn from the outcomes of these investigations, in particular the Biodiversity Assessment and related species impact statements prepared in June 2008.

In addition Environmental Partnership welcomed the input of Ecological Australia Pty Ltd in detailing vegetation management responses as outlined in the Vegetation Management Plan.

Figure 1.2 St Marys Development Precincts

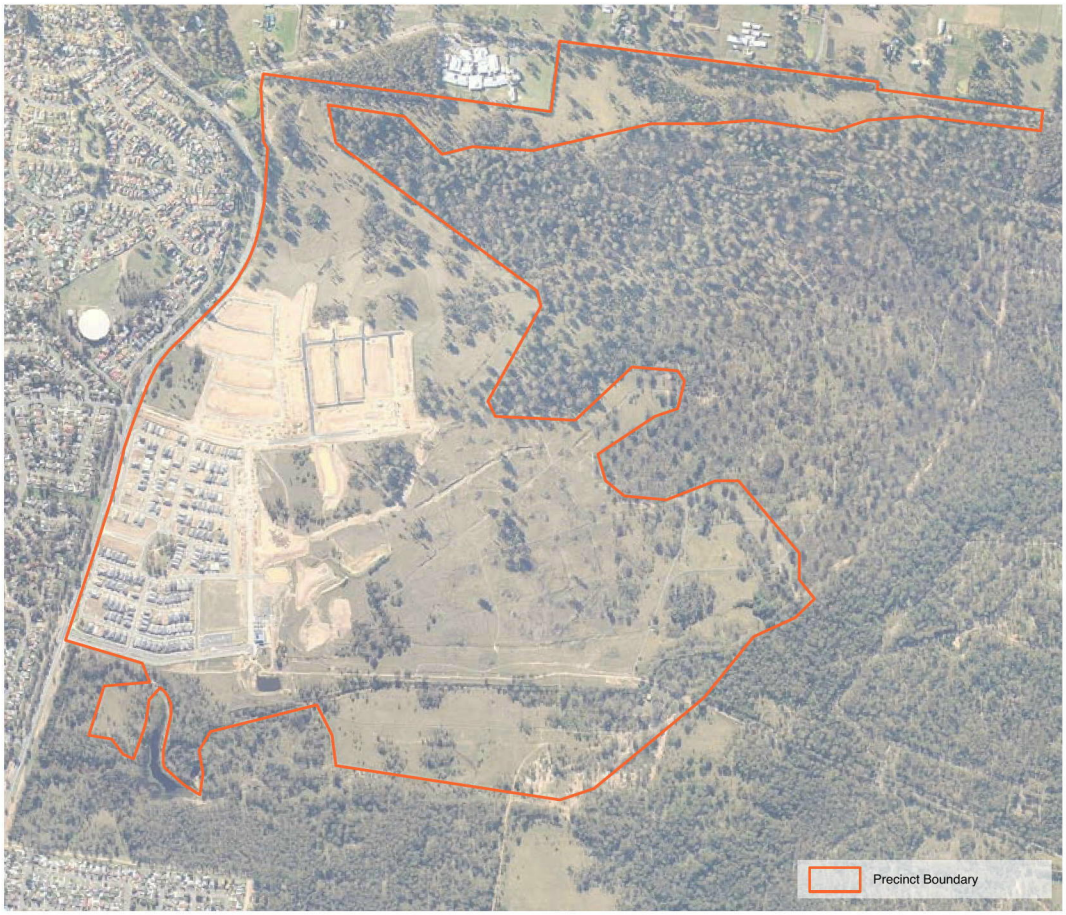

Figure 1.3 Aerial View: Western Precinct Works Area

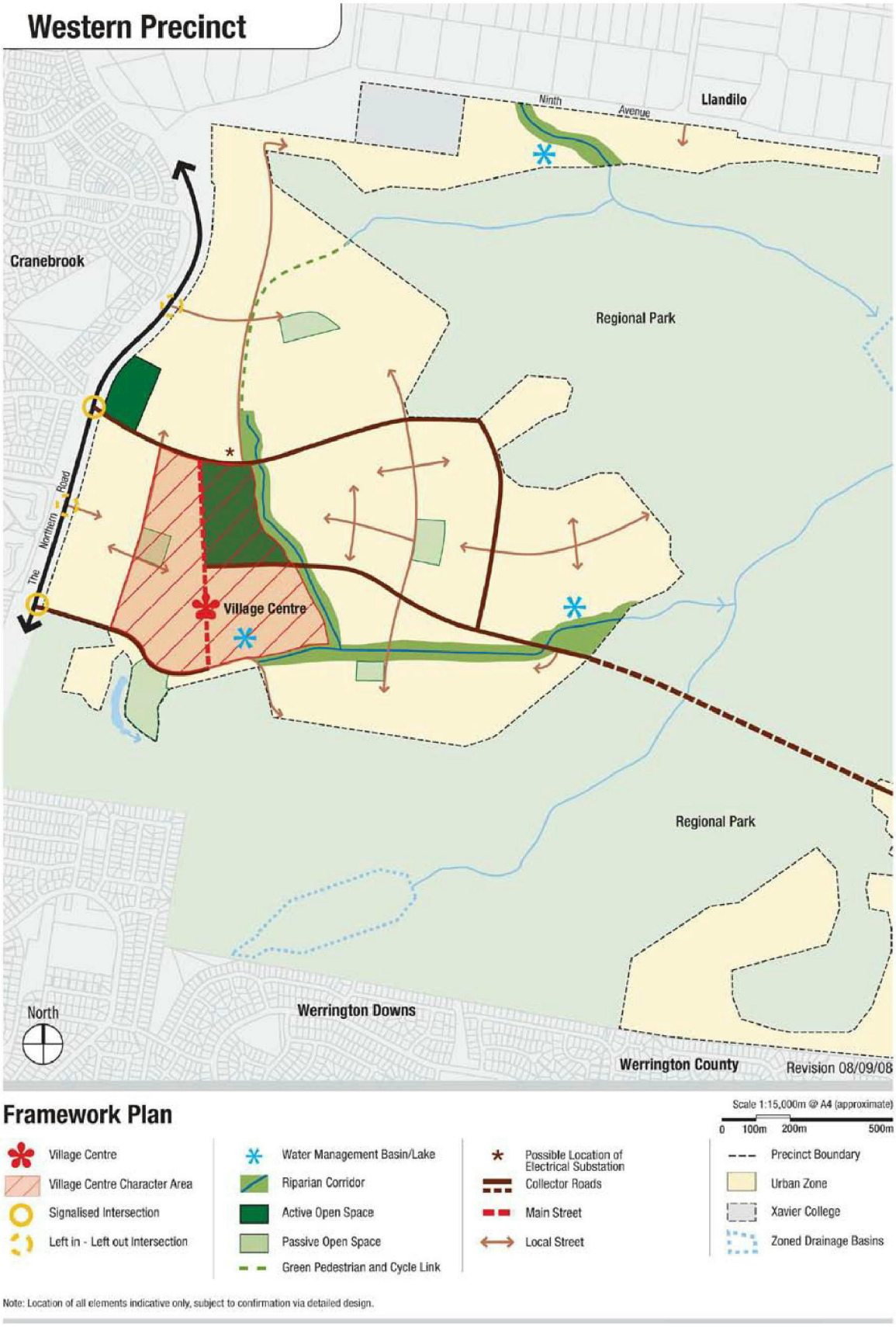

Figure 1.4 Western Precinct Framework Plan

2.0 Site Review

2.1 Site History and Location

The St Marys site was the location of defence munitions manufacturing over many years and these operations have had a range of impacts on the character of the site today. Most notably the clearing, regrading, and building works on the site resulted in major land clearing and landform modification.

The site was subject to significant regrading to establish factory buildings and hardstand areas, whilst the southern section of the area although significantly cleared, retains a semblance of the original landform incorporating several ephemeral drainage lines and scattered stands of remnant tree canopy.

The site was endorsed by the NSW Government for inclusion in the Urban Development Program (UDP) in 1993. It was seen to present an opportunity to provide housing for Sydney's growing population within an environmentally sustainable framework.

On 29th December 2006 the Minister for Planning declared the Western and Central Precincts Release Areas, paving the way for the preparation of a Precinct Plan for these areas, which was undertaken and approved.

Since this time a staged development application process has been undertaken across stage 1, 2, and 3 which are approved by Penrith City Council. Also Construction Certificate approval has been received for the implementation of the Village Lake parklands which will adjoin the south western corner of the north south riparian corridor.

The Western Precinct (Jordan Springs) is located to the far western extent of the St Marys development. Bounded to the west by the Northern Road and the residential suburb of Cranebrook, to the north of the precinct lies both residential and rural development, while the to the south and eastern boundaries lies Wianamatta Regional Park. (refer figures 1.2 and 1.3).

Figure 2.1 Existing Site Images

2.0 Site Review (cont.)

2.2 Landform and Drainage

Limited wetland habitat occurs in the Western Precinct (Jordan Springs), with a man made drainage line running west to east though the southern portion of the precinct and which drains into a minor tributary of South Creek. Figure 2.3 prepared by SKM identifies drainage lines defined as rivers, and to which riparian revegetation management objectives must be applied (refer to Western Precinct Stormwater Management Plan Plan Report by SKM for further detail on hydraulic function of the Creek system and the ephemeral drainage lines).

2.3 Soils

The soils of the site relate to the Cumberland Plain which were formed from weathered clays derived from Wianamatta Shale. Pathways of the Hawkesbury- Nepean River system have left Tertiary and Quaternary alluvial deposits of sand, silt and gravel.

2.4 Flora

A Biodiversity Assessment was prepared by Cumberland Ecology for the Western Precinct (Jordan Springs) development area in June 2008. The report evaluated flora known and considered likely in the locality and evaluated major species most likely to be affected by the development.

'Small areas of vegetation, including four endangered ecological communities, Cumberland Plain Woodland, Shale-gravel Transition Forest, River-flat Eucalypt Forest and Freshwater Wetlands occur in the Western Precinct. The threatened flora species, Grevillea juniperina subsp. juniperina and Pimelea spicata also occur in the Western Precinct. However, the vegetation in this area is highly degraded and the majority of the ecological communities are represented by scattered regrowth indigenous tree cover.'

'Much of the Western Precinct (Jordan Springs) is covered by grassland created by previous clearing of natural woodland and open forest. Subsequent pasture improvement and weed invasion had resulted in the establishment of variable amounts of introduced species. Remnant and regrowth woodland and forest is estimated to cover 20% of the precinct. The woodland and forest areas of the Western Precinct (Jordan Springs) are generally dominated by Eucalyptus moluccana, reflecting the reduced amounts of lateritic gravel in the soil compared with areas in the east of the St Marys Development.'

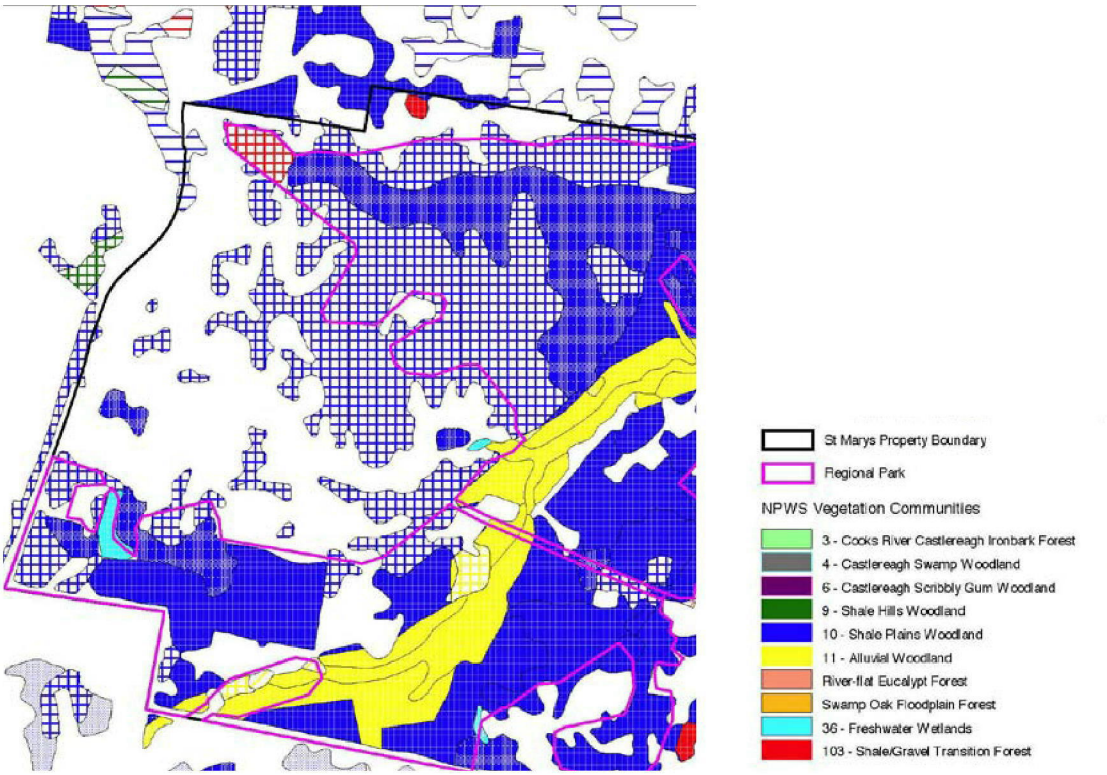

Figure 2.2 Existing Site Vegetation Communities - Jordan Springs Site

2.0 Site Review (cont.)

2.4 Flora (cont.)

The report identified two threatened plant species; Grevillea juniperina ssp juniperina, and Pimelea spicata as recorded in the Western Precinct (Jordan Springs). No other threatened species were recorded from the precinct.

Pimelea spicata

Grevillea juniperina

Figure 2.2 - Local Species Images

The report concluded that;
'Development within the Western Precinct (Jordan Springs) is likely to result in the removal of patches of disturbed native vegetation representative of two endangered ecological communities; Cumberland Plain Woodland and Shale -gravel Transition Forest. Approximately 65.2ha of Cumberland Plain Woodland, 0.7ha of River-flat Eucalypt Forest, 0.6ha of Freshwater Wetlands and 0.7ha of Shale-gravel Transition Forest will be removed. However, the Regional Park contains extensive areas of these vegetation communities that are in excellent ecological condition and will be conserved in the long term.'

'Development within the Western Precinct (Jordan Springs) will also entail the removal of some threatened plants (Grevillea juniperina subsp. juniperina and Pimelea spicata). Over 249,000 specimens of Grevillea juniperina subsp. juniperina occur in the Regional Park and the small numbers to be removed in the Western Precinct (Jordan Springs) are not important for the survival of this species in the locality. Only two small populations of Pimelea spicata are present within the St Marys Development, and the smaller of these will be removed in the Western Precinct (Jordan Springs). Consultation with DECC indicates that this small population is not significant as it is unlikely to contribute to the long term survival of the species in its current location.'

2.5 Fauna

Cumberland Ecology identified that 'Fauna habitat is generally limited to grassland and woodland in the Western Precinct (Jordan Springs). Limited aquatic habitat occurs in the form of a small drainage line in the eastern part of the precinct and wet meadow associated with a dam located in the Regional Park near the south western portion of the precinct. The dam in the Regional Park provides key aquatic habitat within the study area.'

The Cumberland Ecology report concluded that " No threatened fauna species have been recorded from the Western Precinct (Jordan Springs) and no impact is expected to occur to native fauna."

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3.0 Vegetation Management Plan

3.1 Riparian Zone Revegetation Strategy

Generally

The Western Precinct (Jordan Springs) comprises the next stage in the ongoing development of the St Marys Development area. The Western Precinct (Jordan Springs) works area is proposed to comprises 229ha, incorporating detached residential housing, village centre, street networks and open space.

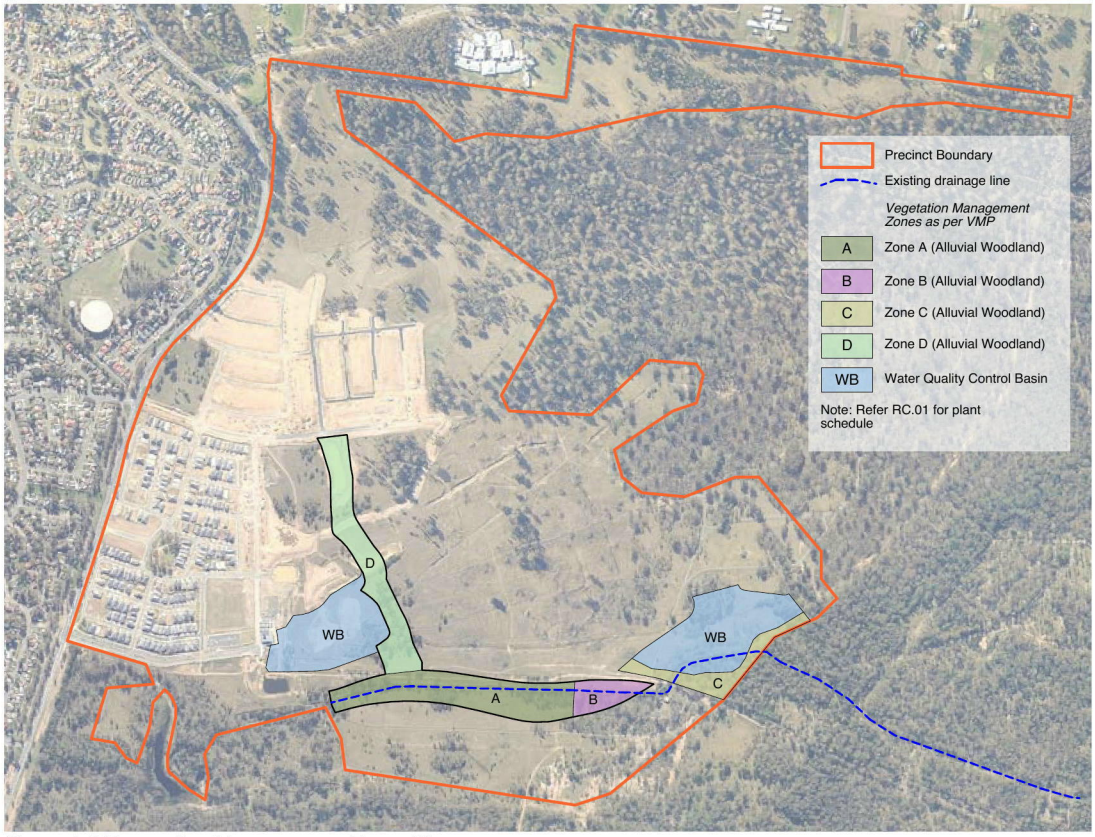


Figure 3.1 Vegetation Management Zones Plan

Figure 3.1 indicates the extent of the development area identifying the key riparian corridor spaces. Outlined following in further detail are the revegetation strategies for each of the identified zones and water quality strategies for basins.

The development of the strategies for each zone establishes an approach to revegetation, regeneration, or weed management (or a combination of these) as applicable, along with species mixes and densities for works required (refer to Appendix 10.1 - Revegetation Plans).

Revegetation strategies have been based on an identification of the indigenous plant community that would have existed on the site prior to the modification of the channel edges/ banks and the impacts of urban development. It is noted that the plans provided in appendix 10.1 indicates general extent of vegetation management zones. These areas will be provided with vegetation management strategies in context with natural areas in the vicinity. The planting / revegetation strategies outlined on the following pages take into account the following principles outlined in NSW OW's standard requirements.

"*Vegetation species composition, planting layout and densities should be identified. The required mix of plant species relates to the actual community to be emulated and the size of the area or areas to be rehabilitated but mature vegetation communities are generally well structured, comprising trees, shrubs and groundcovers species. Planting densities should achieve quick vegetative cover and root mass to maximise bed and bank stability along the subject watercourse.*."

The Vegetation Management Strategy recognises that a key aspect of the desired character and proposed marketing strategy for the site is for urban development within a natural / bushland setting.

3.0 Vegetation Management Plan

3.1 Western Precinct (Jordan Springs) Riparian Corridor Management Strategy

The following section addresses the objectives, constraints, extent of work zones, species for revegetation, planting densities, performance criteria and management actions and techniques to be undertaken within each of the riparian zones identified in Western Precinct (Jordan Springs). Riparian Corridors will be managed with the overall aim of ecosystem restoration.

Objectives

1. Retain and protect any threatened flora identified in the zone where stormwater management criteria allow.
2. Retain and enhance areas of resilient remnant bushland.
3. Reduce weed density to manageable and sustainable levels.
4. Provide manageable and sustainable habitat and corridors for native fauna.
5. Maintain genetic diversity and integrity throughout the landscape.
6. In revegetation areas, replicate the structure and species as best as possible richness of the surrounding native vegetation (Alluvial Woodland).
7. Provide a sustainable landscape in terms of sediment and erosion control.
8. Ensure landscaping works do not detract from areas of ecological value.

Constraints

- Predominant use of Jordan Springs is as a new residential community. The Riparian Corridors provide significant requirements and as such will be a highly modified environment.
- Revegetation and landscaping of the adjacent landuses (e.g., parkland, water quality basins and Asset Protection Zones) will need to consider fauna movement and management in their design.
- Areas which are suitable for topsoil salvage because they are likely to contain a large native seed bank will be identified before any further construction.
- Asset Protection Areas (APZs) between the riparian corridor and the adjoining residential development will be considered. APZ management should be consistent with the goals of improving vegetation condition and fauna habitat.
- APZs will be between 10- 25m wide and have low canopy and shrub densities in accordance with Rural Fire Service recommendations. Any APZs will be exclusive of the riparian corridor but may be adjacent to it.
- Works will be consistent with the recovery plans for any threatened species that have been previously recorded in the Western Precinct (Jordan Springs) (e.g., Grevillea juniperina spp. juniperina and Pimelea spicata) or the recovery of their core habitat.
- Essential infrastructure will need to be incorporated within, across and adjacent to the corridors

Extent of Work Zones

The Riparian Corridor extends along a channel and flows eastward towards Wianamatta Regional Park. This area is divided into four Zones; A, B, C, and D. Refer Figure 3.1.

Zone A is the commencement of the man-made channel which leads to an existing culvert. Severe erosion is occurring in this area on the bank and creek bed. This area is planned for extensive earthworks to facilitate the SW conveyance from the Jordan Springs residential development and significant revegetation is required.

Zone B extends down the channel to the culvert and bitumen road. There are many weed species in this area and extensive weed control is required. This area is planned for extensive earthworks to facilitate the SW conveyance from the Jordan Springs residential development and significant revegetation is required.

Zone C extends from the culvert and bitumen road through to Wianamatta Regional Park. This area requires extensive weed control and will also be subject of extensive earthworks and revegetation.

Zone D refers to the minor channel from the north which is to be diverted into this main drainage channel. This area is highly degraded and will require revegetation works. This area is planned for extensive earthworks to facilitate the SW conveyance from hte Jordan Springs residential development and significant revegetation is required.

Extent of Work Zones (cont.)
Due to the proximity of this entire area to the creek line, only the non-selective herbicide, RoundUp® Biactive® will be used. Where additional chemicals are recommended (e.g., fluroxypyr, triclopyr and metsulfuron methyl), they will be used no closer than 3 metres from the top of bank of any water course. Water should not be flowing or pooled in the creek line in the immediate vicinity of where the weed control is being undertaken. If plants cannot be sprayed for this reason, plants should be removed by hand or slashed to prevent them from fruiting and the herbicide applied later at an appropriate time. This will reduce the threat to aquatic fauna that utilise the creek line from the herbicide.

Species for Revegetation and Plant Densities to Riparian Corridors
Analysis of the field notes collected by Ecological Australia in July 2008, the Native Vegetation of the Cumberland Plain (NPWS 2002) and the ecological assessments carried out by Cumberland Ecology (Cumberland Ecology 2008) has shown that all zones in the riparian areas to be rehabilitated in the Western Precinct (Jordan Springs) were historically dominated by Alluvial Woodland (NPWS 2002).

The proposed species mix for the Riparian Corridor in the Western Precinct (Jordan Springs) is shown in Table 3.3.

Species	**% mix**	**Planting Density**
Canopy and midstorey		**Refer to plans - varies based on location**
Casuarina glauca	40	
Eucalyptus amplifolia	25	
Angophora subvelutina	10	
Melaleuca styphelioides	10	
Melaleuca linariifolia	10	
Eucalyptus baueriana	5	
Shrub Layer		**1 plant per m²**
Acacia parramattensis	10	
Bursaria spinosa	10	
Callistemon citrinus	10	
Clematis aristata	10	
Dodonea triquetra	10	
Grevillea juniperina	10	
Hakea teretifilia	10	
Kunzea ambigua	10	
Leptospermum polygalifolium	10	
Trema aspera	10	
Riparian edge planting (to top of bank)		**4 plants per m²**
Juncus usitatus	30	
Carex appressa	20	
Cyperus exaltatus	20	
Gahnia sieberiana	10	
Lomandra longifolia	20	
Terrestrial Batter Grass Mix		**4 plants per m²**
Cappillipedium spicigerum	10	
Carex appressa	5	
Cymbopogon reractus	10	
Danthonia longifolia	10	
Eragrostis elongata	10	
Lomandra longifolia	20	
Microlaena stipoides	5	
Poa labillardierii	10	

Table 3.3 : Riparian Corridor species mix and planting densities

Works and Performance Criteria

1. For all areas of revegetation plant replacement is to occur when survival of planted stock drops below 90% of the original number planted.
2. Weed cover within Zone F to be kept below 5%.
3. Weed cover is to be reduced within the remaining zones to below 10% by the end of the maintenance period, particularly for the groundcover layer.

Planting approach:

- All revegetation is to be hand planted
- Jute matting stabilisation is to be provided in conjunction with planting to creek base zone to the level of the 1:5 year flow event. This will provide erosion control till the planted vegetation becomes established.

Actions and Techniques

Zone A

Pre-construction Phase Actions

1. Remove dense Juncus acutus stands in channel by digging them out manually. Dispose of this material appropriately.
2. Phoenix canariensis will be transplanted into urban areas outside of Riparian Corridor (eg. Town Square). Any species not transplanted will be cut and painted using herbicide.
3. Stabilise banks and bed of the creek line by battering the edges, jute the banks and armour the bed to prevent further erosion.
4. Collection of provenance seed from locally endemic stock.

Construction Phase Actions

1. Spray any regrowth of Juncus acutus and Phoenix canariensis.
2. Where possible, exclusion fencing will be erected along the boundary of the Western Precinct (Jordan Springs) and the riparian corridor.
3. Thin mulch (50mm) is recommended for the disturbed banks on the edges of the re-constructed channel. Mulch will not be used within the channel itself. Mulch will be sourced from vegetation to be cleared on site.

Post-construction Phase Actions

1. Revegetation with species mix and densities prescribed in Table 3.3. Small amounts of long-life fertiliser and/or water crystals will be necessary if planting occurs after a dry spell.
2. Plants will be watered on the day of planting, two additional times within the first week after planting and on subsequent occasions depending on climatic conditions.
3. Maintenance weeding using methods deemed appropriate for the emerging weed species. Weed Management objectives should focus on the long term establishment of revegetated plants.

Zone B

Pre-construction Phase Actions

1. Control Vinca major using a non-selective herbicide while it is actively growing.
2. Remove dense Juncus acutus stands in channel by digging them out manually. Dispose of this material appropriately.
3. Phoenix canariensis not subject to transplanting will be cut and painted using a non-specific herbicide.

Construction Phase Actions

1. Control Cotoneaster sp. and Ilex aquifolium found behind the existing buildings using the cut and paint method using a non-specific herbicide.
2. Where possible, exclusion fencing will be erected along the boundary of the Western Precinct (Jordan Springs) and the riparian corridor.

Zone B (con.t)

Post-construction Phase Actions

1. Revegetation with species mix and densities prescribed in Table 3.3. Small amounts of long-life fertiliser and/or water crystals will be necessary if planting occurs after a dry spell.
2. Plants will be watered on the day of planting, twice more within the first week after planting and on subsequent occasions depending on climatic conditions.
3. Maintenance weeding using appropriate methods for the emerging weed species. Weed Management objective should focus on the long term establishment of revegetated plants.

Zone C

Pre-construction Phase Actions (Primary weed control)

1. Control the small infestation of Bryophyllum delagoense by hand pulling all plants and disposing all material appropriately. Note this species will re-sprout from root stock if not disposed of appropriately.
2. Remove dense Juncus acutus stands in channel by digging them out manually. Dispose of this material appropriately.
3. Rubus fruiticosus agg. This species can be controlled during the growing season by the cut and paint method using a non-selective herbicide. Spot spraying of regrowth using a non-selective herbicide during the growing season may be required. Large infestations will be controlled by a post-flowering spraying regime using tricolpyr (Garlon).
4. Delairea odorata will be skirted from intact remnant canopy trees and the ground-dwelling component sprayed with a non-specific herbicide.
5. Olea europaea africanus will be treated using the drill and fill method and a non-specific herbicide.

Construction Phase Actions

1. Where possible, exclusion fencing will be erected along the boundary of the Western Precinct (Jordan Springs) and the riparian corridor.
2. Follow-up weeding targeting the species above will be conducted using appropriate techniques.

Post-construction Phase Actions

1. Secondary weed management will be continued and target regrowth of Delairea adorata, Bryophyllum delagoense, Juncus acutus, Rubus fruticosus and Olea europaea africanus.
2. Maintenance weed management targeting herbaceous and grass weeds using appropriate methods will be conducted. Species include Sida rhombifolia, Eragrostis curvula, Senecio madagascariensis, Verbena bonaerensis and Cynodon dactylon.
3. If natural regeneration of native species does not occur undertake active revegetation using understorey species identified in Table 2.

Zone D

Pre-construction Phase Actions

1. Primary Weed Control targeting Juncus acutus in the creek line. Plants will be hand weeded and weed refuse disposed of appropriately.
2. Stabilise banks and bed of the creek line by battering the edges, jute the banks and armour the bed to prevent further erosion.

Construction Phase Actions

1. Where possible, exclusion fencing will be erected along the boundary of the Western Precinct and the riparian corridor.
2. Follow-up weeding targeting the species above will be conducted using appropriate techniques.

Zone D (cont.)

Post-construction Phase Actions

1. Slash and spray perennial grasses, Chloris gayana and Setaria sp. using non-specific herbicide.
2. Revegetate with species mix and densities prescribed in Table 3.3. Small amounts of long-life fertiliser and/or water crystals will be necessary if planting occurs after a dry spell.
3. Plants will be watered on the day of planting, twice more within the first week after planting and on subsequent occasions depending on climatic conditions.
4. Maintenance weeding using methods deemed appropriate for the emerging weed species. Weed Management objective should focus on the long term establishment of revegetated plants. Weed species likely to invade the area include Eragrostis curvula, Verbena bonariensis, Sida rhombifolia, Setaria sp. and Senecio madagascariensis.

Additional Notes – Considerations and Planning Issues

- Areas where works will be restricted to bush regeneration works may require some additional revegetation in the future depending on how these areas respond to bush regeneration techniques. These techniques could include brush matting, direct seeding and trigger techniques such as fire.
- Exclusion fencing is designed to prevent plant and equipment from impacting on remnant bushland areas but should not inhibit small fauna movement. As such, the base of any fencing should be no closer to the ground than 400 mm.

3.0 Vegetation Management Plan (cont.)

3.2 WATER QUALITY BASINS – WESTERN PRECINCTS (JORDAN SPRINGS)

Objectives

1. to provide wet basin environment that allows for water quality improvements
2. to provide a degree of flood mitigation
3. to provide aesthetically attractive landscape and open space nodes to the development
4. to expand habitat opportunities for a range of flora and fauna

Constraints

The need to access the Water Quality Basins for scheduled and emergency maintenance dictates that trees and shrubs are not suitable for these basins.

Extent of Work Zones

Two water quality basins are proposed for the Western Precinct (Jordan Springs); the first is adjacent to the existing main creek line but on the main SW flow channel and towards the eastern side of the Village Centre Zone (the Village Centre Lake), and the second is on the main creek line in the far eastern portion of the precinct prior to stormwater discharge into the Wianamatta Regional Park.

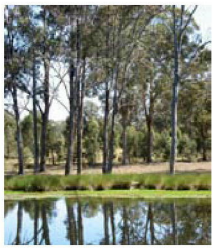


Table 3.4 Existing site images to Western Precinct

Species for Revegetation and Planting Densities to Water Quality Basins

The species mix will be exclusively grasses and sedges no more than one metre high. A small number of trees and shrubs will be used on the banks of the basins. Planting will be selected from this range subject to the scale and extent of basins. It is also noted that maintained open spaces may adjoin these basins which likewise may employ a smaller range of these plant species

Species	**% Mix**	**Planting Density**
Landscape Areas		
Canopy and midstorey		**1 plant per 100m2**
Acacia decurrens	20	
Acacia parramattensis	10	
Acacia terminalis	10	
Angophora floribunda	10	
Eucalyptus sideroxylon	5	
Eucalyptus tereticornis	10	
Eucalyptus molucanna	10	
Melaleuca decora	10	
Melaleuca linariifolia	10	
Pultenaea vilosa	5	
Terrestrial Grass Mix		**4 plants per m²**
Austrodanthonia longifolia	10	
Austrostipa ramosissima	5	
Cappillipedium spicigerum	5	
Carex appressa	5	
Cymbopogon refractus	10	
Dianella revoluta	5	
Eragrostis elongata	5	
Lomandra longifolia	20	
Microlaena stipoides	5	
Poa labillardieri	10	
Themeda australis	20	
Lake Edge Macrophytes		**4 plants per m²**
Baumea articulata	10	
Baumea rubignosa	10	
Baumea teritifolia	10	
Eleocharis acuta	10	
Eleocharis equisetina	10	

Eleocharis sphacelata	20	
Lepironia articulata	10	
Philydrum lanuginosum	5	
Schoenoplectus mucronatus	5	
Schoenoplectus validus	10	
Riparian Edge Planting (To Top of Bank)		**4 plants per m²**
Alisma plantago-aquatica	10	
Carex appressa	20	
Cyperus exaltatus	10	
Dianella longifolia	10	
Gahnia aspera	10	
Gahnia sieberiana	10	
Juncus usitatus	20	
Lomandra longifolia	10	

Table 3.5 Water Quality Basin Species Mix and Planting Densities

Works and Performance Criteria

1. Plant replacement is to occur when survival drops below 90 % of the original number of tubestock planted.
2. Weed cover at the commencement of the post-construction maintenance phase will be kept below 5 %.
3. Management of weeds will aim to facilitate the establishment of the dense cover of herbs, sedges and grasses.

Actions and Techniques

Mechanical planting is not a viable technique in the Water Quality Basins. As a result, plants will be hand planted at the rates outlined in Table 3.4.

Groundcovers will be hand planted evenly throughout the basins to facilitate a good cover. Maintenance will include regular weed control and watering.

Management actions have been divided into pre-construction phase, construction phase and post-construction phase actions.

Pre-construction Phase Actions

1. Primary spray treatment of herbaceous weed species to prevent their dispersal during the construction phase. Targeted species include Eragrostis curvula and Chloris gayana.
2. Collection of provenance seed from locally endemic stock. (This is currently being carried for the entirety of the site by Greening Australia).

Construction Phase Actions

1. Where relevant, erection of exclusion fencing on the bushland edges of the basins.
2. Removal of vegetation and construction of basins. Retention of some mature remnant trees where possible.
3. Appropriate sediment and erosion control around each of the basins
4. Thin mulch (50mm) is recommended for the disturbed banks on the edges of the basins. Mulch will be sourced from vegetation to be cleared on site.

Post-construction Phase Actions

1. Revegetation with species mix and densities prescribed in Table 3.4. It is not anticipated that long-life fertiliser or water crystals will be necessary in the basins.
2. Plants will be watered on the day of planting, twice more within the first week after planting and on subsequent occasions depending on climatic conditions.
3. Maintenance weeding using methods deemed appropriate for the emerging weed species. Weed Management objective should focus on the long term establishment of revegetated plants within the Water Quality Basins.

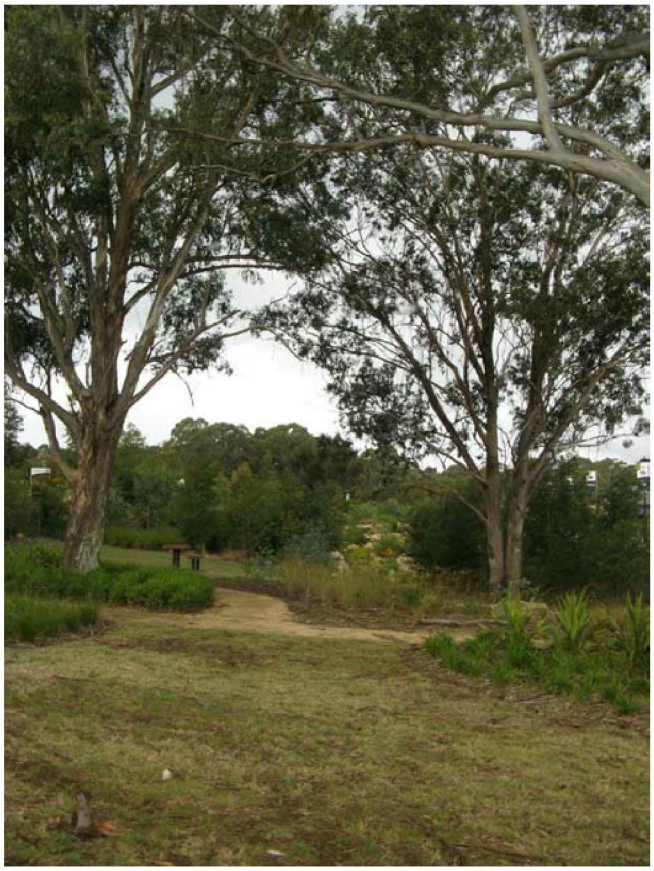
Additional Notes, Considerations and Planning Issues

At such high planting densities, hand-weeding is preferred for the terrestrial areas adjoining basins once revegetation becomes established. Controlled spraying is possible to upper embankments of basins

3.0 Vegetation Management Plan (cont.)

3.3 Examples of Proposed Outcomes

The images below outline the type of recreation actions anticipated for the riparian corridors and adjoining areas.



Eastern Precinct, Ropes Crossing

Eastern Creek, Eastern Precinct, Ropes Crossing

Figure 3.6 Example images of proposed revegetation planting (from Eastern Precinct)

3.4 Implementation Programme

Works to the riparian corridors are subject to the programme for adjoining development precincts. The programme following outlines key milestones for the riparian corridors and basins.

- N-S Channel
- E-W Channel
- Village Lake
- East Lake

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4.0 Stream Works

4.1 Generally

The development of design strategies for the site has and will in the future involved close liaison between the landscape and engineering disciplines in resolution of preferred "multi- objective" solutions for the Riparian Corridors. The hydraulic engineering aspects of Riparian Corridors are detailed in full in the associated Streamworks Planning by Sinclair Knight Merz. as included in the Western Precinct (Jordan Springs) Water Soils & Infrastructure Report.

4.2 Classification of Watercourses

The Water Management Act, 2000 states a requirement to identify "rivers" within the development site. Following a site inspection undertaken with NSW Office of Water (NOW), the "rivers" for the Western Precinct as shown on Figure 4.2 were identified. It was agreed with NOW that the "rivers" will be refined during further consultation with NOW. Refer Figure 4.1.

4.3 Overview of precinct recommendations

The objectives of the stormwater trunk drainage system are to:

- Safely convey runoff through the proposed development;
- Integrate with the road and lot layout; and
- Integrate with the water cycle management system such that runoff quality and quantity are
- controlled efficiently.

4.4 Water Quantity Management Objectives

Watercycle management objectives are outlined in two documents SREP30 and EPS, both prepared by the then Department of Urban Affairs and Planning. Generally changes in local flow regimes due to the development are to be minimised for rainfall events up to the 50% AEP rainfall event; i.e. from 2 yr to 100yr Average Recurrence Interval (ARI events).

4.5 Proposed Drainage System

The following components would make up the drainage system:

- Pit and pipe system able to carry flows up to the 10 year ARI storm;
- Overland flow paths able to carry flows up to the 100 year ARI storm;
- Open channels able to carry flows up to the 100 year ARI storm; and
- Combined detention/wetland basins able to provide the necessary quality and quantity controls, while also coping safely with the 100 year ARI flow

4.6 Proposed Detention

Four detention basins are proposed for the Western Precinct for peak flow mitigation for 2 year to 100 year ARI storm events. Three basins (A1, A2 and C1) are located within the Western Precinct, whilst the remaining basin (C2) is situated outside the Precinct boundary in the Regional Park as shown on Figure 4-1.

4.7 Hydraulics

Channel top widths will be defined for the trunk drainage system during further consultation with the Office of Water regarding their requirements of channel makeup and riparian offsets under the Water Management Act, 2000. It is anticipated that the top widths will vary from 10m in the upstream catchments to 30m further downstream towards South Creek.

4.8 Maintenance of Water Quantity Controls

Proposed detention basins/wetlands will be maintained by MDC for an initial three year period following construction. After this time, Penrith City Council will be responsible for the ongoing maintenance of the basins.

4.9 Natural Systems Controls

In addition to source and conveyance In addition to the above water quality controls,natural system controls will also be adopted wherepossible. Natural system controls involve the management of areas within the catchment and creek systems that will remain unchanged. The use of natural system controls does not necessarily involve specific structural control measures, but rather a general planning approach.

4.0 Stream Works (cont.)

Natural systems controls recognises that natural waterways, floodplains and native vegetation perform essential hydrological and ecological functions that cannot easily be replicated by constructed stormwater control measures.

Therefore essential elements of the natural system will be retained in the development, and where degraded they will be rehabilitated and may include:

- Open space areas located near natural drainage lines;
- Existing native vegetation maintained where possible; and
- Revegetation with native species to batters and open space areas will assist in reducing stormwater pollutant loads, and therefore assist in improving the long term water quality.

4.10 Salinity Impact of Development

Salinity problems may arise when the existing stored salt is brought to the surface by a rising water table, or is washed laterally from the B-horizon by increased infiltration. We consider that though the EM results show variations in the overall ground conductivity, the soil and groundwater test results indicate relatively low salinity overall.

The key groundwater management issue with respect to wetlands is to provide a liner to prevent any interaction between groundwater and the water in the wetland.

4.11 Fauna Movement

Riparian Corridors are envisaged as the primary fauna movement corridor between the Regional Park areas to the north and south of the site.

Of critical importance is the functionality and sustainability of the corridor taking into consideration the significant stormwater conveyance requirements and urban development objectives. Road crossings will be required in key locations.

Key strategies for optimising the effectiveness of crossing points of the corridor where factors allow are;

i. Provision of a naturalised base to the culvert crossing that is rock and soil material with protective groundcover planting at either end (as far as light will allow). Rocks and native plantings are aimed to enhance the natural habitat qualities of the crossing and encourage fauna use.

ii. Consolidation of tree and shrub canopy near and overhanging road to increase protection and encourage avian movement.

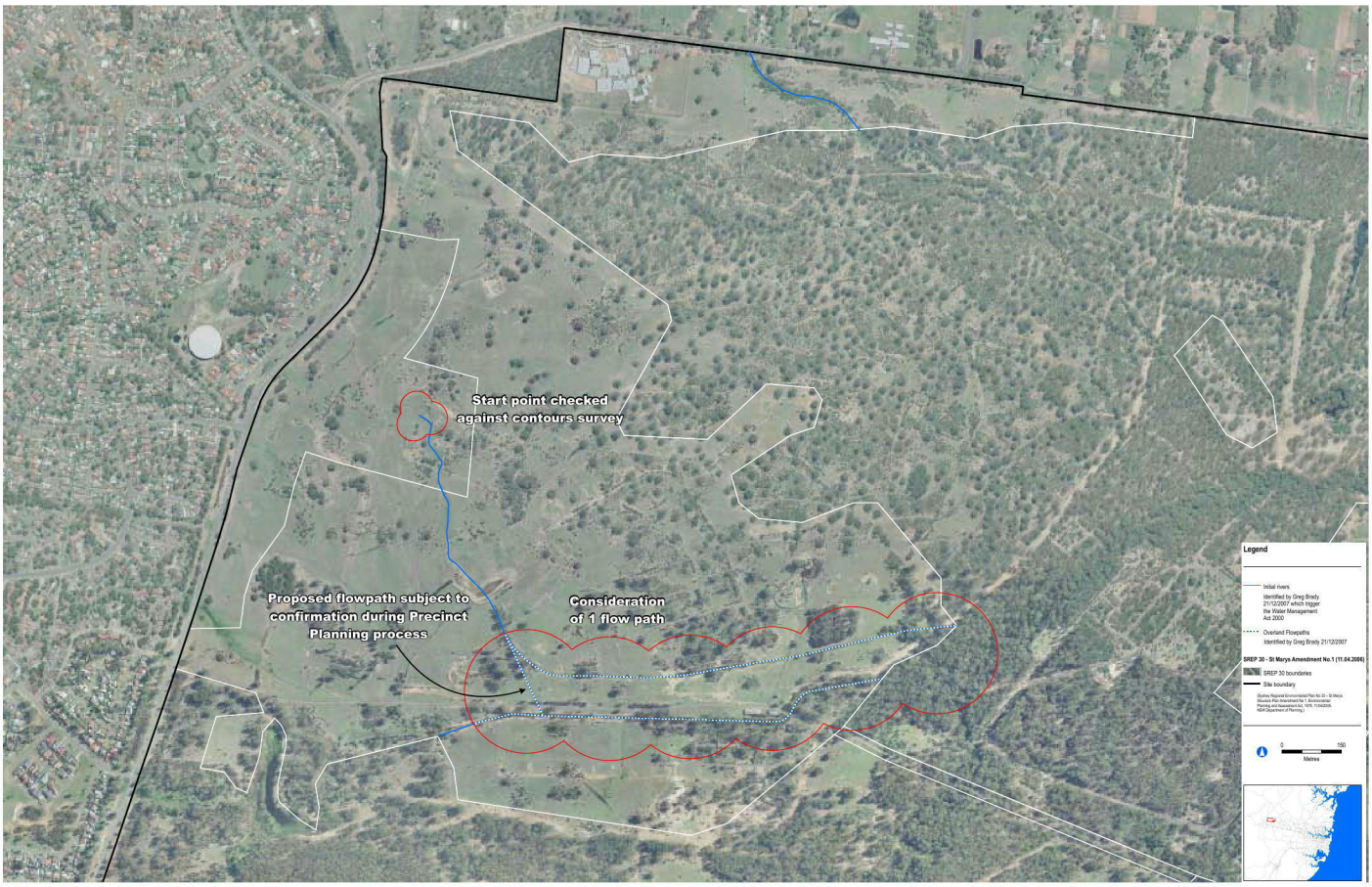

Figure 4.1 Stream classification (Source SKM Water Soils and Infrastructure Report 2009)

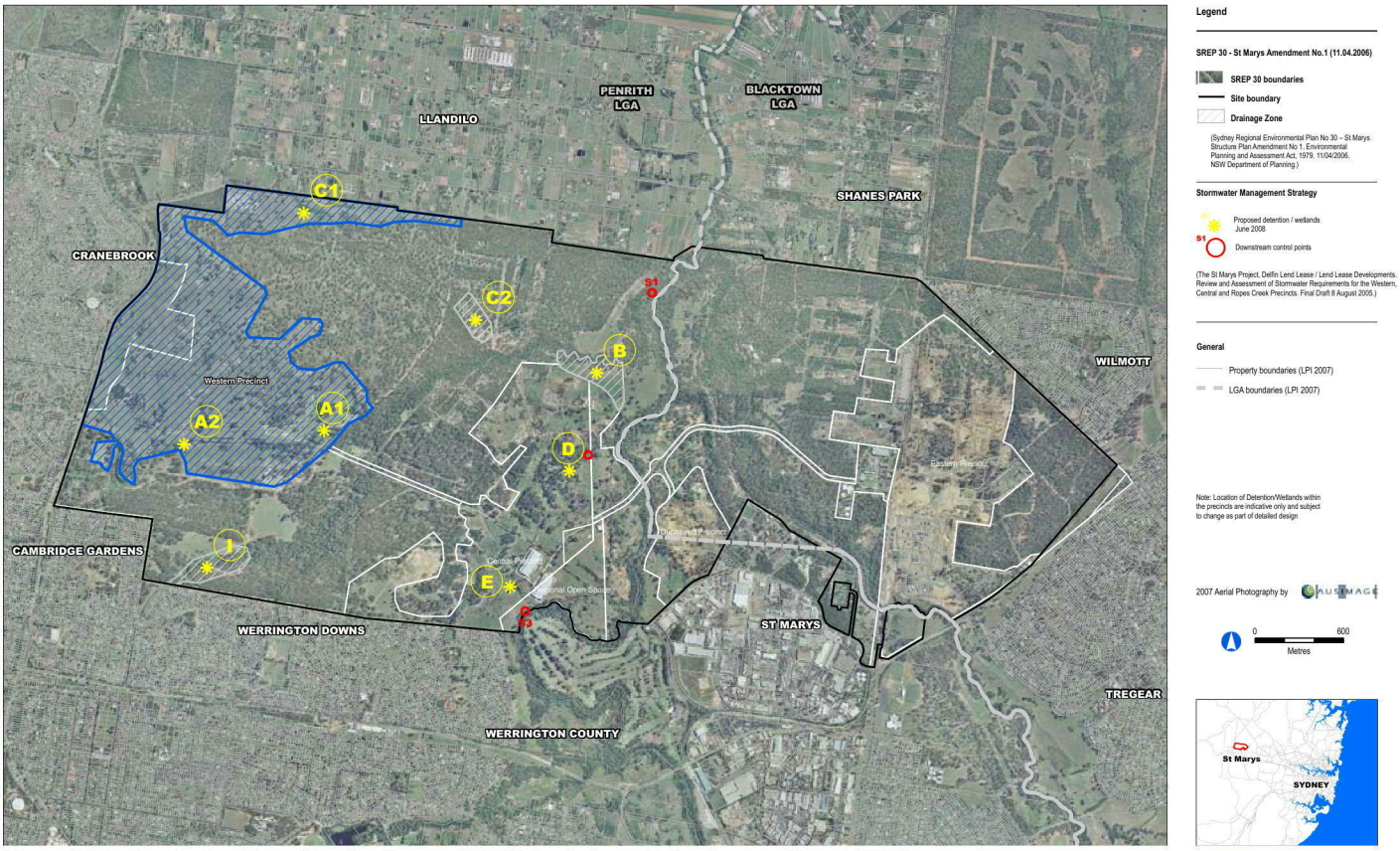

Figure 4.2 Indicative location of basins (Source SKM Water Soils and Infrastructure Report 2009)

5.0 Revegetation Works

The following confirm the key revegetation tasks to be undertaken in implementing the strategies identified earlier.

5.1 Seed Collection

1. Section 132C license

The restoration programme is to occur in and around several vegetation communities listed as Endangered Ecological Communities under the Threatened Species Act, 1995. As such restoration and seed collection activities will require the issuing of a Section 132C Licence administered by the OEH.

2. Preparation of Seed Management Plan

OEH requires the provision of a Seed Management Plan to the Section 132C Licence application
The plan will describe:

- Description of database and recorded information
- Collection techniques to be used
- Cleaning techniques to be used
- Species lists for collection
- Storage requirements
- Appropriate reporting

3. Seed Collection Programme

A carefully managed seed collection programme is currently underway and forms an integral component of the restoration project. Seed collection is a specialized field requiring detailed knowledge of species and plant community distribution, sound knowledge of the effects of fire and excellent ecological observational skills. Good collectors require excellent plant identification skills and physical strength and endurance to work for extended periods in rough terrain and often during extreme climatic conditions.

Seed collection will be performed by experienced and qualified staff. All seed collection, management, cleaning and storage will be in accordance with Florabank Seed Collection Guidelines. The collection programme will continue throughout the entire project as many native species produce seed sporadically and it can be several years between viable seed production seasons.

All plant material to be used in the corridors is to be of local provenance. Where required to ensure the collection process does not delay the project, appropriate existing seed banks will be used for plant propagation.

4. Seed cleaning

Seed will be processed with a range of specialist tools and techniques to ensure efficient and effective cleaning down for storage. Care is to be taken to ensure that cleaning and handling techniques do not compromise seed viability.

5. Seed and database management

Management of the seed database with appropriate project reporting is required. The reports will include work completed and a current composition of the seed bank.

5.0 Revegetation Works (cont.)

5.2 Plant propagation

Plant propagation refers to the germinating of collected seed and "growing on" the plants in hiko cells or forestry tubes.

5.3 Revegetation

The following works are to be employed across the site.

5.3.1 Mechanical Planting

There are certain areas within the corridors where revegetation can occur using mechanical planter. All trees and shrubs will be protected with an appropriate weed mat and guarded with stakes and a plastic sleeve.

The planter does not utilize deep ripping techniques and as such causes minimal soil disturbance during the planting operation. This will ensure saline soils are not disturbed during the planting operation. The planter provides a cut wide enough to insert the plant and then utilizes press wheels to compact the soil around the plant. The operator on the planter also places the mats and bags along side each plant.

Trained staff will then trail behind the planter. The first member will complete the "pressing in" of the plant and place stakes at the plant. The remainder of the team co-ordinate activities to complete the bagging and staking of the plants.

Mechanical planting will only be used to locations where the regular character of plantings by this method can be mitigated by curvilinear alignments following natural or regraded contours.

5.3.2 Installation of native tube stock by hand

Plants are installed by hand into a planting hole excavated by hand tools or mechanical auger. The planting hole will be a minimum of 25% larger than the planting container and its edges will be suitably 'roughed' prior to plant installation. The plant is carefully removed from the planting container and then placed in the hole so that its soil level is level with the surrounding soil. The planting hole will then be backfilled with excavated site soil and firmly tamped down by hand and foot.

5.3.3 Infill planting and replacement planting

This is the practice of scattering plantings throughout areas of remnant trees that have undergone bush regeneration activities or replacing plants which have died during the maintenance period. The plantings occur in the manner described above.

5.3.4 Supply and installation of mulch

Certain areas, particularly planted areas within the corridor will require areas of mulching under canopy tree plantings. Mulch will either be delivered by truck and spread by hand or spread mechanically. Mulch will be sourced from site chipped material where available.

5.3.5 Supplementary hand broadcasting of native seed

Where revegetation activities focus on the establishment of native trees, shrubs and under story species it is proposed to hand broadcast native grass seed throughout the maintenance period of the restoration program. This will add further diversity to the site, particularly ground covers, and assist in supplementary realisation of targets for planting densities.

5.3.6 Direct seeding

Direct seeding involves the delivery of native seeds into the soil using a mechanical seeder known as the "Rodden" Acacia's and other legumes fix nitrogen in the soil while growing and can therefore greatly improve soil condition. Many of these plants also flower heavily and are therefore very attractive to birds and insects. The addition of these pollinators into the revegetation work adds diversity and brings opportunities for natural regeneration.

The direct seeding activities will be used further to "break up" the appearance of mechanical revegetation and enhance natural character.

5.4 Bush Regeneration and weed control

The table below describes the components of the proposed bush regeneration programme that will be employed to specific corridor zones as outlined in the Vegetation Management Strategy.

Stage	Activities	Results
Primary bush regeneration: Weeding through an area for the first time only. May involve target weeding of selected species or a thorough weeding of all invasive species	• drilling or cutting and poisoning all woody weeds, • poisoning and/or removing woody thickets, • poisoning vines and scramblers, • releasing struggling native plants by spot weeding around individuals, and • removing smothering ground covers.	• removes the bulk of the weed material, • removes the local weed seed source, and • creates conditions suitable for germination of natives and weeds, hence the need for intensive secondary weeding.
Secondary bush regeneration: Usually carried out 3-6 months after primary weeding	Deals with • weed regrowth, • weeds missed during primary stage, and • weeds likely to seed within 12 months	• provides increased opportunity for natural regeneration • help add biodiversity • increased native habitat for fauna
Follow up bush regeneration: Subsequent weeding sessions, determined by site conditions, e.g. the type of weeds present or the level of infestation and degradation Follow up weeding is usually carried out for several years.	Deals with: • weed regrowth, • new seedlings, and • monitoring and care of native seedling germination.	• ensures weeds are removed when young, cost effective • reduces weed management issues through time • continues to allow increased biodiversity

Table 5.1 Description of bush regeneration activities

For a description of weed control techniques proposed to be used on specific weeds in the bush regeneration activities refer to Appendix 10.3

6.0 Community Engagement

The Vegetation Management Plan program provides a range of opportunities for community engagement, education and capacity building. The Wianamatta Regional Park also provides additional opportunities regarding interactive passive recreation and education.

Lend Lease is committed to active and positive community engagement through the implementation of the project and is currently investigating the potential for establishment of a small community nursery.

The community engagement programme is envisaged to initially target surrounding local residents following which, it will move strategically to involve new residents. GANSW experience has indicated that engaging residents as close to the development site as possible provides the best outcomes in terms of taking an active role in the management of local open space.

The ultimate aim of the programme is to set up a self sustaining Local Bushcare/Landcare Group to take "ownership" and participate in the management of local bushland.

Key actions may include:

- Investigation of potential for establishment and operation of a small community nursery
- Delivery of community training programme to give them the skills and knowledge to help manage their local bushland in perpetuity.
- Community events targeting restoration activities
- Delivery of education program to new residents targeting;
  - Sustainability initiatives incorporated in house design and services
  - Benefits of effective environment and ecosystems
  - Benefits of backyard native gardening
  - Indigenous and cultural education in native vegetation management
  - Programmes to involve schools
- Recreational activities allowing the community to enjoy their natural bushland
- Formation of Bushcare/Landcare Group
- Interactive community engagement program with surrounding Regional Park

Key stakeholders committed to date and to be involved in revegetation activities include:

- Lend Lease
- Parks and Wildlife Service (of OEH)
- Penrith Council
- Greening Australia
- Conservation Volunteers Australia
- Community Stakeholders

7.0 Maintenance

7.1 Maintenance Regime

Maintenance for the revegetation works areas are to be undertaken on the following basis:

- Fortnightly for the first 13 weeks after completion of planting;
- Monthly thereafter for 91 weeks (to 24 months total)- to NOW release of bond;
- Once every three months for the third year; and
- On an as required basis thereafter sufficient to maintain the Maintenance Acceptance Criteria of this plan.

7.2 Primary Weed Control

This component of the restoration programme refers to the control of listed noxious weeds and general such as Juncus acutus, Phoenix canariensis, Chloris gayana Setaria sp., Eragrostis curvula, Sida rhombifolia and Verbena bonariensis. This programme requires specialised equipment and chemicals and will be managed by appropriately trained contractors. Control of these plants usually requires several treatments and is most effective during summer.

7.3 Maintenance Acceptance Criteria

Maintenance effort will need to suffice to meet the following Maintenance Acceptance Criteria:

- No more than 5% of plant material to be a weed species;
- Mulch to be replaced as bare ground becomes apparent for the first 12 months of the maintenance period;
- All failed plant material to be replaced on a monthly basis for the first 12 months;
- All marker stakes to be kept in place for the first 12 months and thereafter removed; and
- Continue to ensure the general appearance and presentation of the corridor.
- Performance criteria as listed for each corridor/ zone in section 3.0 met

7.4 Maintenance Log Book

The contractor will keep a Maintenance Log Book, recording for each occasion that maintenance is carried out:

- When the maintenance was undertaken;
- What maintenance activities were undertaken;
- What level of resources were committed to the work, eg:
  - how many people undertook the work,
  - over what time frame,
  - what materials were used, and
  - what special requirements will be needed for the next maintenance visit
- Whether the Maintenance Acceptance Criteria was met.

The Maintenance Log is to be made available for NOW compliance audits.

7.5 Maintenance Report

A concise report will be provided to NOW every six months during the three year maintenance period. The report shall provide:

- A summary of the progress of the revegetation works based on the performance indicators outlined in section 8.2
- Any problems faced in implementing the VMP
- Measures developed to overcome these difficulties
- The report should provide reference to the maintenance log book - and the record (dates) of maintenance activity

7.0 Maintenance

7.6 Handover

The diagram on the following page identifies approval milestones for the site as defined in the Jordan Springs Landscape Handover and Maintenance Plan. Open space areas and roads within Ropes Crossing will be passed over to Council for ongoing maintenance once agreed maintenance time frames and performance goals are met, as defined in the development deed.

Handover will be undertaken at the completion of the contract maintenance period and the inspection of the works by Council . If there are any items that Council believes do not meet the handover criteria as established in the deed then these will be immediately identified and liaison between Council and the developer undertaken to resolve any required actions.

It is anticipated that embellishment works will be progressively implemented over the development area. In order to provide a more efficient handover process, final inspections and formal handover are proposed to be focused on two 6 monthly intervals. e.g. March 30th and September 30th.

From handover as agreed between the parties, the ongoing maintenance of the open space areas and facilities by Council will commence based on the ongoing maintenance regimes identified in the St Marys Western Precinct (Jordan Springs) Landscape Handover and Maintenance Plan, this includes:

1. Rubbish Removal
2. Clearing of GPT or other strategic measurement devices
3. Weed Monitoring and Control
4. Aquatic Weed Management

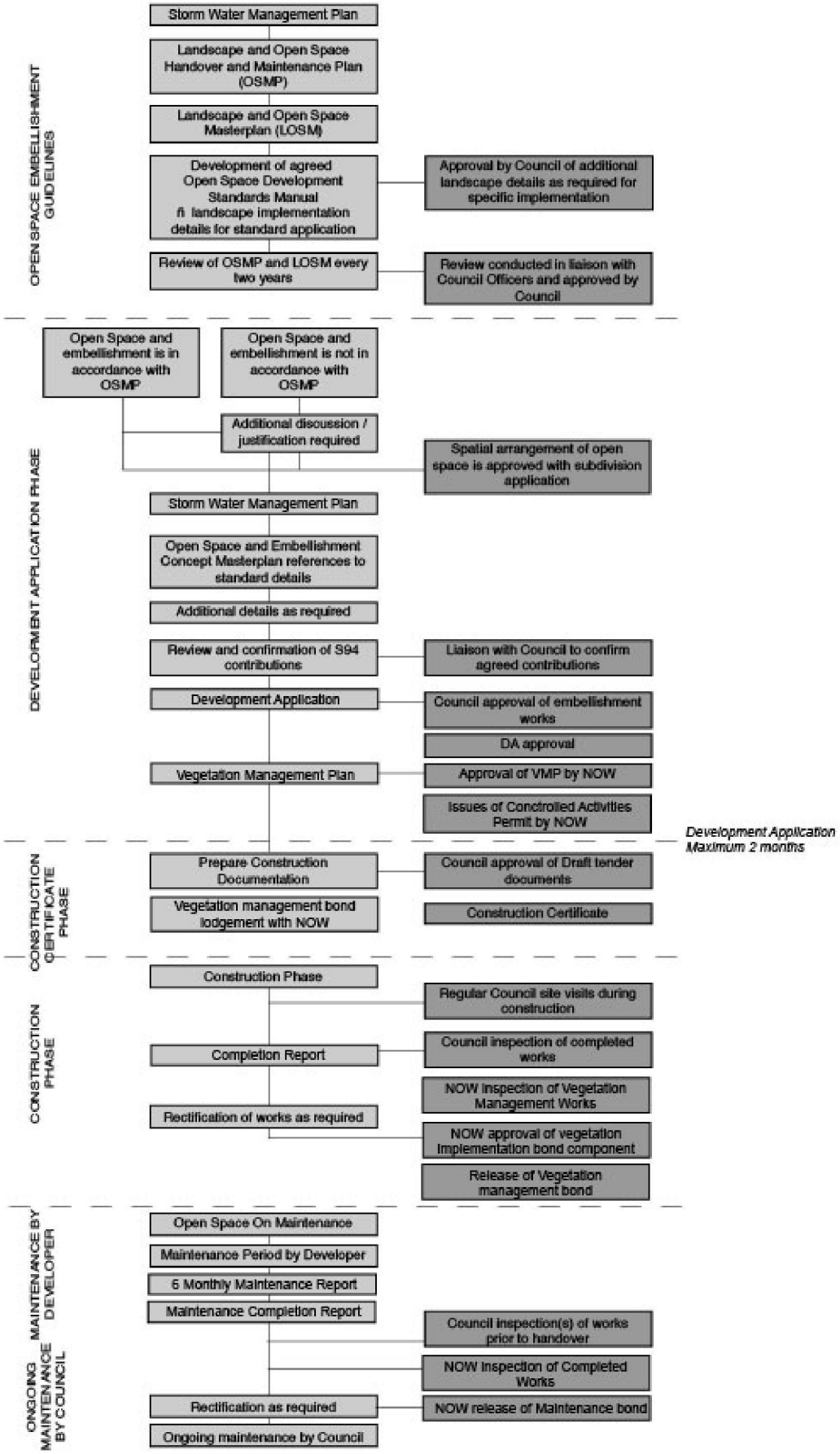

Figure 7.1 Approvals Milestones

8.0 Monitoring and Review

8.1 Generally

The NSW Office of Water (NOW) identifies in their guidelines for VMP preparation ("How to prepare a Vegetation Management Plan") that an ongoing process of monitoring and review of riparian revegetation is required. This will include ongoing liaison and input by Penrith City Council. Such a process is aimed to ensure that revegetation meets long term objectives for environmental improvement and to identify positive and negative factors arising from the revegetation process applied to individual sites. Importantly the review process must enable problems identified to be addressed.

8.2 Performance Indicators

The assessment of performance in all areas of revegetation operations is a fundamental component for success. For the creek restoration works to be successful and the vegetation community to be enhanced it is important that regular reviews are carried out to ensure that :

- Construction items meet design, programme, and quality objectives;
- Developers are meeting commitments for implementation, and establishment / maintenance responsibilities; and
- Recurrent maintenance is of acceptable standard and regularity.

The range of appropriate performance indicators should cover measures of both 'input' and 'output'. Input measures would include but not be limited to:

- level of ongoing planting/replacement
- regular maintenance
- site monitoring and plant protection

Output measures for the complex relate to its provision of flora and fauna habitat benefits. This requires measures such as :

- quality and diversity of revegetation establishment
- degree of fauna and bird species seen in area

Listed below are a series of performance indicators. These indicators provide a basis for periodic reviews. Successful riparian zone establishment is to be regarded as achieving a minimum 90% survival rate for all individual species specified in the VMP and a maximum 5% weed cover. Any maintenance replanting, where it required for more than 20% of the planted vegetation, or 20% of the riparian area for other regeneration methods, must be established at least 12 months before departmental endorsed maintenance completion can be given and any bond returned.

8.2.1. Environment and Landscape Character

Performance Indicators

- Extension of healthy, natural tree canopy on site
- Improvements in water quality of stormwater entering South Creek
- Minimal incidence of vandalism
- Community awareness of environmental protection qualities of site

8.2.2 Vegetation Management

Performance Indicators

- Incidence of weed and garden rubbish dumping decreases
- Decreasing percentage of weed cover in quadrants (see table below)
- Percentage of weed impacted area
  - decreases - first year
  - does not enlarge -second year
- Maintenance and expansion of existing site indigenous vegetation area
- Liaison with other bush regeneration teams working in the Local Government Area (LGA)

Refer Performance Measures for Bush Regeneration Table on following page.

Performance Measures for Bush Regeneration

Establish 5 x 5m quadrant in both in regeneration and revegetation areas. Assess the percentage of weed species and assess the bushland by the following criteria:

Bushland Condition	Description Occurrence	Weed
Excellent	Weed free	0-5%
Good	Generally Weed free	0-10%
Fair	Moderate amount of weeds	20-40%
Poor	Numerous weeds	50 - 70%
Bad	Heavy weed infestation	80-100%

8.2.3 Soil and Water Management

Performance Indicators

- No new scouring of creek/drainage channels
- No displacement of vegetation during high flows
- Reduction in nutrient levels of stormwater entering river system
- Reduction in litter entering drainage channel and riparian system

8.2.4 Management and Maintenance

Performance Indicators

- Satisfaction of NOW in quality of recurrent maintenance
- Satisfaction of organised groups in carriage of responsibilities by other groups for detailed maintenance requirements.

Review Procedures

The implementation of the Vegetation Management Plan recommendations is an ongoing process. Therefore, the outcomes of this Vegetation Management Plan must be subject to review, to ensure its implementation programme remains relevant to the objectives and strategies that must be addressed. The creek restoration works should be subject to review within two (2) years of initial planting to ensure that recommended strategies remain viable, and have been implemented and maintained to the highest possible standard.

Annual requirements

- Review establishment of plant species to creekline in liaison with Penrith Council's Bushcare Officer to confirm strategies for ongoing projects to riparian and open space system.
- Review ongoing maintenance performance for weed management, vandalism, and erosion to determine one off or recurrent mitigation actions required.
- Provide 6 monthly reports to NOW on maintenance progress/ activities/ observations.
- Hold an annual walkover with NOW and Council Bushcare Staff to review progress to date.

9.0 Costing and Review

The chart below indicates broad implementation costs for the programme of works required for revegetation of the riparian zone. The rates capture the general scope of works as indicated for the various areas on the Revegetation Plans.

A two year period has been designated for the ongoing maintenance and establishment of the revegetated riparian zone to be undertaken by Lend Lease.

Note:

- Rates exclude GST
- Creekline earthwork structure and drainage works not included
- Ongoing maintenance works to be undertaken by Council

JORDAN SPRINGS
VMP IMPLEMENTATION COSTING
December 2012

Areas

1	Zone A	55,607	m2
2	Zone B	12,111	m2
3	Zone C	17,764	m2
4	Zone D	41,014	m2
5	JS Lake	45622	m2
6	East Lake	53711	m2

ITEM	DESCRIPTION	QUANTITY	UNIT	RATE	TOTAL
1.0	**Soft Landscape works**				
1.1	Weed management	29,875	m^2	$2.50	$74,687.50
1.2	Revegetation area including preparation and mulching	126,496	m^2	$14.00	$1,770,944.00
1.3	Wet basin embankment revegetation (nom. 3.0m wide)	1,682	lin/m	$25.00	$42,050.00
	Sub Total				**$1,887,681.50**
2.0	**Maintenance**				
2.1	Initial maintenance	3	Months	$12,384.00	$37,152.00
2.2	Ongoing maintenance (monthly monthly to 24 months total)	21	Months	$2,880.00	$60,480.00
2.3	Completion maintenance (tri-monthly to 36 months total)	12	Months	$960.00	$11,520.00
	Sub Total				**$109,152.00**
	Total				**$1,996,833.50**

Exclusions:
Geomat / bank stabilisation

10.0 Appendices

10.1 Bibliography

Cumberland Ecology Report
St. Marys Dunheved Precinct Flora and Fauna Assessment for a Development Application to Fill Dunheved Precinct January 2007

Parsons Brinckerhoff Australia Pty Limited Report
Riparian Zones and Stormwater Management – Dunheved Industrial Estate July 2008

Sinclair Knight Merz Pty Limited Report
Water, Soils and Infrastructure Report May 2009

10.0 Appendices

10.2 Vegetation Management Plans

Note:
The following plans relate to the revegetation and planting proposals for the riparian corridor areas. The riparian corridors will be subject to a further issue of revegetation / planting plans.

Riparian Corridor drawing schedule:

3196-RC01	Key Plan
3196-RC02	Revegetation Plan - Riparian Corridor West
3196-RC03	Revegetation Plan - Riparian Corridor East
3196-RC04	Revegetation Plan - Riparian Corridor North
3196-RC05	Typical Cross Sections A & B
3196-RC06	Typical Cross Sections C & D
3196-RCD01	Riparian Corridor Details - sheet 1
3196-RCD02	Riparian Corridor Details - sheet 2