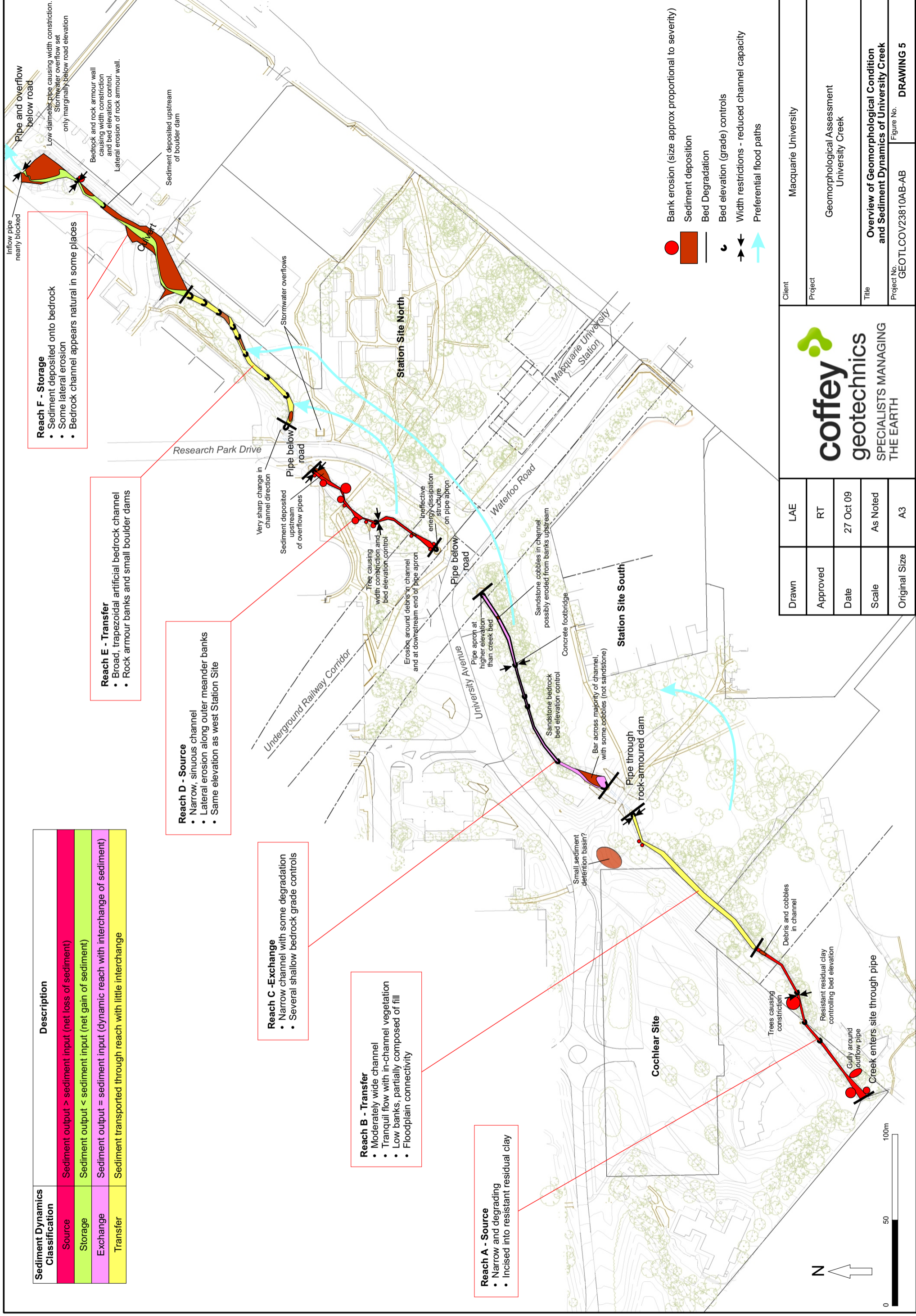


Sediment Dynamics Classification	Description
Source	Sediment output > sediment input (net loss of sediment)
Storage	Sediment output < sediment input (net gain of sediment)
Exchange	Sediment output = sediment input (dynamic reach with interchange of sediment)
Transfer	Sediment transported through reach with little interchange



Reach F - Storage

- Sediment deposited onto bedrock
- Some lateral erosion
- Bedrock channel appears natural in some places

Reach E - Transfer

- Broad, trapezoidal artificial bedrock channel
- Rock armour banks and small boulder dams

Reach D - Source

- Narrow, sinuous channel
- Lateral erosion along outer meander banks
- Same elevation as west Station Site

Reach C - Exchange

- Narrow channel with some degradation
- Several shallow bedrock grade controls

Reach B - Transfer

- Moderately wide channel
- Tranquil flow with in-channel vegetation
- Low banks, partially composed of fill
- Floodplain connectivity

Reach A - Source

- Narrow and degrading
- Incised into resistant residual clay

- Bank erosion (size approx proportional to severity)
- Sediment deposition
- Bed Degradation
- ⤴ Bed elevation (grade) controls
- ↔ Width restrictions - reduced channel capacity
- ➡ Preferential flood paths

Client	Macquarie University
Project	Geomorphological Assessment University Creek
Title	Overview of Geomorphological Condition and Sediment Dynamics of University Creek
Project No.	GEOTLCOV23810AB-AB
Figure No.	DRAWING 5

Drawn	LAE	Approved	RT	Date	27 Oct 09	Scale	As Noted	Original Size	A3
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Appendix A

Important Information about your Coffey Report

Important information about your **Coffey Report**

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.

APPENDIX E

'Macquarie University Creek Study Landscape Opportunities and Constraints; University and College Creeks' prepared by Context Landscape Design (2009)

MACQUARIE UNIVERSITY – CREEK STUDY

Landscape Opportunities and Constraints: UNIVERSITY AND COLLEGE CREEKS

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signed

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1.0 Introduction

At the request of Macquarie University Office of Major Projects, CONTEXT has undertaken a study of the existing landscape character of University and College Creek on the grounds of the campus, extending from the proposed Southern and Northern Station Precincts to Talavera Road. The creek is known as University Creek upstream of the Research Park Drive road bridge and College Creek downstream of the bridge in the vicinity of the Research Park. For the purposes of this study, the whole watercourse will be referred to as University Creek.

This study is part of a broader multidisciplinary study to identify opportunities and constraints impacting on future development of the sites in relation to stormwater management, riparian zone definition and alignment, and landscape. The outcomes of the Opportunities and Constraints Study will inform the development options for the subject sites and University and College Creeks, in line with the 2030 Vision for the Campus.

The study involved a detail analysis and assessment of the existing landscape, a review of reports prepared specialist consultants including the “Ecological Constraints Report” by Lesryk Environmental Consultants (Nov 2009) , and a visit to the campus on 30th October, 2009 with Professor Richard Clough, foundation Landscape Architect and Adviser to the campus from the late 1960s to early 1970s.

2.0 Campus Landscape Design Philosophy and History

(Based on site discussion with Prof Richard Clough, landscape consultant to the University 1968 – late 1970s, Oct 30th 2009.)

The distinctive, predominantly native landscape at Macquarie University is the result of over 40 years of continuous planting, radically transforming the site of former orchards and market gardens into a “Campus in a Park”.

The University was planned as an orthogonal grid of buildings straddled between two natural watercourses, Mars Creek and University Creek. According to University Planner, Wally Abraham, the campus was inspired by the design of Roman military camps and cities; the major north south street (*Cardo maximus*) was focused on the Library, and the major east west street (*Decumanus maximus*) is represented by the tree lined pedestrian walkway, named ‘Wally’s Walk’ after its creator.

Mars Creek, which bisects the campus, was intended to be the focus an ‘open’, picturesque valley–overlooked by the main campus buildings.

University Creek, the less ‘significant’ of the two, was intended to have a more intimate scale, lined with trees such as She oaks (*Casuarina cunninghamiana*), *Turpentine*s (*Syncarpia glomulifera*), Paperbarks (*Melaleuca sp*) and Flooded gums (*Eucalyptus grandis*)

Located some 120m from the University’s Herring Road gateway, University Creek marks the beginning of the campus’ ‘transition landscape’ zone at the gateway to the University.

Prof. Clough’s intention was to create a gradual ‘landscape journey’ from the ‘urban’ streetscapes outside the campus through the ‘transition’ campus building zone to the ‘natural landscape’ of the Mars Creek Valley and its densely planted native backdrop beyond.

To enhance the experience, the landforms to the north of University Creek were shaped during early construction, in particular, the mounds near the junction of Balaclava Road and Research Park Drive. Rock piles and mounds were also created to screen the car parks along University Avenue.

Early Planting Strategy

Over 14,000 trees and shrubs were planted by the APO ground staff throughout the campus between the late ‘60s and ‘70s, of which some 10,000 have matured (Source: *Wally Abraham, University Planner*). Rabbits, natural causes and building works were, and continue to be the main causes for tree loss.

Native plants were sourced from the Forestry Commission at Pennant Hills and planted as tube-stock over successive winters in the first decade.

As evidenced in the 1943 and 1970 aerial photos of the site, large tracts of the existing vegetation alongside University Creek had been cleared for cultivation. The 1943 photo shows a substantial stand of natural woodland (Sydney Sandstone Ridge Top Woodland) in the Station North site, and the edge of the creekline to the south west

shows a sparse stand of Eucalypts representing species from the Sydney Turpentine Ironbark Forest community (Lesryk, Nov 2009)

According to Prof. Clough, the majority of the creek plantings occurred in the late '60s and early '70s. Forest She Oaks (*Casuarina cunninghamiana*) flooded gums (*Eucalyptus grandis*) were planted principally in the cleared zone in the Station South site between the existing pedestrian bridge and Waterloo Road. These were planted 3 -5 deep on either side of the creekline.



Photograph 1: Stand of Forest She Oaks and Flooded Gums in Reach C, planted in the late 60s or early 70s.

The existing groups of trees upstream and downstream from this zone were 'reinforced' with native tubestock including Sydney Red Gum (*Angphora costata*), Paper barks, Turpentines (*Syncarpia glommulifera*) and "any other appropriate *Eucalypt* species that were available at the time from the Forestry Commission nursery" (quote: Professor Clough).

Large clumps of flax (*Phormium tenax*) growing on the creek embankment east of Research Park Drive, were transplanted to enhance the landscape setting in the core of the campus.

Diagram 1 "Landscape Plantings c. 1981" from a report on the campus origins by Wally Abrahams in 2006, illustrates the extent of existing trees, new trees and special plantings introduced to the campus in approximately the first 12 years of its establishment. There are some minor discrepancies between this plan and the 2006 EDAW report (Macquarie University Preliminary Ecological Assessment) in the extent and location of existing vegetation communities. However, the planted group of Flooded gums (*Eucalyptus grandis*) shown clearly at University Creek remain a distinctive entry statement at the gateway to the campus.

3.0 Existing Landscape Character

Macquarie University is located at the geological boundary of Hawkesbury Sandstone and the Ashfield shales of the Wianamatta Group. The gently undulating topography, remnant shale/sandstone transition forest communities (Sydney Turpentine Ironbark Forest, Sandstone Ridgetop Woodland) and occasional loose sandstone boulders in the creekline reflect this characteristic landscape typology.

The existing landscape in the vicinity of University Creek comprises open parklands and mown lawns set within rising topography on either side of the creek. Framing the creek is a backdrop of university buildings, office buildings and colleges, roadways, paths and car parks, partially screened by stands of native trees up to 15 -25m tall. The majority of the trees within this informal entry landscape have been planted - reinforcing the creekline and creating a range of landscape experiences from the more open parkland landscape in the south west to a more 'structured' landscape past Research Park Drive to the north east. A network of footpaths and timber pedestrian bridges connect the campus buildings with the Colleges and bus stop on Herring Road.

The creek parkland is a popular passive recreation area for the college students, in particular for informal ball games. The dense grove of planted She Oaks, Turpentine and Flooded Gums at the junction of Waterloo Road and Research Park Drive planted by Prof Clough have successfully established, resulting in one of the strongest landscape statements on the campus.

Remnant stands of Sydney Turpentine Ironbark Forest and Sydney Sandstone Ridgetop Woodland occur within the creek study area. These have been identified in the Landscape Constraints and Opportunities Plan (Appendix C) and are fully described in the Lesryk report.

Because of the site topography, the creek is not always visible from the roadways as it traverses the campus from south- west to north-east towards Talavera Road and the Lane Cove River beyond. Pedestrians however, are able to experience a more intimate relationship and engagement with the creek zone. This experience is compromised by the pedestrian/vehicular conflict at the junction of Waterloo Road and Research Park Drive, highlighting the need for an alternative crossing, such as an overhead bridge.

At the time of the site visit, there was a slow flowing amount of water in the creek. Although a 'natural' watercourse, the creek channel has been altered over the past 50 or so years, with culverts, stormwater inlets, constructed creek beds and banks and contributing to its current flow and flood regime. The creek zone to south east and downstream is subject to periodic flooding. This is the subject of a separate flood study by TTW Engineers.

For the purposes of this study, University Creek has been divided into a number of precincts or 'reaches' describing the landscape characteristics within each zone. The Creek precincts are consistent with Reaches A – F identified in the Coffey report, "*Geomorphological Assessment of University/College Creek, Macquarie University North Ryde, October 2009*".

Refer Appendix A Plan "Landscape Character" for accompanying photographs.

Reach A - Outside the Site in the vicinity of the Cochlear Building

- Narrow deep creek channel, with relatively steep northern embankment.
- The existing landscape backdrop of predominantly Eucalypts (Smooth – barked Apple (*Angophora costata*), Blackbutt (*Eucalyptus pilularis*), White Stringybark (*Eucalyptus globoidea*) and Turpentine (*Syncarpia glommulifera*) is generally weed infested and appears degraded in character, with little understorey. This small representative stand of remnant Sydney Turpentine ironbark Forest is considered significant (Lesryk) and could have a high level of constraint on future works within this reach. Weeds include Lantana (*Lantana camara*) Morning Glory (*Ipomoea indica*) and Native Sweet Pittosporum (*Pittosporum undulatum*)

Reach B – From Site Boundary to Pedestrian Bridge

- Moderately wider channel with remnant native species of Smooth bark Apple Forest (*Angophora costata*), Blackbutt, Turpentine and White stringybark (*Eucalyptus globoidea*) occurring closely alongside the creekline.
- Steeper embankments occur on the north side of the creek.
- The south embankment rises gently up to the Colleges – its has an open woodland character with a stand of remnant Cottonwood Poplar trees (*Populus deltoides*) turpentines, and plantings of Smooth bark apple and other Eucalypts loosely spaced within the mown lawns.
- Weed species adjacent to the creekline include Willows (*Salix babylonica*), Coral trees (*Erythrina christa-galli*) and Camphor laurels (*Cinnamomum camphora*).
- Flood prone zone.
- The existing pedestrian pathways and bridge passes through an attractive, shaded environment, although the highly engineered stone revetments and concrete culverts could be substantially softened in future creekline improvement works.

Reach C – From Pedestrian Bridge to Waterloo Road

- The creekline is defined by dense stand of She Oaks, Turpentines and Flooded Gum of uniform age and height (20-25m).
- The vegetation stand has a distinctive character – the dark trunks and canopies of the She Oaks and Turpentines are strongly contrasted with the white trunks of tall Flooded Gums grouped at the end of the row. The stand of trees is a strong entry statement and acts as an effective landscape screen to the college buildings when exiting the campus.
- The creekline has narrow channel, with degraded banks, steep embankments to the north with evidence of sandstone boulders.
- The southern bank is relatively flat, opening out through the trees to an open lawn area (large enough for informal ball games) before rising gently up to the University Colleges.
- A group of White Cedars (*Melia azedarach*) remain on the slopes (they were originally planted in a grid to shade the former poultry farm on the site.)
- Flood prone zone.
- The visual impact of the existing culvert and rock revetment adjacent to the bridge compromises the 'natural' setting.

Reach D – From Waterloo Road to Research Park Drive

- Sinuous creekline with narrow channel and dense overhead canopy of remnant Eucalypts and Turpentine.

- Rising landscape beyond, with pleasant sylvan character and attractive landscape setting for a major pedestrian route from Herring Road and the Railway to the campus.
- Landscape character peters out towards Research Park Drive, which is defined by the closer proximity of buildings, privet (*Ligustrum lucidum*) and less attractive plantings.
- Bridge and footpath now considered too narrow for the intensity of pedestrian traffic.
- Existing groups of Smooth Bark Apple, Sydney Blue Gum and Turpentine on either side of Research Park Drive have been identified as being of moderate to high significance by Lesryk, and are to be retained.
- Landscape could be impacted by future creekline stabilization and proposed overhead bridge connection or covered way from the new railway station.

Reach E – Research Park Drive

- Enclosed landscape resulting from the proximity of buildings to the north and south of the bank and mature stands of Paperbarks (*Melaleuca linariifolia*, *Melaleuca armillaris*) and native trees. A number of exotic species (willows, camphor laurel, coral trees) dating from the agricultural period remain.
- The Creek zone has a more constructed character and the creekline has been 'enhanced' with artificial bedrock channel, rock armour banks and small boulder dams.
- The quality of the rock work is inconsistent, although the overall landscape has a 'welcoming' quality and has the potential to be improved.
- The north embankment is steeper with retaining walls and terraces, and densely planted; the southern side is relatively open and level, but subject to flooding with signs of erosion caused by overland flows.

Reach F – Business Park Precinct to Talavera Road

- The landscape is characterised by open ground defined by office buildings with isolated trees, shrubs and groundcovers. At the downstream end, the right bank is defined by a sandstone block wall approximately 2.5m high.
- Sedimentation area subject to flooding, approximately 10 m wide.
- An area with very little pedestrian activity or student presence seems somewhat abandoned.
- Exposed to Talavera Road.
- Channel bedrock outcrops occur in some places.
- Major channel and landscape improvements required to alleviate flooding and improve detention capacity.

4.0 Cochlear Site Riparian Zone

A desk top review was undertaken of the proposed riparian zone landscape for the Cochlear Global Headquarters Stage 1, located upstream of the Station Precinct sites at University Creek. (Landscape Report and plans for Project Application, Cochlear Global Headquarters Stage 1, Macquarie University, prepared by Landscan, June 2008). The development was the subject of a Part 3A Planning Application to the Minister and the extent of the designated riparian zone was defined by the Department of Water and Energy (DWE) as follows:

- A designated riparian zone of 20m; and
- A 10m buffer zone.

The proposed riparian edge landscape to University Creek will include the following components:

- Riparian planting to the north bank of University Creek
- Seating and BBQ facilities for passive recreation
- Trail system of pathways to allow for a future recreation activity.

The 20m riparian zone will be planted out with indigenous riparian plants including indigenous species. Embankments (1:2 – 1:4 slopes) will be stabilized by rock boulders with plantings in between. All outlets and inlet structures to be constructed out of sandstone boulders and pebbles to provide a natural landscape character.

Proposed plantings include Smooth bark apple (*Angophora costata*), turpentine, White Stringybark (*Eucalyptus resinifera*), a shrub layer comprising *Melaleuca decora*, *Acacia longifolia* and low riparian groundcovers such as *Carex apressa*, *Isolepis nodosa* and *Themeda australis*.

The 10m wide Buffer zone will comprise of native plants and pathways to assist maintenance and pedestrian use. A seating area and BBQ facilities will be provided for staff overlooking the creek.

It is noted that the creek setting in the Station precincts, north east of the Cochlear site, is significantly different from the status quo. To this end, the ground rules for establishing the riparian and buffer zones could be different down stream, resulting in a different configuration without adversely impacting on the environmental performance, landscape character and flow regime of the creekline and its setting.

5.0 Landscape Opportunities and Constraints

The proposed Station Precinct and the 2020 University Concept Plan will have a significant impact on the campus entry and experience of University Creek. The proposed roadways, increase in building height and density on both sides of the Creek and improvements to flood mitigation will inevitably alter the scale, character and landscape of the creekline and its surrounds. It is important that the aesthetic and environmental qualities of the existing creekline setting and riparian zone are not compromised in the process.

5.1 Key Landscape Opportunities

Key landscape opportunities should focus on establishing a healthy and sustainable riparian zone which will perform effectively across all environmental and storm water management parameters, contribute to the campus entry experience, and retain as many trees as possible to protect the existing open lawn/ woodland character.

Effective riparian zones carry the following functions:

- Dissipate stream energy and assist in stormwater management;
- Trap sediment;
- Improve water quality by filtering pollutants from surface runoff;
- Act as a wildlife habitat and corridor and improve species diversity;
- Contribute nutrients from terrestrial vegetation to the aquatic food web;
- Mitigate water temperature changes.

At University Creek, the following opportunities can also augment the environmental performance and landscape character of the creekline riparian zone:

1. Form part of an attractive and memorable campus landscape arrival and departure sequence.
2. Establish a continuous canopy to provide environmental amenity, linking into the campus 'green web/ network'.
3. Provide improved passive recreation experiences for the campus population and visitors along the creekline, including retaining the open grass lawns and integration of a jogging/walking trail around the campus grounds.
4. Provide an educational and public awareness opportunity in ecological and environmental management.

5.2 Key Constraints

1. **Potential loss of vegetation and landscape character along the creekline due to flood mitigation and creek channel improvement works:**

Remnant areas of existing and planted native vegetation could be affected by the flood mitigation and creek channel improvement works. Whilst most of the vegetation is not significant and can be replaced in the longer term, the short term aesthetic character and environmental amenity could be affected.

Lesryk has also identified vegetation communities of high and moderate ecological constraint in the vicinity of the creek zone. The remnant community with the highest ecological constraint is the stand of Sydney Turpentine Ironbark Forest to the south west of the study area. This community, and individual trees identified by Lesryk should be retained.

2. Potential loss of open space for passive recreation:

If a 20m wide riparian zone, such as that for the Cochlear site, which is alienated and fully planted with riparian plants, the opportunity to provide passive recreation spaces and pathways within the 20m on both sides of the Creek will be severely compromised. Pathway connectivity could be affected further downstream where the riparian zone is less than 20m wide.

3. Design of channel, embankments, storage basin and revetments:

The design of the above will require sensitive engineering, environmental and landscape input to ensure the most 'natural', effective and attractive landscape outcome for University Creek. 'Soft' and 'bio' engineering options should be explored.

4. Cost and Maintenance:

A balance needs to be achieved between the extent of flood improvement measures and the quantum of landscaping for the riparian corridor. An Intensive riparian planting for 20m on either side of the embankments could result in extensive establishment and maintenance costs and is neither sustainable nor warranted in the current circumstances.

6.0 Conclusion

The Landscape vision for University Creek is to create an attractive and sustainable creekline corridor which will be:

- A high quality landscape and a fundamental part of the pedestrian and vehicular gateway experience to the University.
- A well designed campus passive recreation facility with a rich network of trails, seating areas and interpretive opportunities.
- A natural drainage corridor incorporating well designed flood control mechanisms.
- An ecological corridor to support and enhance the existing campus biodiversity.

Although the design of the flood management options and riparian zone dimensions are still to be finalised, the key landscape constraints and opportunities that should be incorporated in their resolution include the following:

1. Regard for the original campus design vision and early plantings along the creekline.
2. Retention of ecologically significant remnant communities of Sydney Turpentine Ironbark Forest and significant individual trees along the creek zone.
3. Provide a variety of landscape experiences along the creek, recognising the individual precinct characters A – F described in the report.
4. Retention and enhancement of the existing open woodland character and lawn areas at the entrance zone adjacent to Waterloo Road.
5. Maximise the recreation opportunities on either side of the creek.
6. Recognition of existing pathways and desire lines and update bridge crossings (existing and new).
7. Manage riparian vegetation to maintain visual permeability across the creekline.
8. Reduce visual impact of exiting culverts through engineering and planting.
9. Stabilize embankments and provide integrated design solutions to the stormwater and flood management involving 'soft' or 'bio' engineering solutions where possible.

7.0 References

W. V. Abraham, 2006 “*Macquarie at Marsfield*“, Unpublished notes by University Architect Planner 1964 -1988

Coffey Geotechnics, 2009, *Geomorphological Assessment of University/College Creek Macquarie University North Ryde*, GEOTLCOV23810 AB-AB, Oct 2009

Lesryk Environmental Consultants, Nov 2009, *Ecological Constraints Report, University and College Creeks Study, Macquarie University*

TTW, 2009, *Riparian Survey Report for Mars and University Creek Jan. 2009*

DEM, 2008, *Landscape Report for Project Application Cochlear Global Headquarters, Stage 1 University Avenue, Macquarie University Project no 4006 June 2008*

Naturally Trees Arboricultural Consulting, 2009, *Tree Audit, University Creek Catchment Area, Macquarie Park, NSW prepared for Macquarie University Oct 2009*

8.0 List of Appendices

APPENDIX A CAMPUS PLANTING STRATEGY

Source:

“Macquarie at Marsfield”, Notes by W. V. Abraham,
University Architect Planner 1964 -1988
Plan dated 1981 and reproduced 2006

APPENDIX B UNIVERSITY CREEK LANDSCAPE CHARACTER

CONTEXT Landscape Design Nov 2009

APPENDIX C

University Creek Opportunities and Constraints
CONTEXT Landscape Design Nov 2009

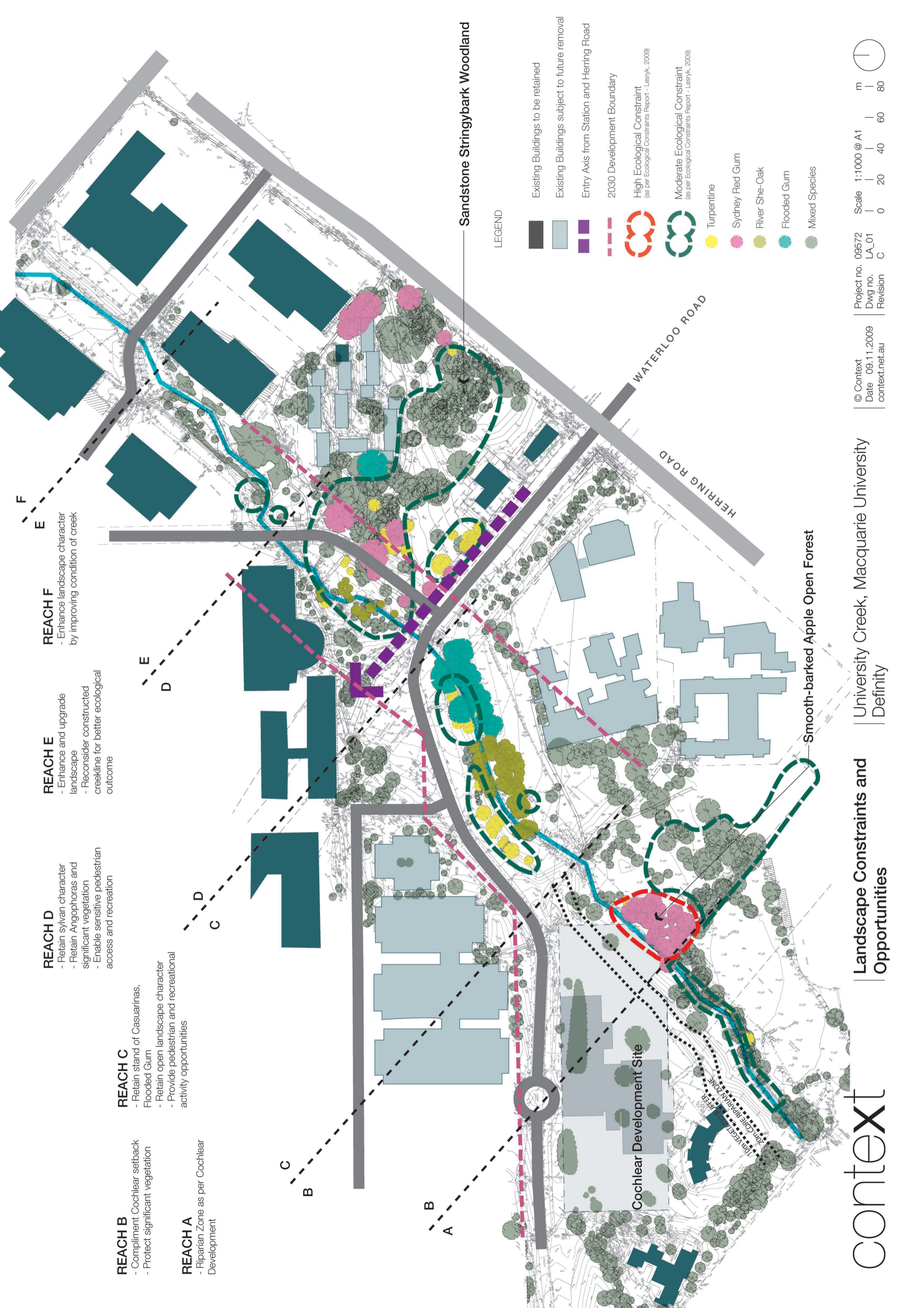
APPENDIX A
CAMPUS PLANTING STRATEGY

Source:

“Macquarie at Marsfield”, Notes by W. V. Abraham,
University Architect Planner 1964 -1988
Plan dated 1981 and reproduced 2006

APPENDIX B
UNIVERSITY CREEK LANDSCAPE CHARACTER

CONTEXT Landscape Design Nov 2009



- REACH B**
 - Complement Cochlear setback
 - Protect significant vegetation
- REACH A**
 - Riparian Zone as per Cochlear Development

- REACH C**
 - Retain stand of Casuarinas, Flooded Gum
 - Retain open landscape character
 - Provide pedestrian and recreational activity opportunities

- REACH D**
 - Retain sylvan character
 - Retain Angophoras and significant vegetation
 - Enable sensitive pedestrian access and recreation

- REACH E**
 - Enhance and upgrade landscape
 - Reconsider constructed creekline for better ecological outcome

- REACH F**
 - Enhance landscape character by improving condition of creek

LEGEND

- Existing Buildings to be retained
- Existing Buildings subject to future removal
- Entry Axis from Station and Herring Road
- 2030 Development Boundary
- High Ecological Constraint (as per Ecological Constraints Report - Leszyk, 2009)
- Moderate Ecological Constraint (as per Ecological Constraints Report - Leszyk, 2009)
- Turpentine
- Sydney Red Gum
- River She-Oak
- Flooded Gum
- Mixed Species

APPENDIX C

University Creek Opportunities and Constraints
CONTEXT Landscape Design Nov 2009